Initial Study/Proposed Mitigated Negative Declaration

Natomas Cross Canal Berm and Channel Enhancements Project

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Prepared For: Reclamation District 1001

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Contents

List of Figures

List of Tables

List of Acronyms

AFRP	Anadromous Fish Restoration Program
BACI	before-after-control-impact
BMPs	Best Management Practices
CalEEMod	California Emissions Estimator Model
CCR	California Code of Regulations
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
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
EC	Environmental Commitment
EFH	Essential Fish Habitat
EIR	Environmental Impact Report
EPA	Environmental Protection Agency
ERPP	Ecosystem Restoration Program Plan
ESA	Endangered Species Act
ESU	Evolutionarily Significant Unit
FONSI	Finding of No Significant Impact
FRAQMD	Feather River Air Quality Management District
FRRFMP	Feather River Regional Flood Management Plan
GGS	Giant Garter Snake
GHG	Greenhouse Gas
HAPC	Habitat Areas of Particular Concern
IS	Initial Study
IS/MND	Initial Study and Mitigated Negative Declaration
ISRAP	Invasive Species Risk Assessment and Planning
MBTA	Migratory Bird Treaty Act

MMRP	Mitigation Monitoring Report Program
MSA	Magnuson-Stevens Fishery Conservation and Management Act
NCC	Natomas Cross Canal
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
RD	Reclamation District
ROG	reactive organic gases
SCP	Scientific Collecting Permits
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
tpy	tons per year
USC	United States Code
USGS	United States Geological Survey
USFWS	United States Fish and Wildlife Service
VELB	Valley Elderberry Longhorn Beetle
WEF	Wildlife Exclusion Fence

1 Project Information

1.1 Project Title

Natomas Cross Canal Berm and Channel Habitat Enhancements Project

1.2 Lead Agency name and Address

Reclamation District 1001
1959 Cornelius Avenue
Rio Oso, CA 95674
(530) 656-2318

1.3 Contact Person and Phone Number

Thomas Engler, PE
District Engineer
(916) 456-4400

1.4 Project Location

The Project Action Area is on undeveloped property on the Natomas Cross Canal (NCC), about 16 miles north of the City of Sacramento, and accessible via Levee Road. The downstream end of the canal is located approximately 1 mile downstream from the confluence of the Feather and Sacramento Rivers at latitude 38°46'47.70" N, longitude 121°36'15.08" W. The survey area occurs within Section 1, Township 11 North, and Range 3 East, Mount Diablo Baseline and Meridian in the “Verona, CA” (CDPC;https://www.earthpoint.us/TownshipsCaliforniaSearchByLatLon.aspx **Figure 1**, Project Location.

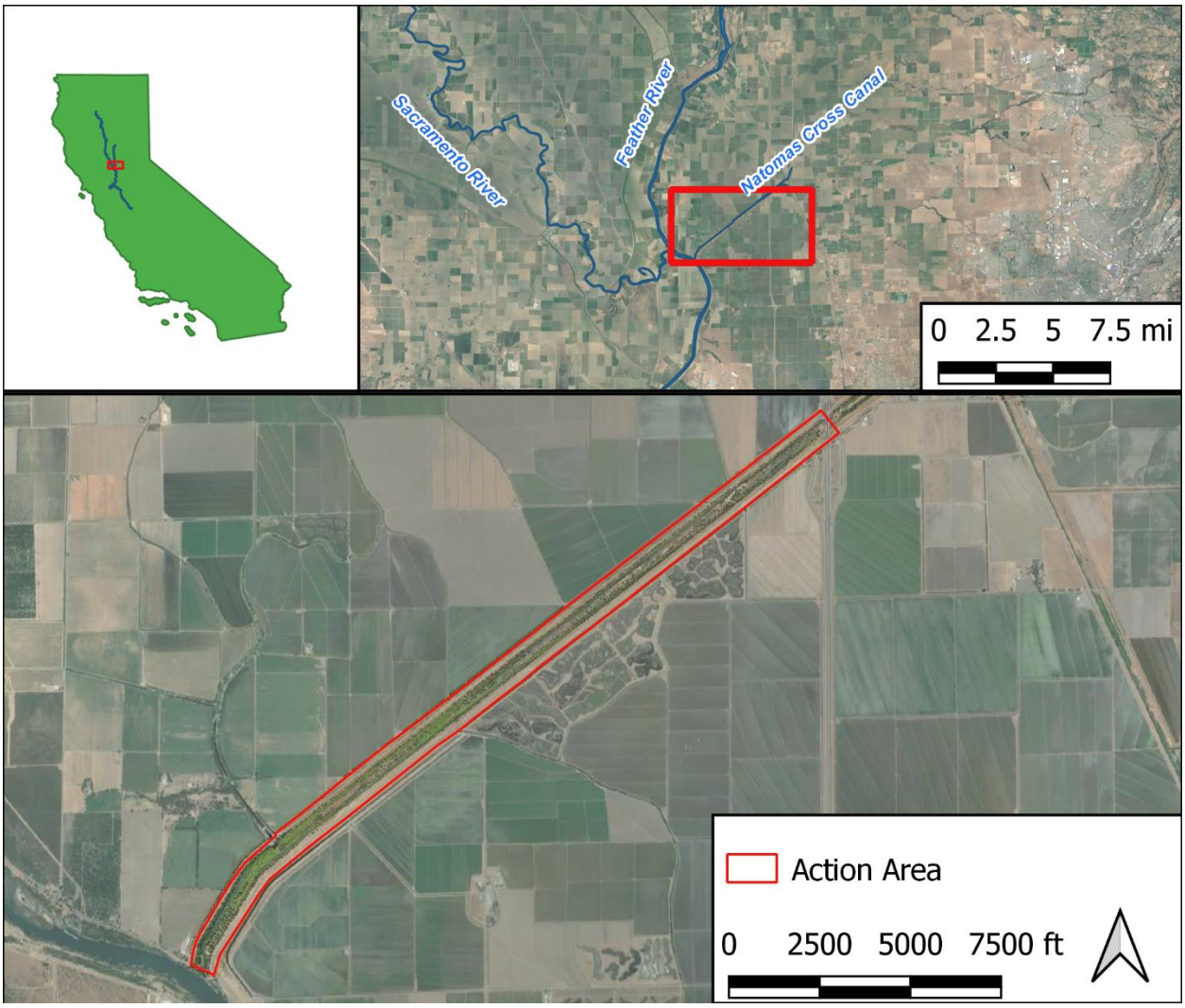


Figure 1. Project location within California (upper left panel) and in relation to the Sacramento and Feather rivers (upper right panel). The Action Area is depicted in the lower panel.

1.5 General Plan Designation

Agricultural

1.6 Zoning

General Agricultural

1.7 Description of Project

See Section 2, Project Description.

1.8 Surrounding Land Use and Setting

The NCC is a man-made flood control canal, tributary to the Sacramento River in California. The NCC is constrained by levees comprised of variable lean to fat clay and silty materials along

the north bank, which are unstable and vulnerable to wind-induced wave erosion. The Project site in the NCC generally includes the canal and the north bank levee extending from the confluence with the Sacramento River upstream for approximately 4 miles (**Figure 1**). The Project site is mostly surrounded by parcels zoned for agricultural use with parcels zoned for park and open space at the west end of the canal and within the canal (Sutter County 2008).

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

RD 1001 has consulted or will consult 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
- Central Valley Regional Water Quality Control Board
- State Lands Commission
- California Department of Fish and Wildlife
- Central Valley Flood Protection Board.

1.9.1 Federal Permits

Section 408 Permission (33 USC 408

Section 14 of the Rivers and Harbors Act of 1899, as amended, and codified in 33 USC 408 (Section 408) provides that the Secretary of the Army may, upon the recommendation of the Chief of Engineers, grant permission to other entities for the permanent or temporary alteration or use of any USACE Civil Works project. This requires a determination by the Secretary that the requested alteration is not injurious to the public interest and will not impair the usefulness of the USACE project.

The project is seeking Section 408 permission through the State Central Valley Flood Protection Board.

National Environmental Policy Act

An Environmental Assessment (EA) is being prepared pursuant to regulations implementing the National Environmental Policy Act (NEPA) (42 United States Code [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 (CWA) (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 (CVRWQCB), is responsible for issuing water quality certifications, or waivers thereof, pursuant to Section 401 of the CWA.
A Section 401 Water Quality Certification will be obtained for the Project prior to implementation.

Section 402 of the CWA (33 U.S.C. § 1341) establishes the NPDS to regulate point source discharges of pollutants into waters of the United States. A National Pollution Discharge Elimination System (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 Stormwater Pollution Prevention Plan (SWPPP) has been drafted and a NPDES permit shall be obtained for the Project prior to implementation.

Section 404 of the CWA (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 Regional General Permit 16 for the restoration of wetland and riverine habitats will be 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. Biological Opinions shall be obtained from USFWS and 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 MBTA. 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 would enhance wetlands and increase their area, and is in compliance with Executive Order 11990. The Initial Study (IS) 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 Action 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 will be 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 EFH Assessment, and compliance with the MSA 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 (NHPA) 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 NHPA.

Section 106 of the NHPA 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 (HWE 2021) and the State Historic Preservation Office (SHPO) has issued a letter of concurrence. Additional consultation will be required to satisfy requirements of Section 408 permission.

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.

An aquatic resources 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.

Endangered Species Act 4(d) Rules for Threatened Species

Section 4(d) of the ESA directs the National Oceanic Atmospheric Administration (NOAA) Fisheries to issue regulations necessary to conserve species listed as threatened. This applies particularly to "take," which can include any act that kills or injures threatened species and may include habitat modification. The ESA prohibits any take of species listed as endangered, but some take of threatened species that does not interfere with survival and recovery may be allowed. A 4(d) permit has been approved for this project and will be renewed annually.

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. CESA listed species have the potential to be affected by the Project, but communication with CDFW 8/6/2020 resulted in the decision that a Memorandum of Understanding will be obtained for this project and that a CESA incidental take permit is not required (Pers. Comm. 2020).

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

California Department of Fish and Wildlife (CDFW) 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. The Board also consults with the Army Corps of Engineers to ensure the project does not adversely affect the Federal Flood Control Project through 33 USC 408 (Section 408).

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.

Feather River Air Quality Management District
The Feather River Air Quality Management District (FRAQMD) requires A Fugitive Dust Control Plan should be submitted to the FRAQMD prior to beginning any construction work.

Scientific Collecting Permit
Fish and Game Code sections 1002, 1002.5 and 1003 authorize the CDFW to issue permits for the take or possession of wildlife, including mammals, birds and the nests and eggs thereof, reptiles, amphibians, fish, certain plants and invertebrates for scientific, educational, and propagation purposes. The Department currently implements this authority through Section 650, Title 14, California Code of Regulations (CCR), by issuing Scientific Collecting Permits (SCP) to take or possess wildlife for such purposes. And SCP has been authorized for this Project.

1.9.3 Count Permits

County Grading Permit
Sutter County requires a County Grading Permit for the following activities:
(a) Grading, filling, excavation, storage or disposal of 350 cubic yards or more of soil or earthly material; or
(b) Clearing or grubbing of one acre of land or more; or
(c) Grading, filling or storage of 50 cubic yards or more of soil or earthly material in a designated floodway; or
(d) Relocation, reshaping, re-routing, obstructing, or altering an existing watercourse.

2 Project Description

2.1 Project Background

Reclamation District 1001 (RD 1001) is proposing to design and implement the Natomas Cross Canal Berm and Channel Habitat Enhancements Project (Project), that will drastically improve flood protection through strengthening of the Natomas Cross Canal (NCC) north levee, and will enhance the aquatic and riparian habitat within the NCC channel.

The NCC is a man-made flood control feature, originally constructed in 1912, through use of a dragline excavator to excavate a canal and the placement of spoils to act as levees, offset from the channel on both sides of the canal. The NCC is intended to act as conveyance for numerous small tributaries that were intercepted by the flood control system to outflow into the Sacramento River. Four watersheds, including the Auburn Ravine, the Markham Ravine, Coon Creek and the Pleasant Grove Creek converge and flow into the Sacramento River through the NCC. These four watersheds are located north of the American River watershed and northeast of Sacramento, California. The original construction excavated and placed existing materials, predominately composed of variable lean to fat clay and silty materials, throughout the levee which are subject to shrink-swell cycles that result in decreased stability over time. These stability issues were evaluated in 1987 (Wahler Associates) and again in the California Department of Water Resources' (DWRs) Non-Urban Levee Evaluation Program (Segment 284).

In addition to embankment stability issues, the NCC north bank levee has also had historical issues with wind-induced wave erosion. This erosion results from high winds pushing waves against levee embankments, resulting in erosion of the embankment material. The NCC north bank levee experiences prevailing southern winds during storm events which pushes the wave action towards the north levee. Observations from the most recent flood fight of wind-wave erosion, which occurred during the January 2006 flood event, indicate that the areas most susceptible to damage are those lacking adequate tree cover in the channel. The riparian forest acts as a buffer to break wind-induced wave action before it reaches the north bank levee. The NCC was listed as the top priority for RD 1001 in the Feather River Regional Flood Management Plan (FRRFMP) (July 2014), due to "Potential overtopping, recurrent wave wash erosion, slumps, and cracking of the Natomas Cross Canal north levee." The highest priority project for RD 1001, as listed in the FRRFMP, was to "[r]aise, buttress, and provide erosion protection for the Natomas Cross Canal levee."

The primary purpose of the Project is to improve flood protection by strengthening the NCC north levee in areas that have not been previously repaired and enhance the aquatic and riparian habitat within the NCC channel. This effort will utilize waterside berm plantings of varietal native understory and native plant species; thus, providing a natural wind-wave buffer that will also provide shaded riverine aquatic habitat over an additional 3,600 linear feet, along the channel edge. The project will also enhance local aquatic and riparian habitat through vegetation management and grading portions of the central islands to create off-channel non-natal rearing habitat for winter-run Chinook salmon with potential ancillary benefits to other native fishes; terracing and grading the in-channel geometry, near the NCC and Sacramento River confluence; and reconfiguring downstream portions of the NCC into a more meandering channel. These habitat enhancements and channel modifications will benefit non-natal rearing habitat for juvenile salmon – particularly winter-run salmon and other commercially or recreationally important fishes (including fall-run Chinook salmon, steelhead, and green sturgeon).

In addition, the habitat enhancements and channel modifications may also provide an additional flood control conveyance and natural erosion protection feature. Fish screens will also be installed on existing intakes in the NCC to prevent fish from becoming entrained in the diversions.

The Project will support the Central Valley Protection Plan's Conservation Strategy, reduce flood risk, provide significant fish and wildlife habitat benefits, maintain the existing water quality within the NCC, and protect local agricultural and forested landscapes. These actions and benefits are also consistent with the State of California's planning priorities.

2.1.1 Anadromous Fish Restoration Program (AFRP)

The Central Valley Project Improvement Act (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 (CCV) rivers and streams. Anadromous fish include Chinook Salmon, steelhead (*Oncorhynchus mykiss*), White Sturgeon (*Acipenser transmontanus*), and Green Sturgeon (*Acipenser medirostris)*. All of these species will benefit from the Project, but the Project channel enhancement design was focused on providing non-natal rearing habitat for winter-run Chinook Salmon. 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 Sacramento River tributaries.

2.1.2 Previous Environmental documentation

The NCC was listed as the top priority for RD 1001 in the FRRFMP (July 2014), due to "Potential overtopping, recurrent wave wash erosion, slumps, and cracking of the Natomas Cross Canal north levee."

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 (CV) 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 CV (USFWS 2001).
- **CALFED Bay-Delta Program.** This cooperative state and federal effort was established to reduce conflicts in the Sacramento-San Joaquin Delta by solving problems in ecosystem and water quality, water supply reliability, and levee and channel integrity. The goal of CALFED's Ecosystem Restoration Program Plan (ERPP) is to improve and increase aquatic and terrestrial habitats and improve ecosystem functions in the Sacramento-San Joaquin Delta to support sustainable populations of diverse and valuable plant and animal species (CALFED 2000). The ERPP vision for the Sacramento 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 Chinook Salmon and steelhead, riparian vegetation, and wildlife resources, and (4) restoring more natural channel configuration to enhance gravel recruitment, transport, and cleansing processes. The NCC is directly adjacent to the lower Sacramento River and can provide many of these benefits.

- **CDFW.** Habitat rehabilitation is recommended in the Sacramento River as a fisheries management strategy in several reports, including Salmon and Steelhead Restoration and Enhancement Plan (CDFG 1990), Restoring CV Streams - A Plan for Action (1993), and Steelhead Restoration and Management Plan (CDFG 1996), and Strategic Plan for Trout Management (CDFG 2003). The NCC has potential to provide much needed seasonal salmonid rearing habitat directly adjacent to the lower Sacramento River.

2.1.3 Previous Salmonid Habitat Improvement Efforts

There is no known previous work done to improve salmonid habitat in the NCC.

2.2 Project Summary

The primary purpose of the Natomas Cross Canal Berm and Channel Habitat Enhancements Project (Project) is to improve flood protection by strengthening the Natomas Cross Canal (NCC) north levee and enhance the aquatic and riparian habitat within the NCC channel. The Project is funded by a grant from the DWR to Reclamation District 1001 through the Proposition 1 Central Valley Tributaries Program. The Project will improve flood protection by constructing a buttress along portions of the NCC levee and to plant additional riparian vegetation to act as natural wind-induced wave defense. The Project will also enhance ecosystem processes with a focus on creating non-natal rearing habitat for Sacramento River winter-run Chinook Salmon with potential ancillary benefits to other salmonids, green sturgeon, and other native flora and fauna. Select diversions in the NCC will be screened to prevent fish entrainment. The improvements will support the Central Valley Protection Plan's Conservation Strategy, while simultaneously reducing flood risk, providing significant fish and wildlife habitat benefits, and protecting local agricultural and riparian landscapes.

While the NCC is not a natural feature, natural hydrologic and fluvial processes do occur and have the potential to be optimized for both aquatic and terrestrial habitat. Tributaries to the NCC have been identified as providing important habitat for anadromous fish, including steelhead, fall-run Chinook Salmon, and other native fish species, while Auburn Ravine is designated critical habitat for CCV steelhead. The NCC is a crucial migratory corridor for these special-status fish species because it links these tributary watersheds to the mainstem Sacramento. The Project has the potential to enhance/create more than 15-20 acres of aquatic habitat for juvenile Chinook Salmon and steelhead. The Project will likely benefit other aquatic and terrestrial species that reside in the NCC, including valley elderberry longhorn beetle (VELB), giant garter snake (GGS), western pond turtle and nesting raptors.

Within the Project footprint, the NCC is virtually flat with a gradient of 0.02% and water elevations are mostly controlled by backwater from the Sacramento River. The morphology of the reach is characterized by long islands centered between the two channels adjacent to the

levee toe on each bank. These islands primarily provide terrestrial habitat because they are only inundated during very high flow events. The Project aims to lower portions of the islands, allowing areas to inundate via backwater from the Sacramento River during lower flow water years when the Fremont Weir does not overtop, providing critical non-natal rearing habitat for juvenile winter-run Chinook salmon which is very limited in the lower Sacramento River. Grading of the NCC islands will create seasonally-inundated off-channel aquatic habitat features at elevations determined to be relevant to the winter-run juvenile Chinook salmon migration life stage. The island habitat features will serve as a low velocity and shallow water refugia for juvenile Chinook salmon from the deeper channels and predatory aquatic species of the NCC.

Habitat enhancement actions would include grading and strategic riparian plantings (**Figures 2 and 3)**. Grading extents and areas were designed to increase the frequency, duration, extent, and suitability of inundated habitat during the juvenile salmonid migration period for non-natal rearing of winter run juvenile Chinook salmon. Large portions of the islands would be lowered and a network of seasonally inundated, well-connected off-channel habitat features created. The spatial extents of the grading activities were designed to target the existing high elevation areas and to minimize impacts to existing stands of vegetation. Creating connections between the new off-channel habitat and each of the two existing channels will improve connectivity.

Existing riparian vegetation stands will be preserved as much as possible. Some trees removed will be used as large wood material features which will provide a variety of geomorphic functions including scour protection, scour enhancement, sediment deposition and sorting, as well as habitat functions including structural cover. Riparian planting will be conducted in some areas, while natural recruitment will be relied upon in other areas.

Grading of the island habitat features will yield a large enough quantity of borrow to construct up to 15,000 linear feet of berm on the north levee. Riparian trees will be planted along 12,520 linear feet of the north levee toe to reduce wind erosion.

2.2.1 Project Operation and Maintenance

The Project construction will take place in NCC over a one to two-year period. Following construction, post-project monitoring will be conducted to ensure that the site was built to design standards. After construction and revegetation are complete (see Section 2.2.2 below), the site will be irrigated and maintained by RD 1001.

2.2.2 Project Construction

The Project will re-grade and enhance approximately 14.5 acres of island habitat, 1.5 acres of the NCC channel, and 15 acres of the north levee, within the Action Area (**Figures 2 and 3**). Approximately 188,000 yd^3 (144,000 m^3) of material will be excavated from the islands to create off-channel rearing habitat (**Table 1**). Approximately 211,000 yd^3 (161,321 m^3) of this material will be used to fill a portion of the southern existing NCC channel to create off-channel juvenile salmonid rearing habitat while also reducing habitat for predatory fish species (**Table 1**). The remaining excavated material will then be used for north levee enhancements or as fill for low-lying areas on the islands.

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

Feature Type	Excavation volume (yd^3)	Fill volume (yd^3)	Area (acres)	Feature Length (ft)
Off-Channel Habitat Features	188,000	11,000	16	10,280
Levee Berm	34,000	211,000	15	17,100
TOTAL	**222,000**	**222,000**	**31**	**27,380**

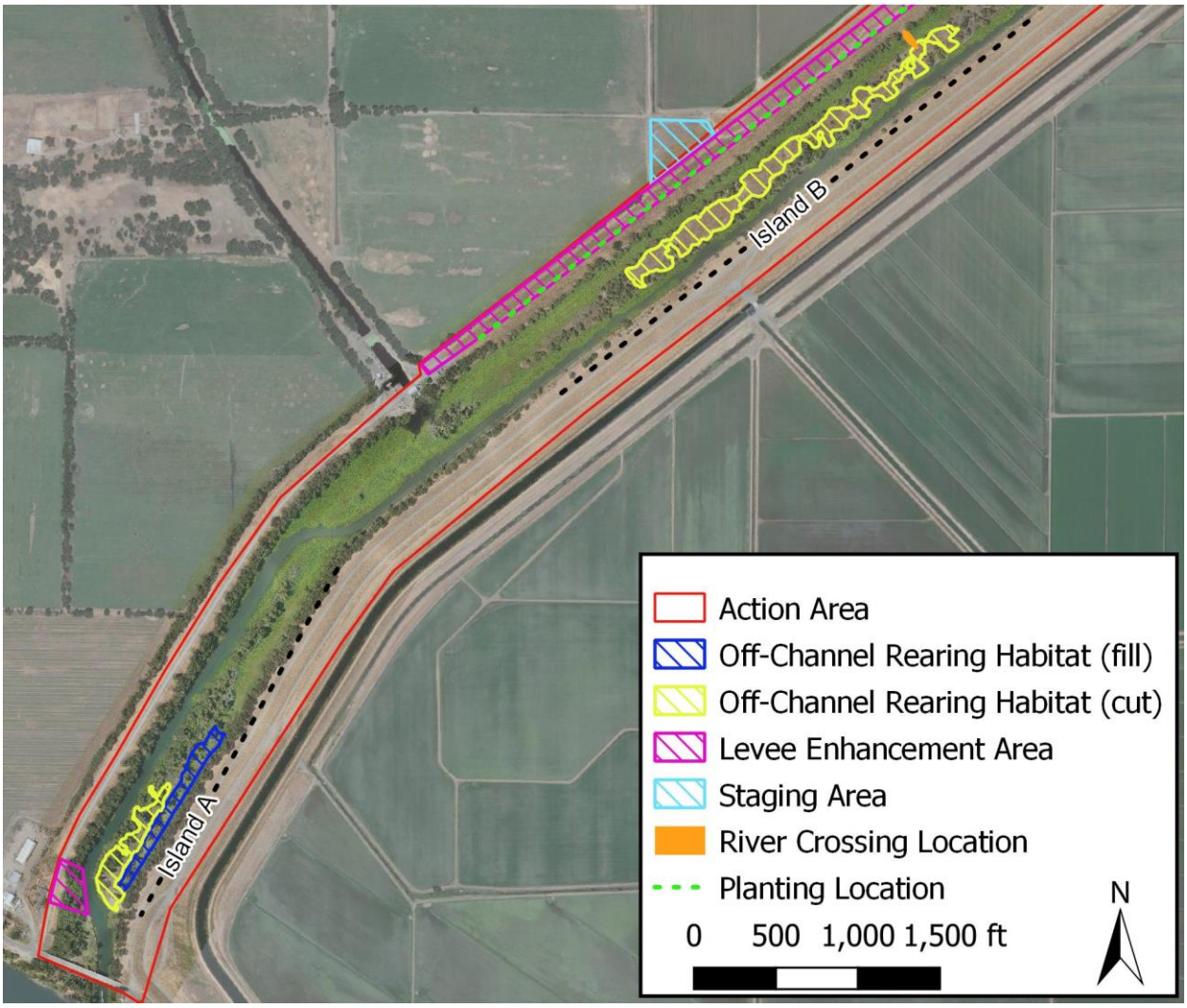


Figure 2: Project conceptual design for the downstream portion of the Project site with grading for off-channel habitat and levee improvements indicated.

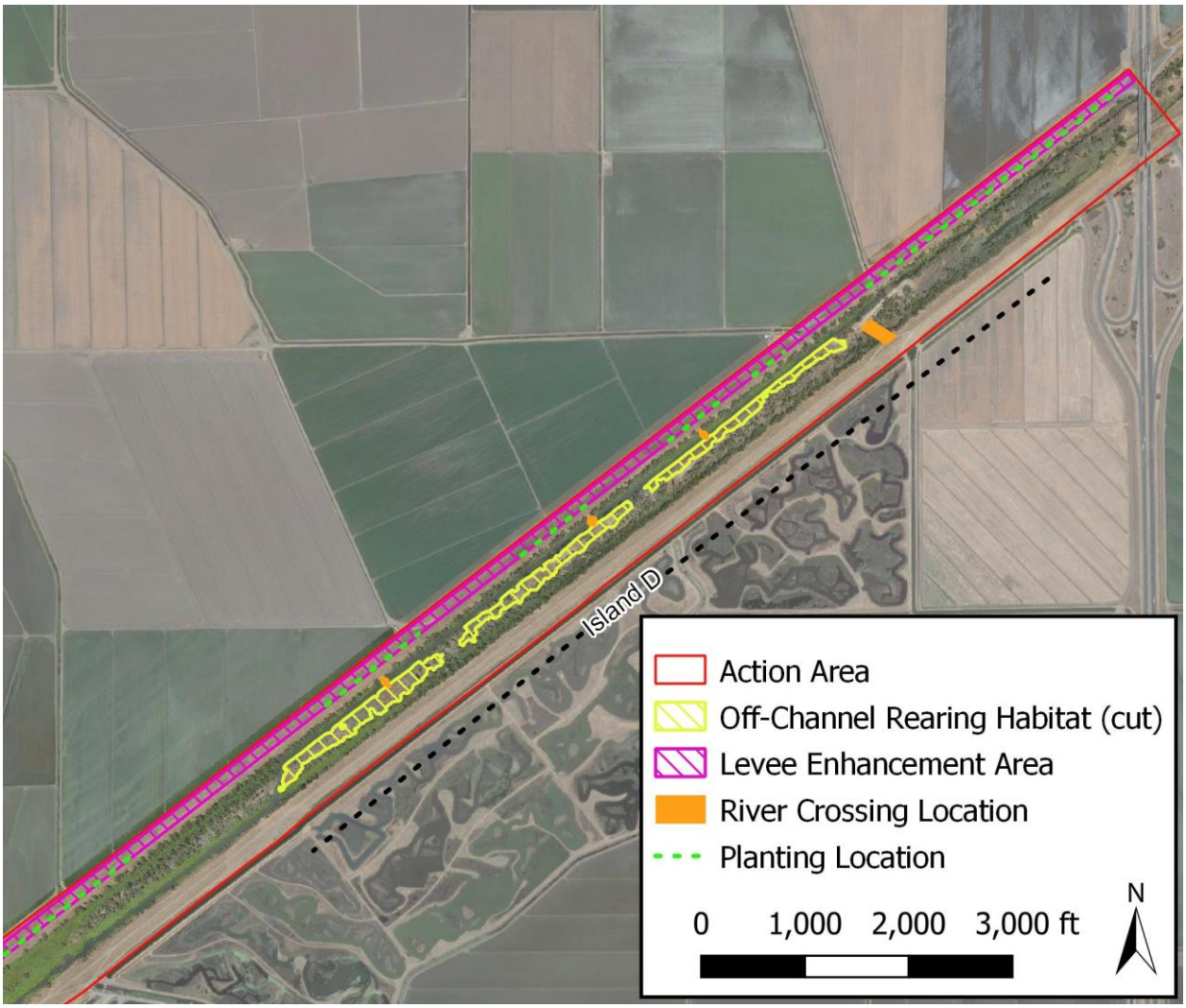


Figure 3. Project conceptual design for the upstream portion of the Project site with grading for off-channel habitat and levee enhancement areas as indicated.

Project implementation will require the operation of construction equipment which may include excavators, bulldozers, motor graders, backhoes, and articulated haul trucks. Access to the island grading areas will require that cross-over structures be built between the levees and islands for construction equipment to cross. Excavated materials will be transported and placed by heavy equipment. All listed fish species, except for CCV steelhead, are not expected to be affected as all in-water work will occur within the Management Unit 3 in-water work window, as defined by NMFS (2014; 1 June to 31 October), when these species are not expected to be present in the NCC. 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.

2.2.2.1 Staging

Staging area will be located on an easement to the north of the north bank levee near the main pumphouse, as shown in **Figure 2,** or on the north levee road. The potential staging area covers a total of 2.25 acres. Existing levee roads will be used as much as possible to access the staging and restoration activity areas. Three to four temporary roads and crossings with culverts may need to be constructed to access locations for restoration activities in the channel from existing levee roads. Temporary stream crossings would follow NMFS and CDFW guidelines for installation and removal (NMFS 2007, CDFW 2011). The potential temporary access roads cover a total of approximately 1 acre. 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

To the extent possible, 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 16 in (40.6 cm) will be protected. 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%, the reason(s) for poor survival would be evaluated and addressed, and more native vegetation would be planted. Riparian vegetation will also be planted in select areas along the toe of the north levee to reduce wind erosion.

Some of the trees removed during construction activities will be used within the created off-channel habitat as large woody material habitat elements. The trees will be strategically placed in the off-channel habitat 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 island grading 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 grading 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 as early as 16 April with in-water work starting as early as 1 June and will be completed by 31 October. No in-stream work would occur after 31 October to avoid impacting migrating Chinook salmon and CCV steelhead. Replanting would commence at the beginning of the rainy season, which generally begins in late November.

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 Environmental Commitment (EC)'s are described in specific sections and listed in the Mitigation Monitoring and Report Program (MMRP; Appendix A).

2.2.3.1 Water Quality

Construction activities would occur in the main channel of the NCC and on the islands and north bank levee. All equipment working within the river corridor would be inspected daily for fuel, lubrication, and coolant leaks; and for potential leaks (e.g., cracked hoses, loose filling caps, stripped drain plugs). 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 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 CWA 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 Action Area, including, but not limited to, watering dirt roads and construction areas to minimize dust. Construction equipment would be limited to operating from 7 am to 7 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 Action Area. Several bat species of special concern may also be present. Trees and shrubs within the Action Area may provide nesting and roosting habitat for songbirds, raptors and/or bats. Any trees that must be removed during breeding season (mid-September through January) would be examined thoroughly for nests and roosts by a qualified biologist prior to removal. If other construction activities must occur during the breeding season, 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 Mitigation Measures described below and in Appendix A for additional details.

Pre-project vegetation monitoring surveys were conducted within the Action Area in the late winter/early spring and summer of 2021 (Vaghti 2021). No special status plants were identified within the island grading areas during these vegetation surveys. If any special status plants are observed in subsequent surveys they would be avoided through use of appropriately sized buffers.

Vegetation monitoring surveys were conducted within the Project footprint in September 2020 and August 2021, and 11 elderberry plants were identified as indicated on **Figure 4**. 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.

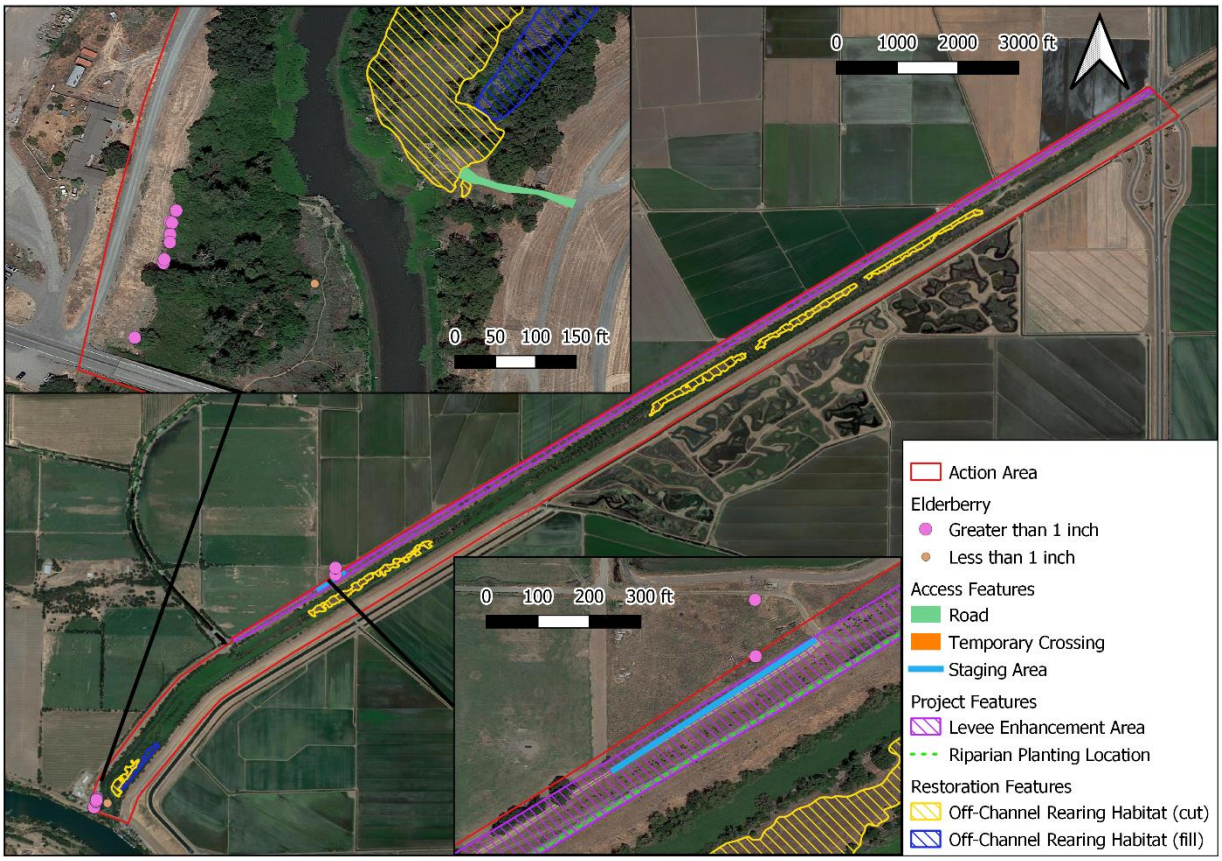


Figure 4. Location of elderberry plants relative to the Action Area and grading footprint.

2.2.3.4 Post-Construction Erosion Control Measures

Following surface grading, the Action Area would be relatively level with a very slight slope to ensure positive drainage into one of the existing NCC channels. 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.

In the levee berm area, all disturbed soils and fill areas will be track walked, covered with stockpiled topsoil from clearing and grubbing operations, hydroseeded with native grasses and a tackifier, and straw mulch would be used to cover slopes to prevent erosion.

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 that 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 Action Area to prevent disturbance. Existing native trees with a diameter of at least 16 in (40.6 cm) would be protected, to the extent possible. Native riparian tree and shrub species, such as Fremont Cottonwood, willow, and oak 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 and riparian trees having a dbh greater than three 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.
- Riparian trees (i.e., willow, cottonwood, sycamore, alder, ash, etc.) with a dbh greater than six 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.

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 recruitment and establishment 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 Action Area. Riparian trees and other wetland plants are expected to colonize newly created floodplain and secondary channels.

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, DWR, the Corps, and other NCC stakeholders, as appropriate.

The monitoring program consists of three conceptual approaches to monitoring: 1) pre-project site description, 2) implementation, and 3) effectiveness. 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. The monitoring efforts described in this plan would improve understanding of rehabilitated ecosystem function and the potential of rehabilitating off-channel rearing habitat to enhance salmonid populations within manmade streams.

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 Action Area. All monitoring data collected would be submitted for inclusion in the California Natural Diversity Database (CNDDB).

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

2.2.5 Environmental Commitments

The Project shall implement appropriate EC's 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 A).

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:** 1/20/2022
Printed Name: Kimberly D Reese	**For:** Reclamation District 1001

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 (EIR) 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 EIR, or other CEQA process, an effect has been adequately analyzed in an earlier EIR 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

3.3 California Environmental Quality Act

The CEQA Guidelines (CCR Section 15000-15387) apply only to discretionary governmental activities that are defined as "projects". A project is defined as the whole of an action that has the potential for resulting in either a direct physical change in the environment or a reasonably foreseeable indirect physical change in the environment. RD determined that the Project would not result in potentially significant impacts and has elected to prepare an initial study and mitigated negative declaration (IS/MND). Under CEQA, the purpose of an IS/MND is to provide objective information to public decision makers and the public regarding potential environmental effects of the project. RD intends to use this Final IS/MND to identify the impacts likely to result from implementation of the Project.

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 remote rural location with minimal access at the western end by motorized boats and on foot. The majority of the Action Area is not visible to persons using the main channel of the Sacramento River for recreation; primarily individuals boating past the Action Area and fishing from the bank at the confluence of the NCC and the Sacramento River, with the heaviest use occurring on weekends and holidays. The berm rehabilitation area would not be visible to persons boating down the Sacramento River or entering the western end of the NCC. The channel enhancements would generally not be visible to persons boating down the Sacramento River but will be visible to those entering the western end of the NCC. Boats have been observed as far upstream in the NCC as the grade control structure, approximately 2 miles upstream from the confluence. Boating traffic within the NCC is expected to be low and may be restricted during construction for public safety. Temporary changes in visual resources would result during the excavation, grading, and transport of material within the Action Area in this rural area of Sutter County. The Action Area is expected to re-vegetate quickly following restoration, therefore no permanent impacts to visual resources are expected. Construction activities would not occur in an area with high use by the public and therefore, potential impacts to visual resources during Project construction would be minimal. No Project activities would occur in the main channel of the Sacramento River resulting in no interference to recreational activities there. 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) There are no state scenic highways located in the Action Area, therefore **no impact** would occur.

c) During the Project, construction activities and the movement of material away from and within the Project site would only be visible in limited areas of the Garden Highway adjacent to the site and at the far western end of the NCC accessible by foot and to boaters entering and traveling up the NCC. There is currently minimal to no boating activity in the NCC so boating impacts will be minimal. Boating traffic would likely have to be restricted during construction for public safety. Construction related impacts on visual resources would be relatively short-term and temporary. Boaters entering and traveling up the NCC after Project implementation would be able to see more of the Action Area, but visual resources would change little compared to the pre-project condition. Much of the island grading would not be visible as most of the riparian vegetation along the island edges would be retained. The Project will create conditions that promote natural vegetation recruitment, so re-establishment is expected to be rapid in areas where vegetation is removed during construction. 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 activities would not create a new source of light or glare; therefore, the Project would have **no impact** on day or nighttime views.

Documentation:

None.

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 Action Area is in the CV in southeastern Sutter County. The California Department of Conservation's (CDC) Farmland Mapping and Monitoring Program designated the land within the Action Area as "Vacant and Non-Agricultural Land" (CDC 2020). Prime Farmland and Farmland of Statewide Importance is located adjacent to the Action Area but will not be impacted by the Project. Therefore, the Project would have **no impact**.

b) There is land adjacent to the Action Area enrolled in the Williamson Act (CDC 2020). However, these lands are located south of the southern levee where no construction activities will occur. Therefore, the Project would have **no impact**.

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

d) There is no forest land in the Action 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). 2020. Tool: California Important Farmland Finder. Accessed 13 October 2020. https://maps.conservation.ca.gov/DLRP/CIFF/.

CDC. 2020. Sutter County Williamson Act, GIS shapefile. Accessed 13 October 2020.Provided by Jarvis Jones at Sutter County, via email 10/13/20.

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 Feather River Air Quality Attainment Plan or Congestion Management Plan. There would be **no impact.**

b) The Project is within the FRAQMD, which is in the Sacramento Valley Air Basin. The California Air Resources Board is responsible for monitoring air quality in Sutter County. The Clean Air Act requires the Environmental Protection Agency (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 2**). The air quality in the Sacramento Valley Air Basin has been designated nonattainment by the Air Resources Board for Ozone (1-hour and 8-hour) and PM10 and by the EPA for Ozone 8-hour (**Table 2**).

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 2. Designation/classification for criteria pollutants in the Feather River Air Quality Management District based on federal and state standards (FRAQMD 2010)

Pollutant	Federal Standards	State Standards
Ozone – One Hour	No Federal Standard	Serious Nonattainment
Ozone – Eight Hour	Serious Nonattainment	Nonattainment - Transitional
PM 10	Attainment	Nonattainment
PM 2.5	Attainment	Attainment
Carbon Monoxide	No Federal Standard	Attainment
Nitrogen Dioxide	Attainment	Attainment
Sulfur Dioxide	Attainment	Attainment
Lead (Particulate)	No Federal Standard	Attainment
Hydrogen Sulfide	No Federal Standard	Unclassified
Sulfates	No Federal Standard	Attainment
Visibility Reducing Particles	No Federal Standard	Unclassified

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 island and levee grading, and operation of heavy equipment. Heavy equipment would be used to lower island areas and create/reinforce the berm. 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 may include excavators, bulldozers, motor graders, backhoes, sheepsfoot compactors, and articulated haulers; emissions estimates for the Project compared with FRAQMD emissions thresholds are summarized in **Table 3**. A water truck would be used periodically throughout the workday to reduce dust on access roads, staging areas, and active work zones (**AQ-1**). In addition, stabilized construction entrances would be used at all connections with public and paved roads to minimize dust impacts. This would result in a **less than significant impact**.

c) FRAQMD has established criteria for determining local air basin impact significance (FRAQMD 2010). For the purpose of determining significance, the District's criteria for emissions of nitrogen oxides (NO_x) and reactive organic gases (ROG) are an average of 25 lbs/day for each (not to exceed 4.5 tons/year) and PM_{10} is 80 lbs/day (**Table 3**). Project emissions that exceed the threshold limits set forth by the District are considered significant and require mitigation. FRAQMD has not established significance thresholds for construction greenhouse gas (GHG), sulfur oxides (SO_x), $PM_{2.5}$ or carbon monoxide (CO) emissions. Therefore, to evaluate these emissions for the Project under CEQA, the Sacramento Metropolitan Air Quality Management District (SMAQMD) threshold of 1,100 metric tons/year (1213 tons) of CO_{2e} and of 82 lbs/day of $PM_{2.5}$ was adopted (SMAQMD 2020). Carbon monoxide and sulfur dioxide emissions thresholds have not been established by FRAQMD so the EPA de minimis standards were used.

Table 3. The emissions estimates of criteria pollutants for the Project in tons per year (tpy) compared to the Feather River Air Quality Management District (FRAQMD) significance thresholds for construction and the EPA's *de minimis* thresholds (EPA, FRAQMD 2010).

	NO_x	ROG	PM_{10} (lbs/day)	$PM_{2.5}$ (lbs/day)	CO	SO_2
Project	1300 lbs (0.65 tons)	620 lbs (0.31 tons)	30.57 lbs/day‡ (1.72 tons)	6.71 lbs/day‡ (0.38 tons)	5.51 tons	0.01 tons
FRAQMD Threshold	25 lbs/day* x 210 days = 5,250 lbs (2.63 tons)	25 lbs/day* x 210 days = 5,250 lbs (2.63 tons)	80 lbs/day	Not Established	Not Established	Not Established
SMAQMD Threshold †				82 lbs/day		
EPA *de minimis* Threshold	50 tons/year		100 tons/year	100 tons/year	100 tons/year	100 tons/year

* multiplied by project length, not to exceed 4.5 tons/year
† SMAQMD threshold used when one has not been established by FRAQMD
‡ The maximum emissions in lbs/day during project construction

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 the following equipment (**Table 4**) entered into the SMAQMD Road Construction Emissions Model version 9.0 (SMAQMD 2018). Rehabilitation activities may potentially result in localized, short-term emissions. Emissions may include hydrocarbons, NO_x, SO_x, 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.

Table 4. Construction equipment and operating hours planned for use during Project construction.

Construction Equipment	Model	Number Used	Horsepower	Total Operating Hours
Excavator	Cat 352	2	425	1600
Bulldozer	Cat D9	1	436	800
Bulldozer	Cat D8	1	357	800
Motor Grader	Cat 14M	1	294	100
Articulated Hauler	Cat 745	6	469	4800
Compactor	Cat CP74B	2	175	1600
Water Truck	International	1	200	600

The emissions estimates for criteria pollutants are all substantially below the FRAQMD significance thresholds and implementation of **AQ-1** 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. 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 Action Area, Pleasant Grove Elementary School, is 2 miles east from the nearest area where rehabilitation activities would occur. There are four residences within 850 feet of the western project activities (grading of Island A). However, the western project activities would take approximately two weeks and the rest of the construction activities would be over 1,000 feet from all residences. The emissions estimates for criteria pollutants are substantially below significance levels so air quality impacts on sensitive receptors in the vicinity of Project activities are expected to be **less than significant**.

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. FRAQMD 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 3**). Considering the Project's limited construction season (16 April through 31 October) 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. The three closest residences to the Action Area where construction would occur are approximately 230 to 500 feet northwest from the Action Area and there is a fourth residence approximately 750 feet south. All other residences are over a 1,000 feet away from areas where heavy equipment will be used. Overall, typical of rural areas, there are a low number of residences in the immediate vicinity of the Project and the area is primarily agricultural. Diesel exhaust from rehabilitation activities would be restricted to the limited one-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 **no impact**.

Documentation:

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.

Feather River Air Quality Management District (FRAQMD). 2010. *A Technical Guide to Assess the Air Quality Impact of Land Use Projects Under the California Environmental Quality Act*. Accessed 8 February 2021. https://www.fraqmd.org/files/8c3d336a1/FINAL+version+ISR+Amendments.pdf

SMAQMD. 2018. Road Construction Emissions Model, Version 9. Available: https://www.airquality.org/Residents/CEQA-Land-Use-Planning/CEQA-Guidance-Tools

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:

AQ-1. Reduce Dust and Air Quality Impacts.
The following dust reduction measures shall be implemented during transport of materials from the borrow areas (islands) where sediment will be removed to berm construction location and secondary channels where filling is planned to occur 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 material transport 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 4 emission standards of at least 0.4 g/hp-hr 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?	☐	☐	☒	☐
e) 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 CESA as threatened or endangered (14 CCR §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 2021)

An official species list was requested for the entire Action area from the U.S. Fish and Wildlife Service (USFWS) on 31 July 2020, by accessing their database: https://ecos.fws.gov/ipac/ (Consultation Code: 08ESMF00-2020-SLI-2510). The CDFW CNDDB was queried for records of protected species within 10 miles of the Action Area (CDFW 2021). The two lists were combined to create **Table 5**.

Pre-project vegetation surveys of the Action Area were performed in 2021 (Vaghti 2021). No species listed by state and federal agencies as threatened, endangered, or a species of special concern are present in the NCC (CDFW 2021; USFWS 2021). **Table 5** lists the special status species that have the potential to occur in the Action Area (Nine quadrangles associated with Verona quadrangle) and may be affected by rehabilitation activities. This list includes fall, spring, and winter-run Chinook Salmon and CV steelhead listed in the USFWS Sacramento Endangered Species Program database (http://www.fws.gov/sacramento/es/default.htm). The in-water work window would be 1 June to 31 October as described for Management Unit 3 therefore, we assume there would be no adverse impacts to this ESU.

Table 6 lists the temporal relative abundance of special status species present at the site and **Table 7** lists the critical periods when disturbance could result in significant impacts to individuals or populations of special status species. All listed fish species, except for CCV steelhead, are not expected to be affected as the construction work will be conducted within the Management Unit 3 in-water work window, as defined by NMFS (2018; 1 June – 31 October 31), when these species are not expected to be present in the NCC (**Table 7)**.

Table 5. Federal and state special status species that may occur in the Action Area. Data compiled from the USFWS database for Sutter County (USFWS 2020) and from the CNDDB database by searching the Verona quadrangle and eight adjoining quadrangles (CDFW 2021).

Species	Status[1]	Effects[2]	Potential to occur and summary basis for ESA determination[3]
Amphibians/Reptiles			
California Tiger Salamander *Ambystoma californiense*	FT, ST	NE	Absent
Western Pond Turtle *Emys marmorata*	SSC	NLAA	Possible
California Red-legged Frog *Rana draytonii*	FT, SSC	NE	Absent
Western Spadefoot *Spea hammondii*	SSC	NLAA	Possible
Giant Garter Snake *Thamnophis gigas*	FT, ST	MA	Present
Birds			
Tri-colored Blackbird *Agelaius tricolor*	ST	MA	Possible
Long-eared Owl *Asio otus*	SSC	NLAA	Unlikely
Burrowing Owl *Athene cunicularia*	SSC	NLAA	Possible
Swainson's Hawk *Buteo swainsoni*	ST	MA	Present
Western Snowy Plover *Charadrius alexandrinus nivosus*	FT, SSC	NLAA	Unlikely
Mountain Plover *Charadrius montanus*	SSC	NLAA	Unlikely
Northern Harrier *Circus cyaneus*	SSC	NLAA	Present
Western Yellow-billed Cuckoo *Coccyzus americanus occidentalis*	FT, SE	NLAA	Unlikely
White-tailed Kite *Elanus leucurus*	SFP	NLAA	Possible
Willow Flycatcher *Empidonax traillii*	SE	NLAA	Unlikely
Merlin *Falco columbarius*	SWL	NLAA	Possible
Yellow-breasted Chat *Icteria virens*	SSC	NLAA	Unlikely
Loggerhead Shrike *Lanius ludovicianus*	SSC	MA	Present
Song Sparrow (Modesto Population) *Melospiza melodia*	SSC	NLAA	Possible
Long-billed Curlew *Numenius americanus*	SWL	NLAA	Possible
Double-crested Cormorant *Phalacrocorax auritus*	SWL	NLAA	Present
White-faced Ibis *Plegadis chihi*	SWL	NLAA	Unlikely
Purple Martin *Progne subis*	SSC	NLAA	Unlikely
Bank Swallow *Riparia riparia*	ST	NLAA	Unlikely
Yellow Warbler *Setophaga petechia*	SSC	NLAA	Unlikely
Fish			
North American Green Sturgeon *Acipenser medirostris*	FT, SSC, X	MA	Possible
White Sturgeon *Acipenser transmontanus*	SSC	NLAA	Possible
Riffle Sculpin *Cottus gulosus*	SSC	NLAA	Possible
Hardhead *Mylopharodon conocephalus*	SSC	NLAA	Possible
Delta Smelt *Hypomesus transpacificus*	FT, SE	NLAA	Absent
Sacrament Hitch *Lavinia exilicauda exilicauda*	SSC	NLAA	Unlikely
California Central Valley steelhead *Oncorhynchus mykiss*	FT, X	MA	Present

California Central Coast steelhead *Oncorhynchus mykiss*	FT	NLAA	Unlikely
Fall-run Chinook Salmon *Oncorhynchus tshawytscha*	SSC, NMFS, EFH	MA	Present
Spring-run Chinook Salmon *Oncorhynchus tshawytscha*	FT, ST, X	MA	Present
Winter-run Chinook Salmon *Oncorhynchus tshawytscha*	FE, SE, X	MA	Possible
Upper Klamath and Trinity Rivers Chinook Salmon *Oncorhynchus tshawytscha*	SSC	NLAA	Absent
Sacramento Splittail *Pogonichthys macrolepidotus*	SSC	MA	Possible
Longfin Smelt *Spirinchus thaleichthys*	ST	NE	Absent
Eulachon *Thaleichthys pacificus*	FT	NE	Absent
Invertebrates			
Conservancy Fairy Shrimp *Branchinecta conservation*	FE	NE	Absent
Vernal Pool Fairy Shrimp *Branchinecta lynchi*	FT	NE	Absent
Valley Elderberry Longhorn Beetle *Desmocerus californicus dimorphus*	FT	NLAA	Possible
Vernal Pool Tadpole Shrimp *Lepidurus packardi*	FE	NE	Absent
Mammals			
Pallid Bat *Antrozous pallidus*	SSC	NLAA	Possible
Western Red Bat *Lasiurus blossevilli*	SSC	NLAA	Possible
Plant			
Depauperate Milk-vetch *Astragalus pauperculus*	RP 4.3	NE	Absent
Alkali Milk-vetch *Astragalus tener var. tener*	RP 1B.2	NE	Absent
Brittlescale *Atriplex depressa*	RP 1B.2	NE	Absent
Valley Brodiaea *Brodiaea rosea ssp. vallicola*	RP 4.2	NE	Absent
Parry's Rough Tarplant *Centromadia parryi ssp. rudis*	RP 4.2	NE	Absent
Palmate-bracted Bird's-beak *Chloropyron palmatum*	FE, SE, RP 1B.1	NE	Absent
Dwarf Downingia *Downingia pusilla*	RP 2B.2	NE	Absent
Boggs Lake Hedge-hyssop *Gratiola heterosepala*	SE, RP 1B.2	NE	Absent
San Joaquin Spearscale *Extriplex joaquinana*	RB 1B.2	NE	Absent
Stinkbells *Fritillaria agrestis*	RP 4.2	NE	Absent
Woolly Rose-mallow *Hibiscus lasiocarpos var. occidentalis*	RP 1B.2	NE	Possible
Legenere *Legenere limosa*	RP 1B.1	NE	Absent
Heckard's Pepper-grass *Lepidium latipes var. heckardii*	RP 1B.2	NE	Absent
Cotula Navarretia *Navarretia cotulifolia*	RP 4.2	NE	Absent
California Alkali Grass *Puccinellia simplex*	RP 1B.2	NE	Absent
Sanford's Arrowhead *Sagittaria sanfordii*	RP 1B.2	NE	Unlikely
Suisun Marsh Aster *Symphyotrichum lentum*	RP 1B.2	NE	Unlikely
Saline Clover *Trifolium hydrophilum*	RP 1B.2	NE	Absent

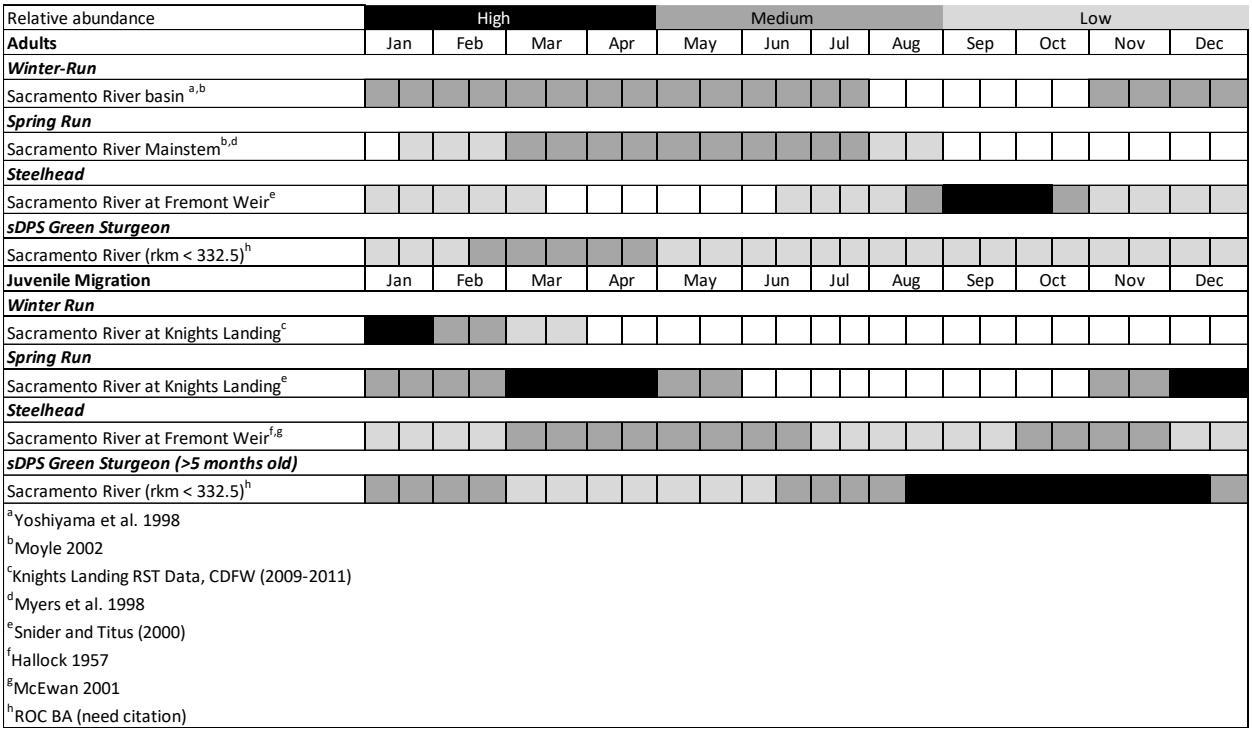
1 Status = Status of state and federally protected species protected under the ESA.
SE: Listed as State Endangered

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. Temporal relative abundance of special status species.



[a] Yoshiyama et al. 1998
[b] Moyle 2002
[c] Knights Landing RST Data, CDFW (2009-2011)
[d] Myers et al. 1998
[e] Snider and Titus (2000)
[f] Hallock 1957
[g] McEwan 2001
[h] ROC BA (need citation)

Table 7. 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
Spring-run Chinook Salmon	September through June
Winter-run Chinook Salmon	September through March
California Central Valley steelhead	December through May
Riffle Sculpin	February through April
Hardhead	April through May
North American Green Sturgeon	February through July
Swainson's Hawk	March through August
White-tailed Kite	February through October
Western Pond Turtle	March through July
Valley Elderberry Longhorn Beetle	November through June
Western Red Bat	May through August
Giant Gartersnake	October through May

Special Status Plants

Pre-project monitoring was conducted within the Action Area in 202117 (Vaghti 2021. No special status plant species were observed within the Action Area during these surveys (Vaghti 2021); however, the special status plant species listed below have the potential to occur in the Action Area.

Depauperate Milk-vetch *Astragalus pauperculus*

Depauperate Milk-vetch is a finely strigose annual herb in the pea family (Fabaceae) and is endemic to California. Its habitats include chaparral, cismontane woodland, and valley and foothill grasslands (CNPS 2021). It is typically under 1 cm tall and blooms small (5-10 mm) purple flowers between March and May (Jepson Flora Project 2021). It prefers vernally mesic and volcanic soils. It has not been documented in the Verona quadrangle, however it has been documented in the adjacent Gray Bend quadrangle (CNPS 2021). The Action Area does not contain suitable habitat, so it is likely absent.

Alkali Milk-vetch *Astragalus tener var. tener*

Alkali Milk-vetch is an annual herb in the pea family (Fabaceae) and is endemic to California. It prefers alkaline soils and grows in playa, valley and foothill grassland, and vernal pool habitat (CNPS 2021). It grows between 4 to 30 cm tall with 2-9 cm long leaves containing 7-17 leaflets (Jasper Flora Project 2021). It has not been documented in the Verona quadrangle, however it has been documented in the adjacent Gray Bend quadrangle (CNPS 2021). The Action Area does not contain suitable habitat, so it is likely absent from the project site.

Brittlescale *Atriplex depressa*
Brittlescale is a decumbent annual herb in the goosefoot family (Chenopodiaceae) and is endemic to California. Its habitats include chenopod scrub, meadows and seeps, playas, valley and foothill grassland, and vernal pools. It prefers alkaline, clay soils (CNPS 2021). It has a reddish, scaley stem with generally opposite, white-scaley, ovate to cordate leaves (Jasper Flora Project 2021). It has not been documented in the Verona quadrangle, however it has been documented in the adjacent Grays Bend quadrangle (CNPS 2021). The Action Area does not contain suitable habitat, so it is likely absent from the project site.

Valley Brodiaea *Brodiaea rosea ssp. vallicola*
Valley Brodiaea is a perennial bulbiferous herb in the brodiaea family (Themidaceae) that is endemic to California. It prefers silty, sandy, and gravelly loam soil, including old alluvial terraces. It grows in valley and foothill grasslands and vernal pools (CNPS 2021). It grows bright purple flowers between April and June (Jasper Flora Project 2021). It has not been documented in the Verona quadrangle; however, it has been documented in the adjacent Rio Linda and Pleasant Grove quadrangles (CNPS 2021). The Action Area does not contain suitable habitat, so it is likely absent from the project site.

Parry's Rough Tarplant *Centromadia parryi ssp. rudis*
Parry's Rough Tarplant is an annual forbe in the aster family (Asteraceae) and is endemic to California. It occurs in alkaline, vernally mesic, seeps, vernal pools and valley and foothill grasslands. It is occasionally found along roadsides (CNPS 2021). It has coarsely hairy leaves and yellow inflorescences, flowering between June and October (Jasper Flora Project 2021). It has not been documented in the Verona quadrangle; however, it has been documented in the adjacent Taylor Monument, Grays Bend, and Sutter Causeway quadrangles (CNPS 2021). The Action Area does not contain suitable habitat, so it is likely absent from the project site.

Palmate-bracted Bird's-beak *Chloropyron palmatum*
Palmate-bracted Bird's-beak, also known as Palmate Salty Bird's-beak, is a hemiparasitic, annual herb in the broomrape family (Orobanchaceae) and is endemic to California. It occurs in alkaline soils in chenopod scrub and grassland habitats (CNPS 2021). It grows 10-30 cm tall, with a gray-green, soft hairy stem, oblong leaves, and pale lavender flowers (Jasper Flora Project 2021). It has not been documented in the Verona quadrangle, however it has been documented in the adjacent Gray Bend quadrangle (CNPS 2021). The Action Area does not contain suitable habitat, so it is likely absent from the project site.

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 2021). 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 2021). There are no documented occurrences of the species in the Verona quadrangle, however it has been documented in the adjacent Pleasant Grove, Sheriden, and Rio

Linda quadrangles (CNPS 2021). The Action Area does not contain suitable habitat, so it is likely absent from the project site.

Boggs Lake Hedge-hyssop *Gratiola heterosepala*
Boggs Lake Hedge-hyssop is an erect annual herb in the plantain family (Plantaginaceae) that is native to California. It occurs in clay soils in mashes, swamps, and vernal pools and is found in Fresno, Lake, Lassen, Madera, Mendocino, Merced, Modoc, Placer, Sacramento, Shasta, Siskiyou, San Joaquin, Solano, Sonoma, and Tehama counties (CNPS 2021). It grows 2-10 cm tall, with proximal lance-linear leaves, and small, white, cup-like flowers. (Jasper Flora Project 2021). There are no documented occurrences of the species in the Verona quadrangle, however it has been documented in the adjacent Pleasant Grove quadrangle (CNPS 2021). It is likely absent from the project site, as there is no vernal pool or marsh habitat within the Action Area.

San Joaquin Spearscale *Extriplex joaquinana*
San Joaquin Spearscale is an annual herb in the goosefoot family (Chenopodiaceae) that is endemic to California. It occurs in alkaline soils in chenopod scrub, meadows and seeps, playas, and grasslands. It is found in Alameda, Contra Costa, Colusa, Fresno, Glenn, Merced, Monterey, Napa, San Benito, Santa Clara, San Joaquin, San Luis Obispo, Solano, Tulare, and Yolo counties (CNPS 2021). It can grow up to a meter tall and has irregularly wavy, tapered leaves (Jasper Flora Project 2021). It has not been documented in the Verona quadrangle; however, it has been documented in the adjacent Grays Bend quadrangle (CNPS 2021). The Action Area does not contain suitable habitat, so it is likely absent from the project site.

Stinkbells *Fritillaria agrestis*
Stinkbells are a perennial bulbiferous herb in the lily family (Liliaceae) and are endemic to California. The species grows in clay and serpentine soils in chaparral, valley grassland, foothill woodland, and wetland 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 2021). 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 2021). There are no documented occurrences of the species in the Verona quadrangle, however it has been documented in the adjacent Rio Linda quadrangle (CNPS 2021). The Action Area does not contain suitable habitat, so it is likely absent from the project site.

Woolly Rose-mallow *Hibiscus lasiocarpos var. occidentalis*
Woolly Rose-mallow is a perennial rhizomatous herb in the mallow family (Malvaceae) that is endemic to California. It often grows in riprap on the sides of levees and in freshwater marshes and swamps and is found in Butte, Contra Costa, Colusa, Glenn, Sacramento, San Joaquin, Solano, Sutter, and Yolo counties (CNPS 2021). It has cordate, shallowly lobed leaves and a 2.5-3 cm white, bell-shaped flower with a red center (Jasper Flora Project 2021). There are documented occurrences in the Verona quadrangle, as well as the adjacent Grays Bend, Knights Landing, and Sutter Causeway quadrangles (CNPS 2021). It is possible for it to occur at the project site as levees are present along the north side of the NCC. However, the species was not observed during the 2021 pre-project special status plant surveys.

Legenere *Legenere limosa*
Legenere is an annual herb in the bellflower family (Campanulaceae) that is endemic to California. It grows in vernal pools and is found in Alameda, Lake, Monterey, Napa, Placer, Sacramento, Santa Clara, Shasta, San Joaquin, San Mateo, Solano, Sonoma, Stanislaus, Tehama, and Yuba counties (CNPS 2021). It has a reclining, branching stem, 10-30 cm long with narrowly triangular leaves and small, white flowers (Jasper Flora Project 2021). There are no documented occurrences of the species in the Verona quadrangle, however it has been documented in the adjacent Rio Linda quadrangle (CNPS 2021). There are no vernal pools present at the project site, so it is likely absent.

Heckard's Pepper-grass *Lepidium latipes var. heckardii*
Heckard's Pepper-grass is an annual herb in the mustard family (Brassicaceae) that is endemic to California. It grows in alkaline flats in valley and foothill grasslands below 700 m elevation and is found in Glenn, Merced, Sacramento, Solano, and Yolo counties (CNPS 2021). It grows from 2 to 15 cm tall and has basal leaves (Jasper Flora Project 2021). There are no documented occurrences of the species in the Verona quadrangle, however it has been documented in the adjacent Grays Bend quadrangle (CNPS 2021). It likely absent from the project site since the site contains no grassland habitat.

Cotula Navarretia *Navarretia cotulifolia*
Cotula Navarretia is an erect annual herb in the phlox family (Polemoniaceae) that is endemic to California. It grows in adobe soils in chaparral, foothill woodlands, and grasslands. It is found in Alameda, Butte, Contra Costa, Colusa, Glenn, Lake, Mendocino, Marin, Napa, San Benito, Santa Clara, Solano, Sonoma, Sutter, and Yolo counties (CNPS 2021). It grows up to 30 cm tall and has a branching green or red stem with clustered hairy needlelike leaves (Jasper Flora Project 2021). There are no documented occurrences of the species in the Verona quadrangle, however it has been documented in the adjacent Grays Bend quadrangle (CDFW 2021). The project site does not contain adobe clay soils, so is likely absent.

California Alkali Grass *Puccinellia simplex*
California Alkali Grass is an annual herb in the grass family (Poaceae) that is native to California. It prefers alkaline and vernally mesic soils in sinks, flats, and lake margins. It grows in chenopod scrub, meadows, seeps, grasslands, and vernal pools, as well as saline flats and mineral springs. It is found in Alameda, Butte, Contra Costa, Colusa, Fresno, Glenn, Kern, Lake, Los Angeles, Madera, Merced, Napa, San Bernardino, Santa Clara, Santa Cruz, San Luis Obispo, Solano, Stanislaus, Tulare, and Yolo counties (CNPS 2021). There are no documented occurrences of the species in the Verona quadrangle, however it has been documented in the adjacent Grays Bend quadrangle (CDFW 2021). The project site does not contain alkaline soils, so is likely absent.

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 CV (CNPS 2018). Sanford’s arrowhead has not been documented in the Verona quadrangle but is

documented in the Rio Linda and Nicolaus adjacent quadrangles (CDFW 2021). The Action Area only contains marsh habitat on the south side of the NCC, where project activities will not occur. It is not likely to be present because it is very rare in the CV and has never been observed in the Verona quadrangle.

Suisun Marsh Aster *Symphyotrichum lentum*
Suisun Marsh Aster is a perennial rhizomatous herb from the sunflower family (Asteraceae) that is endemic to California. It grows in marshes and swamps and is found in Contra Costa, Napa, Sacramento, San Joaquin, Solano, and Yolo counties (CNPS 2021). It grows from 40 to 150 cm tall with narrow, basal leaves and purple flowers (Jasper Flora Project 2021). There are no documented occurrences of the species in the Verona quadrangle, however it has been documented in the adjacent Knights Landing quadrangle (CDFW 2021). The Action Area only contains marsh habitat on the south side of the NCC, where project activities will not occur.

Saline Clover *Trifolium hydrophilum*
Saline Clover is an annual herb in the pea family (Fabaceae) that is endemic to California. It grows in mesic and alkaline soils in mashes, swamps, grasslands, and vernal pools. It is found in Alameda, Contra Costa, Lake, Monterey, Napa, Sacramento, San Benito, Santa Clara, Santa Cruz, San Joaquin, San Luis Obispo, San Mateo, Solano, Sonoma, and Yolo counties (CNPS 2021). There are no documented occurrences of the species in the Verona quadrangle, however it has been documented in the adjacent Grays Bend quadrangle (CDFW 2021). The project site does not contain Saline Clover habitat, so is likely absent.

No special-status plant species were observed at the Action Area during 2021 pre-project field vegetation surveys. If special status plants are discovered, mitigation measure **BIO-1** would be implemented to avoid or minimize impacts to specials status plant species. Therefore, the impact to special status plant species would be **less than significant** with implementation of mitigation measure **BIO-1**.

Special Status Wildlife Species
The Action Area consists of heavily impacted riparian areas. There is residual riparian habitat in the Action 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 Action 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 CV, 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 Verona quadrangle but is documented in the adjacent Sheridan quadrangle (CDFW 2021). This species is not likely to occur within or adjacent to the Action Area as it dependent upon short grass vernal pool landscapes which is absent from within or directly adjacent to the Action 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 CV 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 2006). 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 75ºF (Helm 1998) or when water temperatures drop below 40ºF (Eriksen and Belk 1999). The Vernal pool Fairy Shrimp feeds on algae, bacteria, protozoa, rotifers, and bits of detritus (USFWS 2006). It is documented in the Verona quadrangle and three adjacent quadrangles: Rio Linda, Sheridan, and Pleasant Grove (CDFW 2018). This species is not likely to occur within or adjacent to the Action 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 CV around Redding to the south CV 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

has been documented to occur in the Verona quadrangle and five adjacent quadrangles: Nicolaus, Sheridan, Pleasant Grove, Rio Linda, and Grays Bend (CDFW 2021). Because this species only occurs in short grass vernal pool landscapes, it is unlikely that this species occurs within the Action Area.

Valley Elderberry Longhorn Beetle *Desmocerus californicus dimorphus*
The 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 CV, 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 8 elderberry plants with stem diameter at ground level greater than 1 inch and one with stem diameter less than 1 inch present within the Project Boundary (**Figure 4**) and some could potentially be occupied by the VELB (**Figure 4**). Consultation occurred with the USFWS for impacts to the VELB and USFWS subsequently issued a concurrence letter for the Project.

To minimize adverse Action 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 **(BIO-2**). The majority of the 8 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 **BIO-2** 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 Action Area to be disturbed. The range of the California Tiger Salamander does not overlap with the Action 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. The range of the California Red-Legged Frog does not overlap with the Action Area, and it has not been documented in the surrounding areas.

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 (United States Geological Survey [USGS] 2004). The toad is nocturnal and is most 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 Action Area is within the current range of the Western Spadefoot Toad but does not contain suitable habitat (Gogol-Prokurat 2016), therefore it is likely absent.

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 carapace 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 CV 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 Western Pond Turtle has been documented in the Verona quadrangle and seven adjacent quadrangles: Taylor Monument, Rio Linda, Knights Lands, Nicolaus, Sutter Causeway, Grays Bend, and Pleasant Grove.

The Action 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 **BIO-3** would reduce impacts to Western Pond turtle to **less than significant**.

Giant Garter Snake *Thamnophis gigas*

The Giant Garter Snake (GGS) is both a federally (USFWS 1993) and state threatened species (Fisher et al. 1994). A final GGS recovery plan was completed in 2017 (USFWS 2017). Critical habitat has not been designated for GGS. Wood et al. (2015) found levels of inbreeding and evidence of population bottlenecks in about half of populations sampled. The GGS 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. In the Sacramento Valley, GGS often have distinct stripes and a dark ground color. The underside is light brown or light grayish.

The GGS will move into underground mammal burrows, crevices, or other voids in the earth around October 1 to avoid potentially lethal fall and winter temperatures (USFWS 2017). GGS may emerge temporarily during fall/winter warm periods to bask and/or forage. GGS begin emerging from their winter refuges (hibernacula) around April 1 but may be earlier or later depending on annual weather and location. After emerging, GGS immediately begin foraging for food with activity peaking during April and May and then reducing during mid- to late-summer months. April (or as soon as they emerge) through May are believed to be the mating season (USFWS 2017). Birth takes place in summer to early fall with a litter size that averages between 17 and 23 young which are born fully developed. Male GGS are believed to reach sexual maturity at an average of 3 years and females at an average of 5 years (USFWS 2017). During the active season (April through September), GGS spend greater than 50% of their time on land (but within 10 m of water) basking or using cover such as mammal burrows (Halstead et al. 2015).

This species is endemic to California and historically was found throughout the CV except for the far northern end. Currently, GGS ranges from Butte 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 (Halstead et al. 2021). Historically, GGS occupied the extensive freshwater marshes and shallow lakes found throughout the Central Valley. Marshes contained predominantly emergent vegetation comprised of bulrushes (*Schoenoplectus acutus*) and cattails (*Typha* spp.; Halstead et al. 2021). With loss of 93% of historical Central Valley wetlands, the GGS is currently found in small, isolated patches of remnant marsh habitat and highly modified agricultural wetlands (Wood et al. 2015). Currently, most remaining populations of GGS in the Sacramento Valley are associated with rice farms where the canals, drains, and flooded fields provide surrogate marsh-like habitat (Halstead et al. 2010). The USFWS (2017) identified the following three habitat components as the most important for GGS: 1) a freshwater aquatic component with protective emergent vegetative cover that will allow foraging; 2) an upland component near the aquatic habitat that can be used for thermoregulation and for summer shelter in borrows; and 3) an upland refugia component that will serve as winter hibernacula.

The GGS preys on a variety of native and non-native fish and amphibians. However, despite an abundance of non-native prey, GGS retains a preference for native frogs and toads and will generally prey on frogs and toads over introduced fishes (Halstead et al. 2021, Ersan et al. 2020). A wide variety of species prey on GGS particularly adult bullfrogs (*Lithobates catesbeianus*), raptors, river otters (*Lontra canadensis*), mink (*Neovision vision*), wading birds, and large centrarchid fishes (Halstead et al. 2021).

The Natomas Basin supports a key population of GGS with documented occurrences in locations near the NCC to both the north and south (USFWS 2020). The rice fields, ditches, and ponds adjacent to the Action Area provide suitable habitat. Habitat within the NCC itself is less suitable due to generally thick riparian vegetation along the channel edges and islands (**Figures 2 and 3**) low abundance of tules and cattails, and presence of predators including bullfrogs and largemouth bass. Project construction activities have the potential to adversely impact GGS and its habitat. The Project construction activities have the potential to cause harassment, injury, or mortality to GGS. The potentially adverse effects expected during Project construction activities would result from removal and/or temporary disturbance of aquatic and upland habitat, temporary increases in vehicle traffic, turbidity, noise, and vibration, and potential hazardous chemical spills.

Operation of construction equipment during project implementation has the potential to cause injury or mortality through crushing or burial, particularly if GGS are present in burrows or other soil voids and not visible. Operation of construction equipment would also create noise and vibration which could result in harassment of GGS and may cause them to leave suitable habitat and move into unfamiliar or marginal habitat. Worker vehicle traffic to Project locations would increase temporarily during implementation. This could increase the chance of a vehicle encounter with a GGS leading to injury or mortality from crushing.

Island grading and berm construction could temporarily disturb GGS habitat. The islands are in the NCC and considered less suitable GGS habitat due to thick riparian vegetation along their edges, low abundance of tules and cattails, and presence of predators including bass. The berm construction would occur adjacent to a large section of drain ditch which is north of the toe of the NCC north levee (**Figures 2 and 3**). This drain ditch is suitable GGS habitat, it contains water during the rice growing season and has emergent vegetation including tules and cattails. The upland area to the south of the drain, including the levee toe, likely serves as basking and dispersal being comprised of annual grassland maintained by RD 1001 (**Figures 2 and 3**). Berm construction would disturb the levee toe through excavation, soil placement and compacting, and heavy equipment operation.

BIO-4 would be implemented to reduce potential impacts to GGS during Project implementation. Within 24 hours prior to start of construction activities, the Action Area would be surveyed for GGS. The GGS survey would be repeated if there is a lapse in construction activity of two weeks or greater. The surveys would be performed by a GGS biologist, defined as a biologist with GGS experience and pre-approved by USFWS and CDFW to perform surveys for the species.

Before any construction begins, personnel would receive worker environmental awareness training provided by a USFWS and CDFW approved biologist. The training would instruct workers to recognize GGS and their habitat and discuss the protection measures to be implemented during construction.

GGS wildlife exclusion fencing (WEF) would be installed along the project boundary that is adjacent to or within GGS habitat prior to any other construction activities or staging of equipment to prevent GGS from entering the Action Area during construction. The WEF specifications are the following:

- WEF would consist of taut silt fencing supported by wooden stakes or rebar on the Project side only.
- WEF would be buried at least 6 inches below ground and extend 12 to 18 inches above ground. Soil would be compacted against the fence for its entire length to prevent special status species from going under the fence.
- The WEF would be inspected daily by the contractor to ensure that there are no holes or tears, the bottom is buried, and it remains taut. The contractor would maintain and repair the WEF as necessary for the duration of construction. The GGS biologist would also periodically inspect the GGS WEF to ensure it is properly functioning.
- After WEF installation is completed, the Action Area enclosed by WEF would be surveyed by the GGS biologist. If any GGS are found, they will be relocated by a GGS biologist with a 10(a)(1)(A) recovery permit to an area with suitable habitat that is outside the exclusion area, but adjacent to, the Action Aarea. If any GGS are found in the exclusion area at any other time they will be similarly relocated by a GGS biologist with a 10(a)(1)(A) recovery permit.

Movement of heavy equipment will be confined to existing roadways, designated staging areas, and already disturbed areas, as possible, to minimize habitat disturbance. Project related vehicles would observe a 15 mile-per-hour speed limit within the Action Area. All equipment, vehicles, and supplies would be stored at the designated staging areas at the end of each workday. To eliminate attraction of GGS predators, all food-related trash items will be disposed of in closed containers, which would be removed daily from the Action Area.

Construction activity within 200 feet of potential GGS habitat would be conducted between May 1 and October 1.

A GGS biologist would be present during all initial ground disturbance activities including excavation, grading, and fill placement.

Clearing and grubbing will be confined to the minimal area necessary to perform construction activities. Avoided GGS habitat will be designated as Environmentally Sensitive Areas within and adjacent to the Action Area. The designated Environmentally Sensitive Areas will be fenced with WEF and orange plastic construction fencing on Project side to ensure avoidance by all construction equipment and personnel.

If a snake is encountered during construction, activities within 100 feet of the snake shall cease until the snake leaves the active construction area on its own or the GGS biologist determines the snake is not a GGS. No snakes would be intentionally killed, harmed, or harassed during Project implementation and they would be allowed to volitionally leave the active construction area. If a snake is observed retreating underground or is stationary in the active construction area, all construction activity within 100 feet of the location would cease. If a possible GGS goes

underground, the GGS biologist would be contacted and respond to the situation in coordination with USFWS and CDFW. Only a GGS biologist with 10(a)(1)(A) recovery permit would handle GGS and only as a last resort.

To prevent entrapment of GGS, escape ramps would be placed at both ends of open excavations at the end of each workday to allow any GGS to escape overnight. The escape ramps would be comprised of dirt fill, or wood or other suitable material planking. Any steep sided excavations, such as trenches, would be inspected by the GGS biologist prior to filling. If a trapped GGS is discovered, then the GGS biologist with 10(a)(1)(A) recovery permit would respond in coordination with USFWS and CDFW.

No dewatering of habitat is expected to occur.

To minimize sediment from entering GGS habitat, all BMPs and erosion control measures in the SWPPP and on Project design plans would be implemented and contractually required by the contractor. Weekly BMP inspections would occur to ensure that the BMPs are being implemented as intended.

After completion of construction activities, all temporary fill and construction debris would be removed and disturbed areas restored to pre-project conditions, if feasible. Restoration work would include replanting species removed from banks or replanting emergent vegetation in the active channel. Emergent plants which may be planted would include California bulrush (*Scirpus californicus*), cattail, water primrose (*Ludwigia peploides*), common tule (*Scirpus acutus*), Baltic rush (*Juncus balticus*), or duckweed (*Lemna* spp.). Disturbed upland areas, such as levee slopes, would be hydroseeded to prevent erosion using the following seed mixture. The seed mixture would be comprised of at least 20-40 percent native grass seeds [such as annual fescue (*Vulpia* spp.), California brome (*Bromus carinatus*), blue wildrye (*Elymus glaucas*), and needle grass (*Nasella* spp.)], 2-10 percent native forb seeds, five percent rose clover (*Trifolium hirtum*), and five percent alfalfa (*Medicago sativa*). Approximately 40 -68 percent of the mixture would be non-aggressive European annual grasses [such as wild oats (*Avena sativa*), wheat (*Triticum* spp.), and barley (*Hordeum vulgare*)].

Project implementation would have **potentially significant** impacts to GGS. However, implementation of **BIO-4** would reduce impacts to Giant Garter Snake to **less than significant**.

Special Status Birds

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 land birds, 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. This

species has been documented near the confluence between the NCC and the Sacramento River, which is part of the Action Area. Implementation of **BIO-5** would result in a less than significant impact to the species.

Long-eared Owl *Asio otus*
The Long-eared Owl is broadly distributed throughout the Holarctic. It occurs in California year-round, breeding from February through July. It nests in woodlands that are open or that are adjacent to grasslands, meadows, or shrublands. Loss of riparian habitat in Central California has likely contributed to population declines. There are only unprocessed documented observations of Long-eared Owls in the adjacent Pleasant Grove quadrangle (CDFW 2021). It has been essentially extirpated from the Central Valley floor (Shuford and Gardali 2008). The Action Area also lacks sufficient suitable habitat, so it is unlikely to occur.

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 been observed near the Action Area along the Pleasant Grove Cross Canal and the Action Area contains suitable habitat (Gogol-Prokurat 2016), so Burrowing Owl are likely present. Implementation of **BIO-5** would result in a less than significant impact to the species.

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 CV. 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 in the past (Sutter County 2011). The Project Area contains suitable large nesting trees growing on the banks of the NCC and on the islands. Surrounding agricultural fields, outside of the Project Area, contain suitable foraging habitat for the species. There is a high probability that Swainson's hawk occurs within the Project Area or a quarter mile buffer.

The Project includes removal of select large trees as part of the islanding grading to create seasonal juvenile salmonid rearing habitat. The trees slated for removal could potentially be used by Swainson's hawks for nesting. Nesting Swainson's hawks in the Project vicinity could also be disturbed by construction activities and human presence. To avoid removal of active nesting trees and construction related disturbance, **BIO-6** would be implemented and result in a **less than significant impact**.

Western Snowy Plover *Charadrius alexandrinus nivosus*
The Western Snowy Plover is a small shorebird with a thin dark bill, pale brown to gray upper parts, and black patches above a white forehead and behind the eyes. The species breeds near tidal waters from Washington to Baja California between March and September. Western Snowy Plover forage for invertebrates in sand and within low foredune vegetation. The species is a California Species of Special Concern, its threats included human disturbance, predation, inclement weather, and nesting habitat loss. The Western Snowy Plover has not been documented in the Verona quadrangle, but it has been documented in the adjacent Grays Bend quadrangle (CDFW 2021). The Action Area is not tidally influenced, and lacks sand and dune habitat, so this species is unlikely to occur.

Mountain Plover *Charadrius montanus*
The Mountain Plover is a small shorebird that winters in central and southern California. It is strongly associated with short-grass prairie habitat. It is light brown in color and lacks the contrasting dark breastbelt common to other plovers. Habitat loss and degradation of wintering and breeding grounds is the primary threat to this California Species of Special Concern (Shufurd and Gardali 2008). The Mountain Plover has not been documented in the Verona quadrangle, but it has been documented in the adjacent Grays Bend and Knights Landing quadrangles (CDFW 2021). There is some suitable habitat in and near the Project Area (Gogol-Prokurat 2016), so it is possible that Mountain Plover is present but not during the construction period.

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). This species has not been documented in the Verona quadrangle, but has been in the adjacent Rio Linda and Grays Bend quadrangles and the Action Area contains ample suitable habitat (CDFW 2021, Gogol-Prokurat 2016). Northern Harrier are likely present in the Action Area. Implementation of **BIO-5** would result in a less than significant impact to Northern Harrier.

Western Yellow-billed Cuckoo *Coccyzus americanus occidentalis*
The Western Yellow-billed Cuckoo is a medium-sized bird about 30 cm long that is federally threatened. Its plumage is grayish-brown above and white below, with red primary flight feathers. It has unique feet, with two toes pointing forwards and two toes pointing backwards. It uses a variety of riparian habitat and appear to require large, continuous blocks of riparian habitat for nesting. This species of cuckoo typically raises its own young but has been documented to have

laid eggs in nests of 11 different kinds of birds. Riparian habitat loss and overuse by livestock are the major threats to the Western Yellow-billed Cuckoo. This species has not been documented in the Verona quadrangle, but has been in the adjacent Nicolaus, Knights Landing, Taylor Monument, and Rio Linda quadrangles (CDFW 2021). The closest suitable habitat is about six miles north of the Project Site on the Feather River (Dettling 2017), so it is unlikely that this species is present.

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). This species has not been documented in the Verona quadrangle, but has been in the adjacent Grays Bend quadrangle (CDFW 2021). Suitable habitat exists for the White-tailed Kite in the Action Area (Gogol-Prokurat 2016); therefore, this species may be present. Implementation of **BIO-5** would result in a less than significant impact to White-tailed Kite.

Willow Flycatcher *Empidonax traillii*
The Willow Flycatcher is a small, gray bird with five recognized subspecies. They forage by aerially gleaning or hawking large insects in flight (Craig and Williams 1998). Breeds between May and September in dense riparian habitats characterized by dense tree or shrub cover that is at least 3m tall, dense twig structure, and high levels of green foliage (Sogge et al. 2010). There is unprocessed documentation of the Willow Flycatcher in the Verona quadrangle, however the Action Area is outside of the known range and contains no suitable habitat (Gogol-Prokurat 2016). Therefore, it is unlikely this species is present.

Merlin *Falco columbarius*
The Merlin is an uncommon winter migrant in California between September and May. It is most commonly found in open habitats at low elevations near water and tree stands, feeding on small birds (Zeiner et al. 1990). This species has not been documented in the Verona quadrangle, but has been in the adjacent Grays Bend quadrangle (CDFW 2021). There is marginally suitable habitat within the Action Area (Gogol-Prokurat 2016), so it is possible that the Merlin is present. Implementation of **BIO-5** would result in a less than significant impact to Merlin.

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). Gaines (1974) found singing males "uncommon" on the Feather River in Sutter County. This species has not been documented in the Verona quadrangle, but has been in the adjacent Nicolaus quadrangle (CDFW 2021). It is unlikely to occur at the project site because it is outside of its known range.

Loggerhead Shrike *Lanius ludovicianus*
The Loggerhead Shrike is a thick-bodied songbird with a thick, hooked bill and gray head with a black mask (Cornell 2019). It is a California species of special concern that is abundant in the California CV, where its habitat requirements are met in riparian edges and desert scrub. It breeds mainly in shrublands or open woodlands and requires tall shrubs, tree, power lines, or fences for hunting perches. Habitat loss to agriculture and urbanization is a major threat to the Loggerhead Shrike (Shunford and Gardali 2008). There is unprocessed documentation of Loggerhead Shrike in the Verona quadrangle, and suitable riparian habitat is present at the project site (Gogol-Prokurat 2016, CDFW 2021). Therefore, the species may be present. Implementation of **BIO-5** would result in a less than significant impact to loggerhead shrike.

Song Sparrow (Modesto Population) *Melospiza melodia*
The Modesto Song Sparrow is a medium-sized New World sparrow endemic to California and is considered a state species of special concern (Cornell 2019). It is a sub-species that resides only in the north-central portion of the CV. It lives in freshwater marshes, riparian willow thickets, Valley Oak riparian forests, and along vegetated irrigation canals (Shunford and Gardali 2008). This species has not been documented in the Verona quadrangle, but has been in the adjacent Grays Bend quadrangle and suitable habitat exists in the Action Area (CDFW 2021). It is possible that it is found in the Action Area. Implementation of **BIO-5** would result in a less than significant impact to Song Sparrow.

Long-billed Curlew *Numenius americanus*
The Long-billed Curlew is North America's largest shorebird. It is speckled and barred brown with a long, thin, curved bill. It breeds in shortgrass and mixed-grass prairies and agricultural fields. Otherwise, it is found in wetlands, tidal estuaries, mudflats, flooded rice fields, and beaches (Cornell 2019). This species has not been documented in the Verona quadrangle, but has been in the adjacent Grays Bend quadrangle (CDFW 2021). Suitable habitat exists at the project site (Gogol-Prokurat 2016), so it is possible that the Long-billed Curlew will be present at the project site. Implementation of **BIO-5** would result in a less than significant impact to Long-billed Curlew.

Double-crested Cormorant *Phalacrocorax auratus*
The Double-crested Cormorant is a brown-black large waterbird with a small head and thin, strongly hooked bill. They forage by diving to catch small fish. They are the most widespread cormorant in North America and are frequently seen in freshwater. They are communal nesters and build nests on cliffs, flat ground, trees, or man-made structures. The species will also alter and use old heron or egret nests. They breed on the coast and large inland lakes or other bodies of water (Cornell 2019). They winter in the CV (Zeiner et al. 1990). This species has not been documented in the Verona quadrangle, but has been in the adjacent Sutter Causeway quadrangle (CDFW 2021). Double-crested cormorants were observed perched in trees in the Project area during summer 2021 vegetation surveys. Suitable nesting trees are also present in the Project area.

Implementation of **BIO-5** would result in a less than significant impact to Double-crested Cormorant.

White-faced Ibis *Plegadis chihi*
The White-faced Ibis is a medium-sized, long-legged wading bird with a strongly curved bill. They are found in almost any type of wetland habitat and will also forage in farm fields or other open areas with moist soils (Cornell 2019). Extensive marshes are required for breeding, and they prefer dense marsh vegetation near shallow water foraging areas. The White-faced Ibis no longer breeds regularly anywhere in California (Zeiner et al. 1990). This species has not been documented in the Verona quadrangle, but has been in the adjacent Taylor Mountain quadrangle (CDFW 2021). It is a rare visitor to the CV (Zeiner et al. 1990) and its range does not overlap with the Action Area (Gogol-Prokurat 2016), so it is unlikely to occur there.

Purple Martin *Progne subis*
The Purple Martin is a large, iridescent blue-purple swallow with a stout, hooked bill; short, forked tails; and long, tapered wings (Cornell 2019). They forage in open areas, especially near water. They have been extirpated from the CV except for the city of Sacramento, where they nest in hollow-box bridges (Shuford and Gardali 2008). This species has not been documented in the Verona quadrangle, but has been in the adjacent Rio Linda quadrangle (CDFW 2021). Its range does not overlap with the Action Area (Gogol-Prokurat 2016), so it is unlikely to occur there.

Bank Swallow *Riparia riparia*
The Bank Swallow is small swallow with a large head and short pointed wings. It is brown with white underparts and a thick brown band across its chest (Cornell 2019). They breed in open lowland areas near bodies of water. As of 1999, 110-120 colonies existed within California, and about 75% of those occurred along the Sacramento and Feather Rivers in the northern CV(Zeiner et al. 1990). This species has been documented in the Verona quadrangle (CDFW 2021). However, the Action Area does not contain eroding vertical banks or bluffs comprised of friable soil used by bank swallow for nesting. Therefore, the species is likely absent.

Yellow Warbler *Setophaga petechia*
The Yellow Warbler is a small songbird with a relatively large bill. It is uniformly yellow in color, the males have reddish streaks on their underparts. They breed in shrubby thickets and woods, especially near waterways and in wetlands (Cornell 2019). The Yellow Warbler is a migrant and summer resident in California from late March through early October. The breeding population has largely been extirpated from the CV, including the Sacramento River and its lower tributaries (Shunford and Gardali 2008). This species has not been documented in the Verona quadrangle, but has been in the adjacent Gray Bend quadrangle (CDFW 2021). Its current range does not overlap with the Action Area (Gogol-Prokurat 2016), so it is unlikely to occur there.

Raptors and Migratory Birds
The riparian habitat within the Action Area may be used by nesting raptors and migratory birds. Project construction activities (1 May – 30 September) 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 direct mortality by removing a tree with an active nest, removal of habitat that could serve 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 or other raptors or migratory birds nesting in or nearby the Action Area (**BIO-5 and BIO-6**). If special status bird, raptor, or migratory bird nesting is confirmed, an appropriately sized, no-disturbance buffer would be created around each nest. In addition to these measures, impacts to special-status birds, raptors, and migratory birds and their habitat would be reduced to **less than significant** through implementation of **BIO-7 and BIO-8.**

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 Sheridan quadrangle, adjacent to the Verona quadrant where the Action Area is located (CDFW 2021). Neighboring bridges may serve as a summer maternity roost for this species, with the adjacent riparian corridor serving as summer foraging habitat. Pallid bat may occur within the Action Area. Implementation of **BIO-9** will result in a less than significant impact for Pallid Bat.

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 Knights Landing quadrant within the CNDDB database, which is adjacent to the Action Area (CDFW 2021). Cottonwood riparian habitat associated with the Sacramento River provides significant roosting and foraging habitat for reproductive female Western Red Bats during the summer, and the species may be present within the Action Area. Implementation of **BIO-9** will result in a less than significant impact for Western Red Bat.

Riparian vegetation in the Action Area may provide roosting and foraging habitat for special status bat species, including the Pallid Bat and the Western Red Bat. Project construction activities (1 May – 30 September) 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. The Project design avoided removal of large trees that

may be used by roosting bats as practicable. 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. Implementation of **BIO-7, BIO-8,** and **BIO-9** would reduce impacts to special status bats and their habitat to **less than significant.**

Special Status Fish Species

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, North American Green Sturgeon, White Sturgeon, Riffle Sculpin, Sacramento Hitch, CV Chinook Salmon (fall-, winter-, and spring-run), (fall-, winter-, and spring-run), *O. mykiss*, Splittail, and Hardhead may occur in the Project Area. However, the following species are not expected to occur but were identified in the search: Longfin Smelt, Delta Smelt, and Eulachon.

North American Green Sturgeon *Acipenser medirostris*
The North American Green Sturgeon is a large (up to 350 lbs.), long-lived fish (up to 70 years) that reaches maturity at around 15 years of age (NMFS 2015a). Green Sturgeon typically spawn every three to four years (Poytress et al. 2015). Green sturgeon adults on their spawning run enter San Francisco Bay during late winter to early spring, migrate to their spawning area and spawn from April through early July (Heublein et al. 2009). After spawning, green sturgeon most commonly hold for several months in the river and then migrate downstream in the fall or winter, although some adults migrate downstream during the spring and summer (Heublein et al. 2009). Spawning takes place in deep pools with medium sized gravel, cobble, or boulder substrate and at water temperatures from 10 to 17 ºC (Poytress et al. 2015). Spawning in the Sacramento River has been documented to occur at several sites (Poytress et al. 2015) and spawning has recently been documented in the Feather River (Seesholtz et al. 2015). Juvenile Green Sturgeon begin to migrate downstream between 6 months and 2 years of age (NMFS 2015). Subadult and adult Green Sturgeon spend most their life in the coastal marine environment with them commonly found in coastal bays and estuaries during the summer and fall (NMFS 2015).

The Action Area is within the range of the Green Sturgeon, and the Sacramento River downstream of the Action Area is designated Critical Habitat. Green Sturgeon have been documented in the Action Area quadrant (CDFW 2021), and construction activities may affect them.

White Sturgeon *Acipenser transmontanus*
The White Sturgeon is a CDFW species of special concern. They are the largest freshwater fish in California, historically growing to 6 m in length. They are long-lived and do no reach reproductive maturity until 10-16 years. They primarily reside in large rivers and associated estuaries, ranging from Mexico to Alaska. Adults migrate from the estuary into the river in winter, spawn from February to June, and return to the Delta after spawning. While the early life of this species is not

well understood, current evidence suggests that fertilized eggs settle to the bottom of the river and stick to hard surfaces. Juveniles move down-river into the freshwater region of the estuary during their first year. While the range of White Sturgeon does not overlap directly with the Action Area (Santos 2014a), it extends to just upstream of the confluence between the NCC and the Sacramento River. So, the species is possibly present within the area influenced by the project.

Riffle Sculpin *Cottus gulosus*
The Riffle Sculpin is a CDFW species of special concern. The population present in the Sacramento River and its tributaries is genetically distinct from other populations (Baumsteiger 2013). In the Sacramento River watershed the Riffle Sculpin is found in Putah Creek and in most tributaries on the east side of the valley from the American River north to the upper Sacramento River (Moyle et al. 2015). In the San Joaquin Basin, Riffle Sculpin show considerable genetic differences among populations, 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 CV (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 NCC within the Action 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 eats 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 may be present in the NCC, however it has not been observed.

Delta Smelt *Hypomesus transpacificus*
Delta Smelt is a small (up to 120 mm) euryhaline fish endemic to the Sacramento-San Joaquin Delta of California. Adults make diffuse migrations to areas in the upper Delta in early fall to spawn in the late winter through spring period (Moyle et al. 2002). The specifics on spawning in the river environment are still unclear although the process has been documented in the laboratory. Most Delta Smelt are semelparous and live for about a year, but a small proportion may survive to spawn a second time. After hatching, larvae passively disperse in a downstream direction throughout the low salinity habitats of the Delta region, including Suisun Bay and

Montezuma Slough, where they mature and grow. All Delta Smelt life stages are planktivorous, consuming rotifers, mysids, calanoid copepods, cyclopoid copepods, and copepod nauplii. Because Delta Smelt are poor swimmers, it has been hypothesized that individual fish hang out in the water column and rely on their small size and transparency to hide from predators in turbid waters. While Delta Smelt is generally considered an estuarine species relying on salinity to complete its life cycle, adults have been observed on the lower American and Mokelumne rivers above tidal influence and have been documented in the Yolo Bypass North of Sacramento, well above the saline portions of the system. The range of Delta Smelt does not overlap with the Project Area and suitable habitat is lacking (Santos 2014b), so this species will be absent.

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 CV 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 CV 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 (DO). In the NCC and/or its tributaries, two forms of *O. mykiss* exist: rainbow trout, the resident form that remains in the river its entire life; and Steelhead, the anadromous form that migrates to the ocean as a juvenile and returns to the river to spawn one or more times (Healy 2013).

Historically, CCV steelhead spawned primarily in upper stream reaches and smaller tributaries. As a result of CV water development projects, most spawning is now confined to lower stream reaches below dams. In a few streams, such as Mill and Deer creeks, Steelhead still have access to historic spawning areas. Steelhead migrate up the Sacramento River nearly every month of the year, with the bulk of migration occurring from August through November, with the peak in late September (Bailey 1954, Hallock et al. 1961, McEwan 2001). While little information has been collected on migration patterns for the San Joaquin River tributaries, migration has been observed as early as August and as late as May with peaks in January and February on the lower Mokelumne River (Workman 2005). Spawning in the upper Sacramento River generally occurs between November and late April, with a peak between early January and late March (NMFS 2014). Similar observations have been made on the Mokelumne River as well (Mulchaey and Setka 2007). CV 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; they may return to the ocean after spawning and repeat the spawning cycle (Narum et al. 2008). The percentage of CV steelhead adults surviving spawning

has not been well studied, but in general the percent of repeat spawners on the United States Pacific Coast varies annually and between stocks (5.8-53%; Withler 1966). Recent acoustic tagging studies of Coleman Hatchery kelts (spawned steelhead) indicate that reconditioned kelts released in late spring may emigrate to the Pacific Ocean within weeks to months of release and return to freshwater the following fall, while others may remain in freshwater for an undetermined time (Null et al. 2013).

Steelhead in the nearby lower Yuba River use riffle transitions, riffles, fast glides, slow glides, and point bars for spawning depending on the discharge (Kammel and Pasternack 2014). Spawning steelhead in the lower Yuba River prefer areas with mean water column velocity of 1.2 to 2.3 feet per second, water depths of 1.3 to 2.8 feet, and the medium gravel/small cobble (32-90 mm) substrate size class (Kammel and Pasternack 2014). The survival of embryos is reduced when fine substrates with a diameter smaller than 0.5 inches (1.3 cm) comprises more than 20-25 percent of the total substrate by volume. Studies have shown higher embryo survival when intragravel velocities exceed 8 in/hr (0.2 m/hr) (Coble 1961, Phillips and Campbell 1961). The number of days required for steelhead eggs to hatch is inversely proportional to water temperature and varies from about 19 days at 15.6°C (60.1 °F) to about 80 days at 5.6°C (42.1 °F). Given the spawning window and assuming temperatures are suitable, embryo incubation in Auburn Ravine and other tributaries upstream from NCC occurs from October through late-March (cbec 2017). 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 (Merz et al. 2015). Older fry establish territories, which they defend. Cover is an important habitat component for juvenile CCV steelhead both as velocity refuge and as a means of avoiding predation (Shirvell 1990, Meehan and Bjornn 1991). Steelhead, 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 gradually become more piscivorous as they grow, emerging fry are sometimes preyed upon by older juveniles (Merz and Vanicek 1996, Merz 2002). In winter, they become inactive and hide in any available cover, including gravel or woody debris.

Rearing juvenile steelhead may reside in freshwater all year (Merz 2002, Sogard et al. 2012, Merz et al. 2015). Water temperature and food availability influence the growth rate, population density, swimming ability, ability to capture and metabolize food, and ability to withstand disease (Barnhart 1986, Bjornn and Reiser 1991, Sogard et al. 2012). Optimal temperatures for steelhead growth range between 50 and 68 °F (10 and 20°C), and juvenile steelhead have an upper lethal limit of 75°F (24°C) (Hokanson et al. 1977, Wurtsbaugh and Davis 1977, Myrick and Cech 2005). However, juvenile steelhead can survive up to 80°F (26.7°C) for short time intervals with saturated DO conditions and a plentiful food supply. Variability in diurnal water temperature ranges is also important for the survivability and growth of salmonids (Hokanson et al. 1977, Busby et al. 1996).

Adequate flow and water temperature conditions are important factors for juvenile survival and growth (CDFG 1996). During rearing, suspended and deposited fine sediments can directly affect salmonids by abrading and clogging gills, and indirectly cause reduced feeding, avoidance reactions, destruction of food supplies, reduced egg and alevin survival, and changed rearing habitat (Suttle et al. 2004, Reiser and Bjornn 1979). Bell (1973) found that silt loads of less than

25 milligrams per liter (mg/l) permit good rearing conditions for juvenile salmonids. Increasing concentrations of deposited fine sediment in gravel bedded streams has been observed to decrease growth and survival of juvenile salmonids (Suttle et al. 2004, Harvey et al. 2009).

Generally, throughout their range in California, CCV steelhead that are successful in surviving to adulthood spend at least two years in freshwater before emigrating downstream (Sogard et al. 2012). However, a proportion of CCV steelhead populations below non-passable barriers do demonstrate anadromy, but instead reside in freshwater throughout their lifespan (Sogard et al. 2012). Emigration appears to be more closely associated with size than age but environmental conditions can influence the proportion of the population demonstrating anadromy (Sogard et al. 2012). Juvenile steelhead rearing and downstream migration occurs year-round, while emigrating smolts have been observed from February through mid-April (Healy 2013). The emigration period for naturally spawned steelhead juveniles migrating past Knights Landing on the lower Sacramento River ranges from late December through May (McEwan 2001). In streams south of the American River, CCV steelhead emigration has been observed from November through July (Bilski and Rible 2011, CFS 2015c).

Analyses of steelhead abundance across the DPS indicate that naturally reproducing stocks are suffering severe and long-term declines range-wide, within the Sacramento River and within the Action Area (NMFS 2014). There are small, remnant populations of CCV steelhead present in the upper Sacramento River and its tributaries below impassable barriers (NMFS 2014). Recent CCV steelhead surveys in several of these streams indicate returns of fewer than 1,000 adults (NMFS 2016). 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, Sogard et al. 2012). Trawl data at Chipps Island suggests that natural production of steelhead is very low (NMFS 2016). There is very little monitoring focused on CCV steelhead, therefore population trend and status is poorly understood. The apparent population declines have been attributed to longstanding human induced factors, including climate change (NMFS 1996). Important anthropogenic factors in CCV steelhead decline include destruction and degradation of habitat, over-harvest, and reduced water quality (62 FR 43937). Impassable dams block access to 80 percent of historically available habitat and block access to all historical spawning habitat for about 38 percent of historical sub-populations (Lindley et al. 2006).

The NCC is the only route for Central Valley steelhead to access upstream spawning grounds in the small streams that drain into the NCC and for smolts to migrate downstream to the ocean. Steelhead may occasionally spawn in tributaries that drain into the NCC, but they are not well studied in these small streams. Water temperatures in NCC tributaries are suitable for spawning between November and April, however by mid-May temperatures can reach stressful or lethal levels for rearing and emigrating juveniles (cbec 2017). O. mykiss are known to be present in several of these small streams including Auburn Ravine and Coon Creek (CDFG 2008). Additionally, O. mykiss have been captured in a RST operated near Lincoln indicating that some individuals make downstream movements/migration as would be expected for emigrating smolts. It is hypothesized that relatively low numbers of CCV steelhead seasonally use the NCC during adult upstream migration and juvenile downstream migration. Therefore, the species is considered to be seasonally present.

Fall-run Chinook Salmon *Oncorhynchus tshawytscha*
CVfall- 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 in 2004 because of specific risk factors, including population size and hatchery influence (69 FR 19975). In the CV, 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 eEFH are managed under the MSA.

CV fall-run Chinook Salmon spend most of their lifecycle in the coastal waters of the Pacific Ocean but must return to freshwater to reproduce (Merz et al. 2013). During immigration, adults stop feeding and live on body fat reserves. Although cues triggering adult return to spawning grounds are not well understood it is thought that the ability to navigate to natal streams 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. 2004a, b). 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 CV, 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).

Fall- and late fall-run Chinook Salmon occur in the lower Sacramento River and could also occur in the NCC. Fall-run Chinook Salmon occur in several tributaries of the NCC (Hoobler 2015, Healy 2014, and Helix 2019). Juvenile fall-run Chinook Salmon in the Sacramento River system migrate downstream as fry in response to many habitat factors, such as flow, food availability, and water temperature. The number of juveniles and the timing of their movement is highly variable, though high flows appear to trigger substantial numbers of juveniles moving downstream (Michel et al. 2013). Within the lower Sacramento River, migrating smolts exhibit intermediate movement rates. In addition, juvenile fall-run Chinook Salmon typically spend 3 to 6 months rearing in freshwater, while late fall-run Chinook Salmon can spend up to one year in freshwater before out-migrating. RST data for fall-run Chinook salmon in Auburn Ravine shows that migration occurs between February and May (Healy 2013). The Action Area is designated EFH for fall-run Chinook.

Spring-run Chinook Salmon *Oncorhynchus tshawytscha*
Adult spring-run Chinook Salmon migrate into the nearby lower Yuba River in April through June. Spring-run Chinook Salmon spawning generally occurs from the beginning of September through the middle of October (Yuba RMT 2013). Redds incubate and alevin hatch in the gravel between September and December, depending on time of spawning and water temperature (Yuba RMT 2013). Chinook Salmon spawn in moderately sized cobble in riffles, riffle transitions, run, and fast glide habitat (Pasternack et al. 2014, Merz and Setka 2004). Spawning distribution and incubation success are important factors controlled by substrate size and intergravel flow (Harrison 1923; Hobbs 1937; McNeil 1964; Cooper 1965; Platts et al. 1979). Female Chinook Salmon excavate a redd that is typically 111–189 ft^2 (10.3–17.6 m^2) in size (Healey 1991). The female defends the redd until death, and fertilized eggs incubate for about 13 weeks, depending on water temperature (Bjornn and Reiser 1991). Larvae hatch with yolk sacs and remain in substrate until the sac is absorbed, about 2–3 weeks. Spring-run Chinook Salmon fry begin to emerge from the gravel starting in November and continuing through February (Yuba RMT 2013). After emerging, fry disperse downstream or to lateral margins of the river.

Analyses of spring-run Chinook Salmon abundance across the ESU indicate that naturally reproducing stocks are suffering severe and long-term declines, range-wide (NMFS 2014). Spring-run Chinook Salmon were probably the most abundant salmonid in the CV under historic conditions but have suffered the most severe declines of any of the four Chinook Salmon runs in the CV (NMFS 2014, Yoshiyama et al. 1998). Spring-run Chinook Salmon may have had runs large as 1,000,000 in theCVbut recent returns have averaged around 10,000 (NMFS 2014, Yoshiyama et al. 1998). There are only three streams in the CV (Mill, Deer, and Butte creeks) that support self-sustaining and non-hybridized populations with each of these populations (NMFS 2014). The Coleman National Fish Hatchery and the CDFW Feather River Fish Hatchery both produce spring-run Chinook Salmon; the Feather River Hatchery has documented hybridization between spring-run and fall-run Chinook Salmon (NMFS 2014).

An RST was operated within Auburn Ravine, upstream from NCC, from January through June 2013. Juvenile Chinook Salmon that were categorized as spring-run using lengthat-date relationship were captured between mid-March to mid-April, indicating that spring-run Chinook Salmon may be present in the NCC during the spring rearing period (Healy, 2013). Run identity was not confirmed through genetic analysis, but i f these individuals are spring-run Chinook Salmon it is likely they are non-natal due to poor adult summer holding habitat within the accessible reach of Auburn Ravine. Current conditions in the NCC are poor for juvenile rearing, including stressful water temperatures from June through August deep areas with abundant submerged aquatic vegetation that supports predatory fish species (CFS 2018, Zeug et al. 2020) and seasonally placed barriers (Healy 2013). In addition, spring-run Chinook Salmon upstream migration and successful spawning through the NCC is unlikely due to a lack of spawning habitat conditions. (Healey 2014). The Action Area is designated critical habitat and EFH for spring-run Chinook Salmon.

Winter-run Chinook Salmon *Oncorhynchus tshawytscha*
The winter-run Chinook Salmon historical abundance pre-Shasta dam construction is unknown; estimates of historical population size are variable, ranging from several thousand to 200,000 fish (NMFS 1993 and Slater 1963). CV winter-run Chinook Salmon runs may have been as large as 1,000,000, but recent returns have averaged around 10,000 (NMFS 2014; Yoshiyama et al. 1998). In the 1960's the population was higher than 20,000 fish, but has since experienced continued

declines, dropping dramatically in the late 1980's and early 1990's when the run was listed as endangered under the CESA and federal ESA. From 1990-1997 the population continued to drop, averaging 600 fish. Escapement gradually rose from 1998 to 2016, averaging 4,770 fish including fish collected at Livingston Stone National Fish Hatchery (LSNFH) (Moyle 2002 and GrandTab 2021). In recent years (2017 to 2020), escapement has averaged 4,793 (range 977 in 2017 to 8,128 in 2019; GrandTab 2021).

Winter run Chinook Salmon have been propagated at LSNFH since the mid- 1990's and are considered to be part of the Sacramento River winter-run Chinook ESU. The LSNFH has a goal of managing the hatchery population to be less than 20% of the in-river escapement, which they have maintained successfully (NMFS 2011). As of 2010, only wild fish (non-clipped) are being spawned at the hatchery in order to decrease the effects of domestication, however in 2015 a Captive Broodstock Program was initiated using broodstock from the Conservation Hatchery Program in response to drought conditions that threaten the persistence of the run (NMFS 2016).

Historically, Sacramento River winter-run Chinook Salmon spawned in the upper reaches of the Sacramento River as well as the McCloud and Pit rivers, but Shasta and Keswick dams have prevented access to this spawning habitat since the 1940's (Moyle 1995). Currently, they are restricted in their distribution by impassible dams with 58% of their original (pre-dam construction) habitat accessible. Nearly all current winter-run Chinook Salmon spawning occurs immediately downstream of Keswick Dam on the Sacramento River (Moyle et al. 1995 and USBR 2008) and is reliant on cold water releases to maintain suitable water temperatures during the spawning period. Drought years result in a small cool water pool in Lake Shasta which is depleted earlier in the year, resulting in water temperatures exceeding suitable thermal conditions for embryo development (Dusek Jennings and Hendrix 2020).

After spending 1-3 years in the ocean, Sacramento River winter-run Chinook Salmon begin migrating inland through the Delta and Sacramento River beginning December, peaking in March and ending in July, spawning from April through August (Moyle 2002, Table 6). Winter-run Chinook Salmon enter the river reproductively immature, holding in the colder water below Keswick Dam (Moyle et. al 1989). Winter-run Chinook Salmon upstream migration and spawning through the NCC is unlikely due to lack of spawning habitat and unfavorable water temperatures during the adult the spawning window (Healey 2014). Fry begin to emerge and move downstream with peak re-distribution occurring in September and October (Vogel and Marine 1991). Monitoring data suggests that most individuals disperse from the spawning reach as fry (del Rosario et al. 2013, Poytress et al. 2014) and these early dispersants may use non-natal habitat, including the NCC (Phillis et al. 2018). Juvenile winter-run Chinook Salmon rear in the upper reaches of the Sacramento River before initiating downstream migration towards the Delta in the fall through early-winter. Juvenile winter-run Chinook Salmon passed Knights Landing (rkm 144) between October and April, with a peak between December and February (del Rosario et al. 2013). Initiation of downstream migration appears to be associated with the first high flow event of the migration season (del Rosario et al. 2013).

Otolith microchemistry has revealed that over 50% of juvenile winter-run Chinook Salmon spent at least three weeks rearing in non-natal habitat before entering the ocean (Phillis et al 2018). The NCC was not evaluated as a non-natal rearing location in the Phillis (et al. 2018) study but nearby rivers including the American River were documented as non-natal rearing locations. However, Chinook Salmon of winter-run based on length-at-date criteria (but not confirmed as winter-run

through genetic analysis) have been collected in an RST located in Auburn Ravine near the City of Lincoln, upstream of the NCC (Healey 2014), indicating non-natal rearing is potentially occurring in reaches above the NCC, therefore may also occur within the NCC if appropriate habitat is available (Phillis et al. 2018).

The Sacramento River, located downstream of the Action Area, is considered Critical Habitat (Gavette 2017).

Sacramento Splittail *Pogonichthys macrolepidotus*
The Sacramento Splittail is a large cyprinid fish that can grow to over 40cm in length. Adults are characterized by a distinct hump on the back of the neck, an elongated body, a small, blunt head, an enlarged dorsal lobe of the caudal fin, and usually barbels at the corners of a slightly subterminal mouth. During spawning season, their fins become tinged with an orange-red color. They are native to the CV, and their range covers much of the Sacramento River and its tributaries. However, the species only has access to this range during wet years, due to impoundment by dams and diversions. Most year, Splittail are confined to the Delta, Suisun Bay, Suisun Marsh, and Napa Marsh. They are benthic foragers. They typically occupy slow moving sections of rivers and sloughs. Because they require flooded vegetation for breeding, they are frequently found in areas subject to flooding. The Action Area is within the range of the Sacramento Splittail (Santos 2014c), and marginal habitat is present. It is possible that this species occurs within the Action Area during the spawning season in wet years.

Longfin Smelt *Spirinchus thaleichthys*
Longfin Smelt is a small fish found along the Pacific coast of the United States, including the San Francisco Estuary and Sacramento/San Joaquin Delta. They are typically found in nearshore waters, estuaries, and lower portions of streams. This species is euryhaline (able to tolerate a wide range of salinities) and anadromous. They spawn in freshwater between February and April in areas with gravel or sandy substrate and rocks or aquatic plants. Its range does not extend upstream into the Sacramento River from the Delta (Santos 2014c and it has only been observed in quadrangles adjacent to the Verona quadrangle (Taylor Mountain). It is unlikely to occur within the Action Area.

Eulachon *Thaleichthys pacificus*
Eulachon are an anadromous species of smelt that occurs in the Pacific from northern California to Alaska. The southern DPS is federally endangered. They typically grow to between 20 and 30 cm in length, with an elongated body and large mouth. Most reach sexual maturity after three years and enter their natal streams to spawn and then die between December and May. They typically do not swim further than 10 to 12 km upstream to spawn. Spawning habitat is typified by gravel, sand, wood, and other debris. In the ocean, Eulachon live and feed in both deep and shallow water, primarily consuming copepods, euphausiid shrimp, and other crustaceans. While there is a documented occurrence of a single Eulachon being captured in a screw trap on the Sacramento River at Knights Landing in 2006 (Vincik and Titus 2007), the inland range of the Eulachon in California is restricted to the coastal rivers north of the Mad River in Trinity County (Santos 2014d). Therefore, this species will is unlikely to occur within the Action Area.

The following special status fish species are likely or have the potential to occur in the Action Area: North American Green Sturgeon, White Surgeon, Riffle Sculpin, Hardhead, CCV steelhead, Fall-run Chinook Salmon, Spring-run Chinook Salmon, Winter-run Chinook Salmon, and

Sacramento Splittail. 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. The potentially adverse effects expected during Project construction activities are unintentional spread of non-native invasive species by equipment, sediment mobilization and increase in turbidity, temporary loss of riparian vegetation, disturbance or harassment from construction equipment including noise, and 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 NCC as well as in the Sacramento River at the confluence. 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 NCC 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. Deposition of fine substrate may 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 Action Area, attenuating 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 nephelometric turbidity unit(s) (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 Action 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 Action 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). Some turbidity may extend down the NCC and into the main channel of the Sacramento River. Any turbidity that does enter the Sacramento River is expected to be rapidly attenuated by the large volume and flow of the river. 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 **WQ-1 - 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 NCC and Sacramento 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 and by implementing the construction housekeeping measures described in the SWPPP (**WQ-1)**. 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 **WQ-2,** 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, mollusks 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, particularly during installation of crossings, this is a potentially significant impact. However, implementation of **BIO-10** 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 and removal of culvert and rock to create temporary crossings and sediment placed for topographic modification to improve rearing habitat. Using experienced heavy equipment operators would help minimize the noise impact during placement or removal. Diesel engines will also generate noise within the Action Area. No diesel engines or their exhaust systems would come into contact with water in the 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 **BIO-8** and **NOISE-1**, 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 NCC. 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 Sacramento 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, Sacramento Splittail, or Riffle Sculpin may be displaced (CFS unpublished data). Given the limited size of the Action Area and small number of individual fish that may be affected, it 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 Action Area for the duration of construction. Channel crossings will be designed using NMFS passage criteria and installed to support fish passage and minimize in-channel work (NMFS 2007). Instream construction activities are therefore unlikely to impede migration of special status fish species within the Action Area.
Implementation of **BIO-8** and **BIO-11** 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 lowering island elevations and thus bank heights. To the maximum extent practicable, existing riparian habitat would be retained and disturbance would be minimized. Removal of riparian trees would be mitigated for in-kind following **BIO-7**. 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. Some short-term loss of mature riparian vegetation may occur during construction. There will be short-term reduction in riparian habitat resulting from tree removal in the long-term there will be an increase in riparian habitat from mitigation planting and bank erosion protection planting. Overall the Project is expected to provide increased rearing habitat, complexity, and cover for Chinook Salmon and other native fishes in the Project Area.

When complete, the Project is expected to improve migration conditions for fish in the NCC.

Overall, completion of the Project is expected to provide higher quality and quantity of habitat for juvenile salmonids and other native fishes. Although some short-term disturbance may occur when sediment and culverts are placed or removed from the NCC, and the islands are graded, these effects would be minimized through implementing **BIO-8** 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 and freshwater migration corridors

and the EFH Habitat Areas of Particular Concern (HAPC) of complex channels and floodplain habitats, and migration corridors through construction disturbance and modification as well as the removal of some riparian trees and shrubs. Freshwater rearing habitat and migration corridors would be temporarily disturbed during construction and removal of temporary culvert crossings and topographic modification of 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 and increased native riparian vegetation. These modifications would result in a beneficial effect on special status fish by converting existing islands that inundate only at high flows to shallow refugia for juveniles and off-channel aquatic habitat. The main channel within the Action 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 habitat for Chinook Salmon.

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

b) Project construction activities would have temporary impacts which are potentially significant on these sensitive natural communities. This includes some removal of riparian vegetation to create the berm and grade the islands. However, additional riparian vegetation will be planted after construction to create natural wind-induced wave defense and to mitigate for removed vegetation. Riparian planting and predicted natural recruitment, as well as **BIO-7** and **BIO-2** 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 Action Area.

c) Implementation of the Project would result in floodplain and riparian rehabilitation to improve habitat for Chinook Salmon and potentially for other native fishes. Within the Action Area there are 14.4 acres of emergent wetland, 0 acres of riparian wetland above the ordinary high-water mark (OHWM), 94.1 acres of riparian wetland below the OHWM, and 75.1 acres of perennial channel (**Table 8**).

Table 8. The existing versus Project acres of the various aquatic resource types within the Action Area and the associated change in acreage.

Aquatic Resource Type	Existing Acreage	Project Acreage	Change in Acreage
Emergent Wetland	14.4	14.4	0
Riparian Wetland above OHWM	0	0	0
Riparian Wetland below OHWM	94.1	106.6	12.5
Perennial Channel	75.1	73.9	-1.2
Seasonal Channel	0	1.8	1.8
Total	**183.6**	**196.7**	**13.1**

Overall, implementation of the Project would result in the creation of 13.17 acres of new aquatic resources, permanent change to the aquatic resource type of 1.68 acres, and temporary impacts to 0.64 acres (**Table 9**). Specifically, grading of Island A would result in permanent impacts from excavation to 0.70 acres of riparian wetland, permanent change through fill of 1.22 acres of perennial channel and 0.46 acres of riparian wetland to seasonal channel, and creation of 1.13 acres of new riparian wetland and 0.15 acres of new seasonal channel. Grading of Island B would result in permanent impacts from excavation to 0.94 acres of riparian wetland, temporary impact to 0.08 acres of perennial channel from fill for temporary crossing, and creation of 4.85 acres of new riparian wetland. Grading of Island D would result in permanent impacts to 7.78 acres of riparian wetland through excavation, temporary impacts from fill for temporary crossing to 0.42 acres of perennial channel and 0.05 acres of riparian wetland, temporary impacts from temporary access road to 0.09 acres of riparian wetland, and creation of 7.04 acres of new riparian wetland. The permanent impacts to riparian wetland would be expected to return overtime to riparian wetland from natural recruitment of vegetation as well as mitigation plantings for tree removal associated with the excavation.

Table 9. The type of impacts the Project would have on the aquatic resource types present within the Action Area.

Aquatic Resource Type	Island	Permanent Impact (acres)	Permanent Change (Conversion to Seasonal Channel; acres)	Temporary Impact (acres)	New (acres)
Riparian Wetland below OHWM	A	0.70	0.46	0	1.13
Perennial Channel	A	0	1.22	0	0
Seasonal Channel	A	0	0	0	0.15
Riparian Wetland below OHWM	B	0.94	0	0	4.85
Perennial Channel	B	0	0	0.08	0
Seasonal Channel	B	0	0	0	0
Riparian Wetland below OHWM	D	7.78	0	0.14	7.04
Perennial Channel	D	0	0	0.42	0
Seasonal Channel	D	0	0	0	0
Total		**9.42**	**1.68**	**0.64**	**13.17**

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 seasonal channels (**Table 9**). 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 NCC 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. 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. Similarly, deer and other wildlife species present primarily migrate/are active at dawn and dusk which are outside the 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) Sutter 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 Action Area.

f) The Project includes area covered by the Natomas Basic Habitat Conservation Plan (HCP), however most of the Project work will be done on the north bank of the NCC, while the HCP only covers the south bank. However, the Project objectives align with the HCP goals to support viable populations of Giant Garter Snake and Swainson's Hawk by improving riparian habitat along the NCC. This includes staggering tree planting to support Giant Garter Snake passage. The Project does not include any area that is covered by an adopted Natural Community Conservation Plan or other approved local, regional, or state habitat conservation plan. Therefore, there would be **no impact**.

Documentation:

Allen, M.A. and T.J. Hassler. 1986. Species profiles: life histories and environmental requirements of coastal fishes and invertebrates (Pacific Southwest) - Chinook Salmon. U.S. Fish and Wildlife Service, Biological Report 82 (11.49). U.S. Army Corps of Engineers, TR EL-82-4.

Anderson, C.W., F.R. Rinella, and S.A. Rounds. 1996. Occurrence of selected trace elements and organic compounds and their relation to land use in the Willamette river basin, Oregon, 1992-94.

Anderson, I.J., M.K. Saiki, K.L. Sellheim, and J.E. Merz. 2014. Differences in benthic macroinvertebrate assemblages associated with a bloom of *Didymosphenia geminata* in the Lower American River, California. The Southwestern Naturalist 59(3): 389-395.

Ashton, D.T., A.J. Lind, and K.E. Schlick. 1997. Western pond turtle (*Clemmys marmorata*). Natural History. USDA Forest Service, Pacific Southwest Research Station, Arcata, CA.

Ashton, D.T., J.B. Bettaso, H.H. Welsh Jr, and H. Hartwell. 2011. Comparative ecology of Western Pond Turtle (*Actinemys marmorata*) populations on the free-flowing South Fork and regulated Main

Fork Trinity River: demography, size, and body condition comparisons, thermal ecology, and spatial dynamics. Final Report to the Trinity River Restoration Program, United StatesDOI, Bureau of Reclamation.

Bailey, E.D. 1954. Time pattern of 1953–54 migration of salmon and steelhead into the upper Sacramento River. CDFG unpublished report. 4 p.

Bams, R.A. 1970. Evaluation of a revised hatchery method tested on pink and chum salmon fry. Journal of the Fisheries Board of Canada 27(8):1429-1452.

Barnhart, R.A. and M.S. Busby. 1986. Chinook salmon populations and related biological parameters, Mattole River lagoon, June 1986-October 1986. Summary Report to Bureau of Land Management, Arcata Resource Area, Arcata, CA. California Cooperative Fishery Research Unit, Humboldt State University, Arcata, CA.

Barr, C.B. 1991. The distribution, habitat, and status of the valley elderberry longhorn beetle *Desmocerus californicus dimorphus*. U.S. Fish and Wildlife Service, Sacramento, CA.

Baumsteiger, J.D. 2013. Diversification, speciation, and phylogeography of freshwater sculpins (*Cottus Cottopsis*) in California. Doctoral dissertation, University of California, Merced.

Beamesderfer, R.C.P. 2000. Managing fish predators and competitors: deciding when intervention is effective and appropriate. Fisheries 25(6):18-23.

Bell, M.C. 1973. Fisheries handbook of engineering requirements and biological criteria. U.S. Army Corps of Engineers, Fisheries Engineering Research Program, Contract No. DACW57-68-C-006, Portland, Oregon.

Berg, L. and T. G. Northcote. 1985. Changes in territorial, gill-flaring, and feeding behavior in juvenile coho salmon (Oncorhynchus kisutch) following short-term pulses of suspended sediment. Canadian Journal of Fisheries and Aquatic Sciences 42(8): 1410-1417.

Bilski, R., and E. Rible. 2011. Lower Mokelumne River Salmonid Redd Survey Report: October 2010 through March 2011. East Bay Municipal Utility District, Lodi, CA, 17.

Bisson, P.A. and R.E. Bilby. 1982. Avoidance of suspended sediment by juvenile Coho Salmon. North American Journal of Fisheries Management 2(4): 371-374.

Bjornn, T.C. and D.W. Reiser. 1991. Habitat requirements of salmonids in streams. American Fisheries Society 19:83-138.

Blanco, S. and L. Ector. 2009. Distribution, ecology and nuisance effects of the freshwater invasive diatom *Didymosphenia geminata* (Lyngbye) M. Schmidt: a literature review. Nova Hedwigia 88(3–4): 347–422.

Brandes, P.L. and J.S. McLain. 2000. Juvenile Chinook salmon abundance, distribution, and survival in the Sacramento-San Joaquin Estuary. Department of Fish and Game.

Brenneis, V.E., A. Sih, and C.E. de Rivera. 2011. Integration of an invasive consumer into an estuarine food web: direct and indirect effects of the New Zealand Mud Snail. Oecologia 167(1): 169-179.

Buklis L.S. and L.H. Barton. 1984. Yukon River fall chum salmon biology and stock status. Informational Leaflet 239. Available at the Alaska Department of Fish and Game, Division of Commercial Fisheries, P.O. Box 25526, Juneau, Alaska 99802, U.S.A.

Busby, P.J., T.C. Wainwright, G.J. Bryant, L.J. Lierheimer, R.S. Waples, F.W. Waknitz, and I.V. Lagomarsino. 1996. Status review of west coast Steelhead from Washington, Idaho, Oregon, and California. NOAA Tech Memo, Vol. NWFSC-27. 261 pp.

California Department of Fish and Game (CDFG). 2008. Summary of 2004 and 2005 fish community surveys in Auburn Ravine and Coon Creek (Placer County). Memorandum – Fisheries Files. 12p.

CDFG. 1996. Steelhead restoration and management plan for California. State of California, Resources Agency, Department of Fish and Game. Available: http://friendsofventurariver.org/wp-content/themes/client-sites/venturariver/docs/steelhead-restoration-mgmt-ca-df&g.pdf.

CDFW. 2021. California Natural Diversity Database. Sacramento, CA. http://www.dfg.ca.gov/biogeodata/cnddb/mapsanddata.asp. Accessed May 2021.

California Native Plant Society (CNPS), Rare Plant Program. 2021. Inventory of Rare and Endangered Plants of California (online edition, v8-03 0.45). Website http://www.rareplants.cnps.org [accessed May 2021].

Cavallo, B., J. Merz, and J. Setka. 2013. Effects of predator and flow manipulation on Chinook salmon (*Oncorhynchus tshawytscha*) survival in an imperiled estuary. Environmental Biology of Fishes 96(2):393-403.

Chapman, D.W. 1988. Critical review of variables used to define effects of fines in redds of large salmonids. Transactions of the American Fisheries Society 117(1): 1-21.

Chebanov, N. 1991. The effect of spawner density on spawning success, egg survival, and size structure of the progeny of the sockeye salmon, *Oncorhynchus nerka*. Journal of Ichthyology 31:101-106.

Cheatham, N.D. 1976. Conservation of vernal pools. Pages 87-89 in, S. Jain, ed. Vernal Pools: Their Ecology and Conservation. Institute of Ecology Publication No. 9, University of California Davis.

Chevalier, B.C., C. Carson, and W.J. Miller. 1984. Report of engineering and biological literature pertaining to the aquatic environment: with specific emphasis on dissolved oxygen and sediment effects on salmonid habitat. Colorado State University, Department of Agriculture and Chemical Engineering. ARS Project 5602-208130-008A, Fort Collins.

Coble, D.W. 1961. Influence of Water exchange and dissolved oxygen in redds on survival of steelhead trout embryos. Transactionss of the American Fisheries Society 90(4): 469-474.

Colas, F., J. Baudoin, M. Danger, P. Usseglio-Polatera, P. Wagner, and S. Devin. 2013. Synergistic impacts of sediment contamination and dam presence on river functioning. Freshwater Biology 58:320-336.

Cooper, A. C. 1965. The effect of transported stream sediments on the survival of sockeye and pink salmon eggs and alevins. International Pacific Salmon Fisheries Commission Bulletin 18.

Cornell Lab of Ornithology. 2019. All About Birds. Cornell Lab of Ornithology, Ithaca, New York. https://www.allaboutbirds.org Accessed on 3 February 2021.

Craig, D. and P. L. Williams. 1998. Willow Flycatcher (*Empidonax traillii*). *In* The Riparian Bird Conservation Plan: a strategy for reversing the decline of riparian-associated birds in California. California Partners in Flight. http://www.prbo.org/calpif/htmldocs/riparian_v-2.html

Cramer, S.P. and N.K. Ackerman. 2009. Linking stream carrying capacity for salmonids to habitat features. In American Fisheries Society Symposium 71:225-254.

Cramer Fish Sciences (CFS). 2015. Juvenile salmonid out-migration monitoring at Caswell Memorial State Park in the Stanislaus River, California. Prepared for U.S. Fish and Wildlife Service's Comprehensive Assessment and Monitoring Program. Grant No. 813326G008. 46pp.

Crisp, D.T. and P.A. Carling. 1989. Observations on siting, dimensions and structure of salmonid redds. Journal of fish biology 34(1):119-134.

del Rosario, R.B., Redler, Y.J., Newman, K., Brandes, P.L., Sommer, T., Reece, K. and Vincik, R., 2013. Migration patterns of juvenile winter-run-sized Chinook salmon (Oncorhynchus tshawytscha) through the Sacramento–San Joaquin Delta. San Francisco Estuary and Watershed Science, 11(1).

Dettling, M. 2017. Yellow-billed Cuckoo Survey Generalized [ds1967]. Calif. Dept. of Fish and Wildlife. Biogeographic Information and Observation System (BIOS). Retrieved February 4, 2021 from http://bios.dfg.ca.gov

Dittman, A. and T. Quinn. 1996. Homing in Pacific salmon: mechanisms and ecological basis. Journal of Experimental Biology 199(1):83-91.

Dixon, J.B., R.E. Dixon, and J.E. Dixon. 1957. Natural history of the White-tailed Kite in San Diego County, California. The Condor 59(3):156-165.

Dunk, J.R. 1995. White-tailed Kite (*Elanus leucurus*). In A. Poole and F. Gill (eds.), The Birds of North America, No. 178. The Academy of Natural Sciences, Philadelphia, PA and The American Ornithologists' Union, Washington, DC U.S.A.

Dusek Jennings, E. and Hendrix, A.N., 2020. Spawn Timing of Winter-Run Chinook Salmon in the Upper Sacramento River. San Francisco Estuary and Watershed Science, 18(2).

Eckerle, K.P. and C.F. Thompson. 2001. Yellow-breasted Chat (*Icteria virens*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/575doi:bna.575

Eng, L.L., D. Belk, and C.H. Eriksen. 1990. California Anostraca: Distribution, habitat, and status. Journal of Crustacean Biology 10(2):247-277.

Eriksen, C.H. and D. Belk. 1999. Fairy shrimps of California's puddles, pools and playas. Mad River Press, Inc., Eureka, CA.

Ersan, J.S., Halstead, B.J., Wildy, E.L., Casazza, M.L. and Wylie, G.D., 2020. Intrinsic Prey Preference and Selection of the Giant Gartersnake: A Threatened Predator in a Nonnative Prey-Dominated Community. Journal of Fish and Wildlife Management, 11(1), pp.164-173.

Feyrer, F., B. Herbold, S.A. Matern, and P.B. Moyle. 2003. Dietary shifts in a stressed fish assemblage: consequences of a bivalve invasion in the San Francisco Estuary. Environmental Biology of Fishes 67(3): 277-288.

Fisher, R.G., R.W. Hansen, G. Hansen, and G. Stewart. 1994. Giant Garter Snake: Conservation and Recovery. Page 285 in C.G. Thelander and M. Crabtree (eds.), Life on the Edge: a Guide to California's Endangered Natural Resources and Wildlife. Santa Cruz, CA: Biosystems Books.

Fleming, I.A. and M.R. Gross. 1990. Latitudinal clines; a tradeoff between egg number and size of Pacific salmon. Ecology 71:1-11.

Gaines, D. 1974. A new look at the nesting riparian avifauna of the Sacramento Valley, California. W. Birds 5:61–80.

Gavette, C. 2017. Chinook Salmon Sacramento River Winter-run Critical Habitat - NOAA [ds2665]. Calif. Dept. of Fish and Wildlife. Biogeographic Information and Observation System (BIOS). http://bios.dfg.ca.gov. Accessed 5 February 2021.

Geist, D.R., C.S. Abernethy, K.D. Hand, V.I. Cullinan, J.A. Chandler, and P.A. Groves. 2006. Survival, development, and growth of fall Chinook Salmon embryos, alevins, and fry exposed to variable thermal and dissolved oxygen regimes. Transactions of the American Fisheries Society 135(6):1462-1477.

Gillis, C.A. and M. Chalifour. 2010. Changes in the macrobenthic community structure following the introduction of the invasive algae Didymosphenia geminata in the Matapedia River (Quebec, Canada). Hydrobiologia 647: 63–70.

Gogol-Prokurat, M. 2016. Calif. Dept. of Fish and Wildlife. Biogeographic Information and Observation System (BIOS). Retrieved February 4, 2021 from http://bios.dfg.ca.gov).

GrandTab 2020. California Central Valley Chinook Population Database Report. California Department of Fish and Wildlife.

Groot, C. and L. Margolis. 1991. Pacific Salmon life histories. Vancouver: UBC Press.

Goniea, T.M., M.L. Keefer, T.C. Bjornn, C.A. Peery, D.H. Bennett, and L.C. Stuehrenberg. 2006. Behavioral thermoregulation and slowed migration by adult fall Chinook salmon in response to high Columbia River water temperatures. Transactions of the American Fisheries Society 135(2):408-419.

Hallock, R. J., W.F. Van Woert, and L. Shapovalov. 1961. An evaluation of stocking hatchery reared steelhead rainbow trout (*Salmo gairdnerii gairdnerii*) in the Sacramento River system. California Department of Fish and Game 114. 74 pp.

Halstead, B.J., Valcarcel, P., Kim, R., Jordan, A.C., Rose, J.P., Skalos, S.M., Reyes, G.A., Ersan, J.S., Casazza, M.L., Essert, A.M. and Fulton, A.M., 2021. A tale of two valleys: endangered species policy and the fate of the giant gartersnake. California Fish and Wildlife, pp.264-283.

Halstead, B.J., Wylie, G.D. and Casazza, M.L., 2010. Habitat suitability and conservation of the giant gartersnake (Thamnophis gigas) in the Sacramento Valley of California. Copeia, 2010(4), pp.591-599.

Harrison, C.W. 1923. Planting eyed salmon and trout eggs. Transactions of the American Fisheries Society. 53: 191-199.

Harvey, B.C., J.L. White, and R.J. Nakamoto. 2009. The effect of deposited fine sediment on summer survival and growth of rainbow trout in riffles of a small stream. North American Journal of Fisheries Management 29:434-440.

Healey, M.C. 1991. Life history of Chinook Salmon (*Oncorhynchus tshawytscha*). Pages 311–393 in C. Groot and L. Margolis, editors. Pacific salmon life histories. University of British Columbia Press, Vancouver, British Columbia.

Healey, M.C., and W.R. Heard. 1984. Inter-and intra-population variation in the fecundity of Chinook Salmon (*Oncorhynchus tshawytscha*) and its relevance to life history theory. Canadian Journal of Fisheries and Aquatic Sciences 41:476-483.

Healy M. 2013. Auburn Ravine Rotary Screw Trap Monitoring Report. California Department of Fish and Wildlife, Auburn CA.

Healey, M. 2014. Completion of the 2013 Auburn Ravine Rotary Screw Trap Monitoring Report. California Department of Fish and Wildlife memorandum to Colin Purdy, Rancho Cordova, July 10.

Heard, W.R. 1978. Probable case of streambed overseeding: 1967 Pink Salmon, *Oncorhynchus gorbuscha*, spawners and survival of their progeny in Sashin Creek, southeastern Alaska. National Oceanic and Atmospheric Administration (United States) Fishery Bulletin 76:569-582.

Helix Environmental Planning . 2019. Salmon Spawning and Water Quality Surveys in Auburn Ravine. Prepared for Nevada Irrigation District Company and Helix Environmental Planning, INC. Auburn, California.

Helm, B.P. 1998. Biogeography of eight large branchiopods endemic to California. In Ecology, conservation, and management of vernal pool ecosystems− proceedings from a 1996 conference. California Native Plant Society, Sacramento, CA (pp. 124-139).

Heming, T.A. 1982. Effects of temperature on utilization of yolk by chinook salmon (*Oncorhynchus tshawytscha*) eggs and alevins. Canadian Journal of Fisheries and Aquatic Sciences 39(1):184-190.

Hermanson, J.W. and T.J. O'Shea. 1983. *Antrozous Pallidus*. Mammalian Species 213:1-8.

Heublein, J.C., J.T. Kelly, C.E. Crocker, et al. 2009) M.gration of green sturgeon, *Acipenser medirostris*, in the Sacramento River. Environ Biol Fish 84:245–258. doi:10.1007/s10641-008- 9432-9.

Hillemeier, D. 1999. An assessment of pinniped predation upon fall-run Chinook salmon in the Lower Klamath River, CA, 1997. Yurok Tribal Fisheries Program Report.

Hobbs, D. F. 1937. Natural reproduction of quinnat salmon, brown and rainbow trout in certain New Zealand waters, N. Z. Mar. Dep. Fish. Bull., 6, 104 pp.

Hokanson, K.E.F, C.F. Kleiner, and T.W. Thorslund. 1977. Effects of constant temperatures and diel temperature fluctuations on specific growth and mortality rates and yield of juvenile rainbow trout, *Salmo gairdneri*. Journal of the Fisheries Board of Canada 34(5):639-648.

Holland, D.C. 1994. The Western Pond Turtle: Habitat and History. Final Report. Portland, OR: U.S. Department of Energy, Bonneville Power Administration.

Hoobler, S. 2015. Completion of the Auburn Ravine Chinook Salmon Redd Survey Report. State of California, Department of Fish and Wildlife, Memorandum to MaryLisa Lynch, Dated September 14, 2015.

James, D.A., S.H. Ranney, S.R. Chipps, and B.D. Spindler. 2010. Invertebrate composition and abundance associated with Didymosphenia geminata in a montane stream. Journal of Freshwater Ecology 25:235–241.

Jeffres, C.A., J.J. Opperman, and P.B. Moyle. 2008. Ephemeral foodplain habitats provide best growth conditions for juvenile Chinook Salmon in a California river. Environmental Biology of Fishes 83:449–458.

Jennings, M.R., M.P. Hayes, and D.C. Holland. 1992. A petition to the U.S. Fish and Wildlife Service to place the California Red-legged Frog (*Rana aurora draytonii*) and the Western Pond Turtle (*Clemmys marmorata*) on the list of endangered and threatened wildlife and plants. US Fish and Wildlife Service, Portland, OR.

Jepson Flora Project. 2021. Jepson eFlora, http://ucjeps.berkeley.edu/eflora/, accessed on August 23, 2021.

Kalinowski, R.S. and M.D. Johnson. 2010. Influence of Suburban Habitat on a Wintering Bird Community in Coastal Northern California. The Condor 112(2):274-282.

Kammel, L.E., G. B. Pasternack. 2014. *Oncorhynchus mykiss* adult spawning physical habitat in the lower Yuba River . Prepared for the Yuba Accord River Management Team. University of California, Davis, California.

Kaufman, R.C., A.G. Houck, M. Workman, and J.J. Cech. 2009. Chinook Salmon length/fecundity : A regression model for the Mokelumne River, California. California Fish and Game 95:88-105.

Kellner, C.V. 1992. The presence of the valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*) in the San Joaquin Valley, California. Pages 143–147 in Endangered and sensitive species of the San Joaquin Valley, California: their biology, management and conservation, D. F. Williams, S. Byrne and T. A. Rado, Eds. California Energy Commission.

King, J.L., M.A. Simovich, and R.C. Brusca. 1996. Species richness, endemism and ecology of crustacean assemblages in northern California vernal pools. Hydrobiologia 328:85-116.

Kondolf, G.M. and M.G. Wolman. 1993. The sizes of salmonid spawning gravels. Water Resources Research 29(7):2275-2285.

Kondolf, G.M., J.C. Vick, and T.M. Ramirez. 1996. Salmon spawning habitat rehabilitation on the Merced River, California: an evaluation of project planning and performance. Transactions of the American Fisheries Society 125(6):899-912.

Limas, B. 2001. *Circus cyaneus* (On-line), Animal Diversity Web. Available: http://animaldiversity.ummz.umich.edu/site/accounts/information/Circus_cyaneus.html

Lindley, S.T. and M.S. Mohr. 2003. Modeling the effect of striped bass (*Morone saxatilis*) on the population viability of Sacramento River winter-run chinook salmon (Onchorhynchus tshawytscha). Fishery Bulletin 101(2):321-331.

Lindley, S.T., R.S. Schick, A. Agrawal, M. Goslin, T.E. Pearson, E. Mora, J.J. Anderson, B. May, S. Greene, C. Hanson, and A. Low. 2006. Historical population structure of Central Valley steelhead and its alteration by dams. San Francisco Estuary and Watershed Science 4(1).

Lloyd, D.S. 1987. Turbidity as a water quality standard for salmonid habitats in Alaska. North American Journal of Fisheries Management: Vol. 7, No. 1 pp. 34–45.

Macwhirter, R. and K. Bildstein. 1996. Northern Harrier. The Birds of North America, 210:1-25.

McEwan, D. 2001. “Central Valley Steelhead”. In contribution to the biology of Central Valley Salmonids, edited by R.L Brown 1-43. Sacramento California; California Department of Fish and Game.

McEwan, D. and T.A. Jackson. 1996. Steelhead restoration and management plan for California. California Department of Fish and Game, Inland Fisheries Division, Sacramento, Management Report.

McNeil, W.J. 1964. Redd superimposition and egg capacity of pink salmon spawning beds. Journal of the Fisheries Board of Canada, 21(6):1385-1396.

Meehan, W.R. and T.C. Bjornn. 1991. Salmonid distributions and life histories. Transactions of the American Fisheries Society 19.

Merz, J.E. 2001. Diet of juvenile fall-run Chinook Salmon in the lower Mokelumne River, California. California Fish and Game 87:102–114.

Merz, J.E. 2002. Comparison of diets of prickly sculpin and juvenile fall-run Chinook Salmon in the lower Mokelumne River, California. Southwestern Naturalist 47:195–204.

Merz, J.E., J.D. Setka, G.B. Pasternack, and J.M. Wheaton. 2004. Predicting benefits of spawning-habitat rehabilitation to salmonid (*Oncorhynchus* spp.) fry production in a regulated California river. Canadian Journal of Fisheries and Aquatic Sciences 61:1433-1446.

Merz, J.E. and L.K. Chan. 2005. Effects of gravel augmentation on macroinvertebrate assemblages in a regulated California river. River Research and Applications 21:61-74.

Merz, J.E. and P.B. Moyle. 2006. Salmon, wildlife, and wine: marine-derived nutrients in human-dominated ecosystems of Central California. Ecological Applications 16:999-1009..

Merz, J.E. and C.D. Vanicek. 1996. Comparative feeding habits of juvenile Chinook salmon, steelhead, and Sacramento squawfish in the lower American River, California. California Fish and Game 82(4):149-159.

Merz, J.E., M. Workman, D. Threloff, and B. Cavallo. 2013. Salmon lifecycle considerations to guide stream management: examples from California's Central Valley. San Francisco Estuary and Watershed Science 11(2).

Merz, J.E., D.G. Delaney, J.D. Setka, and M.L. Workman. 2015. Seasonal Rearing Habitat in a Large Mediterranean-Climate River: Management Implications at the Southern Extent of Pacific Salmon (Oncorhynchus spp.). River Research and Applications.

Merz, J.E., P.S. Bergman, J.L. Simonis, D. Delaney, J. Pierson, and P. Anders. 2016. Long-Term Seasonal Trends in the Prey Community of Delta Smelt (*Hypomesus transpacificus*) within the Sacramento-San Joaquin Delta, California. Estuaries and Coasts 39(5): 1526-1536.

Michel, C.J., Ammann, A.J., Chapman, E.D., Sandstrom, P.T., Fish, H.E., Thomas, M.J., Singer, G.P., Lindley, S.T., Klimley, A.P. and MacFarlane, R.B. 2013. The effects of environmental factors on the migratory movement patterns of Sacramento River yearling late-fall run Chinook salmon (*Oncorhynchus tshawytscha*). Environmental Biology of Fishes, 96(2), pp.257-271.

Miller, J.A., A. Gray, and J. Merz. 2010. Quantifying the contribution of juvenile migratory phenotypes in a population of Chinook Salmon (*Oncorhynchus tshawytscha*). Marine Ecology Progress Series 408:227–240.

Moyle, P.B. 2002. Inland fishes of California. Revised and expanded. University of California Press, Berkeley and Los Angeles, CA. 502 pp.

Moyle, P.B. and R. Nichols. 1973. Ecology of some native and introduced fishes of the Sierra-Nevada foothills in Central California. Copeia 1973:478-490.

Moyle, P.B., R.M. Quinones, J.V. Katz, and J. Weaver. 2015. Fish Species of Special Concern in California, Third Edition. California Department of Fish and Wildlife, Sacramento, CA.

Mulchaey, B. and J. Setka. 2007. Salmonid survey spawning report, October 2006 through March 2007, Mokelumne River, California. Available from: East Bay Municipal Utility District, 500 San Pablo Dam Road, Orinda CA 94563. 19pp.

Mundie, J.H. and D.G. Crabtree. 1997. Effects on sediments and biota of cleaning a salmonid spawning channel. Fisheries Management and Ecology 4: 111–126.

Myers, J.M., R.G. Kope, and G.J. Bryant. 1998. Status review of Chinook Salmon from Washington, Idaho, Oregon, and California. U.S. Department of Commerce, NOAA.

Myrick, C.A. and J.J. Cech Jr. 2005. Effects of temperature on the growth, food consumption, and thermal tolerance of age-0 Nimbus-strain steelhead. North American Journal of Aquaculture 67(4):324-330.

Narum, S.R., J.S. Zendt, D. Graves, and W.R. Sharp. 2008. Influence of landscape on resident and anadromous life history types of *Oncorhynchus mykiss*. Canadian Journal of Fisheries and Aquatic Sciences 65(6):1013-1023.

National Marine Fisheries Service (NMFS). 1993. Designated Critical Habitat: Sacramento River winter-run Chinook Salmon. Federal Register 58: 33212-33219.

NMFS. 1996. Factors for decline; a supplement to the notice of determination for West Coast Steelhead under the federal ESA. Portland, Oregon.

NMFS. 2006. Biological Opinion for the Sacramento River Flood Control Project, Critical Levee Erosion Repair Project. 151422SWR2006SA00115:HLB. Long Beach, CA. June.

NMFS. 2007. NOAA Guidance for Salmonid Passage at Stream Crossings. Southwest Region. May 2007.

NMFS. 2014. Recovery Plan for the Evolutionarily Significant Units of Sacramento River Winter-run Chinook Salmon and Central Valley Spring-run Chinook Salmon and California Central Valley Steelhead. West Coast Region. Sacramento, CA. July 2014.

NMFS. 2015. Southern distinct population segment of the north American green sturgeon (Acipenser medirostris) 5-year review: summary and evaluation. National Marine Fisheries Service West Coast Region, Long Beach.

NMFS. 2016. Biological opinion and conference opinion and Fish and Wildlife Coordination Act Recommendations for the Mendota Pool Bypass and Reach 2B Improvements Project. Section 7 Consultation with the U.S. Bureau of Reclamation. Available: http://www.restoresjr.net/?wpfb_dl=1605

Null E. R., Niemela S. K.., Hamelberg F. S. 2013. Post-spawn migrations of hatchery-origin Oncorhynchus mykiss kelts in the Central Valley of California. Environ Biol Fish (2013) 96:341-353. Springer Science and Business B.V. 2012.

Parenskiy, V.A. 1990. Relation between the spawning success of Sockeye Salmon, *Oncorhynchus nerka*, and behavior on spawning grounds. Journal of Ichthyology 30:48–58.

Pasternack, G. B., D. Tu, and J.R. Wyrick. 2014. Chinook adult spawning physical habitat of the lower Yuba River. Prepared for the Yuba Accord River Management Team. University of California, Davis, CA, 154pp.

Patterson, D.A., H. Guderley, P. Bouchard, J.S. Macdonald, and A.P. Farrell. 2004. Maternal influence and population differences in activities of mitochondrial and glycolytic enzymes in emergent Sockeye Salmon (*Oncorhynchus nerka*) fry. Can J Fish Aquat Sci 61:1225–1234.

Pennack, R.W. 1989. Freshwater invertebrates of the United States from Protozoa to Mollusca. 3rd Edition. Wiley, NY.

Phillips, R. W. and H. J. Campbell. 1961. The embryonic survival off coho salmon and steelhead trout as influenced by some environmental conditions in gravel beds. Pac. Mar. Fish. Comm. Rep. 14: 60-73.

Phillips, R.W., R.L. Lantz, E.W. Claire, and J.R. Moring. 1975. Some effects of gravel mixtures on emergence of coho salmon and steelhead trout fry. Transactions of the American Fisheries Society 104(3): 461-466.

Phillis, C.C., Sturrock, A.M., Johnson, R.C. and Weber, P.K., 2018. Endangered winter-run Chinook salmon rely on diverse rearing habitats in a highly altered landscape. Biological Conservation, 217, pp.358-362.

Platts, W. S., M. A. Shirazi, and D. H. Lewis. 1979. Sediment particle sizes used by salmon for spawning with methods for evaluation, U.S. EPA Rep. EPA 600/3-79-043, Corvallis, OR.

Poytress, W.R., Gruber, J.J., Carrillo, F.D. and Voss, S.D., 2014. Compendium report of Red Bluff Diversion Dam rotary trap juvenile anadromous fish production indices for years 2002–2012. Report of US Fish and Wildlife Service to California Department of Fish and Wildlife and US Bureau of Reclamation.

Poytress, W.R., Gruber, J.J., Van Eenennaam, J.P. and Gard, M., 2015. Spatial and temporal distribution of spawning events and habitat characteristics of Sacramento River green sturgeon. Transactions of the American Fisheries Society, 144(6), pp.1129-1142.

Quinn, T.P. 1980. Evidence for celestial and magnetic compass orientation in lake migrating sockeye salmon fry. Journal of Comparative Physiology A: Neuroethology, Sensory, Neural, and Behavioral Physiology 137(3):243-248.

Reeves, J.E. 1964. Age and growth of hardhead minnow *Mylopharodon conocephalus* (Baird and Girard), in the American River basin of California, with notes of its ecology. M.S. Thesis, U.C. Berkeley, Berkeley, CA.

Reiser, D. and T. Bjornn. 1979. Influence of forest and rangeland management on anadromous fish habitat in the western United States and Canada. USDA Forest Service Technical Report PNW-96.

Reynolds, F.L., T.J. Mills, R. Benthin, and A. Low. 1993. Restoring Central Valley streams: a plan for action. California Department of Fish and Game, Sacramento, California.

Sabal, M., S. Hayes, J. Merz, and J. Setka. 2016. Habitat alterations and a nonnative predator, the Striped Bass, increase native Chinook Salmon mortality in the Central Valley, California. North American Journal of Fisheries Management 36(2):309-320.

Santos, N. 2014a. White sturgeon Range - FSSC [ds1206]. Calif. Dept. of Fish and Wildlife. Biogeographic Information and Observation System (BIOS). Retrieved February 4, 2021 from http://bios.dfg.ca.gov

Santos, N. 2014b. Delta Smelt Range [ds1249]. Calif. Dept. of Fish and Wildlife. Biogeographic Information and Observation System (BIOS). Retrieved February 4, 2021 from http://bios.dfg.ca.gov

Santos, N. 2014c. Sacramento Splittail Range - FSSC [ds1305]. Calif. Dept. of Fish and Wildlife. Biogeographic Information and Observation System (BIOS). http://bios.dfg.ca.gov. Accessed 10 February 2021

Santos, N. 2014d. Eulachon Range [ds1325]. Calif. Dept. of Fish and Wildlife. Biogeographic Information and Observation System (BIOS). http://bios.dfg.ca.gov. Accessed 15 February 2021

Sasaki, S. 1966. Distribution and food habits of king salmon, *Oncorhynchus tshawytscha*, and steelhead rainbow trout, *Salmo gairdnerii,* in the Sacramento-San Joaquin Delta. CDFG Fish Bulletin 136:108-14.

Sellheim, K.L., M. Vaghti, and J.E. Merz. 2016. Vegetation recruitment in an enhanced floodplain: Ancillary benefits of salmonid habitat enhancement. Limnologica-Ecology and Management of Inland Waters 58:94-102.

Servizi, J.A. and D.W. Martens. 1992. Sublethal responses of coho salmon (Oncorhynchus kisutch) to suspended sediments. Canadian Journal of Fisheries and Aquatic Sciences 49(7):1389-1395.

Sogge, M.K., D. Ahlers, and S.J. Sferra. 2010. A natural history summary and survey protocol for the southwestern willow flycatcher. U.S. Geological Survey Techniques and Methods 2A-10, 38 p

Shrivell, C.S. 1990. Role of instream rootwads as juvenile coho salmon (*Oncorhynchus kisutch*) and steelhead trout (*O. mykiss*) cover habitat under varying streamflows. Canadian Journal of Fisheries and Aquatic Sciences 47(5):852-861.

Shuford WD, Gardali T. 2008. California Bird Species of Special Concern: A ranked assessment of species, subspecies, and distinct populations of birds of immediate conservation concern in California.

Studies of Western Birds 1: Western Field Ornithologists, Camarillo, CA, and California Department of Fish and Game, Sacramento, CA.

Sigler, J.W., T.C. Bjornn, and F.H. Everest. 1984. Effects of chronic turbidity on density and growth of steelheads and coho salmon. Transactions of the American Fisheries Society 113(2): 142-150.

Slater, D. W. 1963. Winter-run Chinook salmon in the Sacramento River, California with notes on water temperature requirements at spawning. Special Scientific Report – Fisheries 461. U.S. Fish and Wildlife Service.

Sogard, S.M., Merz, J.E., Satterthwaite, W.H., Beakes, M.P., Swank, D.R., Collins, E.M., Titus, R.G. and Mangel, M., 2012. Contrasts in habitat characteristics and life history patterns of Oncorhynchus mykiss in California's central coast and Central Valley. Transactions of the American Fisheries Society, 141(3), pp.747-760.

Sogge, M.K., D. Ahlers, and S.J. Sferra. 2010. A natural history summary and survey protocol for the southwestern willow flycatcher. U.S. Geological Survey Techniques and Methods 2A-10, 38.

Sommer, T.R., M.L. Nobriga, W.C. Harrell, W. Batham, and W.J. Kimmerer. 2001. Floodplain rearing of juvenile Chinook Salmon: evidence of enhanced growth and survival. Canadian Journal of Fisheries and Aquatic Sciences 58:325-333.

Spinks, P.Q., R.C. Thomson, and H.B. Shaffer. 2014. The advantages of going large: genome-wide SNPs clarify the complex population history and systematics of the threatened Western Pond Turtle. Molecular Ecology 23(9):2228-2241.

Stillwater Sciences. 2005. Conceptual restoration design for the Merced River Ranch. Volume I: conceptual design report. Stillwater Sciences, Berkeley, California.

Sutter County. 2011. 2030 Sutter County General Plan. 29 March 2011. Available: https://www.suttercounty.org/government/county-departments/development-services/planning-and-building-services/planning-services/general-plan.

Suttle, K.B., M.E. Power, J.M. Levine, and C. McNeely. 2004. How fine sediment in riverbeds impairs growth and survival of juvenile salmonids. Ecological applications 14(4): 969-974.

Tappel, P.D. and T.C. Bjornn. 1983. A new method of relating size of spawning gravel to salmonid embryo survival. North American Journal of Fisheries Management 3(2): 123-135.

Tierney K.B., D.A. Patterson, and C.J. Kennedy. 2009. The influence of maternal condition on offspring performance in Sockeye Salmon *Oncorhynchus nerka*. Journal of Fish Biology 75:1244–1257.

USFWS. 1997. Guidance on site assessment and field surveys for California red-legged frogs. 6 pp.

USFWS. 1999. Conservation guidelines for the Valley elderberry longhorn beetle. U.S. Fish and Wildlife Service, Sacramento, California, July 1999. 13 pp.

USFWS. 1993. Determination of Threatened Status for the Giant Garter Snake. 50 CFR Part 17, 54053-54065

USFWS. 2005. Recovery plan for vernal pool ecosystems of California and Southern Oregon. Portland, OR.

USFWS. 2006. Final Critical Habitat for Vernal Pool Fairy Shrimp (*Branchinecta lynchi*)-Vernal Pool Species. Sacramento, CA.

USWFS. 2009. Species Account: California Tiger Salamander *Ambystoma californiense*. Sacramento Fish & Wildlife Office. 29 July 2009. Available: https://www.fws.gov/sacramento/es_species/Accounts/Amphibians-Reptiles/ca_tiger_salamander/documents/california_tiger_salamander.pdf

USFWS. 2014. Endangered and threatened wildlife and plants; Withdrawal of the proposed rule to remove the Valley Elderberry Longhorn Beetle from the Federal List of Endangered and Threatened wildlife. Federal Register 74:55874-55917.

USFWS. 2017. Framework for Assessing Impacts to the Valley Elderberry Longhorn Beetle (*Desmocerus californicus dimorphus*). U.S. Fish and Wildlife Service; Sacramento, California. 28 pp.

USFWS. 2021. Threatened and endangered species list for the Natomas Cross Canal Habitat Restoration Project. USFWS Sacramento Fish and Wildlife Office, Sacramento, CA.

U.S. Geological Survey (USGS). 2004. Habitat Assessment and Baseline Surveys for the Western Spadefoot (*Spea hammondii*) and the Western Pond Turtle (*Emys marmorata*) on the Irvine Ranch Land Reserve. Prepared for The Nature Conservancy and The Irvine Company. October 2004. Available: https://sdmmp.com/upload/SDMMP_Repository/0/p7zfjg0vqt3y4k25d9rm8csxw6bnh1.pdf

Vaghti, M. 2021. Natomas Cross Canal Restoration Project: Pre-Project Vegetation Sampling. Prepared for Cramer Fish Sciences and MBK. West Sacramento, CA.

Vincik, Robert & Titus, Rob. (2007). Occurrence of a eulachon, *Thaleichthys pacificus*, in the Lower Sacramento River, California. California Fish and Game. 93. 161-165.

Vogel, D.A. and K.R. Marine. 1991. Guide to upper Sacramento River Chinook Salmon life history. Prepared by CH2M Hill, Redding, California for U.S. Bureau of Reclamation, Central Valley Project.

Water, T.F. 1995. Sediment in streams; sources, biological effects and controls. American Fisheries Society Monograph 7. Bethesda, MA: American Fisheries Society.

Wheaton, J.M., G.B. Pasternack, and J.E. Merz. 2004. Spawning Habitat Rehabilitation – II. Using hypothesis development and testing in design, Mokelumne River, California, U.S.A. International Journal of River Basin Management 2:1:21-37.

Wheeler, B. and W. Clark. 1987. The Peterson Field Guide Series: A Field Guide to Hawks of North America. Boston: Houghton Mifflin Company.

Williams, J.G. 2001. Chinook salmon in the lower American River, California's largest urban stream. In R. Brown, editor, Contributions to the biology of anadromous salmonids of the Central Valley, California. Fish Bulletin 179(2):1-37.

Williams, T.H., Lindley, S.T., Spence, B.C. and Boughton, D.A., 2011. Status review update for Pacific salmon and steelhead listed under the Endangered Species Act: Southwest. NOAA's National Marine Fisheries Service, Southwest Fisheries Science Center, Santa Cruz, CA.

Withler, I.L., 1966. Variability in life history characteristics of steelhead trout (*Salmo gairdneri*) along the Pacific coast of North America. Journal of the Fisheries Board of Canada, 23(3), pp.365-393.

Wood, D.A., B.J. Halstead, M.L. Casazza, E.C. Hansen, G.D. Wylie, and A.G. Vandergast. 2015. Defining population structure and genetic signatures of decline in the giant gartersnake (*Thamnophis gigas*): implications for conserving threatened species within highly altered landscapes. Conservation Genetics 16(5):1025-1039.

Workman, M.L. 2005. Downstream Fish Migration Monitoring at Woodbridge Irrigation District Dam Lower Mokelumne River, January 2004 through June 2004 September 2004. East Bay Municipal Utility District, Lodi, California.

Wurtsbaugh, W.A. and G.E. Davis. 1977. Effects of temperature and ration level on the growth and food conversion efficiency of *Salmo gairdneri*, Richardson. Journal of Fish Biology, 11:87–98.

Yoshiyama, R.M., F.W. Fisher, and P.B. Moyle. 1998. Historical abundance and decline of Chinook Salmon in the central valley region of California. North America Journal of Fisheries Management 18(3):487-521.

Yuba River Accord River Management Team (Yuba RMT). 2013. Interim Monitoring & Evaluation Report.

Zeug, S.C., K. Sellheim, C. Watry, J.D. Wikert, and J. Merz. 2014. Response of juvenile Chinook Salmon to managed flow: lessons learned from a population at the southern extent of their range in North America. Fisheries Management and Ecology 21(2):155-168.

Zeiner, D.C., W.F. Laudenslayer Jr., K.E. Mayer, and M. White, eds. 1990. California's Wildlife. Vol. I-III. California Department of Fish and Game, Sacramento, California.

Zeug, S.C., Null, R., Brodsky, A., Johnston, M. and Ammann, A.J., 2020. Effect of release timing on apparent survival of juvenile fall run Chinook Salmon from Coleman National Fish Hatchery. Environmental Biology of Fishes, 103(5), pp.411-423.

Zimmerman, C.E., G.W. Edwards, and K. Perry. 2009. Maternal origin and migratory history of steelhead and rainbow trout captured in rivers of the Central Valley, California. Transactions of the American Fisheries Society 138(2): 280-291

Mitigation:

BIO-1. Survey for Rare Plants and Avoid or Relocate if Discovered
Prior to the start of construction, a rare plant survey would be performed following the Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Natural Communities (CDFW 2018) during the appropriate blooming season for potential species present. If any special status plant species are discovered during the survey, additional ESA fencing or relocation would be performed to avoid and minimize impacts to special status plant species. CDFW may be consulted with concerning appropriate buffer distances and/or species relocation.

BIO-2. Adaptive Construction Approach to Protect Elderberry Plants, Monitor Survival, and Mitigate for Loss
To avoid direct mortality to VELB from crushing by heavy equipment or through destruction of their elderberry shrub habitat during construction, elderberry plants shall be clearly marked prior to construction and intrusion into the prescribed 20-foot buffer zone shall be avoided, as possible. If any mortality of elderberry shrubs occurs, USFWS shall be consulted immediately and appropriate mitigation will be implemented.

BIO-3. Survey for and Relocate Western Pond Turtle if Observed in Project Area
Within 24 hours prior to start of construction activities, the project area would be surveyed for western pond turtle by a qualified biologist. If a western pond turtle is observed in the project area, the qualified biologist would relocate it to the nearest suitable habitat location that is outside of the project area.

After WEF installation is completed, the Project area enclosed by WEF would be surveyed by the GGS biologist for western pond turtle as well during the GGS survey. If any western pond turtles are found, they would be relocated by the biologist to the closest location with suitable habitat that is outside of the project area. If any western pond turtles are found in the exclusion area at any other time they will be similarly relocated by a qualified biologist.

BIO-4. Avoidance and Minimization Measure to Reduce Potential Impacts to GGS during Project Implementation
Within 24 hours prior to start of construction activities, the project area would be surveyed for GGS. Project area GGS survey would be repeated if there is a lapse in construction activity of two weeks or greater. A GGS biologist would perform the surveys. A GGS biologist is defined as a biologist with GGS experience and approved by USFWS and CDFW to perform surveys for the species.

Before any construction begins, personnel would receive worker environmental awareness training provided by a USFWS/CDFW approved biologist. The training would instruct workers to recognize GGS and their habitat and discuss the protection measures to be implemented during construction.

The first construction activity would be the installation of GGS wildlife exclusion fencing (WEF) along the project boundary that is adjacent to or within GGS habitat. The WEF would be installed prior to any other construction activities or staging of equipment to prevent GGS from entering project areas during construction. The WEF specifications are the following:

- WEF would consist of taught silt fencing supported by wooden stakes or rebar on the Project side only.
- WEF would be buried at least 6 inches below ground and extend 12 to 18 inches above ground. Soil would be compacted against the fence for its entire length to prevent special status species from going under the fence.
- The WEF would be inspected daily by the contractor to ensure that there are no holes or tears, the bottom is buried, and it remains taught. The contractor would maintain and repair the WEF as necessary for the duration of construction. The GGS biologist would also periodically inspect the GGS WEF to ensure it is properly functioning.
- After WEF installation is completed, the Project area enclosed by WEF would be surveyed by the GGS biologist. If any GGS are found, they will be relocated by a GGS biologist with a 10(a)(1)(A) recovery permit to an area with suitable habitat that is outside the exclusion area, but adjacent to, the Project area. If any GGS are found in the exclusion area at any other time they will be similarly relocated by a GGS biologist with a 10(a)(1)(A) recovery permit.

Movement of heavy equipment will be confined to existing roadways, designated staging areas, and already disturbed areas, as possible, to minimize habitat disturbance. Project related vehicles would observe a 15 mile-per-hour speed limit within the project area. All equipment, vehicles, and supplies would be stored at the designated staging areas at the end of each workday. To eliminate attraction of GGS predators, all food-related trash items will be disposed of in closed containers, which would be removed daily from the Project area.

Construction activity within 200 feet of potential GGS habitat would be conducted between May 1 and October 1.

A GGS biologist would be present during all initial ground disturbance activities including excavation, grading, and fill placement.

Clearing and grubbing will be confined to the minimal area necessary to perform construction activities. Avoided GGS habitat will be designated as Environmentally Sensitive Areas within and adjacent to the project area. The designated Environmentally Sensitive Areas will be fenced with WEF and orange plastic construction fencing on project side to ensure avoidance by all construction equipment and personnel.

If a snake is encountered during construction, activities within 100 feet of the snake shall cease until the snake leaves the project area on its own or the GGS biologist determines the snake is not a GGS. No snakes would be intentionally killed, harmed, or harassed during Project implementation and they would be allowed to volitionally leave the Project area. If a snake is observed retreating underground or is stationary in the Project area, all construction activity within 100 feet of the location would cease. If a possible GGS goes underground, the GGS biologist would be contacted and respond to the situation in coordination with USFWS and CDFW. Only a GGS biologist with 10(a)(1)(A) recovery permit would handle GGS and only as a last resort.

To prevent entrapment of GGS, escape ramps would be placed at both ends of open excavations at the end of each workday to allow any GGS to escape overnight. The escape ramps would be

comprised of dirt fill, or wood or other suitable material planking. Any steep sided excavations, such as trenches, would be inspected by the GGS biologist prior to filling. If a trapped GGS is discovered, then the GGS biologist with 10(a)(1)(A) recovery permit would respond in coordination with USFWS and CDFW.

No dewatering of habitat is expected to occur.

To minimize sediment from entering GGS habitat, all BMPs and erosion control measures in the SWPPP and on Project design plans would be implemented and contractually required by the contractor. Weekly BMP inspections would occur to ensure that the BMPs are being implemented as intended.

After completion of construction activities, all temporary fill and construction debris would be removed and disturbed areas restored to pre-project conditions, if feasible. Restoration work would include replanting species removed from banks or replanting emergent vegetation in the active channel. Emergent plants which may be planted would include California bulrush (*Scirpus californicus*), cattail, water primrose (*Ludwigia peploides*), common tule (*Scirpus acutus*), Baltic rush (*Juncus balticus*), or duckweed (*Lemna* spp.). Disturbed upland areas, such as levee slopes, would be hydroseeded to prevent erosion using the following seed mixture. The seed mixture would be comprised of at least 20-40 percent native grass seeds [such as annual fescue (*Vulpia* spp.), California brome (*Bromus carinatus*), blue wildrye (*Elymus glaucas*), and needle grass (*Nasella* spp.)], 2-10 percent native forb seeds, five percent rose clover (*Trifolium hirtum*), and five percent alfalfa (*Medicago sativa*). Approximately 40 -68 percent of the mixture would be non-aggressive European annual grasses [such as wild oats (*Avena sativa*), wheat (*Triticum* spp.), and barley (*Hordeum vulgare*)].

BIO-5. Monitor for Special-Status Raptors and Other Birds to Prevent Impacts
Pre-construction surveys shall be conducted by qualified biologists, who shall determine the use of the Project Area by special status species.

Protocol-level surveys shall be implemented for special status species including Tri-colored Blackbird , Burrowing Owl , White-tailed Kite, Northern Harrier, Loggerhead Shrike (*Lanius ludovicianus*), and other nesting birds and raptors. This includes pre-construction surveys conducted no more than 10 days before Project implementation by qualified biologists. A minimum no-disturbance buffer of 250 feet around active nests of non-listed and migratory bird species and a 500 foot no-disturbance buffer around active raptor nests shall be established until breeding season is over or biologist has determined the young have fledged and are no longer reliant on the nest for survival. If such a buffer cannot be reasonably accomplished, CDFW shall be consulted.

BIO-6. Pre-Construction Surveys and Buffer Implementation to Prevent Impacts to Swainson's Hawk
Pre-construction surveys for Swainson's hawk nests would be performed by a qualified biologist within a quarter mile of the Project area within 10 days of construction starting following the Swainson's Hawk Technical Advisory Committee Recommended Timing and Methodology for Swainson's Hawk Nesting Surveys in California's Central Valley protocol. Additionally, any trees slated for removal would be surveyed for active nests within 48 hours of planned removal. If an

active nest is observed in a tree slated for removal the tree would not be removed until after all young have fledged (Bio -5). Any active nest observed would be protected with a quarter mile buffer. If a quarter mile buffer is not feasible, then CDFW would be consulted to determine an appropriate buffer distance and/or protective measures that would still allow the project to proceed.

BIO-7. Protect and Compensate for Native Trees
Native trees, such as Fremont cottonwood, willows, and alder, with a dbh of 6 in (15.2 cm) or greater shall be protected with 30-ft (9.1-m), 10-ft (3-m), and 10-ft (3-m) buffers, respectively, as possible. Native trees shall be marked with flagging if close to the work area to prevent disturbance. To compensate for the removal of riparian shrubs and trees during Project implementation, the plans shall identify tree and shrub species to be planted, how, where, and when they would be planted, and measures to be taken to ensure a minimum performance criteria of 70% survival of planted trees. The tree plantings shall be based on native tree species compensated for in the following manner:

- Oaks having a dbh of 3 – 5 in (7.6 – 12.7 cm) shall 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 of greater than 5 in shall be replaced in-kind at a ratio of 5:1.
- Riparian trees (i.e., willow, cottonwood, poplar, alder, ash, etc.) and shrubs shall be replaced in-kind within the Project boundary, at a ratio of 3:1, and planted in the nearest suitable location to the area where they were removed.

BIO-8 Work Outside of Critical Periods for Special Status Species
To avoid impacts to special status species, all ground disturbing activities shall be conducted during the period of 1 June through 31 October. Nesting birds and raptors are protected under the MBTA and CDFG Code, and trees and shrubs within the Project Area likely provide nesting habitat for songbirds and raptors. If construction activities occur during the potential breeding season (February through August) a qualified biologist shall conduct surveys for active nests and/or roosts within a ½ mile radius of the Project Area no more than 10 days prior to the start of construction. A minimum no disturbance buffer shall be delineated around active nests (size of buffer will depend on species encountered) until the breeding season has ended or until a qualified biologist has determined that the birds have fledged and are no longer reliant upon the nest or parental care for survival.

BIO-9. Monitor for Bats to Prevent Impacts.
The Project construction shall occur outside the critical period for bats (after 15 July). Before any ground disturbing activities, a qualified biologist shall survey for the presence of associated habitat types for the bat species of concern. If bats are present, the biologist shall apply a minimum 300 ft (91.4 m) no-disturbance buffer around roosting bats, maternity roosts or winter hibernacula until all young bats have fledged.

BIO-10. Prevent Spread of New Zealand Mudsnails and other Aquatic Invasive Species
New Zealand mudsnails (*Potamopyrgus antipodarum*), an introduced species, has been identified in numerous rivers of the Central Valley. To minimize the chance that the snails may be transported and spread to other water bodies on equipment, construction specifications shall

require that equipment be steam cleaned immediately after the work is completed and before being used in other water bodies. An Invasive Species Risk Assessment and Planning (ISRAP) protocol shall be developed, and all appropriate staff shall be trained as to its purpose and implementation before construction begins. The ISRAP shall be used to prevent the spread of invasive species during Project construction.

BIO-11. Monitor for Fish to Prevent Impacts
Within 48 hours prior to the start of any in-water work, the work area would be surveyed for special status fish species by a qualified biologist. If the biologist observes any special status species in the in-water work area a strategy for minimizing impact will be determined. If fish would be able to volitionally move away from the in-water work area then they would be allowed to do so to avoid being impacted. If fish would not be able to volitionally move away then they would be herded out of the in-channel work area to suitable habitat using a beach seine. After relocation, fish exclusion netting would be installed around the work area as feasible to prevent fish from entering the area during in-water work.

WQ-1. Monitor Water Quality and Prevent Impacts
During in river work, turbidity and total suspended solids shall be monitored with intermittent grab samples from the river, and construction curtailed if turbidity exceeds criteria established by the Regional Water Quality Control Board in its Clean Water Act §401 Water Quality Certification for the Project. Specifically, sampling shall be performed immediately upstream from the Project Area and approximately 300 feet downstream of the active work area during construction.

Activities shall not cause in surface waters:

a) turbidity to exceed 2 NTU's where natural turbidity is less than 2 NTU;
b) where natural turbidity is between 1 and 5 NTUs, increases exceeding 1 NTU;
c) where natural turbidity is between 5 and 50 NTUs, increase exceeding 20 percent;
d) where natural turbidity is between 50 and 100 NTUs, increases exceeding 10 NTUs;
e) where natural turbidity is greater than 100 NTUs, increase exceeding 10 percent.

Activities shall not cause settleable material to exceed 0.1 ml/L in surface waters as measured in surface waters downstream from the Project Area. Activities shall not cause pH to be depressed below 6.5 nor raised above 8.5 as measured in surface waters downstream from the Project Area.

The Project shall not discharge petroleum products into surface water. The Central Valley Water Board shall be notified immediately of any spill of petroleum products.

Sediment fencing shall be used along the river corridor to capture floating materials or sediments mobilized during construction activities and prevent water quality impacts. Stream bank impacts shall be isolated and minimized to reduce bank sloughing. Banks shall be stabilized with revegetation following Project activities, as appropriate.

A SWPPP shall be developed as part of the BMPs. All pertinent staff shall be trained on and familiarized with these plans. Copies of the plans and appropriate spill prevention equipment referenced in them shall be made available onsite and staff shall be trained in its use. Spill

prevention kits shall be in close proximity to construction areas, and workers trained in their proper use.

WQ-2. Use Clean Equipment and Biodegradable Lubricants.
All equipment used shall be clean. All equipment working within the stream channel shall be inspected daily for fuel, lubrication, and coolant leaks; and, for leak potentials (e.g. cracked hoses, loose filling caps, stripped drain plugs). Vehicles shall be fueled and lubricated in a designated staging area located outside the stream channel and banks. Construction specifications shall require that any equipment used in or near the river is properly cleaned to prevent any hazardous materials from entering the river, and containment material shall be available onsite in case of an accident. Spill prevention kits shall be located close to construction areas, with workers trained in its use. Contracted construction managers shall regularly monitor construction personnel to ensure environmental compliance.

NOISE-1. Reduce Impacts from Noise.
To mitigate noise related impacts, the Project shall require all contractors to comply with the following operational parameters:

- restrict construction activities to time periods between 7:00 am and 5:00 pm when there is the least potential for disturbance;

- install and maintain sound-reducing equipment and muffled exhaust on all construction equipment.

V. Cultural Resources	Potentially Significant Impact	Less Than Significant with Mitigation	Less Than Significant Impact	No Impact
Would the project:				
a) Cause a substantial adverse change in the significance of a historical resource which is either listed or eligible for listing on the National Register of Historic Places, the California Register of Historic Resources, or a local register of historic resources?	☐	☐	☒	☐
b) Cause a substantial adverse change in the significance of a unique archaeological resources (i.e., an artifact, object, or site about which it can be clearly demonstrated that, without merely adding to the current body of knowledge, there is a high probability that it contains information needed to answer important scientific research questions, has a special and particular quality such as being the oldest or best available example of its type, or is directly associated with a scientifically recognized important prehistoric or historic event or person)?	☐	☐	☒	☐
c) Disturb or destroy a unique paleontological resource or site?	☐	☐	☐	☒

d) Disturb any human remains, including those interred outside of formal cemeteries?	☐	☐	☒	☐

Discussion:

a) As part of the preparation for the Project, a cultural resource study was conducted by Horizon Water and Environment (HWE 2021). Compliance with Section 106 of the National Historic Preservation Act (NHPA) of 1966 (16USC § 470f [2008]) is required, whereby any federal undertaking must "take into account the effect of the undertaking on any district, site, building, structure, or object that is included in or eligible for inclusion in the National Register." The implementing regulations for Section 106 are found under 36 CFR § 800, as amended (2001). Cultural resources may also be considered separately under the National Environmental Protection Act (42 USC) Section 4321-4327, whereby federal agencies are required to consider potential environmental impacts and appropriate EC's for projects with federal involvement. Also, impacts to cultural resources are considered if the resource is "significant" or "important" or "unique archaeological resource" under the provisions of CEQA Sections 15064.5 and 15126.4. The policies of the 2030 Sutter County General Plan (Sutter County 2011) also apply to the Project. Cultural resources are addressed under the Cultural Resources Element of the general plan. The County's current 2015 General Plan includes policies and implementation measures relevant to the preservation and protection of cultural resources. Even with these measures undertaken, it is possible that during construction activities unknown cultural resources could be unearthed.

No known historic properties would be affected by the Project and no historical resources, as defined by CEQA, would be impacted by the Project. The only structures within the Action Area are pumping stations; therefore, there are no human built architectural resources that could be impacted. However, if any objects of cultural significance are unearthed during the construction process, work would be halted until a qualified archeologist can assess the significance of the new find (see **CR-1- Inadvertent Discoveries of Objects of Cultural Significance**). If human remains are unearthed during the construction process, the Project team would comply with the California Health and Safety Code Section 7050.5, which states that no further disturbance shall occur until the County Coroner has investigated the situation following the Public Resource Code Section 5097.98. With this EC in place, the Project is expected to have **a less than significant impact** on historical resources.

b) No cultural resources considered to be historic properties or historical resources were recorded in the Action Area as a result of the records search and field survey. However, the Project's construction activities would include grading and excavation of areas. Subsurface cultural objects could be unearthed during the grading and excavation activities which is a potentially significant impact. If any objects with potential cultural significance are unearthed during the construction process, work would be halted within the vicinity of the inadvertent discovery until a qualified archeologist (and Native American representative if the find is potentially pre-historic) can assess the significance of the new find (see **CR-1- Inadvertent Discoveries of Objects of Cultural Significance**) and prescribe measures to reduce potential impacts to be **less than significant**. The final disposition of archaeological, historical, and paleontological resources recovered on State lands under the jurisdiction of the State Lands Commission must be approved by the Commission.

c) The Action Area contains Modesto and Riverbank formations. Numerous vertebrate fossils have been found throughout the CV in these formations.The documentation of vertebrate fossils in these formations in localities throughout the CV suggests there is potential for uncovering similar fossil remains during Project earth moving activities. No known unique paleontological resources, sites, or unique geological features are present within the Action Area. Therefore, **no impact** is expected.

d) No potential burial grounds were determined to be present in the Area of Potential Effects during the records search and field survey. Construction activities for the Project would include excavation and grading which have the potential to unearth subsurface human remains which is a potentially significant impact. If human remains are unearthed during the construction process, work would be halted within the vicinity of the human remains, the Coroner contacted, and **CR-1 - Inadvertent Discoveries of Objects of Cultural Significance** would be implemented. This EC would reduce potential impacts to a **less than significant** level. The Project would comply with the California Health and Safety Code Section 7050.5, which states that no further disturbance shall occur until the County Coroner has investigated the situation following the Public Resource Code Section 5097.98.

Documentation:

Horizon Water and Environment, LLC (HWE). 2021. Cultural Resources Assessment Report. Natomas Cross Canal Berm and Channel Habitat Enhancements Project Sutter County, California. Prepared for Cramer Fish Sciences (CFS). June 2021.

Sutter County. 2011. 2030 Sutter County General Plan. 29 March 2011. Available: https://www.suttercounty.org/government/county-departments/development-services/planning-and-building-services/planning-services/general-plan.

Mitigation:

CR-1. Inadvertent Discoveries of Objects of Cultural Significance
If any objects of cultural significance are unearthed during the construction process, work shall be halted immediately until a qualified archeologist can assess the significance of the new find. If human remains are unearthed during the construction process, the Project team shall comply with the California Health and Safety Code Section 7050.5, which states that no further disturbance shall occur until the County Coroner has investigated the situation following the Public Resource Code Section 5097.98.

VI. Energy	Potentially Significant Impact	Less Than Significant with Mitigation	Less Than Significant Impact	No Impact
Would the project:				
a) Result in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation?	☐	☐	☒	☐
b) Conflict with or obstruct a state or local plan for renewable energy or energy efficiency?	☐	☐	☐	☒

Discussion:

a) Energy consumption during project construction would be minimal and restricted to that required for operating heavy machinery to move material to grade the islands and reinforce the berm. The impact would be **less than significant.**

b) The project would not interfere with a state or local plan for renewable energy or energy efficiency. There would be **no impact**.

Documentation:

None required.

Mitigation:

None Required.

VII. Geology and Soils	Potentially Significant Impact	Less Than Significant with Mitigation	Less Than Significant Impact	No Impact
Would the project:				
a) Directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving:				
i) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42.	☐	☐	☐	☒
ii) Strong seismic ground shaking?	☐	☐	☐	☒
iii) Seismic-related ground failure, including liquefaction?	☐	☐	☐	☒
iv) Landslides?	☐	☐	☐	☒

b) Result in substantial soil erosion or the loss of topsoil?	☐	☐	☒	☐
c) Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse?	☐	☐	☐	☒
d) Be located on expansive soil, as defined in **Table 1**8-1-B of the Uniform Building Code (1994), creating substantial direct or indirect risks to life or property?	☐	☐	☐	☒
e) Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water?	☐	☐	☐	☒
f) Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?	☐	☐	☐	☒

Discussion:

a) The Action Area is in the Great Valley geomorphic province of California. This geomorphic province consists of deep marine basins filled with large volumes of sediment eroded during the Jurassic to Quaternary periods from the western Sierra Nevada Range and eastern Coast Range. The Action Area consists of bedrock and alluvial cobbles, gravels, and sand deposited by the Merced River which have been altered and disturbed by dredge mining.

The nearest active fault is the San Andreas Fault which is located approximately 70 miles west of the Action Area in foothills of the eastern slope of the Coastal Range. No active faults or Earthquake Fault Zones are located within or adjacent to the Action Area.

The Action Area is in an area of relatively low seismic risk and is not within an earthquake fault zone or landslide and liquefaction zone. The Project would not construct new structures or facilities. Therefore, the Project is not expected to expose people or structures to earthquake and related hazards. Therefore, the Project would have **no impact**.

b) The Project design includes excavating material from three islands in order to create floodplain areas and to acquire material for levee berm construction. In addition, a portion of the secondary NCC channel will be filled. The excavation of island areas would remove approximately 188,000 yd^3 with 11,000 yd^3 of material returned used to fill the secondary NCC channel and the remainder to be used for levee berm construction. These activities are not expected to substantially increase soil erosion or the loss of topsoil. Therefore, the impact is expected to be **less than significant**.

c) The Project will not occur on strata or soil that is unstable or would become unstable as a result of the Project. Soils in the Action Area are predominantly Capay silty clay, which has a high expected shrink-swell. A review of a map of expansive soils in California (Olive et al. 1989) indicated that the Project will not occur on expansive soil. Therefore, there would be **no impact**.

d) The Project includes buttressing the levee berm to address the expansive soils on the site and reduce instability and slipping. There are no substantial risks to life or property associated with the

existing expansive soils, and risks associated with levee instability will be reduced following Project implementation. **No impact** is expected.

e) The Project does not require sewers, septic tanks, or alternative wastewater disposal systems. **No impact** is expected.

f) The Project would not result in the loss of a unique geologic feature. **No impact** is expected.

Documentation:

Olive, W.W., A.F. Chleborad, C.W. Frahme, J. Schlocker, R.R. Schneider, and R.L Shuster. 1989. Swelling clays map of the conterminous United States. U.S. Geological Survey.

Mitigation:

No mitigation required.

VIII. Greenhouse Gas Emissions	Potentially Significant Impact	Less Than Significant with Mitigation	Less Than Significant Impact	No Impact
Would the project:				
a) Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?	☐	☐	☒	☐
b) Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?	☐	☐	☐	☒

Discussion:

a) The construction activities from the Project would emit GHGs from the earth-moving equipment. Using the California Emissions Estimator Model (CalEEMod), the Project's estimated CO_{2e} emissions are 199.96 metric tons (220.42 tons) per year for a total of 399.92 metric tons (440.84 tons) over the two years of the Project (CAPCOA 2017). The Project's estimated emissions of 399.92 metric tons (440.84 tons) over the two years of the Project are below the significance threshold of 1,100 metric tons (1213 tons) of CO_{2e} therefore the GHG emissions are **less than significant**.

b) The Project does not conflict with an applicable plan adopted for the purpose of reducing GHG emissions. **No impact** is expected.

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.

Duffy, W.G. and S.N. Kahara. 2011. Wetland ecosystem services in California's Central Valley and implications for the Wetland Reserve Program. Ecological Applications 23(3): S18-S30.

Mitigation:

No mitigation required.

IX. Hazards and Hazardous Materials	Potentially Significant Impact	Less Than Significant with Mitigation	Less Than Significant Impact	No Impact
Would the project:				
a) Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?	☐	☐	☒	☐
b) Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?	☐	☐	☐	☒
c) Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?	☐	☐	☐	☒
d) Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?	☐	☐	☐	☒
e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard or excessive noise for people residing or working in the project area?	☐	☐	☐	☒
f) Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?	☐	☐	☒	☐
g) Expose people or structures, either directly or indirectly, to a significant risk of loss, injury or death involving wildland fires?	☐	☐	☒	☐

Discussion:

a) Materials and waste are considered hazardous if they are poisonous, ignitable, corrosive, or reactive. California law (Health and Safety Code 6.95, Section 25501(o)) defines "hazardous material" as any material that, because of quantity, concentration, or physical or chemical characteristics, poses a significant present or potential hazard to human health and safety or to the

environment. Soils having concentrations of contaminants that are higher than acceptable levels as a result of past spills or leaks must be handled and disposed as hazardous waste during excavation, transportation, and disposal. The characteristics that would cause soil to be classified as hazardous waste are found in the CCR, Title 22, Section 66261.20-24.

The California EPA Cortese List (CC § 65962.5)is used to comply with CEQA requirements in providing information about the location of hazardous materials release sites. The Cortese List data resources were searched to determine if any hazardous waste facilities or sites are located within or near the Action Area. The Cortese List data resources are the following: list of hazardous waste and substance sites from the Department of Toxic Substances Control (DTSC) EnviroStor database, list of leaking underground storage tank sites from the Water Board geo tracker database, list of solid waste disposal sites identified by Water Board with waste constituents above hazardous waste levels outside the waste management unit, list of active Cease and Desist Orders and Cleanup and Abatement Orders from the Water Board, and list of hazardous waste facilities subject to corrective action pursuant to Section 25187.5 of the Health and Safety Code as identified by DTSC. The Cortese List data resources were searched in January 2021 with no listed sites being located within 0.5 miles of the Action Area.

The heavy equipment and vehicles used for Project construction would use potentially hazardous substances including diesel, gasoline, oil, grease, hydraulic fluid, and solvents. These hazardous substances are similar or identical to those used in heavy equipment and vehicles for other construction projects in Sutter County. All equipment that is used within the NCC's stream corridor would be properly cleaned before being transported to the Action Area to prevent release of any hazardous materials into the river, riparian areas, wetlands, or other sensitive areas. All equipment working within the stream corridor would be inspected daily for fuel, lubrication, and coolant leaks and for leak potentials. All equipment would be free of fuel, lubrication, and coolant leaks before working. All equipment would be stored in staging areas which are away from the wetted channel, riparian areas, and wetlands. A Spill Prevention and Response Plan would be prepared for the Project and spill prevention kits would be kept close to construction areas and workers would be trained in their use. A search (January 2021) of the Cortese List data resources determined that the Action Area is not on a list of hazardous sites compiled pursuant to CC § 65962.5. Therefore, the Project would have a **less than significant** impact.

b) The Project does not create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the likely release of hazardous materials into the environment. Therefore, the Project would have **no impact**.

c) The Action Area is not within one-quarter mile of an existing or proposed school. The nearest school is the Pleasant Grove Elementary School which is approximately three miles east of the Action Area. In addition, emissions resulting from the Project would be limited to diesel and gasoline engine exhaust and fugitive dust. The Project construction would occur outside in a rural area such that all diesel and gasoline engine exhaust is expected to dissipate rapidly and not reach concentrations that are hazardous to public health. Fugitive dust would be controlled through periodic wetting of access roads and work areas as necessary. Therefore, the Project would have **no impact**.

d) The Action Area is not located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would not create a significant hazard to the public or the environment. Therefore, the Project would have **no impact**.

e) There are no public airports or public use airstrips near the Action Area. The Action Area is not located within an airport land use plan or within two miles of a public airport or public use airport. The nearest public airport to the Action Area is the Sacramento International Airport which is approximately 7.5 miles southwest. Therefore, the Project would have **no impact**.

f) Traffic associated with Project implementation would include the mobilization and demobilization of heavy equipment (loaders, excavator, articulated haulers) for the construction season (1 June through 31 October). Once the heavy equipment is onsite, it would travel within the Action Area using temporary access roads and be stored at the staging area. Additional traffic on public roads during Project implementation would be limited to daily trips for personnel and service and supply vehicles. Sediment would be moved within the site from the island (borrow areas) to the berm which may require use of Garden Highway for 2,000 feet. Construction activities would be conducted and managed to not interfere with emergency response or evacuation plans. The impact on emergency response or evacuation plans would be **less than significant.**

g) The Project construction activities would create a wildfire ignition risk. However, the majority of vegetation within the Action Area is riparian vegetation which are relatively moist areas with green vegetation, resulting in a low ignition risk. If riparian areas do ignite, fire typically spreads slowly as an underburn due to the relatively moist, green vegetation. Fire extinguishers would be present onsite in vehicles to quickly put out any vegetation that ignites because of a spark from heavy equipment. Any tall, dried grass present on the staging areas or temporary access roads would be cleared prior to being used by vehicles or heavy equipment. In the long-term the Project would not alter the existing fire hazard conditions. The Project would result in additional areas of riparian vegetation which have low fire hazard risk. These additional areas of riparian vegetation would not change the overall wildfire risk. Therefore, the impact of the Project on wildfire risk is **less than significant**.

Documentation:

California Environmental Protection Agency. 2021. Cortese List. DTSC . 21 January 2021.

Mitigation:

No mitigation required.

X. Hydrology and Water Quality	Potentially Significant Impact	Less Than Significant with Mitigation	Less Than Significant Impact	No Impact
Would the project:				
a) Violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or ground water quality?	☐	☐	☒	☐
b) Substantially decrease groundwater supplies or interfere substantially with groundwater recharge such the project may impede sustainable groundwater management of the basin?	☐	☐	☐	☒
c) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would:				
(i) result in substantial erosion or siltation on- or off-site;	☐	☐	☒	☐
(ii) substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or offsite;	☐	☐	☒	☐
(iii) create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff; or	☐	☐	☐	☒
(iv) impede or redirect flood flows?	☐	☐	☐	☒
d) Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan?	☐	☐	☐	☒
e) Place structures within a 100-year floodplain structures which would impede or redirect flood flows?	☐	☐	☐	☒
f) Place housing within a 100-year floodplain, as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map?	☐	☐	☐	☒

Discussion:

a) The existing designated beneficial uses of surface water in the NCC are irrigation for agriculture, canoeing and rafting, warm and cold freshwater habitat, migration of warmwater and coldwater fishes, migration of warmwater and coldwater aquatic organisms, and wildlife habitat preservation.

The NCC is listed under Section 303(d) of the CWA as water quality limited for the following pollutants with their listed source in parentheses:

- Mercury (resource extraction)

No temperature or DO data is available.

Project construction may temporarily increase or contribute to the amount of suspended sediment and turbidity in the NCC, as well as the Sacramento River downstream of the confluence. Actions likely to temporarily impact turbidity include: constructing and removing temporary crossings and grading the islands. In-stream construction would be performed in a manner that minimizes sediment discharge. Turbidity associated with Project construction activities would not exceed turbidity objectives in the Sacramento River Basin (CRWQCB 1998). Instream construction would be temporarily halted to allow turbidity to decrease when necessary. Where feasible, a silt curtain would be installed in the channel to capture floating material or sediment mobilized during construction activity to minimize water quality impacts.

Chemical constituents would be limited to those present at the Action Area. The pH would not be changed, and no pesticides would be used or mobilized during Project activities. Salinity and radioactivity would not be changed due to Project activities. Temperature conditions would not be elevated during construction activities.

To minimize construction related water quality impacts, the Project's proponents would obtain and implement a SWPPP prepared in accordance with NPDES. All access and staging areas would be treated with erosion control measures at the end of each construction season as detailed in the SWPPP and on the design plans. Erosion control measures may include erosion control fabric, coir logs, and hay or straw spreading. At the end of the Project, native grass mix and riparian vegetation would be planted in select locations including locations disturbed by construction. The contractor would be required to follow all construction BMPs in the SWPPP to minimize water quality impacts. The Project must comply with the water quality and waste discharge requirements of the CVRWQCB, which would be outlined in the Section 401 Water Quality Certification for the Project. Complying with water quality standards and implementing **WQ-1 - Monitor Water Quality and Prevent Impacts** would reduce water quality impacts to **less than significant**.

b) The NCC is a source of water for the North American Sub-basin. The North American Sub-basin is a 351,000-acre basin between the Bear River to the north, the Feather River to the west, and the Sacramento River to the south. The eastern boundary is a north-south line extending between Bear River south to Folsom Lake. Little to no groundwater flows into or out of these groundwater basin boundaries due to the presence of Sierra Nevada bedrock (DWR 2006). Groundwater use is primarily for irrigation of agricultural crops, and some urban and municipal use. Groundwater recharge occurs in the Sub-basin where surface water flows over permeable sediments (gravel and sand) in the river channels, allowing for the direct infiltration of surface water. Deep percolation of applied irrigation water also recharges the groundwater basin (Sutter County 2012).

The Project would not deplete groundwater supplies or interfere with groundwater recharge. No net deficit in aquifer volume or a lowering of the local groundwater table level would occur because of the Project.

The Project would not reduce groundwater recharge by converting pervious surfaces to impervious surfaces. The creation of shallow rearing habitat on the islands, which will inundate more frequently than under current conditions, would likely increase the groundwater recharge

within the Action Area. The Project would not pump any groundwater or cause any groundwater to be pumped. Therefore, the Project would have **no impact** with respect to groundwater resources.

c) The drainage pattern would be altered as a result of the Project through the lowering of islands and increasing connectivity between the two main channels and floodplain habitat on the islands. However, these changes, along with reinforcing a flood protection berm, are expected to decrease flood risk.

The Project would not increase the area of impermeable surfaces and erosion and siltation would be minimized by implementing a SWPPP. Specifically, erosion control measures will be implemented within all access and staging areas at the end of each construction season, and at the end of the Project, planting native grass mix and riparian vegetation in locations disturbed by the rehabilitation activities. Additionally, the contractor would be required to follow all construction BMPs in the SWPPP to minimize water quality impacts. Implementing the above and **WQ-1- Monitor Water Quality and Prevent Impacts** would reduce erosion and sedimentation impacts **to less than significant.**

d) The Project does not conflict with the implementation of another water quality control plan or groundwater management plan. Therefore, **no impact** is expected.

e-f) The Project would not place any housing within a 100-year flood hazard area nor would it place any structures or features that would impede or redirect flood flows. Water surface elevation in the NCC is dominated by the backwater effect from flows on the Sacramento River and proposed changes to the bathymetry in the NCC would not alter these dynamics. Therefore, the impact is **less than significant**.

Documentation:

California Regional Water Quality Control Board (CRWQCB). 1998. Water quality control plan (basin plan) for the Sacramento River and San Joaquin River basins, 4th Ed. Central Valley Region, Sacramento, CA.

Mitigation:

WQ-1. Monitor Water Quality and Prevent Impacts.

During in-water work, turbidity will be monitored with grab samples every four hours from the canal, and construction curtailed if turbidity exceeds criteria established by the Regional Water Quality Control Board in its CWA §401 Water Quality Certification for the Project. Specifically, sampling shall be performed immediately upstream from the Action Area and approximately 300 feet downstream of the active work area during construction.

Activities shall not cause in surface waters:

a) turbidity to exceed 2 NTU's where natural turbidity is less than 2 NTU;

b) where natural turbidity is between 1 and 5 NTUs, increases exceeding 1 NTU;
c) where natural turbidity is between 5 and 50 NTUs, increase exceeding 20 percent;
d) where natural turbidity is between 50 and 100 NTUs, increases exceeding 10 NTUs;
e) where natural turbidity is greater than 100 NTUs, increase exceeding 10 percent.

Activities shall not cause pH to be depressed below 6.5 nor raised above 8.5 as measured in surface waters downstream from the Action Area.

The Project shall not discharge petroleum products into surface water. The Central Valley Water Board shall be notified immediately of any spill of petroleum products. Daily fines samples shall be collected from processed material and analyzed for total mercury. Borrow areas shall be re-graded to ensure the areas do not become potential mercury methylation spots. Floodplains shall be re-vegetated to minimize transport of any mercury-containing sediment, as described in Project BMP's.

Sediment fencing shall be used along the canal corridor to capture floating materials or sediments mobilized during construction activities and prevent water quality impacts. Stream bank impacts shall be isolated and minimized to reduce bank sloughing. Banks shall be stabilized with revegetation following Project activities, as appropriate.

A SWPPP shall be developed as part of the BMPs. All pertinent staff shall be trained on and familiarized with these plans. Copies of the plans and appropriate spill prevention equipment referenced in them shall be made available onsite and staff shall be trained in its use. Spill prevention kits shall be in close proximity to construction areas, and workers trained in their proper use.

XI. Land Use and Planning	**Potentially Significant Impact**	**Less Than Significant with Mitigation**	**Less Than Significant Impact**	**No Impact**
Would the project:				
a) Physically divide an established community?	☐	☐	☐	☒
b) Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect?	☐	☐	☐	☒
c) Conflict with any applicable habitat conservation plan or natural communities' conservation plan?	☐	☐	☐	☒

Discussion:

a) The Project would not divide an established community. The Project would improve flood protection for a rural agricultural landscape with scattered houses. The Project would rehabilitate

off-channel habitat in the NCC to improve the quality and quantity of salmonid rearing habitat within the Action Area. Therefore, there would be **no impact**.

b) The general plan and zoning designations of the land within the Action Area allow habitat rehabilitation projects. The Project is consistent with the Sutter County General Plan (Sutter County 2020), with habitat rehabilitation projects being an allowable use on lands designated as Agricultural. The Project does not conflict with the zoning by Sutter County of the land as agricultural exclusive as habitat rehabilitation projects are an accepted use. Implementation of the Project would not conflict with land uses adjacent to the Action Area. Therefore, implementation of the Project would have **no impact**.

c) The Project does not include land covered by any habitat conservation plans or natural community conservation plans. Therefore, the Project would have **no impact**.

Documentation:

Sutter County. 2020. Sutter County 2030 General Plan Land Use Diagram. Accessed 20 January 2021. https://www.suttercounty.org/doc/government/depts/ds/ps/gp/gp_home

Mitigation:

No mitigation required.

XII. Mineral Resources	Potentially Significant Impact	Less Than Significant with Mitigation	Less Than Significant Impact	No Impact
Would the project:				
a) Result in the loss of availability of a known mineral resource classified MRZ-2 by the State Geologist that would be of value to the region and the residents of the state?	☐	☐	☐	☒
b) Result in the loss of availability of a locally-important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan?	☐	☐	☐	☒

Discussion:

a) Sutter County has no mineral resources areas classified as MRZ-2 (Sutter County 2008). Therefore, the Action Area is not within a delineated mineral resources recovery site resulting in **no impact**.

b) The Action Area does not contain any mineral resource recovery sites or mines, resulting in **no impact** on mineral resources.

Documentation:

Sutter County. 2008. General Plan Technical Background Report. Accessed 20 January 2021. https://www.suttercounty.org/doc/government/depts/ds/ps/gp/gp_documents#background.

Mitigation:

No mitigation required.

XIII. Noise	Potentially Significant Impact	Less Than Significant with Mitigation	Less Than Significant Impact	No Impact
Would the project result in:				
a) Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?	☐	☐	☒	☐
b) Exposure of persons to or generation of excessive ground-borne vibration or ground-borne noise levels?	☐	☐	☒	☐
c) A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?	☐	☐	☐	☒
d) A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?	☐	☐	☒	☐
e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?	☐	☐	☐	☒
f) For a project within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels?	☐	☐	☐	☒

Discussion:

a-b) The Project would operate construction equipment (e.g., bulldozers, excavators, articulated haulers, etc.) in the Action Area as part of construction. The construction equipment would generate noise during their operation. The types of construction equipment used for the Project would typically generate noise levels ~75 decibels above the reference noise at a distance of 50 ft (15.2 m). Construction equipment would be properly equipped and maintained to reduce noise levels. The Project would not expose people to or generate noise levels in excess of standards established in the local general plan or noise ordinance (75 decibels maximum for Industry; Sutter County General Plan 2011), or applicable standards of other agencies. Vibration would increase during operation of construction equipment, but no construction equipment would be used that is known to cause excessive vibration levels (impact and vibratory pile drivers, vibratory rollers, large bulldozers, hydraulic breakers, and jackhammers). All changes in noise and vibration levels would occur in a mostly rural/agricultural and relatively unpopulated area. The impact is still considered potentially significant because there would be increases in noise levels at the Action

Area. However, the impact would be mitigated to a **less than significant** level with implementation of **Noise-1- Reduce Impacts from Noise.**

c-d) The Project would result in a temporary increase in noise levels from construction equipment being used to construct and remove temporary roads and crossings, topographically modify islands, and construct the berm. These noise levels would be higher than the current ambient noise levels in the area but would be temporary in nature and not excessive. The maximum noise levels allowed by agricultural activity in the Sutter County General Plan are 75 decibels. The Project may create noise at or near this level for a temporary time period (up to four months). The Project would have a limited and temporary impact on noise levels in the immediate area, so the impact of noise is expected to be **less than significant**.

e-f) There is not a public airport within two miles of the Action Area. There are two private airstrips within two miles of the Action Area; however, the Project would have **no impact** on air traffic or airport activity.

Documentation:

Sutter County. 2011. Sutter County 2030 General Plan. 29 March 2011. Available: https://www.suttercounty.org/doc/government/depts/ds/ps/gp/gp_home.

Mitigation:

Noise-1. Reduce Impacts from Noise.
To mitigate noise related impacts, the Project shall require all contractors to comply with the following operational parameters:

- restrict construction activities to time periods between 7:00 am and 5:00 pm when there is the least potential for disturbance;
- install and maintain sound-reducing equipment and muffled exhaust on all construction equipment.

XIV. Population and Housing	Potentially Significant Impact	Less Than Significant with Mitigation	Less Than Significant Impact	No Impact
Would the project:				
a) Induce substantial population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?	☐	☐	☐	☒
b) Displace substantial numbers of existing people or housing, necessitating the construction of replacement housing elsewhere?	☐	☐	☐	☒

c) Displace substantial numbers of people, necessitating the construction of replacement housing elsewhere?	☐	☐	☐	☒

Discussion:

a) The Action Area is in an agricultural area and does not currently have any houses, businesses, or other structures present. Implementation of the Project would provide temporary employment for several people during Project construction and post-project monitoring. New permanent jobs would not be created that would induce substantial population growth. Implementation of the Project would not indirectly induce population growth. Therefore, there will be **no impact**.

b-c) The Project will occur on undeveloped land, adjacent to agricultural land. Implementation of the Project does not displace housing or residents or cause the construction of replacement housing in another location. There will be **no impact.**

Documentation:

No documentation required

Mitigation:

No mitigation required.

XV. Public Services	**Potentially Significant Impact**	**Less Than Significant with Mitigation**	**Less Than Significant Impact**	**No Impact**
a) Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the public services:				
(i) Fire protection?	☐	☐	☐	☒
(ii) Police protection?	☐	☐	☐	☒
(iii) Schools?	☐	☐	☐	☒
(iv) Parks?	☐	☐	☐	☒
(v) Other public facilities?	☐	☐	☐	☒

Discussion:

a) The Project has **no impact** on fire protection for the area.

b) The Project is of limited duration and is located in a rural area. It has **no impact** on police protection for the area.

c) The Project is not near a school. Therefore, it has **no impact** on schools.

d) The Project is not near a park. Therefore, it has **no impact** on parks.

e) The Project has **no impact** on any other public facilities. The Project has no impact on public services.

Documentation:

No documentation required.

Mitigation:

No mitigation required.

XVI. Recreation	Potentially Significant Impact	Less Than Significant with Mitigation	Less Than Significant Impact	No Impact
a) Would the project increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?	☐	☐	☐	☒
b) Does the project include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?	☐	☐	☐	☒

Discussion:

a) The Action Area does not contain, nor is it adjacent to, any existing parks or other recreational facilities. It comprises a man-made canal that is only occasionally used for fishing, therefore there will be **no impact**.

b) The Project does not include recreational facilities, therefore there will be **no impact**.

Documentation:

No documentation required.

Mitigation:

No mitigation required.

XVII. Transportation	Potentially Significant Impact	Less Than Significant with Mitigation	Less Than Significant Impact	No Impact
Would the project:				
a) Conflict with an applicable plan, ordinance, or policy establishing measures of effectiveness for the performance of the circulation system, taking into account all modes of transportation including mass transit and non-motorized travel and relevant components of the circulation system, including but not limited to intersections, streets, highways and freeways, pedestrian and bicycle paths, and mass transit?	☐	☐	☒	☐
b) Conflict with an applicable congestion management program, including but not limited to level of service standards, and travel demand measures, or other standards, established by the county congestion management agency for designated roads or highways?	☐	☐	☒	☐
c) Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks?	☐	☐	☐	☒
d) Substantially increase hazards to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?	☐	☐	☐	☒
e) Result in inadequate emergency access?	☐	☐	☐	☒
f) Conflict with adopted policies, plans or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities?	☐	☐	☐	☒

Discussion:

a-b) The Project would cause a minor, short-term, temporary increase in traffic volume as a result of daily commutes by workers to the Action Area during the construction season and occasional supply deliveries. A few days of additional traffic would occur at the beginning and end of each construction season during transport of heavy equipment to the Action Area during annual mobilization and demobilization. Individual drivers may experience minor delays if they are travelling behind a truck transporting heavy equipment on a two-lane road. The Project's temporary traffic would primarily center on the Garden Highway, Levee road and their intersections with dirt access roads. All worker vehicles would be parked and heavy equipment would be stored in staging areas where there would be sufficient room for all of the vehicles and equipment; the Project would not displace any existing parking. Therefore, the Project would have a **less than significant impact**.

c) The Project will not occur within two miles of a public airport but is within two miles of twoprivate airstrips. However, construction workers or other personnel would not travel to the Action Area via airplane. The Project would not construct any structures or perform activities that would interfere with air traffic patterns. Therefore, the Project would have **no impact** on air traffic safety.

d) The Project would not modify any public roads or intersections and no incompatible vehicles would be used. The Project would not interfere with or increase safety risk for pedestrian and bicycle use of public roads. Therefore, there would be **no impact**.

e) The Project would not change the existing emergency access to the Action Area resulting in **no impact**.

f) The Project would not conflict with adopted policies, plans, or programs supporting alternative transportation; therefore, there would be **no impact**.

Documentation:

No documentation required.

Mitigation:

No mitigation required.

XVIII. Tribal Cultural Resources	**Potentially Significant Impact**	**Less Than Significant with Mitigation**	**Less Than Significant Impact**	**No Impact**
Would the project:				
a) Cause a substantial adverse change in the significance of a historical resource which is either listed or eligible for listing on the National Register of Historic Places, the California Register of Historic Resources, or a local register of historic resources?	☐	☐	☒	☐
b) Cause a substantial adverse change in the significance of a unique archaeological resources (i.e., an artifact, object, or site about which it can be clearly demonstrated that, without merely adding to the current body of knowledge, there is a high probability that it contains information needed to answer important scientific research questions, has a special and particular quality such as being the oldest or best available example of its type, or is directly associated with a scientifically recognized important prehistoric or historic event or person)?	☐	☐	☒	☐
c) Disturb or destroy a unique paleontological resource or site?	☐	☐	☐	☒

d) Disturb any human remains, including those interred outside of formal cemeteries?	☐	☐	☐	☒

Discussion

a) As part of the preparation for the Project, a cultural resource study was conducted by Horizon Water and Environment (HWE 2021). During Section 106 consultation, pursuant to the regulations at 36 CFR § 800.3(f)(2), HWE identified the United Auburn Indian Community of the Auburn Rancheria, and the Shingle Spring Band of Miwok Indians as Indian tribes who might attach religious and cultural significance to historic properties within the APE. On September 03, 2020 the Native American Heritage Commission sent letters that included a project description and invited the participation of these tribes in the Section 106 process pursuant to 36 CFR § 800.4(a)(4) (HWE 2021). To date, no sites of tribal cultural significance have been identified through consultation with these Indian tribes and Native American organizations.

On August 13, 2020 the District submitted an AB52 consultation request form to the Native American Heritage Commission. The following local Tribes were identified: United Auburn Indian Community of the Auburn Rancheria, and the Shingle Spring Band of Miwok Indians. A letter was sent to representatives of each of these Tribes on September 03, 2020 containing the project description, project location, lead agency contact info, and a notification that the tribe has 30 days to request consultation (HWE 2021). The Shingle Springs Band of Miwok emailed their response on September 18, 2020, in which they requested consultation and a meeting to discuss the project. A conference call was held with the tribe on October 4, 2020. Also in attendance were project participants from MBK Engineers, CFS, and HWE. The Project was described and discussed, and a field review was planned. The field review was conducted on October 26, 2020. The tribe had few concerns, after the field visit, and requested that they be contacted if any Native American archaeological remains or burials were discovered during project implementation.
An email was sent to the United Auburn Indian Community of the Auburn Rancheria on September 28, 2020, as a follow-up to the project notification letter. The tribe responded later that day with a request for additional information about the Project. HWE replied by summarizing the record search results and sending some of the record search materials. After reviewing the record search materials, the tribe indicated that there would be a low probability for impacting known or unrecorded cultural resources.

The record search did not identify any previously recorded Native American or historic era archaeological sites within the Project study area. However, the record search revealed that five built environment resources of the historic era have been recorded within the Project study area, and another six have been recorded within the 0.5-mile search radius (HWE 2021).
No known historic properties would be affected by the Project and no historical resources, as defined by CEQA, would be impacted by the Project. The Action Area does not contain any buildings or structures beyond pumping stations that will be impacted by the project; therefore, there are no human built architectural resources that could be impacted. However, if any objects of cultural significance are unearthed during the construction process, work would be halted until a qualified archeologist can assess the significance of the new find (see **CR-1- Inadvertent Discoveries of Objects of Cultural Significance**). If human remains are unearthed during the construction process, the Project team would comply with the California Health and Safety Code Section 7050.5, which states that no further disturbance shall occur until the County Coroner has investigated the situation following the Public Resource Code Section 5097.98. With this EC in place, the Project is expected to have **a less than significant impact** on historical resources.

b) Subsurface cultural objects could be unearthed during the grading and excavation activities which is a potentially significant impact. The Holocene alluvial deposits within the Action Area have a high potential for containing buried archeological remains at the central and eastern portions of the NCC due to their recent depositional history (HWE 2021). The sensitivity for buried archeological remains grades to moderate and variable from the central portion of the NCC west towards the Sacramento River and reflects the greater potential for regular inundation from flooding (HWE 2021). The majority of excavation would occur on NCC islands which are original earth surface but are in the central and western portion which have lower potential for archeological remains. The islands may contain portions of Modesto or Riverbank formations. Paleontological resources have been discovered in these formations in other locations in the CV. If any objects with potential cultural significance are unearthed during the construction process, work would be halted within the vicinity of the inadvertent discovery until a qualified archeologist (and tribal representative if appropriate) can assess the significance of the new find (see **CR-1- Inadvertent Discoveries of Objects of Cultural Significance**) and prescribe measures to reduce potential impacts to be **less than significant**. The final disposition of archaeological, historical, and paleontological resources recovered on State lands under the jurisdiction of the State Lands Commission must be approved by the Commission.

c) The islands may contain portions of Modesto or Riverbank formations. Paleontological resources have been discovered in these formations in other locations in the CV. However, no known unique paleontological resources or sites are present within the Action Area. If any objects with potential paleontological significance are unearthed during the construction process, work would be halted within the vicinity of the inadvertent discovery until a qualified archeologist can assess the significance of the new find (see **CR-1- Inadvertent Discoveries of Objects of Cultural Significance**) and prescribe measures to reduce potential impacts to be **less than significant**. The final disposition of archaeological, historical, and paleontological resources recovered on State lands under the jurisdiction of the State Lands Commission must be approved by the Commission.

d) No potential burial grounds were determined to be present in the Area of Potential Effects during the records search and field survey. Construction activities for the Project would include excavation and grading which have the potential to unearth subsurface human remains which is a potentially significant impact. If human remains are unearthed during the construction process, work would be halted within the vicinity of the human remains, the coroner contacted, and **CR-1 - Inadvertent Discoveries of Objects of Cultural Significance** would be implemented. This EC would reduce potential impacts to a **less than significant** level. The Project would comply with the California Health and Safety Code Section 7050.5, which states that no further disturbance shall occur until the County Coroner has investigated the situation following the Public Resource Code Section 5097.98.

Documentation:

Horizon Water and Environment, LLC (HWE). 2021. Cultural Resources Assessment Report. Natomas Cross Canal Stability Berm and Channel Habitat Enhancements Project Sutter County, California. Prepared for CFS. June 2021.

Mitigation:

CR-1. Inadvertent Discoveries of Objects of Cultural Significance
If any objects of cultural significance are unearthed during the construction process, work shall be halted immediately until a qualified archeologist can assess the significance of the new find. If human remains are unearthed during the construction process, the Project team shall comply with the California Health and Safety Code Section 7050.5, which states that no further disturbance shall occur until the County Coroner has investigated the situation following the Public Resource Code Section 5097.98.

XIX. Utilities and Service Systems	**Potentially Significant Impact**	**Less Than Significant with Mitigation**	**Less Than Significant Impact**	**No Impact**
Would the project:				
a) Exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board?	☐	☐	☒	☐
b) Require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?	☐	☐	☐	☒
c) Require or result in the construction of new storm water drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?	☐	☐	☐	☒

d) Are sufficient water supplies available to serve the project from existing entitlements and resources, or are new or expanded entitlements needed?	☐	☐	☒	☐
e) Has the wastewater treatment provider which serves or may serve the project determined that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?	☐	☐	☐	☒

Discussion:

a) The Project team would prepare a SWPPP as required to obtain a Storm Water Construction General Permit from the CVRWQCB. The SWPPP contains BMPs to minimize impacts to surface water quality from erosion or contaminants. The construction contractor would be required to implement the BMPs in the SWPPP and erosion and sediment controls as detailed in the design plans to minimize impacts to water quality. With these measures in place, the impact is **less than significant**.

b) The Project does not require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects. Therefore, the Project will have **no impact.**

c) The Project does not require or result in the construction of new storm water drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects. Therefore, the Project will have **no impact.**

d) The Project would only use a small amount of water during the limited construction season. This water would be used by a water truck for dust control during construction. The water would be obtained from the NCC using existing water rights [A015858 (Murphy Lake Farms) and A015858A (Nicoli Nicolaus)]. Since a small amount of water would be needed for the limited construction season and obtained using an existing water right there would be **no impact**.

e) The Project does not require increased wastewater treatment capacity or a landfill. Project workers would be serviced by a portable toilet that is sited per BMP and maintained for the duration of construction work. The Project has **no impact** on utilities and service systems.

Documentation:

No documentation required.

Mitigation:

No mitigation required.

XX. Wildfire	Potentially Significant Impact	Less Than Significant with Mitigation	Less Than Significant Impact	No Impact
If located in or near state responsibility areas or lands classified as very high fire hazard severity zones, would the project:				
a) Substantially impair an adopted emergency response plan or emergency evacuation plan?	☐	☐	☐	☒
b) Due to slope, prevailing winds, and other factors, exacerbate wildfire risks, and thereby expose project occupants to, pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire?	☐	☐	☒	☐
c) Require the installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines or other utilities) that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment?	☐	☐	☐	☒
d) Expose people or structures to significant risks, including downslope or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes?	☐	☐	☐	☒

Discussion:

a) The project is in a rural area and there are no adopted emergency response or emergency evacuation plans. There would be **no impact.**

b) The Project construction would create a wildfire ignition risk. However, the Action Area is designated for wildfire risk as mostly unzoned with some small areas of moderate fire hazard severity zones (CalFire 2007). The majority of the Action Area is comprised of heavily vegetated islands. In addition, the majority of vegetation within the Action Area is riparian vegetation which are relatively moist areas with green vegetation resulting in a low ignition risk. If riparian areas do ignite, fire typically spreads slowly as an underburn due to the relatively moist, green vegetation. Additionally, the NCC levee roads would act as fire breaks and surrounding irrigated agricultural land is very unlikely to ignite serving to minimize any potential for fire spreading. Fire extinguishers would be present onsite in vehicles to quickly put out any vegetation that ignites as a result of a spark from heavy equipment. Any tall, dried grass present on the staging areas or temporary access roads would be cleared prior to being used by vehicles or heavy equipment. In the long-term the Project would not alter the existing fire hazard conditions. The Project would result in additional areas of riparian vegetation which have low fire hazard risk. These additional areas of riparian vegetation would not change the overall wildfire risk. Therefore, the impact of the Project on wildfire risk is **less than significant**.

c) The Project would not require the installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines or other utilities) that may exacerbate

fire risk or that may result in temporary or ongoing impacts to the environment. There would be **no impact.**

d) The Project would not expose people or structures to significant risks to wildfire. The Project would occur in an area comprised primarily of islands in the middle of open water, riparian vegetation, and sparsely vegetated berm and would be of limited duration. Therefore, **no impact** is expected.

Documentation:

CalFire. 2007. Fire Hazard Severity Zone Maps. Available: http://www.fire.ca.gov/fire_prevention/fire_prevention_wildland_zones

Mitigation:

No mitigation required.

XXI. Mandatory Findings of Significance	**Potentially Significant Impact**	**Less Than Significant with Mitigation**	**Less Than Significant Impact**	**No Impact**
a) Does the project have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?	☐	☐	☒	☐
b) Does the project have the potential to achieve short-term, to the disadvantage of long-term, environmental goals?	☐	☐	☐	☒
c) Does the project have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects)?	☐	☐	☐	☒
d) Does the project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?	☐	☐	☐	☒

Discussion:

a) The Project does not have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below

self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory. Limited short-term impacts are expected, but these will be mitigated with implementation of the EC's described above. Therefore, the project would have **a less than significant impact.**

b, c) There would be temporary and minor adverse impacts that would occur within the Action Area during construction; however, the overall improvement to the environment is expected to outweigh these effects. The Project would not contribute to the accumulation of impacts in the watershed. However, cumulative actions to improve stream habitats in the watershed are expected to provide long-term benefits to associated vegetation, wildlife, and fish. Because vegetation communities and wildlife habitats within the NCC watershed have been substantially modified to suit human land uses and would likely continue to be modified as human populations increase, cumulative benefits from Projects over time may be partially offset with new adverse impacts in the watershed cause by human activities.

Other related activities aimed at salmonid production, enhancement, rehabilitation, and mitigation are being planned and implemented for the CV under directives of the DWR, CDFW, CVPIA, USFWS AFRP, and Reclamation. These activities include gravel additions, floodplain creation, riparian habitat rehabilitation, and other enhancement actions. The magnitude of cumulative effects under all current and proposed salmonid habitat improvement actions is undetermined at this time, but the impacts are expected to be beneficial.

Together, the Project and other rehabilitation projects and actions would improve environmental quality. Therefore, **no significant cumulative impacts to the environment are expected** if the Project is implemented.

d) The Project would improve the environmental conditions in the area by recovering functioning floodplain habitat. There would be **no impact** to human beings.

Documentation:

No documentation required.

Mitigation:

No mitigation required.

5 References

Beechie, T.J., M. Liermann, E.M. Beamer, and R. Henderson. 2005. A classification of habitat types in a large river and their use by juvenile salmonids. Transactions of the American Fisheries Society 134(3): 717-729.

CALFED Bay-Delta Program. 2000. Ecosystem Restoration Program. CALFED Bay-Delta Program, Sacramento, CA.

California Department of Fish and Game (CDFG). 1990. Central Valley salmon and steelhead restoration and enhancement plan. State of California, Resources Agency, Department of Fish and Game.

CDFG. 1993. Restoring Central Valley streams: A plan for action. State of California, Resources Agency, Department of Fish and Game.

CDFG. 1996. Steelhead restoration and management plan for California. State of California, Resources Agency, Department of Fish and Game. Available: http://friendsofventurariver.org/wp-content/themes/client-sites/venturariver/docs/steelhead-restoration-mgmt-ca-df&g.pdf

CDFG. 2009. California Salmonid Stream Restoration Manual, Part XII, Fish Passage Design and Implementation. California Department of Fish and Game. http://www.dfg.ca.gov/fish/Resources/HabitatManual.asp

Cramer, S.P. and N.K. Ackerman. 2009. Linking stream carrying capacity for salmonids to habitat features. In American Fisheries Society Symposium, vol. 71: 225-254.

Cramer Fish Sciences (CFS). 2018. Draft Merced Salmonid Habitat Drought Restoration Project. Prepared for Merced Irrigation District. 16pp.

Inoue, M. and S. Nakano. 1998. Effects of woody debris on the habitat of juvenile Masu Salmon (*Oncorhynchus masou*) in Northern Japanese streams. Freshwater Biology 40: 1-16.

Miyakoshi, Y., H. Hayano, H. Omori, M. Nagata, and J. Irvine. 2002. Importance of instream cover for young masu salmon, *Oncorhynchus masou*, in autumn and winter. Fisheries Management and Ecology 9: 217-223.

Nagayama, S., Y. Kawaguchi, D. Nakano, and F. Nakamura. 2009. Summer microhabitat partitioning by different size classes of masu salmon (*Oncorhynchus masou*) in habitats formed by installed large wood in a large lowland river. Canadian Journal of Fisheries and Aquatic Sciences 66: 42-51.

NMFS. 2007. NOAA Guidance for Salmonid Passage at Stream Crossings. Southwest Region. May 2007.

NMFS. 2014. Recovery Plan for the Evolutionarily Significant Units of Sacramento River Winter-run Chinook Salmon and Central Valley Spring-run Chinook Salmon and California Central Valley Steelhead. West Coast Region. Sacramento, CA. July 2014.

Roni, P., and T.P. Quinn. 2001. Density and size of juvenile salmonids in response to placement of large woody debris in western Oregon and Washington streams. Canadian Journal of Fisheries and Aquatic Sciences 58: 282-292.

Roni, P. and E. Quimby, eds. 2005. Monitoring stream and watershed restoration. CABI.

San Joaquin River Management Plan. 1995. The Resources Agency, advisory council established by Assembly Bill #3603.

Sellheim, K.L., M. Vaghti, and J.E. Merz. 2016. Vegetation recruitment in an enhanced floodplain: Ancillary benefits of salmonid habitat enhancement. Limnologica-Ecology and Management of Inland Waters 58: 94-102.

Shrivell, C.S. 1990. Role of instream rootwads as juvenile coho salmon (*Oncorhynchus kisutch*) and steelhead trout (*O. mykiss*) cover habitat under varying streamflows. Canadian Journal of Fisheries and Aquatic Sciences 47(5): 852-861.

Sutter County. 2011. 2030 Sutter County General Plan. 29 March 2011. Available: https://www.suttercounty.org/government/county-departments/development-services/planning-and-building-services/planning-services/general-plan.

USFWS. 2001. Final Restoration Plan For The Anadromous Fish Restoration Program. A plan to increase natural production of anadromous fish in the Central Valley of California. Prepared for the Secretary of the Interior by the USFWS with assistance from the Anadromous Fish Restoration Program core group under authority of the Central Valley Project Improvement Act. 146 pp.

USFWS. 2017. Framework for Assessing Impacts to the Valley Elderberry Longhorn Beetle (*Desmocerus californicus dimorphus*). U.S. Fish and Wildlife Service; Sacramento, California. 28 pp.

Vaghti, M. 2021. Natomas Cross Canal Restoration Project: Pre-Project Vegetation Sampling. Prepared for Cramer Fish Sciences and MBK. West Sacramento, CA.

Wheaton, J.M., G.B. Pasternack, and J.E. Merz. 2004a. Spawning habitat rehabilitation – I. Conceptual Approach & Methods. International Journal of River Basin Management 2:1:3-20.

Wheaton, J.M., G.B. Pasternack, and J.E. Merz. 2004b. Spawning Habitat Rehabilitation – II. Using hypothesis development and testing in design, Mokelumne River, California, U.S.A. International Journal of River Basin Management 2:1:21-37.

APPENDIX A: MITIGATION MONITORING AND REPORT PROGRAM
NATOMAS CROSS CANAL BERM AND CHANNEL ENHANCEMENTS PROJECT
MITIGATED NEGATIVE DECLARATION

This Mitigation Monitoring and Reporting Program (MMRP) was prepared in accordance with Section 15097 of the California Environmental Quality Act (CEQA) Guidelines. Section 15097 requires that a lead agency establish a program to report on or monitor measures adopted as part of the environmental review process to mitigate or avoid significant effects on the environment. The MMRP for the Natomas Cross Canal Berm and Channel Enhancements Project (Project) is presented here as Table 1.
This MMRP is designed to ensure that the mitigation measures necessary to reduce significant impacts identified in the Project Initial Study and Proposed Mitigated Negative Declaration (IS/MND) are implemented. The components of the MMRP Table 1 are listed below:

Mitigation Measures: The mitigation measures are taken verbatim from the Project IS/MND.

Timing/Milestone: Identifies a schedule for conducting each mitigation action.

Responsible Entity: Identifies the entity responsible for implementing specific mitigation measures.

Mitigation Action: Identifies the specific action or actions that must be completed to implement the mitigation measure.

Monitoring and Enforcement Responsibility: Identifies the department/agency, consultant, or other entity responsible for overseeing that mitigation occurs.

Check off Date/Initials: To be filled out when individual mitigation is complete.

MITIGATION MONITORING AND REPORTING PROGRAM: Natomas Cross Canal Berm and Channel Enhancements Project					
Mitigation Measure(s)	Timing/ Milestone	Responsible Entity	Mitigation Action	Monitoring and Enforcement Responsibility	Check off Date/Initials
Air Quality					
AQ-1. Reduce Dust and Air Quality Impacts The following dust reduction measures shall be implemented during transport of materials from the borrow areas (islands) where sediment will be removed to berm construction location and secondary channels where filling is planned to occur 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 material transport 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.	During construction	Project Applicant/ Contractor	Use qualified QSP and implement measures	Project Applicant/ Contractor	

Biological Resources					
BIO-1. Survey for Rare Plants and Avoid or Relocate if Discovered Prior to the start of construction, a rare plant survey would be performed following the Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Natural Communities (CDFW 2018) during the appropriate blooming season for potential species present. If any special status plant species are discovered during the survey, additional ESA fencing or relocation would be performed to avoid and minimize impacts to special status plant species. CDFW may be consulted with concerning appropriate buffer distances and/or species relocation.	Prior to initiation of restoration activities	Project Applicant/ Contractor	Implement specified mitigation measures	Project Applicant/ Contractor	
BIO-2. Adaptive Construction Approach to Protect Elderberry Plants, Monitor Survival, and Mitigate for Loss To avoid direct mortality to VELB from crushing by heavy equipment or through destruction of their elderberry shrub habitat during construction, elderberry plants shall be clearly marked prior to construction and intrusion into the prescribed 20-foot buffer zone shall be avoided, as possible. If any mortality of elderberry shrubs occurs, USFWS shall be consulted immediately and appropriate mitigation will be implemented.	During and following restoration activities, as needed	Project Applicant/ Contractor	Implement specified mitigation measures	Project Applicant/ Contractor	
BIO-3. Survey for and Relocate Western Pond Turtle if Observed in Project Area Within 24 hours prior to start of construction activities, the project area would be surveyed for western pond turtle by a qualified biologist. If a western pond turtle is observed in the project area, the qualified biologist would relocate it to the	Prior to and during restoration activities	Project Applicant/ Contractor	Implement specified mitigation measures	Project Applicant/ Contractor	

nearest suitable habitat location that is outside of the project area. After WEF installation is completed, the Project area enclosed by WEF would be surveyed by the GGS biologist for western pond turtle as well during the GGS survey. If any western pond turtles are found, they would be relocated by the biologist to the closest location with suitable habitat that is outside of the project area. If any western pond turtles are found in the exclusion area at any other time they will be similarly relocated by a qualified biologist.					
BIO-4. Avoidance and Minimization Measure to Reduce Potential Impacts to Giant Garter Snake during Project Implementation Within 24 hours prior to start of construction activities, the project area would be surveyed for GGS. Project area GGS survey would be repeated if there is a lapse in construction activity of two weeks or greater. A GGS biologist would perform the surveys. A GGS biologist is defined as a biologist with GGS experience and approved by USFWS and CDFW to perform surveys for the species. Before any construction begins, personnel would receive worker environmental awareness training provided by a USFWS/CDFW approved biologist. The training would instruct workers to recognize GGS and their habitat and discuss the protection measures to be implemented during construction. The first construction activity would be the installation of GGS wildlife exclusion fencing (WEF) along the project boundary that is adjacent to or within GGS habitat. The WEF would be installed prior to any other construction activities or	Prior to and during restoration activities	Project Applicant/ Contractor	Implement specified mitigation measures	Project Applicant/ Contractor	

staging of equipment to prevent GGS from entering project areas during construction. The WEF specifications are the following: • WEF would consist of taught silt fencing supported by wooden stakes or rebar on the Project side only. • WEF would be buried at least 6 inches below ground and extend 12 to 18 inches above ground. Soil would be compacted against the fence for its entire length to prevent special status species from going under the fence. • The WEF would be inspected daily by the contractor to ensure that there are no holes or tears, the bottom is buried, and it remains taught. The contractor would maintain and repair the WEF as necessary for the duration of construction. The GGS biologist would also periodically inspect the GGS WEF to ensure it is properly functioning. • After WEF installation is completed, the Project area enclosed by WEF would be surveyed by the GGS biologist. If any GGS are found, they will be relocated by a GGS biologist with a 10(a)(1)(A) recovery permit to an area with suitable habitat that is outside the exclusion area, but adjacent to, the Project area. If any GGS are found in the exclusion area at any other time they will be similarly relocated by a GGS biologist with a 10(a)(1)(A) recovery permit. Movement of heavy equipment will be confined to existing roadways, designated staging areas, and already disturbed areas, as possible, to minimize habitat disturbance. Project related vehicles would observe a 15 mile-per-hour speed limit within the project area. All equipment, vehicles, and supplies would be stored at the designated staging areas at the end of each workday. To eliminate attraction of GGS predators, all food-related trash items will be disposed of in closed					

containers, which would be removed daily from the Project area. Construction activity within 200 feet of potential GGS habitat would be conducted between May 1 and October 1. A GGS biologist would be present during all initial ground disturbance activities including excavation, grading, and fill placement. Clearing and grubbing will be confined to the minimal area necessary to perform construction activities. Avoided GGS habitat will be designated as Environmentally Sensitive Areas within and adjacent to the project area. The designated Environmentally Sensitive Areas will be fenced with WEF and orange plastic construction fencing on project side to ensure avoidance by all construction equipment and personnel. If a snake is encountered during construction, activities within 100 feet of the snake shall cease until the snake leaves the project area on its own or the GGS biologist determines the snake is not a GGS. No snakes would be intentionally killed, harmed, or harassed during Project implementation and they would be allowed to volitionally leave the Project area. If a snake is observed retreating underground or is stationary in the Project area, all construction activity within 100 feet of the location would cease. If a possible GGS goes underground, the GGS biologist would be contacted and respond to the situation in coordination with USFWS and CDFW. Only a GGS biologist with 10(a)(1)(A) recovery permit would handle GGS and only as a last resort. To prevent entrapment of GGS, escape ramps would be placed at both ends of open excavations at the end of each workday to allow any GGS to escape overnight. The escape ramps would be comprised of dirt fill, or wood or other suitable material planking. Any steep sided excavations, such as trenches,					

would be inspected by the GGS biologist prior to filling. If a trapped GGS is discovered, then the GGS biologist with 10(a)(1)(A) recovery permit would respond in coordination with USFWS and CDFW. No dewatering of habitat is expected to occur. To minimize sediment from entering GGS habitat, all BMPs and erosion control measures in the SWPPP and on Project design plans would be implemented and contractually required by the contractor. Weekly BMP inspections would occur to ensure that the BMPs are being implemented as intended. After completion of construction activities, all temporary fill and construction debris would be removed and disturbed areas restored to pre-project conditions, if feasible. Restoration work would include replanting species removed from banks or replanting emergent vegetation in the active channel. Emergent plants which may be planted would include California bulrush (*Scirpus californicus*), cattail, water primrose (*Ludwigia peploides*), common tule (*Scirpus acutus*), Baltic rush (*Juncus balticus*), or duckweed (*Lemna* spp.). Disturbed upland areas, such as levee slopes, would be hydroseeded to prevent erosion using the following seed mixture. The seed mixture would be comprised of at least 20-40 percent native grass seeds [such as annual fescue (*Vulpia* spp.), California brome (*Bromus carinatus*), blue wildrye (Elymus glaucas), and needle grass (Nasella spp.)], 2-10 percent native forb seeds, five percent rose clover (*Trifolium hirtum),* and five percent alfalfa (*Medicago sativa*). Approximately 40 -68 percent of the mixture would be non-aggressive European annual grasses [such as wild oats (*Avena sativa*), wheat (*Triticum* spp.), and barley (*Hordeum vulgare*)].					

BIO-5. Monitor for Special-Status Raptors and Other Birds to Prevent Impacts Pre-construction surveys shall be conducted by qualified biologists, who shall determine the use of the Project Area by special status species. Protocol-level surveys shall be implemented for special status species including Tri-colored Blackbird , Burrowing Owl , White-tailed Kite, Northern Harrier, Loggerhead Shrike (*Lanius ludovicianus*), and other nesting birds and raptors. This includes pre-construction surveys conducted no more than 10 days before Project implementation by qualified biologists. A minimum no-disturbance buffer of 250 feet around active nests of non-listed and migratory bird species and a 500 foot no-disturbance buffer around active raptor nests shall be established until breeding season is over or biologist has determined the young have fledged and are no longer reliant on the nest for survival. If such a buffer cannot be reasonably accomplished, CDFW shall be consulted.	Prior to and during restoration activities	Project Applicant/ Contractor	Implement specified mitigation measures	Project Applicant/ Contractor	
BIO-6. Pre-Construction Surveys and Buffer Implementation to Prevent Impacts to Swainson's Hawk Pre-construction surveys for Swainson's hawk nests would be performed by a qualified biologist within a quarter mile of the Project area within 10 days of construction, following the Swainson's Hawk Technical Advisory Committee Recommended Timing and Methodology for Swainson's Hawk Nesting Surveys in California's Central Valley protocol. Additionally, any trees slated for removal would be surveyed for active nests within 48 hours of planned removal. If an active nest is observed in a tree slated for removal the tree would not be removed until after all young have fledged (Bio -	Prior to and during restoration activities	Project Applicant/ Contractor	Implement specified mitigation measures	Project Applicant/ Contractor	

5). Any active nest observed would be protected with a quarter mile buffer. If a quarter mile buffer is not feasible, then CDFW would be consulted to determine an appropriate buffer distance and/or protective measures that would still allow the project to proceed.					
BIO-7. Protect and Compensate for Native Trees Native trees, such as Fremont cottonwood, willows, and alder, with a dbh of 6 in (15.2 cm) or greater shall be protected with 30-ft (9.1-m), 10-ft (3-m), and 10-ft (3-m) buffers, respectively, as possible. Native trees shall be marked with flagging if close to the work area to prevent disturbance. To compensate for the removal of riparian shrubs and trees during Project implementation, the plans shall identify tree and shrub species to be planted, how, where, and when they would be planted, and measures to be taken to ensure a minimum performance criteria of 70% survival of planted trees. The tree plantings shall be based on native tree species compensated for in the following manner: • Oaks having a dbh of 3 – 5 in (7.6 – 12.7 cm) shall 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 of greater than 5 in shall be replaced in-kind at a ratio of 5:1. Riparian trees (i.e., willow, cottonwood, poplar, alder, ash, etc.) and shrubs shall be replaced in-kind within the Project boundary, at a ratio of 3:1, and planted in the nearest suitable location to the area where they were removed.	Prior to, during, and after restoration activities	Project Applicant/ Contractor	Implement specified mitigation measures	Project Applicant/ Contractor	

BIO-8. Work Outside of Critical Periods for Special Status Species To avoid impacts to special status species, all ground disturbing activities shall be conducted during the period of 1 June through 31 October. Nesting birds and raptors are protected under the MBTA and CDFG Code, and trees and shrubs within the Project Area likely provide nesting habitat for songbirds and raptors. If construction activities occur during the potential breeding season (February through August) a qualified biologist shall conduct surveys for active nests and/or roosts within a ½ mile radius of the Project Area no more than 10 days prior to the start of construction. A minimum no disturbance buffer shall be delineated around active nests (size of buffer will depend on species encountered) until the breeding season has ended or until a qualified biologist has determined that the birds have fledged and are no longer reliant upon the nest or parental care for survival.	During restoration activities	Project Applicant/ Contractor	Implement specified mitigation measures	Project Applicant/ Contractor	
BIO-9. Monitor for Bats to Prevent Impacts The Project construction shall occur outside the critical period for bats (after 15 July). Before any ground disturbing activities, a qualified biologist shall survey for the presence of associated habitat types for the bat species of concern. If bats are present, the biologist shall apply a minimum 300 ft (91.4 m) no-disturbance buffer around roosting bats, maternity roosts or winter hibernacula until all young bats have fledged.	Prior to and during restoration activities	Project Applicant/ Contractor	Implement specified mitigation measures	Project Applicant/ Contractor	

BIO-10. Prevent Spread of New Zealand Mudsnail and other Aquatic Invasive Species New Zealand mudsnails (*Potamopyrgus antipodarum*), an introduced species, has been identified in numerous rivers of the Central Valley. To minimize the chance that the snails may be transported and spread to other water bodies on equipment, construction specifications shall require that equipment be steam cleaned immediately after the work is completed and before being used in other water bodies. An Invasive Species Risk Assessment and Planning (ISRAP) protocol shall be developed, and all appropriate staff shall be trained as to its purpose and implementation before construction begins. The ISRAP shall be used to prevent the spread of invasive species during Project construction.	During restoration activities	Project Applicant/ Contractor	Implement specified mitigation measures	Project Applicant/ Contractor	
BIO-11. Monitor for Fish to Prevent Impacts Within 48 hours prior to the start of any in-water work, the work area would be surveyed for special status fish species by a qualified biologist. If the biologist observes any special status species in the in-water work area a strategy for minimizing impact will be determined. If fish would be able to volitionally move away from the in-water work area then they would be allowed to do so to avoid being impacted. If fish would not be able to volitionally move away then they would be relocated to suitable habitat using the best method as determined by the biologist. After relocation, fish exclusion netting would be installed around the work area to prevent fish from entering the area during in-water work.	During restoration activities	Project Applicant/ Contractor	Implement specified mitigation measures	Project Applicant/ Contractor	

Water quality					
WQ-1. Monitor Water Quality and Prevent Impacts During in river work, turbidity and total suspended solids shall be monitored with intermittent grab samples from the river, and construction curtailed if turbidity exceeds criteria established by the Regional Water Quality Control Board in its Clean Water Act §401 Water Quality Certification for the Project. Specifically, sampling shall be performed immediately upstream from the Project Area and approximately 300 feet downstream of the active work area during construction. Activities shall not cause in surface waters: a) turbidity to exceed 2 NTU's where natural turbidity is less than 2 NTU; b) where natural turbidity is between 1 and 5 NTUs, increases exceeding 1 NTU; c) where natural turbidity is between 5 and 50 NTUs, increase exceeding 20 percent; d) where natural turbidity is between 50 and 100 NTUs, increases exceeding 10 NTUs; e) where natural turbidity is greater than 100 NTUs, increase exceeding 10 percent. Activities shall not cause settleable material to exceed 0.1 ml/L in surface waters as measured in surface waters downstream from the Project Area. Activities shall not cause pH to be depressed below 6.5 nor raised above 8.5 as measured in surface waters downstream from the Project Area.	During restoration activities	Project Applicant/ Contractor	Use qualified QSP and implement measures	Project Applicant/ Contractor	

The Project shall not discharge petroleum products into surface water. The Central Valley Water Board shall be notified immediately of any spill of petroleum products. Sediment fencing shall be used along the river corridor to capture floating materials or sediments mobilized during construction activities and prevent water quality impacts. Stream bank impacts shall be isolated and minimized to reduce bank sloughing. Banks shall be stabilized with revegetation following Project activities, as appropriate. A SWPPP shall be developed as part of the BMPs. All pertinent staff shall be trained on and familiarized with these plans. Copies of the plans and appropriate spill prevention equipment referenced in them shall be made available onsite and staff shall be trained in its use. Spill prevention kits shall be in close proximity to construction areas, and workers tined in their proper use.					
WQ-2. Use Clean Equipment and Biodegradable Lubricants All equipment shall be clean and use biodegradable lubricants and hydraulic fluids. All equipment working within the stream channel shall be inspected daily for fuel, lubrication, and coolant leaks; and, for leak potentials (e.g. cracked hoses, loose filling caps, stripped drain plugs). Vehicles shall be fueled and lubricated in a designated staging area located outside the stream channel and banks. Construction specifications shall require that any equipment used in or near the river is properly cleaned to prevent any hazardous materials from entering the river, and containment material shall be available onsite in case of an accident. Spill prevention kits shall be located close to construction areas, with workers trained in its use. Contracted construction	During restoration activities	Project Applicant/ Contractor	Implement specified mitigation measures	Project Applicant/ Contractor	

managers shall regularly monitor construction personnel to ensure environmental compliance.					
Noise					
Noise-1. Reduce Impacts from Noise To mitigate noise related impacts, the Project shall require all contractors to comply with the following operational parameters: • Restrict construction activities to time periods between 7:00 am and 5:00 pm when there is the least potential for disturbance; •install and maintain sound-reducing equipment and muffled exhaust on all construction equipment.	During restoration activities	Project Applicant/ Contractor	Implement specified mitigation measures	Project Applicant/ Contractor	
Cultural Resources					
CR-1. Inadvertent Discoveries of Objects of Cultural Significance If any objects of cultural significance are unearthed during the construction process, work shall be halted immediately until a qualified archeologist can assess the significance of the new find. If human remains are unearthed during the construction process, the Project team shall comply with the California Health and Safety Code Section 7050.5, which states that no further disturbance shall occur until the County Coroner has investigated the situation following the Public Resource Code Section 5097.98.	During restoration activities	Project Applicant/ Contractor	Implement specified mitigation measures	Project Applicant/ Contractor	

APPENDIX B. NATOMAS CROSS CANAL BERM AND CHANNEL ENHANCEMENTS PROJECT MONITORING PLAN

CRAMER FISH SCIENCES®
An Employee Owned Consulting Company

NATOMAS CROSS CANAL BERM AND CHANNEL ENHANCEMENTS PROJECT

Monitoring Plan

Prepared for:

Reclamation District 1001

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Rocko Brown, PhD

Updated November 2021

TABLE OF CONTENTS

INTRODUCTION

The Natomas Cross Canal Berm and Channel Enhancements Project (Project), funded by the California Department of Water Resources (DWR) Division of Flood Management, Central Valley Tributaries Program, is intended to address salmonid habitat limiting factors in Sacramento River watershed. Specifically, portions of the Natomas Cross Canal (NCC) will be graded to increase the amount of non-natal rearing habitat for winter-run juvenile Chinook Salmon (*Oncorhynchus tschawytscha).* Grading activities will seek to increase the frequency of inundation during typical flows during the winter-run rearing and migration period by lowering the surface of several islands in the NCC. Material excavated will then be used to construct a buttress along approximately 15,000 feet of the NCC levee, in areas that have not been previously repaired, and additional riparian vegetation will be planted to act as a natural wind-induced wave defense. This effort will utilize waterside berm plantings of varietal native understory and native plant species; thus, providing a natural wind-wave buffer that will also provide shaded riverine aquatic habitat over an additional 3,600 linear feet, along the channel edge. Fish screens will also be installed at three locations to reduce the potential for fish entrainment while rearing in the NCC.

The Project will create an estimated 16 acres of salmonid rearing habitat, 3,600 linear feet of shaded aquatic habitat along the main channel edge, and approximately 12,000 linear feet of newly planted riparian trees along the north levee toe. The studies proposed below will directly measure Project effectiveness in terms of habitat quality, juvenile salmon habitat use, and native and non-native fish communities. This research will provide essential information that will allow state and federal resource agencies to better understand how habitat rehabilitation influences habitat quality and subsequent juvenile salmonid habitat use. Ultimately, this will inform management decisions and directly enhance and inform future restoration efforts in the NCC and other Central Valley rivers with limited rearing habitat.

BASELINE SITE DESCRIPTION

The NCC is a 5.3-mile long, man-made, flood control feature located approximately 16 miles north of the City of Sacramento and approximately 1 mile downstream from the confluence of the Feather and Sacramento rivers (Figure 1). Originally constructed in 1912, the NCC is intended to act as conveyance for numerous small tributaries that were intercepted by the flood control system to outflow into the Sacramento River. Four watersheds, including the Auburn Ravine, the Markham Ravine, Coon Creek, and the Pleasant Grove Creek converge and flow into the NCC. The original construction used a dragline excavator to excavate a canal and placed the excavated materials throughout the levee. Those materials are predominately composed of variable lean to fat clay and silty materials, which are subject to shrink-swell cycles that result in decreased stability over time. These stability issues were evaluated in 1987 by Wahler Associates and again in DWR's Non-Urban Levee Evaluation Program (Segment 284).

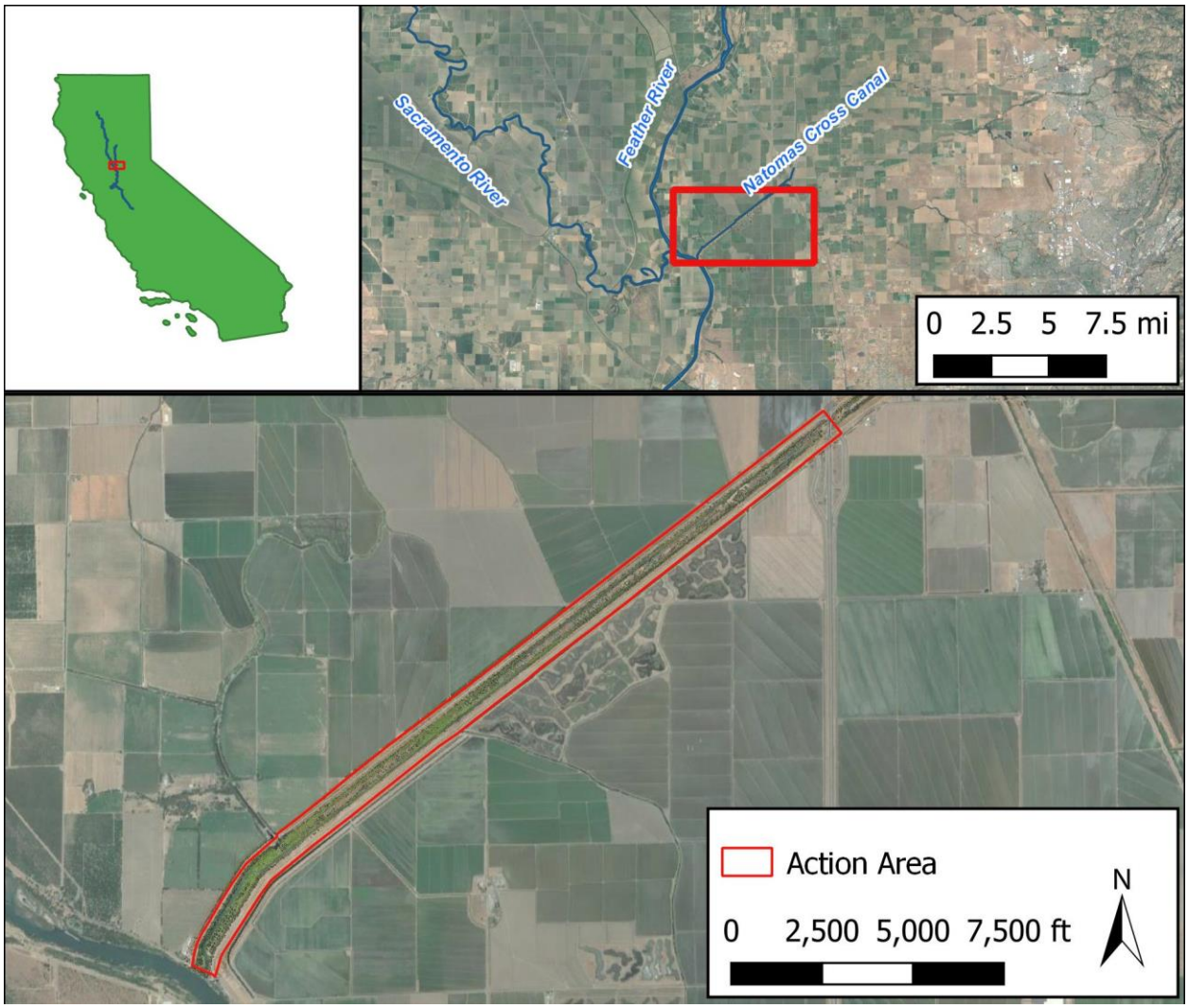

Figure 1: Project location within California (upper left panel) and in relation to the Sacramento and Feather rivers (upper right panel). The Action Area is depicted in the lower panel.

An important component of the Project will be to construct a buttress along portions of the NCC north bank levee, in areas that have not been previously repaired, and to plant additional riparian vegetation to act as a natural wind-induced wave defense. The NCC north bank levee has had historical issues with wind-induced wave erosion. This erosion results from high winds pushing waves against levee embankments, resulting in erosion of the embankment material. The NCC north bank levee experiences prevailing southern winds during storm events which push the wave action towards the north levee. Observations from the most recent flood fight of wind-wave erosion, which occurred during the January 2006 flood event, indicate that the areas most susceptible to damage are those lacking adequate tree cover in the channel. The riparian forest acts as a buffer to break wind-induced wave action before it reaches the north bank levee. The NCC was listed as the top priority for Reclamation District (RD) 1001 in the Feather River Regional Flood Management Plan (FRRFMP), due to "Potential overtopping, recurrent wave wash erosion, slumps, and cracking of the Natomas Cross Canal north levee." The highest priority project for RD 1001, as listed in the FRRFMP, was to "[r]aise, buttress, and provide erosion protection for the Natomas Cross Canal levee."

While the NCC is not a natural feature, natural hydrologic and fluvial processes do occur, and the NCC does provide ecosystem services to aquatic species. The NCC is a crucial migratory corridor for several

special-status fish species, because it provides a link between key tributary watersheds and the mainstem Sacramento River. Several NCC tributaries have been identified as providing important habitat for anadromous fish, including steelhead, spring-run Chinook salmon, fall-run Chinook salmon, and other native fish species, while Auburn Ravine is considered Critical Habitat for steelhead. The Project aims to create rearing habitat near the mouth of the NCC to benefit fish migrating along the mainstem Sacramento River, as well to create rearing habitat along an approximately 4-mile reach of the NCC for fish migrating from the upstream tributaries.

Within the Project area, the morphology is characterized by long islands centered between two low-flow channels that are adjacent to the levee toe on each bank. Currently, these islands provide terrestrial habitat but are only inundated during very high flow events. Within the Project reach, the channel is virtually flat with a channel gradient of 0.02%, and water elevations are mostly controlled by backwater from the Sacramento River. The Project design will lower portions of the NCC islands, thereby allowing those areas to inundate via backwater from the Sacramento River during lower flow water years, thus providing critical non-natal rearing habitat for juvenile winter-run Chinook salmon where little currently exists in the lower Sacramento River.

Approximately 16 total acres of off-channel rearing habitat for migratory winter-run Chinook salmon will be created under the current Project design on three different islands (islands A, B, and D; Figure 2 and Figure 3). Approximately 14.5 acres of that habitat will be created by grading portions of three islands down to specific target elevations. The remaining approximately 1.5 acres of that habitat will be created by filling a portion of the southern existing NCC channel near the confluence with the Sacramento River to those same target elevations, which also serves to reduce deep-water habitat suitable for predatory aquatic species that pose a threat to juvenile Chinook salmon. An ecohydrologic analysis was used to define flow scenarios relevant to the winter-run juvenile Chinook salmon migration life stage. To determine approximate grading elevations, we subtracted an average depth suitable for rearing salmonids of 3 ft from the water elevations corresponding to the relevant ecohydrology. Since juvenile Chinook Salmon generally prefer water depths less than 3 ft, this also minimizes the suitability of water depths for predatory fish species. Grading of the islands and filling a portion of the NCC channel to these target elevations will create seasonally inundated off-channel aquatic habitat features via backwater from the Sacramento River that will serve as low velocity and shallow water refugia for juvenile Chinook salmon, with potential benefits extending to other special-status fish species. The creation of these habitat features includes significant and extensive topographic modifications of areas that are currently densely vegetated. The spatial extents of the topographic modifications (grading limits) were selected to target the existing high elevation areas while also avoiding impacts to existing beneficial stands of vegetation, to the extent possible. These topographic modifications were designed to increase the frequency, duration, extent, and suitability of inundated habitat during the period that winter-run juvenile Chinook salmon are expected to migrate, while also maintaining existing vegetation that can provide cover and food.

Grading of the island habitat features will yield a large enough quantity of borrow to construct up to 15,000 linear feet of berm on the north levee (Figure 2 and Figure 3). The Project plans to add riprap, soil, and plants on another 3,600 linear feet of the north NCC levee between RD 1001's main pumping plant and the Sacramento River confluence, to correct channel scour that is encroaching into the levee prism. These features will also provide adequate waterside berm to allow riparian habitat between the levee toe and the channel.

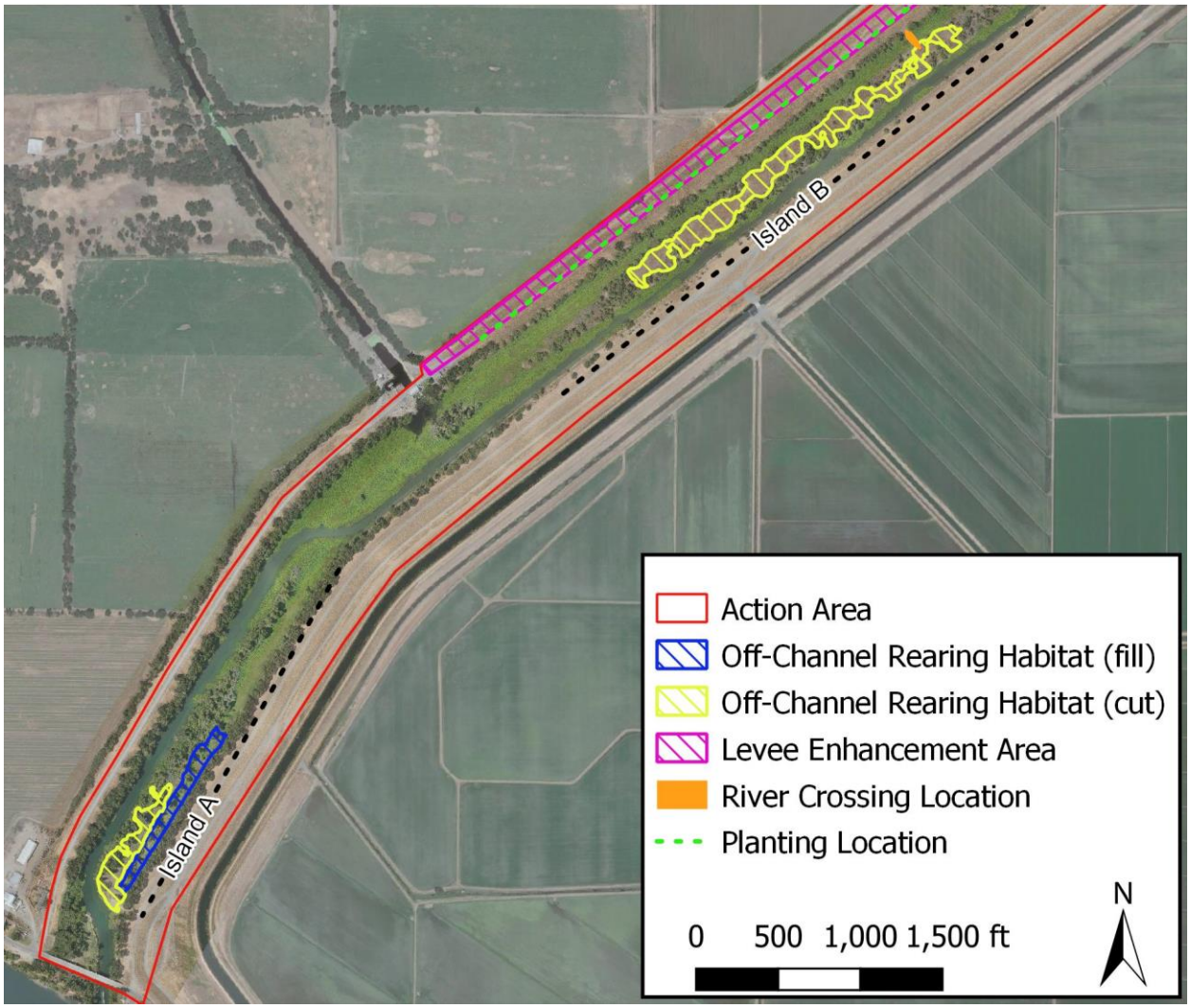

Figure 2: Project conceptual design for the downstream portion of the Project site with grading for off-channel habitat and levee improvements indicated.

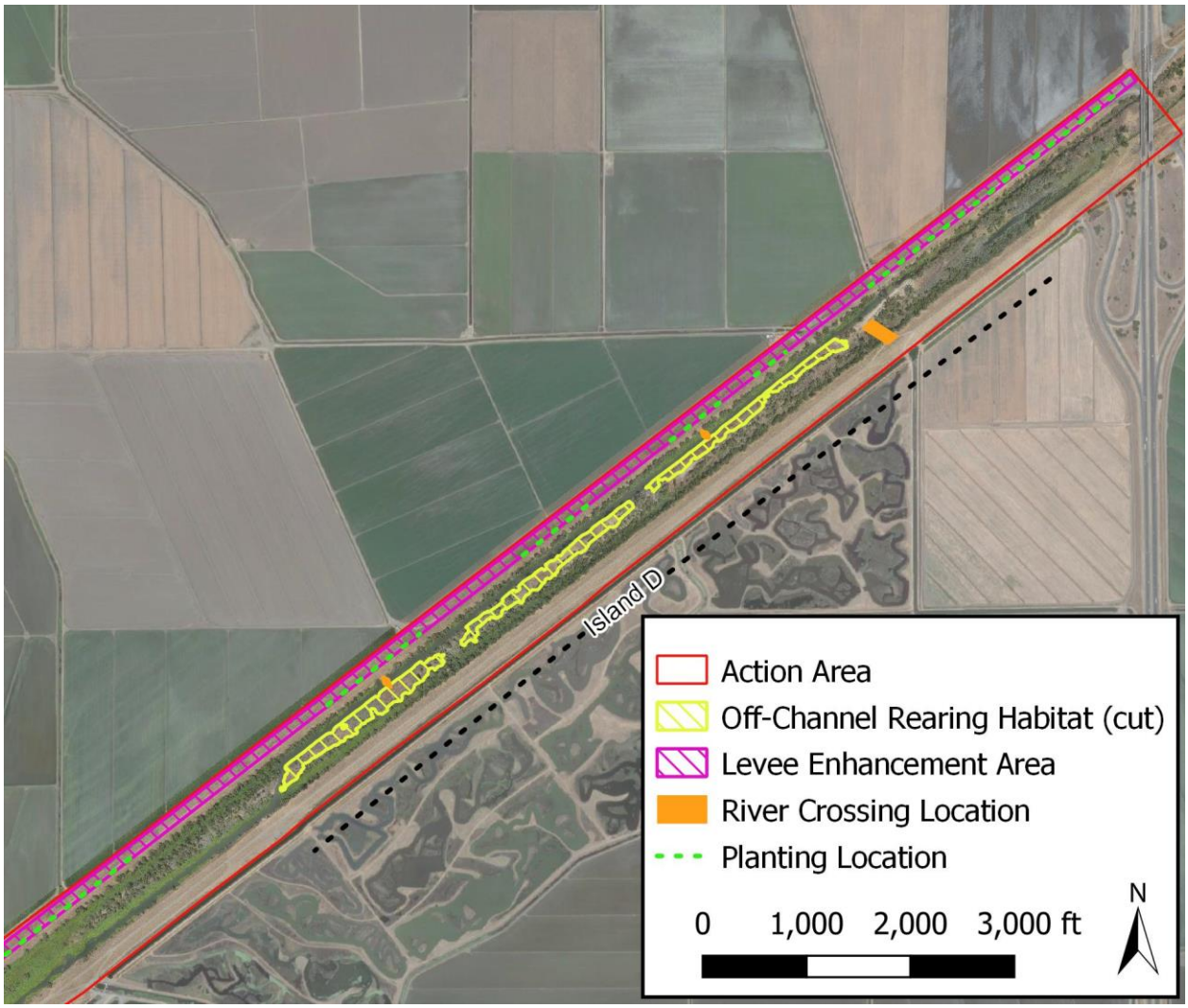

Figure 3: Project conceptual design for the upstream portion of the Project site with grading for off-channel habitat and levee enhancement areas as indicated.

ANTICIPATED RESPONSE

The Sacramento River is critical habitat for winter-run Chinook Salmon and California Central Valley steelhead. Critical habitat includes the water column, river bottom, and adjacent riparian zone which fry and juveniles use for rearing (NMFS 2005). The conservation value of critical habitat in the study area is high because it supports both recruitment and survival of juveniles and adults (NMFS 2005).

The NCC could be an important area of non-natal rearing habitat for juvenile steelhead and salmon, especially winter-run salmon. The importance of floodplain habitats as productive foraging areas and predator refuge for rearing juvenile salmon, compared to main river channels, has been well documented (Jeffres, et al., 2008). Previous studies in Central Valley streams and other systems have demonstrated that creating or enhancing floodplain habitat can increase the quantity and quality of rearing habitat under a range of flow conditions, and that juvenile salmonids utilize these restored features (Sellheim, et al., 2016; Ogston, et al., 2014). Inundated floodplains can enhance juvenile salmonid growth and survival if water temperatures, prey biomass, and velocities, are more favorable compared to main channel habitat (Ahearn, et al., 2006).

Auburn Ravine, Markham Ravine, Coon Creek and Doty Ravine upstream from the NCC are identified as providing important habitat for anadromous fish, including steelhead, spring-run Chinook salmon, fall-run Chinook salmon, and other native fish species; thus, making the NCC an established and crucial migratory corridor for special status species fish in these watersheds.

One of the primary Project goals is to improve habitat for juvenile salmonids. This Monitoring Plan will directly measure Project effectiveness in terms of habitat quality, juvenile salmon habitat use, and native and non-native fish communities. The following hypotheses will be addressed:

H_1: Chinook Salmon and steelhead will be more abundant in the NCC after restoration.
H_2: The proportion of native to non-native fish will be higher following restoration.
H_3: Salmonid rearing habitat will improve following restoration.

These hypotheses will be tested using a combination of fish sampling during the spring when key salmonid life stages are present and aquatic habitat modeling. These studies will inform future habitat enhancement projects that seek to improve rearing conditions in channels bounded by levees where salmonids are present. As these conditions are present throughout the Central Valley, these results have broad applications for salmonid recovery and habitat enhancement.

MONITORING APPROACH

The Monitoring Plan consists of three monitoring phases to evaluate the success of this Project: pre-project assessment, implementation, and effectiveness. Pre-project monitoring provides baseline conditions used to inform Project design and demonstrates the impaired condition of the Project site. Pre-project assessment will be used to evaluate conditions before construction implementation and will be compared with post-project monitoring data to measure Project success, including environmental response and restoration value. Implementation monitoring will help determine if the Project was installed per the design standards. Effectiveness monitoring will support determination of Project effectiveness in creating habitat conditions suitable for target species and will address the hypotheses outlined above.

Pre-Project Monitoring

Pre-project monitoring establishes a baseline from which to measure change following a restoration action. It is a critical component of the other monitoring phases because questions posed by effectiveness monitoring can only be answered if the pre-project condition of the site is documented. Pre-project monitoring is also a component of regulatory compliance because pre-project wildlife and habitat surveys help resource agencies determine whether the Project is likely to negatively impact special status plants and animals and what mitigation measures need to be implemented to prevent these impacts. Monitoring specifically related to permitting compliance is outside the scope of this document and may include but is not limited to: special-status plant surveys, wetland delineation, fish and wildlife surveys, standardized photo points to document change over time, and water quality measurements during site construction. For the purposes of this monitoring plan, pre-project monitoring will only address the monitoring efforts used to test implementation and effectiveness monitoring hypotheses.

Pre-project topographic, bathymetry, and water surface elevation data collection has been completed as of the date of this document. Topographic and bathymetric surveys were conducted in July and November 2020. The composite digital elevation model (DEM) developed from the survey products is shown in Figure 4. Water surface elevation data were collected during the topographic surveys and also

continuously recorded using pressure loggers between July 2020 and August 2021. The methods for these studies are described below. These data, along with other field observations during pre-project surveys, have informed design development and an evaluation of existing habitat suitability.

Implementation Monitoring

Implementation monitoring will determine if the Project was built accurately to the design plan and met the goals of the Project design. Generally, this monitoring occurs after construction completion; however, some aspects will be carried out during implementation as a check on design appropriateness (Kershner 1997). Mid-course corrections to implementation can be made as appropriate. In addition to tracking the success of the implementation in terms of physical structure, the hydrological function of the created off-channel island habitats will also be investigated. The frequency and duration of flooding are among the primary drivers of habitat productivity in terms of accessibility for fish, prey resource production, and habitat maintaining processes leading to increased survival (Hill et al. 1991, Tockner et al. 2000, Zeug et al. 2014). To determine whether the Project was implemented as planned, as-built bathymetry and topography will be compared with the design plans. Additionally, water surface elevation data (described under Effectiveness Monitoring) will be compared to the post-project topography to assess inundation frequency and duration. Below, the methods used to collect these data are described.

Bathymetry and Topography

In-channel and floodplain topographical data support several aspects of habitat restoration, including habitat evaluation, project design, sediment budgeting using digital elevation models (DEMs), and project implementation (determining whether a project was *implemented* according to design) as well as long-term monitoring of habitat function and evolution (Wheaton et al. 2004). Furthermore, the data can be used in two-dimensional habitat models to determine whether water depth and velocity are within the range preferred by rearing juvenile salmonids. Bathymetric and topographic data can support a determination of relative channel stability and thus are a way of evaluating physical habitat change within a restoration site (Merz et al. 2006).

Topographic and bathymetric surveys were already conducted for pre-project conditions and will also be conducted for as-built conditions using a combination of techniques that may include real-time kinematic global positioning system (RTK-GPS), echo sounder, Light Detection and Ranging (LiDAR) data collection, and Structure-from-Motion (SfM) photogrammetry techniques. LiDAR data will be collected for the terrestrial areas by a sub-contractor who specializes in LiDAR technology, and aerial imagery will be collected in conjunction with the LiDAR flights. RTK-GPS and echo sounder data will be collected by Cramer Fish Sciences and will primarily cover the submerged, low-flow area of the NCC channels. Some terrestrial RTK-GPS survey points will also be collected to support ground-truthing of the LiDAR flight products and aerial imagery. Shallow (e.g. water depth < ~1.5 ft) bathymetric surveys will be completed using a Trimble R10 RTK-GPS system (or similar) where signal and vegetative cover allow. Deep-water (e.g. water depth > ~1.5 ft) bathymetric surveys will be conducted from a small boat using a Sonarmite echo sounder (or similar) coupled with an RTK-GPS system. Survey point spacing will be based on grade-breaks and channel topography rather than a uniform grid (Brasington et al. 2000). The bathymetric surveys will also include survey points collected at the water's edge throughout the Project area to support hydraulic modeling calibration efforts.

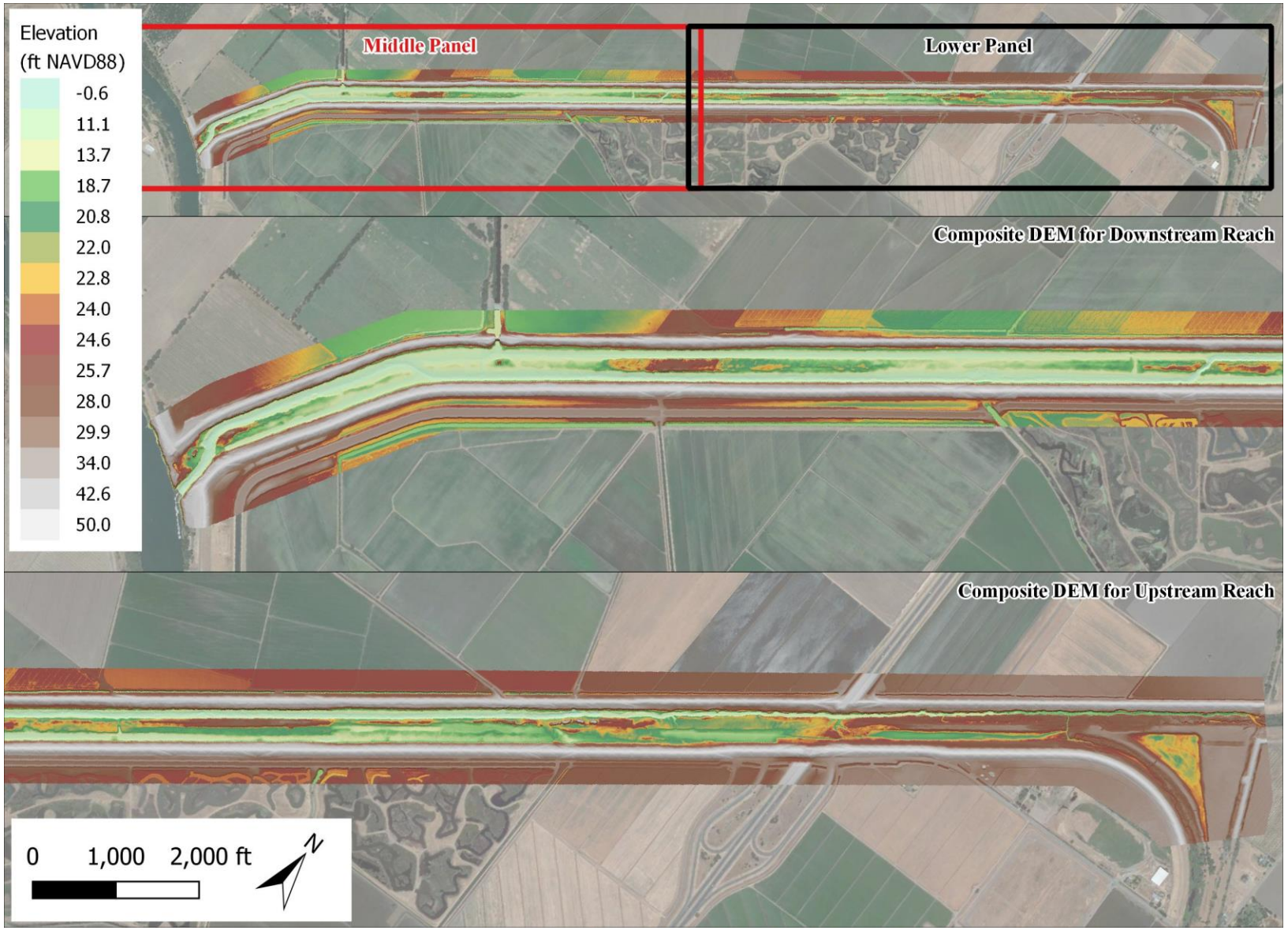

Figure 4: Composite DEM showing existing conditions as surveyed during pre-project monitoring for the downstream reach (middle panel) and upstream reach (lower panel) of NCC.

SfM photogrammetry products will be derived from aerial imagery collected by an unmanned aerial vehicle (UAV, or "drone"). Aerial imagery will be captured by a DJI Phantom 4 Pro camera with a Polar Pro lens filter (or similar). Ground control points, which can be used for accurate georeferencing of UAV imagery-derived outputs, will be synchronously measured with an RTK-GPS system. Imagery will be adjusted for optimal brightness and contrast, and then processed using Pix4D photogrammetry software. Pix4D outputs included georeferenced orthomosaics and digital terrain models (DTM) generated via SfM photogrammetry techniques. Topographic data from the SfM DTM may be leveraged to supplement survey data collected with other methods.

Effectiveness Monitoring

Effectiveness monitoring will track physical conditions and biological responses to determine whether the Project effectively enhanced salmonid rearing habitat. Effectiveness monitoring is complex and requires evaluating the outcomes of multiple objectives relating physical, biological, and biogeochemical factors at work in the river ecosystem (Kondolf and Micheli 1995; Roni et al. 2002, 2008; Wohl et al. 2005). Pre-project monitoring (described above) is an essential part of effectiveness monitoring because it provides a baseline from which to compare post-project conditions.

The hypotheses listed in Table 1 directly address the target habitat objectives for the Project. The following methods are for periodic and continuous tracking of those parameters outlined. Below, the specific methods used to measure each parameter are described in greater detail.

Table 1: Effectiveness monitoring hypotheses and parameters.

Hypothesis	Parameter/monitoring method
H_1 Chinook Salmon and steelhead will be more abundant in the NCC after restoration.	Seining/boat-based sampling
H_2 The proportion of native to non-native fish will be higher following restoration.	Seining/boat-based sampling
H_3 Salmonid rearing habitat will improve following restoration.	Topography/bathymetry/water surface elevation

Sample Sites

Sample sites within the NCC will be stratified from the confluence of the NCC with the Sacramento River upstream through Island D (Figure 5). Within the NCC, sample sites will be located adjacent to Islands A, B, and D pre-project, to document baseline fish communities. Post-restoration, transects will also be taken within the restored floodplain islands during a time when they are inundated with at least 0.6 m depth of water. Transects will also be conducted within the mainstem Sacramento River upstream and downstream from the NCC entrance. At least three replicate transects will be collected within each sample site. Figure 5 depicts the sample sites. Depending on depth and aquatic vegetation conditions, a combination of beach seining and boat-based surveys will be utilized. These methods are described in more detail below.

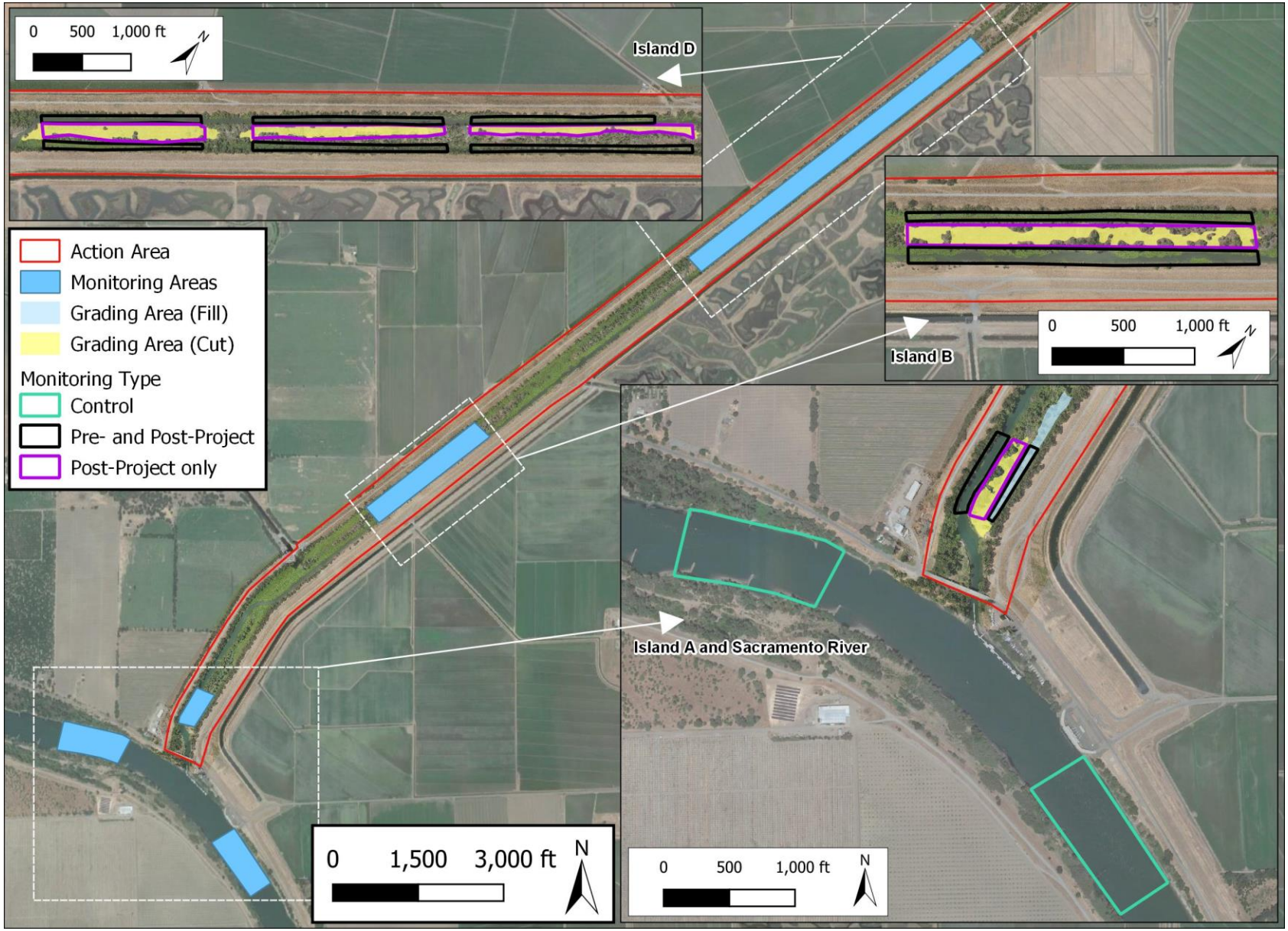

Figure 5: Monitoring locations in the NCC and Sacramento River.

Seining Surveys

Seining surveys will be conducted before and after restoration, to compare salmonid abundance and native and non-native fish community composition within the NCC and unrestored control sites in the Sacramento mainstem, immediately upstream and downstream from the NCC confluence (Figure 5). Measuring fish communities directly tests whether the Project met its goals of increasing juvenile salmonid abundance and reducing invasive fish species abundance.

Seining will be conducted using a 50-foot, ¼" mesh beach seine. For fish community surveys, a single seine haul will be performed at each site by hauling the seine in an upstream direction to reduce disturbance of fish, following the general methods of Merz et al. (2016). The seine will be pulled near shore and all fish will be placed into a bucket of clean, cool river water and processed immediately. Fish species and fork length will be collected for all species and weight will be recorded for all juvenile salmon. Three seining surveys will be conducted per season during April-June.

Seining surveys are most effective in >1 m of water, when there is little aquatic vegetation, and when the benthic substrate is smooth and lacks boulders, rip-rap, and other obstacles. If these conditions are not met, boat-based fish surveys will be utilized to collect fish community data.

Boat-based Fish Surveys

The primary objective of the boat-based fish surveys is to relate temporal, spatial, environmental, and biological parameters in aquatic environments to answer ecological questions about fish community and population metrics, considering environmental factors. The patented Cramer Fish Sciences Sampling Platform (Platform) is an integrated aquatic species and habitat sampling system that can effectively sample fish, invertebrates, and other key biotic and abiotic aquatic conditions to reveal habitat and ecological associations while having minimal or no "take" of sensitive or ESA-listed fish species. It effectively samples open water, shallow water, and complex habitats beyond the reach of traditional methods like trawls and seines. This is possible because of its unique design.

Deployment of this versatile sampling system expands data collection to shallow and off-channel habitat, while offering the capability to transition to deeper and open water habitats, providing for reliable estimates of sampling efficiency (e.g., probability fish detected if present) and "catch" per unit effort (i.e., number of individual species per volume of water sampled) and improving our knowledge about populations, habitat associations and major stressors of key organisms.

The Platform:

1. Is capable of using image acquisition (e.g. still image and stereo-videography), live-trapping, or genetic identification to allow expanded sampling that is cost-effective and minimizes impacts to sensitive fish species

2. Links biological data directly to various water quality and physical parameters (e.g. temperature, turbidity, dissolved oxygen, depth, prey species, etc.), and geographic location, which are recorded simultaneously to recorded fish observations

3. Can sample continuously (rather than at discrete stations) and yields specific time and geographic location stamped observations

4. Reduces downtime between samples, a major inefficiency of current sampling techniques

5. Reduces or eliminates the need to handle listed species

6. May reduce effort and expense by collapsing multiple surveys into a single sampling methodology

As with seining surveys, platform surveys will be conducted before and after restoration, to compare salmonid abundance and native and non-native fish community composition within the NCC and unrestored control sites in the Sacramento mainstem, immediately upstream and downstream from the NCC confluence (Figure 5). Measuring fish communities directly tests whether the Project met its goals of increasing juvenile salmonid abundance and reducing non-native fish species abundance. Fish species and fork length will be collected for all species and weight will be recorded for all juvenile salmon. Three Platform or seining surveys will be conducted per season during April-June.

Water Surface Elevation

Water surface elevation data will be used in comparison with as-built topography to evaluate post-project inundation of the island habitats. Water surface elevation data will either be extrapolated from a nearby stream gage or will be measured directly with pressure transducers. If these data are extrapolated from a nearby stream gage, stage data from the Sacramento River at Verona gage will be used. The water surface slope between the Verona gage and the island habitats will be estimated using RTK-GPS water surface elevation data or results from 2d hydraulic models.

If pressure transducers are utilized, they (Onset Computer, Inc. Hobo® U20L) will be deployed at multiple locations along the length of the NCC adjacent to the island habitats to provide a continuous hourly record of local water stage and provide baseline data about hydrologic conditions. Pressure transducer deployment configurations will facilitate the following objectives:

- measure water depth in the NCC through time,
- measure the hydraulic gradient along the primary channel of the NCC from upstream to downstream across a range of flow conditions, and
- provide water surface elevation data across a range of flow conditions for upstream boundary conditions to support calibration of 2d hydraulic models.

A single additional pressure transducer will also be installed on the upland to continuously record local barometric pressure and facilitate post-processing of the in-water pressure transducer data. Benchmark ‘pins’ will be established near each water pressure transducer to facilitate manual measurements of water surface elevations at the location of the loggers. The pin elevations will be surveyed during the RTK-GPS survey (described above), and those elevations will provide the datum upon which all pressure logger data are post-processed and converted to water surface elevation. Additional water surface elevation measurements will be collected in association with the bathymetric survey using RTK-GPS in order to capture greater point-in-time spatial variability in water surface elevations than the pressure transducer measurements and to provide a quality control check for pressure transducer measurements.

DATA MANAGEMENT

Raw Data description: Counts of all fish species collected at each site and fork length measurements. Volume of water sampled and number of seine hauls. Seine or sampling platform transect shapefiles. Continuous measurements of barometric and water pressure, measurements of temperature, dissolved oxygen, and turbidity for sampling platform transects. Topographic and bathymetric spatial data files.

Final Project Data Products: A quality assured/quality controlled (QAQC'd) relational database, plus Project metadata. All final data products will be in open-source file formats and will adhere to the protocols developed pursuant to The Open and Transparent Water Data Act (Wat. Code, § 12406) for data sharing, transparency, documentation, and quality control.

Metadata: Metadata for the data types listed above will be collected for each site and will be annotated with metadata that includes, but is not limited to, all CVPIA Data Guidance metadata requirements. Metadata will indicate at a minimum: who collected the data; when, how, and where the data was collected; the purposes for which the data was collected; definitions of variables, fields, codes, units of measure, and abbreviations used in the data.

Storage and Backup: Prior to QA/QC, raw Project data will be stored on a local server, with a backup copy on Dropbox. Files that have been QA/QC'd will be similarly stored and backed up.

Archiving, preservation and sharing: QA/QC'd Project data will be maintained on a Cramer Fish Sciences server and in the cloud (Dropbox). Copies will be made available upon request and upon completion of the Project. All surface water quality data and metadata will be formatted and submitted to the California Environmental Data Exchange Network (CEDEN).

Format: The data and metadata collected as part of the study will be recorded by hand on hard copy data sheets or using a digital data collector app. Data from the hard copies will be transcribed into spreadsheet form, specifically a Microsoft Excel file (XLSX), and exported to a single text file (CSV), with an approximate file size of 5-10MB. Following QA/QC, data will be stored in rds files within a single R project file. Any accompanying geospatial data will be delivered in an industry-standard format where applicable and documented with metadata in accordance with the CVPIA Data Guidance metadata requirements.

Quality Assurance: Data QA/QC procedures occur in three stages:

1) Field QA/QC: The name of the person recoding data will be included on each data sheet in case there are questions about the fields filled in and values recorded. On the day data are collected, a field QC will be performed by having a crew member that did not record the data check each data sheet to determine if all fields have been entered and the values fall within a range that makes sense. The name of the person performing the field QC will also record their name on the hard copy data sheet.

2) Data Entry QA/QC: Original hard copy data sheets will be scanned upon return from the field and transcribed into Microsoft Excel spreadsheets (XLSX). This transcription will be reviewed independently to ensure data in the Excel file matches the original hard copy. The name of the person performing this procedure will be included in the Excel file.

3) Electronic data QA/QC: This involves standardizing column headings and programmatically checking the spreadsheet/table entries for errors and inconsistencies. The study-specific CSV or

XLSX file is imported as a tabular data object into the R software environment and the data table of detections is QA/QC'd with a collection of standardized, reproducible R functions sourced from available open-source R packages or specially written functions to accompany the project.

After the detection data has been "cleaned" in stage (3) above, the data is appended directly to a relational database (SQLite, Access, or similar) for use in the next stage of the analysis. The hard copies, Excel files, and Access database file will be archived in case of any discrepancies.

REFERENCES

Ahearn D.S., Viers J.H., Mount J.F., Dahlgren R.A. 2006. Priming the productivity pump: flood pulse driven trends in suspended algal biomass distribution across a restored floodplain. Freshwater Biol. 51: 1417–1433.

Brasington, J., B. T. Rumsby, and R. A. McVey. 2000. Monitoring and modelling morphological change in a braided gravel-bed river using high resolution GPS-based survey. Earth Surface Processes and Landforms 25:973–990.

Hill, M. T., W. S. Platts, and R. L. Beschta. 1991. Ecological and geomorphological concepts for instream and out-of-channel flow requirements. Rivers 2:198–210.

Jeffres C.A., J.J. Opperman, and P.B. Moyle. 2008. Ephemeral floodplain habitats provide best growth conditions for juvenile Chinook Salmon in a California river. Environmental Biology of Fishes 83:449-458.

Kershner, J.L. 1997. Monitoring and adaptive management. Pages 116-131 in J. E. Williams, C. A. Wood, and M. P. Dombeck, editors. Watershed restoration: principles and practices. American Fisheries Society, Bethesda, MD.

Kondolf, G. M., and E. R. Micheli. 1995. Evaluating stream restoration projects. Environmental Management 19:1–15.

Merz, J. E., G. B. Pasternack, and J. M. Wheaton. 2006. Sediment budget for salmonid spawning habitat rehabilitation in a regulated river. Geomorphology 76:207–228.

Merz, J.E., D.G. Delaney, J.D. Setka, and M.L. Workman. 2016. Seasonal Rearing Habitat in a Large Mediterranean-Climate River: Management Implications at the Southern Extent of Pacific Salmon (*Oncorhynchus* spp.). River Research and Applications 32(6): 1220-1231.

National Oceanic and Atmoshperic Administration (NOAA). 2005. Updated Status of Federally Listed ESUs of West Coast Salmon and Steelhead. Available from: https://swfsc.noaa.gov/publications/fed/00749.pdf

Ogston, L., S. Gidora, M. Foy, and J. Rosenfeld. 2014. Watershed-scale effectiveness of floodplain habitat restoration for juvenile Coho Salmon in the Chilliwack River, British Columbia. Canadian Journal of Fisheries and Aquatic Sciences 72(4):479-490.

Roni, P., T. . Beechie, R. E. Bilby, F. E. Leonetti, M. M. Pollock, and G. R. Pess. 2002. A review of stream restoration techniques and a hierarchical strategy for prioritizing restoration in Pacific Northwest Watersheds. North American Journal of Fisheries Management 22:1–20.

Roni, P., K. Hanson, and T. Beechie. 2008. Global review of the physical and biological effectiveness of stream habitat rehabilitation techniques. North American Journal of Fisheries Management 28:856–890.

Sellheim, K.L., C.B. Watry, B. Rook, S.C. Zeug, J. Hannon, J. Zimmerman, K. Dove, and J.E. Merz. 2016. Juvenile salmonid utilization of floodplain rearing habitat after gravel augmentation in a regulated river. River Research and Applications 32(4):610-621.

Tockner, K., F. Malard, and J. V. Ward. 2000. An extension of the flood pulse concept. Hydrological Processes 14:2861–2883.

Wheaton, J.M., Pasternack, G.B. and J.E. Merz. 2004. Spawning habitat rehabilitation-II. Using hypothesis development and testing in design, Mokelumne river, California, USA. International Journal of River Basin Management 2(1): 21-37.

Wohl, E., P. L. Angermeier, B. Bledsoe, G. M. Kondolf, L. MacDonnell, D. M. Merritt, M. A. Palmer, N. L. Poff, and D. Tarboton. 2005. River restoration. Water Resources Research 41.

Zeug, S. C., K. Sellheim, C. Watry, J. D. Wikert, and J. E. Merz. 2014. Response of juvenile Chinook Salmon to managed flow: lessons learned from a population at the southern extent of their range in North America. Fisheries Management and Ecology 21:155–168.