Alternative Intake Project
Transmission Line and Interconnection

Final Environmental Assessment

November 2008

Western Area Power Administration

DOE/EA-1602

Final
Environmental Assessment
for the
Western Area Power Administration
Alternative Intake Project
Transmission Line and Interconnection

As part of its comprehensive water quality strategy to protect and improve water quality for its customers, the Contra Costa Water District (CCWD) is implementing the Alternative Intake Project (AIP). The AIP will enable CCWD to relocate some of its existing diversions to Victoria Canal, a Delta location with higher-quality source water than is currently available at its Old River and Rock Slough intakes. The AIP project purpose is to protect and improve the quality of water delivered to CCWD's untreated- and treated-water customers. Key objectives of the AIP are to improve delivered water quality, especially during drought periods; protect and improve health and/or aesthetic benefits to consumers; improve operational flexibility; and protect delivered water quality during emergencies. The AIP facilities include an intake and pump station, pipeline, and pipeline intertie, as well as construction and operations/maintenance of a new transmission line and interconnection.

This Final Environmental Assessment (EA) evaluates Western Area Power Administration's (Western's) Transmission Line and Interconnection (Proposed Action) for the AIP. The Proposed Action would extend Western's existing Tracy-Los Vaqueros 69-kilovolt (kV) transmission line from near CCWD's existing Old River Pump Station, span Old River onto Victoria Island, and continue along existing dirt roads to the AIP's new power substation serving the new CCWD Victoria Canal Pump Station. The Proposed Action would make the AIP a new point of delivery on Western's system for delivery of power for pumping CCWD's Central Valley Project (CVP) water and non-CVP water at the AIP. This arrangement would be similar to CCWD's other intake facilities' power deliveries with Western and would offset some of the existing power usage by CCWD at Old River Pump Station. The AIP would be a new point of delivery for project power. Western would be responsible for constructing, operating, and maintaining the Proposed Action.

CCWD, together with the U.S. Department of the Interior, Bureau of Reclamation (Reclamation), prepared an Environmental Impact Report/Environmental Impact Statement (EIR/EIS) for the AIP to comply with the California Environmental Quality Act (CEQA) and the National Environmental Policy Act (NEPA), respectively. The EIR/EIS has State Clearinghouse Number 2005012101. The CCWD Board certified the EIR on November 15, 2006. This Final EA uses much of the information contained in the EIR/EIS but is focused solely on the potential environmental effects associated with the Proposed Action.

For further information regarding the Final EA, please contact Cherie Johnston-Waldear, Western Area Power Administration, Sierra Nevada Region, 114 Parkshore Drive, Folsom, California 95630-4710 or phone at (916) 353-4035.

Final
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for the
Western Area Power Administration
Alternative Intake Project
Transmission Line and Interconnection

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Acronyms and Abbreviations

ABAG	Association of Bay Area Governments
ACTM	Airborne Toxics Control Measure
AIP	Alternative Intake Project
AIRFA	American Indian Religious Freedom Act
APE	area of potential effects
ARB	California Air Resources Board
ASIP	Action Specific Implementation Plan
BAAQMD	Bay Area Air Quality Management District
BACT	best available control technology
BACT	Best Available Control Technology
BMP	best management practice
Board	Board of Directors
Business Plan	hazardous materials business plan
Business Plan Act	California Hazardous Materials Release Response Plans and Inventory Law of 1985
CAA	Clean Air Act
CAAA	Clean Air Act Amendments
CAAQS	California ambient air quality standards
Cal/EPA	California Environmental Protection Agency
CALFED	CALFED Bay-Delta Program
CalFire	California Department of Forestry and Fire Protection
Cal-OSHA	California Occupational Safety and Health Administration
Caltrans	California Department of Transportation
CBC	Building Standards Code
CCAA	California Clean Air Act
CCIC	Central California Information Centers
CCR	California Code of Regulations
CCWD	Contra Costa Water District
CEQ	Council on Environmental Quality
CEQA	California Environmental Quality Act
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Information System
CESA	California Endangered Species Act
CFR	Code of Federal Regulations

cfs	cubic feet per second
CHP	California Highway Patrol
CHRIS	California Historical Resources Information System
CNDDB	California Natural Diversity Database
CNPS	California Native Plant Society
CO	carbon monoxide
CRHR	California Register of Historic Resources
CVP	Central Valley Project
CWA	Clean Water Act
dB	Decibels
dBA	A-weighted decibels
DBP	disinfection byproduct
Delta	Sacramento–San Joaquin Delta
DFG	California Department of Fish and Game
diesel PM	Diesel particulate matter
DPR	California Department of Parks and Recreation
DTSC	California Department of Toxic Substances Control
EA	environmental assessment
EDR	Environmental Data Resources
EFH	essential fish habitat
EIR	environmental impact report
EIS	environmental impact statement
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
FMMP	Farmland Mapping and Monitoring Program
FONSI	Finding of no significant impact
FPP	Farmland Protection Program
FPPA	Farmland Protection Policy Act
FWCA	Fish and Wildlife Coordination Act
GPS	Global Positioning System
HAP	hazardous air pollutants
HCP	habitat conservation plan
HI	Hazard Index
I	Interstate
kV	Kilovolt
L_{dn}	day/night noise level
L_{eq}	equivalent noise level
LESA	Land Evaluation and Site Assessment

Acronyms and Abbreviations

L_{max}	maximum noise level
L_{min}	minimum noise level
LRGA	Leland R. Gardner and Associates
μS/cm	microSiemens per centimeter
MACT	maximum available control technology
MAF	Million acre-feet
MBTA	Migratory Bird Treaty Act
MEI	maximally exposed individual
MOA	memorandum of agreement
mph	miles per hour
MSCS	Multi-Species Conservation Strategy
NAAQS	national ambient air quality standards
NAGPRA	Native American Graves Protection and Repatriation Act
NAHC	Native American Heritage Commission
NCCP	natural community conservation plan
NCCPA	Natural Communities Conservation Plan Act
NEPA	National Environmental Policy Act
NESHAP	national emissions standards for hazardous air pollutants
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NO	nitric oxide
NO_2	nitrogen dioxide
NOAA	National Oceanic and Atmospheric Administration
NOI	notice of intent
NOP	notice of preparation
NO_X	oxides of nitrogen
NPDES	National Pollutant Discharge Elimination System
NPPA	Native Plant Protection Act
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NWIC	Northwest Information Centers
O&M	Operations and Maintenance
OEHHA	Office of Environmental Health Hazard Assessment
OSHA	U.S. Department of Labor Occupational Safety & Health Administration
PL	Public Law
Plan	project monitoring and adaptive management plan
PM	particulate matter

ppm	parts per million
ppt	parts per thousand
ppv	peak particle velocity
Proposed Action	Western Area Power Administration's Transmission Line and Interconnection
RCRA	Resource Conservation and Recovery Act
RD	Reclamation District
REC	recognized environmental condition
Reclamation	U.S. Department of the Interior, Bureau of Reclamation
RFTA	Reserve Forces Training Area
ROG	reactive organic gases
RWQCB	regional water quality control board
SCS	U.S. Soil Conservation Service
S.O.T. Co.	Southern Pacific Transportation Company
SFBAB	San Francisco Bay Air Basin
SHPO	State Historic Preservation Officer
SIP	State Implementation Plan
SJMSCP	San Joaquin Multi-Species Habitat Conservation and Open Space Plan
SJVAB	San Joaquin Valley Air Basin
SJVAPCD	San Joaquin Valley Air Pollution Control District
SO_2	sulfur dioxide
SRHR	Sacramento River Hydrological Region
SWP	State Water Project
SWPPP	storm water pollution prevention plan
SWRCB	State Water Resources Control Board
TAC	toxic air contaminants
TBACT	Toxic Best Available Control Technology
TMDL	total maximum daily load
TPY	tons per year
USC	United States Code
USACE	U.S. Army Corps of Engineers
USC	U.S. Code
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VAMP	*Vernalis Adaptive Management Plan*
VDE	visible dust emissions
WAPA	Western Area Power Administration

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1 Purpose and Need

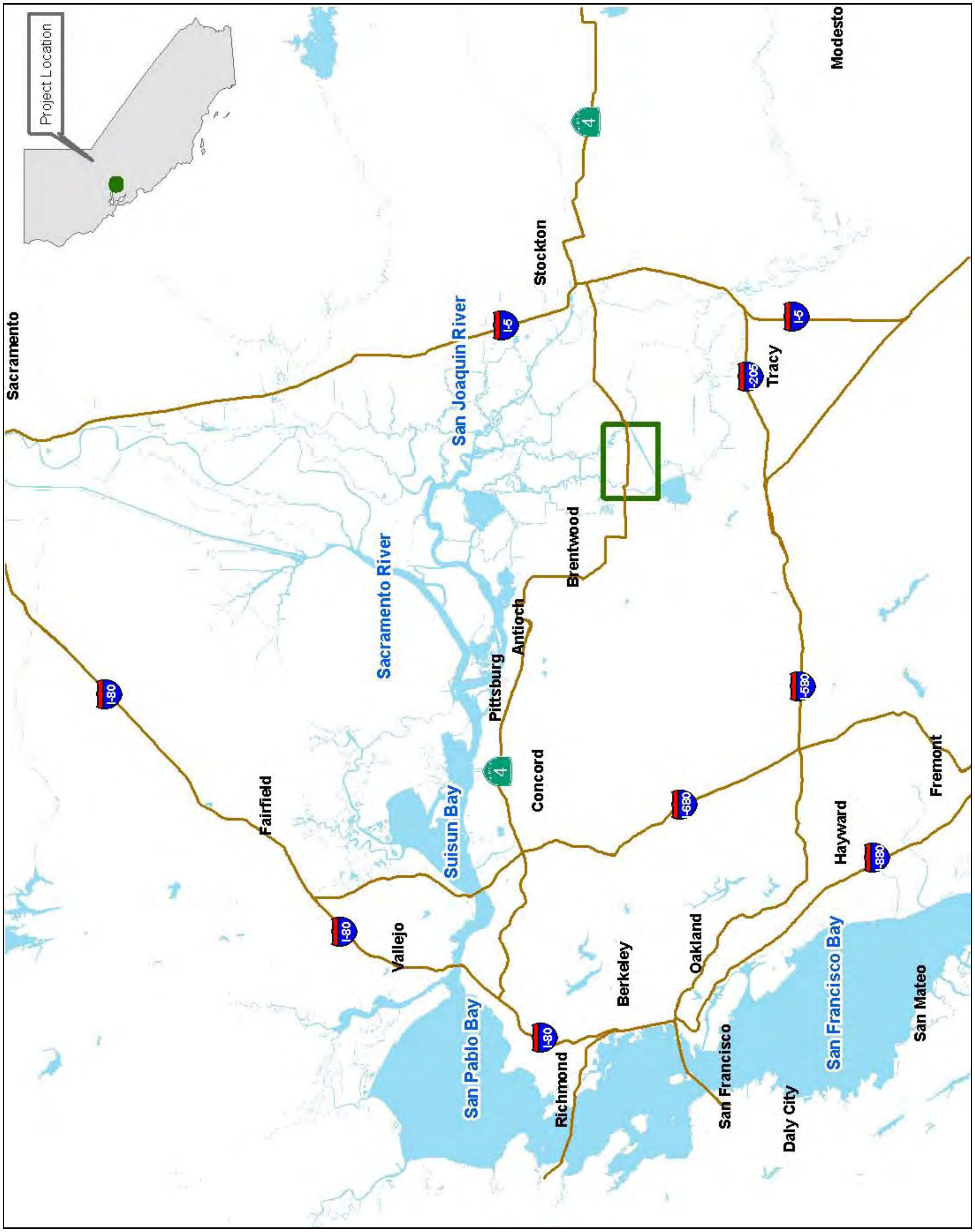
1.1 Introduction and Background

The Contra Costa Water District's (CCWD's) mission is to "strategically provide a reliable supply of high-quality water at the lowest cost possible, in an environmentally responsible manner." CCWD obtains its water supply exclusively from the Sacramento–San Joaquin Delta (Delta) and serves treated and untreated water to approximately 550,000 people in central and eastern Contra Costa County. CCWD's Board of Directors (Board) has adopted water quality objectives in order to keep constituents of major health concern at the lowest levels that are technically feasible and provide its customers with a consistent supply of aesthetically pleasing, high-quality water.

As part of its comprehensive water quality strategy to protect and improve water quality for its customers, CCWD is implementing the Alternative Intake Project (AIP). The AIP will enable CCWD to relocate some of its existing diversions to Victoria Canal, a Delta location with higher quality source water than is currently available at its Old River and Rock Slough intakes. The AIP project purpose is to protect and improve the quality of water delivered to CCWD's untreated- and treated-water customers. Key objectives of the AIP are to improve delivered water quality, especially during drought periods; protect and improve health and/or aesthetic benefits to consumers; improve operational flexibility; and protect delivered water quality during emergencies. The AIP facilities include an intake and pump station, pipeline, and pipeline intertie, as well as construction and operations/maintenance of a new transmission line and interconnection.

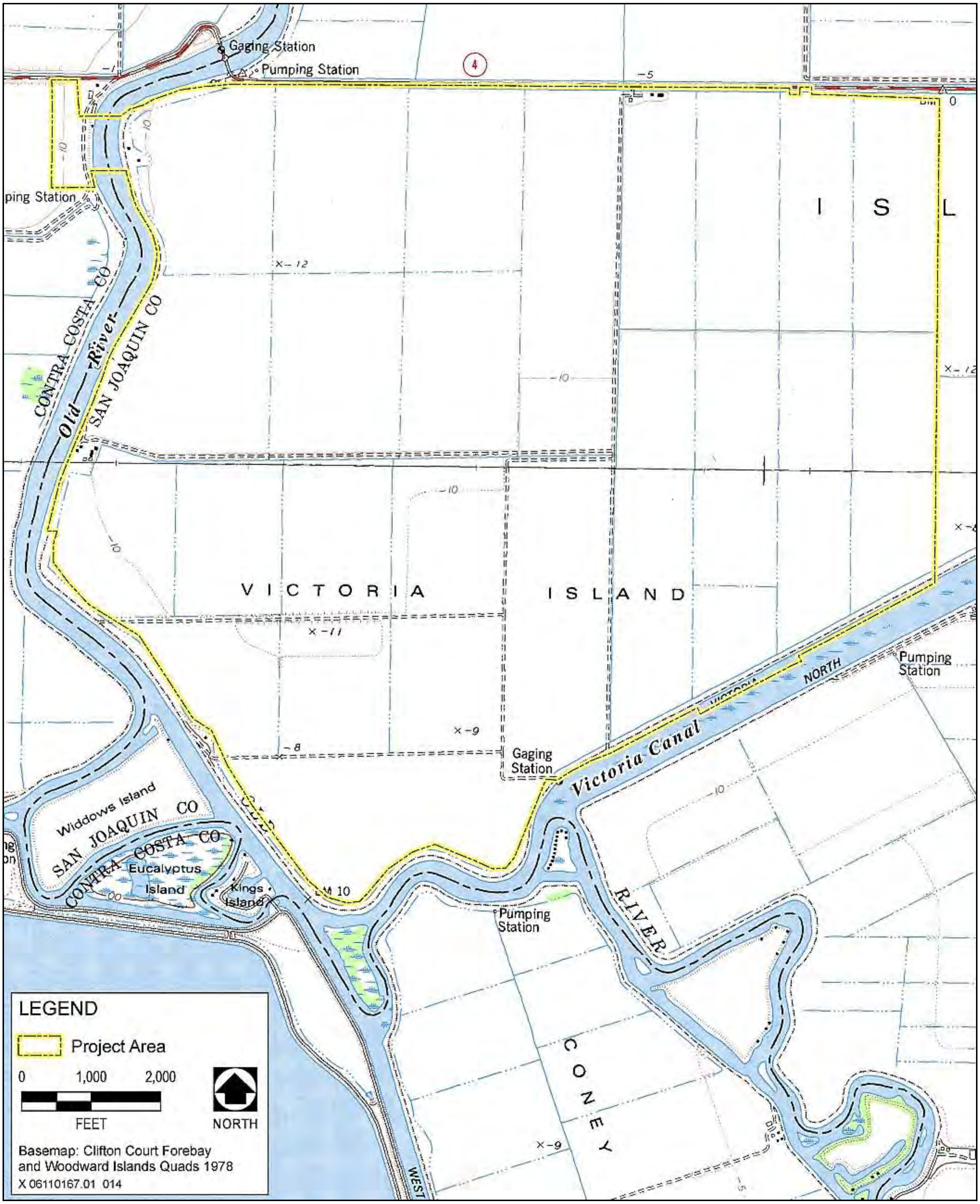
This environmental assessment (EA) evaluates Western Area Power Administration's (Western's) Transmission Line and Interconnection (Proposed Action) for the AIP. The Proposed Action would extend Western's existing Tracy–Los Vaqueros 69-kilovolt (kV) transmission line from near CCWD's existing Old River Pump Station, span Old River onto Victoria Island, and continue along existing dirt roads to the AIP's new power substation serving the new CCWD Victoria Canal Pump Station. The Proposed Action would make the AIP a new point of delivery on Western's system for delivery of power for pumping CCWD's Central Valley Project (CVP) water and non-CVP water at the AIP. This arrangement would be similar to CCWD's other intake facilities' power deliveries with Western and would offset some of the existing power usage by CCWD at the Old River Pump Station. Western would be responsible for constructing, operating, and maintaining the Proposed Action.

CCWD, together with Reclamation, prepared an environmental impact report/environmental impact statement (EIR/EIS) for the AIP to comply with the California Environmental Quality Act (CEQA) and National Environmental Policy Act



Source: Carollo Engineers

Regional Vicinity Map for the Proposed Action **Exhibit 1-1**



Source: Carollo Engineers

Project Location Area for the Proposed Action **Exhibit 1-2**

(NEPA), respectively. The EIR/EIS has State Clearinghouse Number 2005012101. The CCWD Board certified the EIR on November 15, 2006. This EA uses much of the information contained in the EIR/EIS but is focused solely on the potential environmental effects associated with the Proposed Action described below.

1.2 Purpose of and Need for Action

CCWD has requested an interconnection to the Western transmission system to serve its AIP electric load. The request will require Western to extend its existing Tracy–Los Vaqueros 69-kV transmission line by constructing a new approximately 3.6-mile-long 69-kV transmission line to serve the AIP electric load. Western will consider CCWD's request pursuant to its Open Access Transmission Tariff, and consider the environmental effects of the Proposed Action. Design, construction, operation, and maintenance of the 69-kV transmission line would be completed by Western.

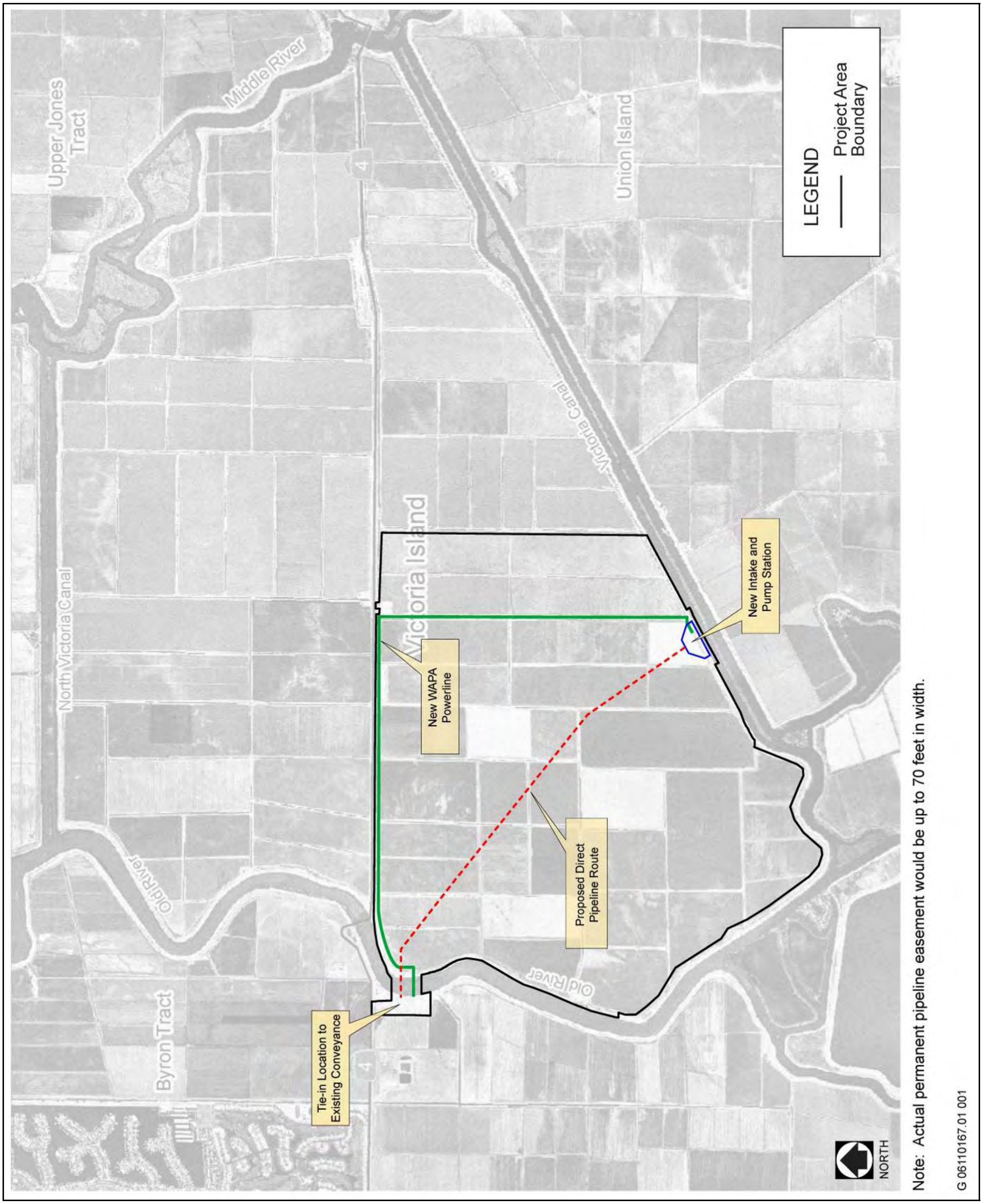
The purpose of the Proposed Action is to enable CCWD to receive electric service at the AIP power substation for operating AIP project facilities, including the pump station on Victoria Canal, while minimizing costs and environmental effects.

The Proposed Action is needed to enable CCWD to deliver power to the AIP project components. Without the delivery of power, the AIP could not be operated to meet its purpose or project objectives.

1.3 Location and Study Area Description

The Proposed Action would be implemented in the Delta, San Joaquin and Contra Costa Counties, California. Exhibits 1-1 and 1-2 show the general and detailed project area, respectively. Exhibit 1-3 presents an aerial photograph of the proposed transmission line alignment.

The AIP electric interconnection to Western's transmission system would be located on Victoria Island in San Joaquin County. The new transmission line would span Old River to Victoria Island, in San Joaquin County, and parallel State Route 4 until turning south to connect with CCWD's proposed intake and pump station on Victoria Canal. Old River separates the two counties and two tracts. The Byron Tract levee at CCWD's Old River Pumping Plant is maintained by Reclamation District (RD) 800. The surrounding lands are used for agricultural production. Victoria Island is bounded by Woodward Island and Woodward Canal/North Victoria Canal to the north, Upper Jones Tract and Middle River to the east, Union Island and Victoria Canal to the south, and Old River and Byron Tract to the west. The island is under private ownership by the Victoria Island Farms, and the land in the project area is used exclusively for agriculture (primarily alfalfa, corn silage, tomatoes, asparagus, and wheat). RD 2040 maintains the levee system on Victoria Island.



Source: EDAW 2007 GIS files

Aerial View of Proposed Action **Exhibit 1-3**

1.4 Scope of this Environmental Assessment

Western has prepared this EA (DOE/EA-1602), with assistance from CCWD, to disclose potential environmental and socioeconomic effects of the Proposed Action. Western was not a cooperating agency to the AIP EIR/EIS (CCWD and Reclamation 2006). Since Western's Proposed Action is connected to the AIP, an action which may have potentially significant environmental impacts, it does not meet the definition of applications for Categorical Exclusion in accordance with Code of Federal Regulations (CFR) Section 1508.25(a)(1). Therefore, to ensure proper NEPA compliance, an EA is being prepared. This document follows regulations issued by the Council on Environmental Quality (CEQ) for implementing procedural provisions of NEPA (40 CFR 1500–1508) and the U.S. Department of Energy's *Implementing Procedures* (10 CFR 1021). This EA is intended to disclose potential impacts on the quality of the human environment resulting from the Proposed Action and No-Action Alternative to determine if the impacts may be significant and, therefore, would require preparation of an EIS. If impacts resulting from the Proposed Action are determined to not be significant, Western would complete a finding of no significant impact (FONSI).

This document describes the components and environmental consequences of constructing, operating, and maintaining an interconnection to Western's existing transmission system and extending the existing Tracy–Los Vaqueros 69-kV transmission line approximately 3.6 miles from near the existing Old River Pump Station to CCWD's proposed Victoria Canal pump station.

The EA comprises the following chapters and appendices:

- Chapter 1, "Purpose and Need";
- Chapter 2, "Alternatives, Including the Proposed Action";
- Chapter 3, "Affected Environment and Environmental Consequences";
- Chapter 4, "Cumulative Effects";
- Chapter 5, "Compliance with Environmental Laws and Regulations";
- Chapter 6, "Coordination and Review of the Draft EA";
- Chapter 7, "Monitoring and Adaptive Management";
- Chapter 8, "List of Preparers";
- Chapter 9, "References";
- Appendix A, "Designations, Policies, and Regulations";
- Appendix B, "Correspondence with, and Biological Opinions Issued by the U.S. Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS)
- Appendix C, "Floodplain and Wetland Environmental Review";
- Appendix D, "Correspondence with the State Historic Preservation Officer (SHPO)"; and
- Appendix E, "Comments and Responses."

Assessment of the affected environment and environmental consequences relied on a combination of existing data and data collected through completion of CCWD's and Reclamation's EIR/EIS, an Action Specific Implementation Plan (ASIP) to satisfy the federal Endangered Species Act and California Endangered Species Act, and biological surveys (CCWD 2006), as well as a cultural resources report (CCWD 2007). Extensive biological and cultural resources surveys of the entire action area for this EA have been completed, with results and analyses included in the aforementioned documents.

1.5 Decisions Needed

This EA, which is the responsibility of Western, is a concise public document that serves to:

- provide sufficient evidence and analysis for determining whether to prepare an EIS or a FONSI,
- aid Western's compliance with NEPA when no EIS is necessary, and
- facilitate preparation of an EIS if one is necessary (40 CFR 1508.9).

Based on the environmental analysis in the EA, Western will either prepare a FONSI and proceed with the Proposed Action, or prepare an EIS if the EA reveals the potential for unmitigated significant environmental impacts.

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2 Alternatives Including the Proposed Action

2.1 Proposed Action

2.1.1 Description and Facilities

Western would be responsible for constructing, operating, and maintaining the Proposed Action. The Proposed Action would extend the existing Western Tracy–Los Vaqueros 69-kilovolt (kV) transmission line near the existing Old River Pump Station on Byron Tract in Contra Costa County to the proposed CCWD power substation at the new Victoria Canal intake. The power pole alignment would be located directly adjacent to, or in the footprint of, existing dirt access roads and would be approximately 3.6 miles long. The Proposed Action would enable CCWD to receive electric service at AIP components, including the 250-cubic-feet-per-second (cfs) Victoria Canal Pump Station. Conservation measures, as identified in Section 2.1.2, would be incorporated into the Proposed Action to ensure that project impacts would be less than significant.

The Proposed Action involves the following facilities:

- The new transmission line would be an overhead 69-kV single circuit copper wire line and fiber optic cable supported on wood or steel poles. The poles would be approximately 50-80 feet tall with a 3- to 4-foot diameter base. The poles would be embedded in the ground to approximately 12–15 feet deep below existing grade. Guy wires or steel monopoles would be necessary for pole support at certain locations. The right-of-way (ROW) would be 50 feet wide.

- Approximately 18–20 poles per mile would be used to support the 69-kV line or one pole approximately every 300 feet. Approximately 60–70 poles would be required.

- Large transmission line steel structures would be required on each side of the Old River crossing to satisfy the minimum conductor clearances from the water surface. These would be steel monopoles, up to approximately 90 feet tall (to allow sufficient electrical clearance of a navigable waterway), with an 8-foot base.

- All poles would be designed for 125 mile per hour (mph) wind loading, moisture conditions associated with the Sacramento–San Joaquin Delta (Delta), and appropriate seismic forces.

- New meters and metering current transformers are required.

- A new interconnection would be provided at the AIP substation on Victoria Island.
- Construction staging areas of approximately 5 acres or less would be located on each side of the Old River crossing. One to three additional staging areas of less than approximately 1 acre would be located along the transmission line alignment on Victoria Island. Western has agreements in place with the land owner to use the land for staging, construction, and the 50-foot-wide permanent easement for the transmission lines.

Much of the project action area is immediately adjacent to State Route 4. The project action area is easily accessible from Highway 4 on existing dirt roads.

2.1.2 Conservation Measures

The AIP EIR/EIS (CCWD and Reclamation 2006) considered environmental effects of the power poles and transmission line and, as such, provides a foundation for the focused analysis to be conducted in this EA. CCWD's Board of Directors (Board) has adopted numerous mitigation measures as part of certifying the AIP EIR; these measures have been incorporated into this Proposed Action as conservation measures and are part of the project description. Reclamation also adopted a Record of Decision (ROD) authorizing the AIP and associated mitigation measures which mitigate adverse effects of the AIP pursuant to the EIR/EIS. Western has incorporated these mitigation measures into the Proposed Action as conservation measures. Conservation measures which are included in the Proposed Action are summarized in Table 2.1-1 below and presented in full in Table 7.4-1 (Chapter 7 of this EA).

2.1.3 Construction Schedule

The Proposed Action would include power pole and transmission line construction over a period of approximately 9 months during 2008 and 2009.

2.1.4 Operations and Maintenance

Western's Operations and Maintenance (O&M) Program has been developed to improve the safety and reliability of its electric transmission systems and will be used for O&M of the Proposed Action. The Proposed Action includes maintaining the new transmission line and access road, thereby ensuring that Western's maintenance crews have safe access to transmission line structures.

Minimal O&M activity by Western is expected as part of the Proposed Action because no natural vegetation exists in the new transmission line ROW, the area is devoid of trees and shrubs, and the current landowner maintains vegetation control through normal agricultural practices. Transmission system maintenance activities would consist of regular aerial and ground patrols to locate and correct problems, and perform preventative maintenance, on power poles and transmission lines. Access road repairs and typical O&M activities, such as grading and resurfacing, would be performed as needed.

2.2 No-Action Alternative

Under the No-Action Alternative, Western would not allow interconnection with its Tracy–Los Vaqueros 69-kV transmission line, and would not construct and maintain a new approximately 3.6-mile-long 69-kV transmission line. All construction and O&M-related environmental and socioeconomic impacts associated with the Proposed Action would not occur. The project would not go forward as described above and the AIP would not be a new point of delivery for project power.

Table 2.1-1
Conservation Measures Included in the Proposed Action.

Measure # in AIP EIR/EIS	Conservation Measure
4.5-d	Prepare and Implement a Storm Water Pollution Prevention Plan (SWPPP) that Minimizes the Potential Contamination of Surface Waters, and Comply with Regional Water Quality Control Board (RWQCB) Requirements to Protect Water Quality [in EA Sections 3.5.2.4 and 3.8.2.4]
4.6-a	Minimize Potential Fill of Jurisdictional Waters of the United States and Loss of Sensitive Habitat, and Compensate for Unavoidable Impacts [in EA Sections 3.3.2.4, 3.5.2.4 and 3.8.2.4]
4.6-b	Minimize Potential Effects on Special-status Plants, and Compensate for Loss if Required [in EA Section 3.3.2.4]
4.6-c	Implement Avoidance and Conservation Measures as Needed to Minimize Potential Effects on Giant Garter Snake [in Section 3.4.2.4]
4.6-e	Conduct Surveys and Implement Protective Measures, if Needed, to Minimize Potential Effects on Swainson's Hawk, White-Tailed Kite, Northern Harrier, and Other Raptors. To the extent feasible, Western will follow Avian Protection Plan guidelines for power lines (Edison Electric Institute's Avian Power Line Interaction Committee and U.S. Fish and Wildlife Service 2005): (1) provide 60-inch minimum horizontal separation between energized conductors and/or energized conductors and grounded hardware, (2) insulate hardware or conductors against simultaneous contact if adequate spacing is not possible, (3) use Western-approved poles that minimize impacts on birds, and/or (4) increase the visibility of conductors or shield wires to prevent avian collisions. [in EA Section 3.4.2.4]
4.6-f	Conduct Surveys and Implement Protective Measure, if Required, to Minimize Potential Effects on Burrowing Owl [in EA Section 3.4.2.4]
4.6-i	Conduct Surveys and Minimize Potential Impacts on Tricolored Blackbird, if Required [in EA Section 3.4.2.4]
4.8-a	Preserve the Agricultural Productivity of Prime Farmland and Farmland of Statewide Importance to the Extent Feasible [in EA Section 3.2.2.4]
4.9-c	Prepare and Implement a Traffic Control and Safety Assurance Plan [in EA Section 3.13.3]
4.10-a	Implement San Joaquin Valley Air Pollution Control District (SJVAPCD) and Bay Area Air Quality Management District (BAAQMD) Measures to Control Construction-Generated Air Pollution Emissions [EA Section 3.7.2.4]
4.11-a	Implement Measures to Control Generation of Short-Term Construction Noise [in EA section 3.9.2.4]

Table 2.1-1
Conservation Measures Included in the Proposed Action.

Measure # in AIP EIR/EIS	Conservation Measure
4.13-b	Coordinate with the Applicable Landowners and Land Managers to Ensure That Temporary Construction Workers and Western Personnel are not Exposed to Harmful Levels of Pesticides from Adjacent Agricultural Practices [in EA Section 3.9.2.4]
4.16-a(2)	Stop Work within 100 Feet of the Find and Implement Measures to Protect Archaeological Resources if Discovered during Surveys or Ground-Disturbing Activities [in EA Section 3.11.2.4]
4.16-b	Stop Potentially Damaging Work if Human Remains are Uncovered during Construction [in EA Section 3.11.2.4]

Measure # is from the AIP EIR/EIS, State Clearinghouse #2005012101

2.3 Alternatives Considered but Eliminated from Detailed Analysis

During initial development stages of the AIP, CCWD evaluated numerous options and routes to deliver power to the proposed AIP pump station. CCWD is a Central Valley Project (CVP) contractor and diverts the majority of its water supply under a contract with Reclamation. The contract includes an allotment of CVP power for use in pumping CVP water. Western is the sole agency able to provide transmission for CVP power to CCWD and currently provides CVP power (project power) delivery to CCWD's pumping plants on Rock Slough and Old River.

Several pipeline and corresponding transmission line routes were evaluated to provide connection to the proposed Victoria Canal intake. Several factors were taken into account when evaluating optional routes with the major factors being minimizing environmental impacts, landowner impacts, and cost. During pre-project planning meetings with CCWD and Reclamation, Western determined that an indirect route, which is the route followed in the Proposed Action, was the preferred route; this transmission route made the best use of existing access roads, paralleled State Route 4, would be easiest to maintain, and had less environmental impact because it minimizes disruptions to existing agricultural operations and production on Victoria Island. The direct route across agricultural lands was eliminated because these environmental impacts would be greater than under the indirect route (the Proposed Action). In addition, the indirect route eliminates engineering concerns related to stray current corrosion (i.e., electrolysis) when placing a metallic pipeline and power transmission line within the same corridor.

Because interconnection with other electrical distribution systems and other alternative routes were all infeasible or would have greater potential environmental impact than the Proposed Action, these alternatives were eliminated from detailed analysis.

3 Affected Environment and Environmental Consequences

Organized by environmental resource category, this Chapter 3, entitled "Affected Environment and Environmental Consequences," provides an integrated discussion of the affected environment (including environmental and regulatory settings) and environmental consequences (including direct and indirect impacts). Proposed conservation measures, which have been included in the Proposed Action, are presented as well. Section 3.1 summarizes the resources evaluated and those not evaluated. The geographic scope for this environmental analysis is the transmission line right-of-way (ROW) and staging areas associated with the constructing, operating, and maintaining the transmission line and poles. The surrounding area also was evaluated in the EIR/EIS for the larger AIP.

3.1 Resources

The following discussions present the organization and general assumptions used in the environmental analysis contained in this EA. The reader is referred to the individual technical sections regarding specific assumptions, methodology, and significance criteria (thresholds of significance) used in the analysis.

3.1.1 Resources Evaluated

The environmental setting, impacts, and mitigation measures have been prepared using NEPA terminology (affected environment, environmental consequences [generally], and mitigation measures). The remainder of Chapter 3 is organized into the following resource areas:

- Section 3.2, "Land Use"
- Section 3.3, "Habitats and Vegetation"
- Section 3.4, "Wildlife"
- Section 3.5, "Fisheries"
- Section 3.6, "Geology and Soils"
- Section 3.7, "Air Quality"
- Section 3.8, "Water Quality"
- Section 3.9, "Public Health"
- Section 3.10, "Recreation"
- Section 3.11, "Cultural Resources"
- Section 3.12, "Aesthetics"
- Section 3.13, "Summary of Impacts," including subsections:
  - "Overview of the Environmental Effects of the Alternatives"
  - "No-Action Alternative Effects"
  - "Proposed Action Effects"

3.1 Resources

3.1.1.1 Affected Environment and Environmental Consequences Analysis

Sections 3.2 through 3.13 follow the same general format:

"**Affected Environment**" provides an overview of the existing physical environmental conditions and, when appropriate, applicable regulations in the area that could be affected by implementation of the Proposed Action, in accordance with NEPA regulations (40 CFR 1502.15).

"**Environmental Consequences and Mitigation Measures**" identifies the impacts of the project on the environment, in accordance with NEPA regulations (40 CFR 1502.16). The following discussions are included in this subsection:

"Methods and Assumptions" describes the methods, process, procedures, and/or assumptions used to formulate and conduct the impact analysis.

"Significance Criteria" provides the criteria used in this document to define the level at which an impact would be considered significant in accordance with NEPA. Significance criteria used in this EA are based on factual or scientific information and data and regulatory standards of Federal, State, and local agencies, as applicable. These thresholds also encompass the factors taken into account under NEPA to determine the significance of an action in terms of the context and the intensity of its effects (40 CFR 1508.27).

Project impacts are organized into two categories: **Direct and Indirect Impacts**. Direct impacts are those that are caused by the action and occur at the same time and place. Indirect effects are reasonably foreseeable consequences that may occur at a later time or at a distance that is removed from the project area.

"Impacts of Alternatives on the Resource" The level of impact of the Proposed Action is determined by comparing estimated effects with baseline conditions. Under NEPA, the No-Action Alternative (expected future conditions without the project) is the baseline against which the effects of the Proposed Action are compared.

"**Mitigation Measures"** Conservation measures are incorporated where feasible to avoid, minimize, rectify, reduce, or compensate for significant and potentially significant impacts of the project. These conservation measures serve as mitigation measures, in accordance with NEPA regulations (40 CFR 1508.20), that have been committed to and incorporated into the Proposed Action as part of the AIP. No mitigation measures are proposed when the impact is determined to be "less than significant."

3.1.1.2 Cumulative Impact Analysis

Cumulative Impacts of the Proposed Action are described in Chapter 4. The NEPA regulations define a cumulative impact as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions" (40 CFR 1508.7). Cumulative effects can result from individually minor, but collectively significant, actions over time and differ from indirect impacts (40 CFR 1508.8). They are caused by the incremental increase in total environmental effects, when the evaluated project is added to other past, present, and reasonably foreseeable future actions.

3.1.2 Resources Eliminated from Detailed Analysis

NEPA regulations provide for the identification and elimination from detailed study the issues that are not significant or that have been covered by prior environmental review (40 CFR 1501.7 [a][3]).

Western determined the resources addressed in this Section 3.1.2 would not have a significant effect on the human environment or have been covered elsewhere in environmental documents based on Western's review of information obtained during the AIP EIR/EIS process. Specifically, Western reviewed information obtained during initial scoping with the public and governmental agencies, and information obtained through literature review, agency correspondence, consultations, and field data collection. Accordingly, these resources are not addressed further in this EA, but are identified below with a brief explanation.

3.1.2.1 Mineral Resources

The Proposed Action would not affect any known sand, gravel, natural gas, gold, or silver areas or result in the loss of availability of any known mineral resource. In addition, the project would not interfere with any existing commercial mining activity. No oil and gas operations exist in the study areas. Potential project facilities associated with the Proposed Action do not fall within any areas identified by the Contra Costa County (2005) or San Joaquin County (1992) General Plans as mineral resource areas. Therefore, no impacts on mineral resources would occur and no further evaluation is included in this EA. Soils (including peat), however, are addressed in Section 3.6, "Geology and Soils."

3.1.2.2 Population and Housing

The Proposed Action would not directly or indirectly result in population growth through the provision of new homes, new businesses, or in any other manner. In addition, the project would not displace existing housing or people such that replacement housing would be required to be constructed elsewhere. Therefore, no significant effects would occur and no further discussion is warranted.

3.1.2.3 Public Services (fire and police protection, schools, parks, and other public facilities)

As described above, the Proposed Action would not directly or indirectly result in population growth. Therefore, the project would not increase long-term demand for public services, including fire and police protection, additional schools, parks, and other public facilities, that would necessitate the construction of new or altered government service facilities. No further evaluation of this impact is included in this EA.

3.1.2.4 Transportation Resources

The Proposed Action would result in minor additional traffic within the project site during construction as construction vehicles go to and from the site. Additionally, a very small increase in traffic for periodic operations and maintenance visits would be expected. With the implementation of a traffic control and safety assurance plan, as prescribed in the Proposed Action's conservation measures, all potential impacts on transportation are less than significant. No further evaluation of this resource is included in this EA.

3.2 Land Use

This section describes the existing land uses and land use designations of the project site (Victoria Island/Byron Tract) and addresses the consistency of the Proposed Action with the applicable land use designations, plans, and policies. A brief discussion of agricultural resources, and the potential impact of the Proposed Action on nearby agricultural lands, is included in this section.

3.2.1 Affected Environment

3.2.1.1 Existing Land Uses

General Location

The proposed transmission line and its 50-foot-wide transmission ROW would be located on Victoria Island, in San Joaquin County, and Byron Tract, in Contra Costa County. Old River, which separates the two counties, also separates the two tracts (see Exhibit 3.2-1). State Route (SR) 4 forms the northern boundary of the proposed project site.

Victoria Island is bounded by Woodward Island and Woodward Canal/North Victoria Canal to the north, Upper Jones Tract and Middle River to the east, Union Island and Victoria Canal to the south, and Old River and Byron Tract to the west. The land is used exclusively for agriculture. Reclamation District (RD) 2040 maintains the levee system.

Byron Tract is located within the East County Area of Contra Costa County, but outside its urban limit line (Contra Costa County 2005a, p. 3-9). Byron Tract is bounded by Orwood Tract to the north, the community of Byron to the west, and Old River and Victoria Island to the east. Byron Tract is under private ownership by various entities, including CCWD, which owns the existing Old River intake and pump station site and adjacent lands. The Old River levee at the project site is maintained by RD 800.

Existing land uses at Victoria Island and Byron Tract consist primarily of agricultural lands that are in production or fallowed. Row crops, the dominant vegetation community at Victoria Island and Byron Tract, are planted in asparagus, alfalfa, and wheat. Agricultural support facilities (barn structure, storage facilities, and farm employee housing) are located on Victoria Island, south of SR 4. Seaton's Marine Service and CCWD's existing Old River intake and pump station are located adjacent to Old River on Byron Tract, bounded by agricultural lands.

Several residential communities, including the Town of Discovery Bay and the community of Byron, are located nearby but outside of the project site.

Sensitive Land Uses

Sensitive land uses in the vicinity of Victoria Island and Byron Tract include schools, fire stations, residential areas, churches, and other uses (primarily located in and around Discovery Bay). The only sensitive land use located within the Victoria Island and Byron Tract project site is the temporary (seasonal) farm employee residence situated on Victoria Island south of SR 4. The nearest sensitive land uses outside the proposed project site include residences in Discovery Bay, approximately one-half mile or more northwest of the proposed project site, and residential homes approximately 1 mile away from the proposed intake site on an island south of Victoria Canal. There are no Williamson Act contract lands on Byron Tract or in adjacent areas (CCWD 2003, p. 3-7).

3.2.1.2 Designations, Policies, and Regulations

For discussion of designations, policies, and regulations for land use and agriculture, see Appendix A, Section A.2. Farmland designations for the Project site are presented in Exhibit 3.2-1.

3.2.2 Environmental Consequences

3.2.2.1 Methods and Assumptions

This section presents an evaluation of the potential for general land use or planning conflicts associated with implementation of the Proposed Action or alternatives.

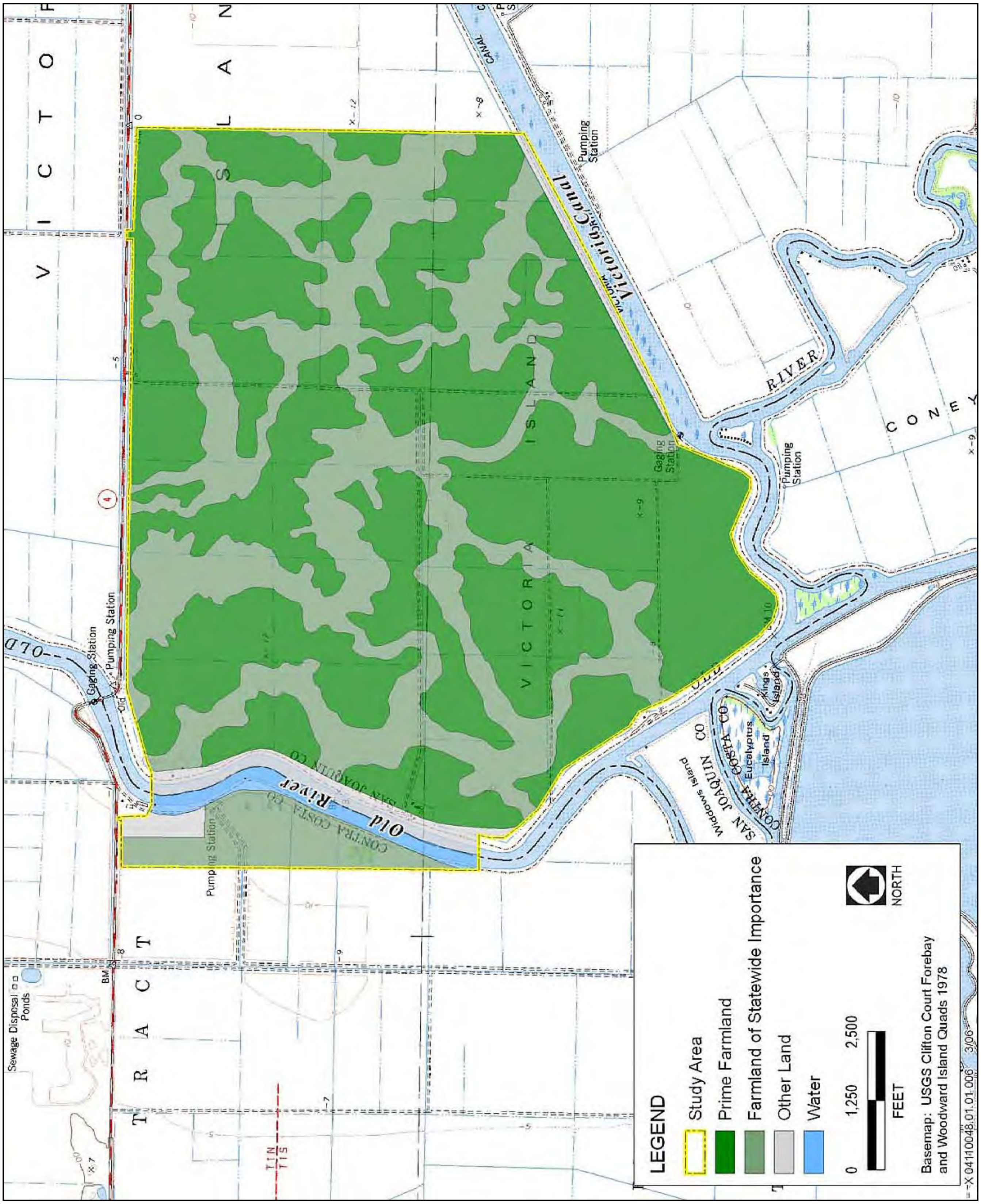
3.2.2.2 Significance Criteria

Significance under NEPA is determined by assessing the impact of a proposed action in terms of its context and the intensity of its effects. An alternative was determined to result in a significant effect on land use and agricultural resources if it would:

- conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project;
- create an outcome where the resulting condition would significantly conflict with surrounding land uses;
- involve changes in the existing environment that, due to their location or nature, could result in the conversion of farmland to nonagricultural use; or
- convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance to nonagricultural use.

Discussions of consistency with land use and zoning designations are provided below for the Proposed Action. CCWD and Western are not subject to local zoning laws. However, these discussions are provided to fully inform the public and the decision makers about such consistency if local laws were applicable.

Because San Joaquin County has no adopted thresholds related to the conversion of agricultural land to nonagricultural uses, any amount of Prime Farmland, Unique Farmland, or Farmland of Statewide Importance that would be permanently converted to nonagricultural uses was considered to be a significant impact under the AIP EIR/EIS (CCWD and Reclamation 2006).



Source: EDAW 2005

Farmland Designations for Victoria Island/Byron Tract Project Site **Exhibit 3.2-1**

3.2.2.3 No-Action Alternative

Under the No-Action Alternative, no new facilities would be constructed and no existing facilities would be altered, expanded, or demolished. Therefore, no environmental impacts related to land use would occur from implementing the No-Action Alternative, and the No-Action Alternative would not contribute to any cumulative land use impacts.

3.2.2.4 Proposed Action

The Proposed Action could potentially affect a small portion of the land use and agricultural resources listed above. As described above, land use designations include general agricultural (Victoria Island) and public and semi-public uses (Byron Tract). Zoning in these areas is AG-80 and heavy agricultural use, respectively. Installation of transmission lines along the existing dirt access road (north-south) and SR 4 (east-west) would not conflict with adjacent agricultural land uses or conflict with existing land use and zoning designations.

Contra Costa County and San Joaquin County establish design policies that are intended to protect sensitive resources (e.g., waterways, archaeological resources, and biological resources) as well as reduce potential safety hazards to people and structures. The Proposed Action would generally conform to these goals and policies. Conforming with these goals and policies, component activities of the Proposed Action would not create a significant impact on sensitive resources in the area, such as the temporary (seasonal) farm employee residence located along the south side of SR 4.

Located within the 50-foot-wide transmission ROW, installing and maintaining the two steel support structures (8-foot- to 10-foot-square base) on either side of Old River could potentially affect a very small portion of agricultural land adjacent to Old River. Except for the structures closest to Old River, the transmission line poles would be located adjacent to the existing dirt farm access roads. The potential impact, over the long-term and short-term, would be **less than significant**. No mitigation is required.

3.3 Habitats and Vegetation

This section describes the existing plant communities and wildlife habitats of the project site (Victoria Island/Byron Tract) and identifies the potential impacts of the Proposed Action and No-Action Alternative on existing habitat and plant resources. Mitigation measures to offset any identified impacts are also provided, as applicable.

3.3.1 Affected Environment

3.3.1.1 Existing Plant Communities and Wildlife Habitats

Victoria Island/Byron Tract

A habitat map was not prepared due to the small patch size of plant communities in relation to the agricultural areas. Representative photographs of the plant communities at Victoria Island/Byron Tract are shown in Exhibits 3.3-1 and 3.3-2. The following description of habitat types within the project area, which includes the 50-foot-wide transmission ROW, is consistent with the natural communities conservation plan (NCCP) habitats as described in the CALFED Bay-Delta Program's (CALFED's) *Multi-Species Conservation Strategy* (MSCS), but also includes habitat types not evaluated in the MSCS.

Upland Cropland

Row crops, the dominant vegetation community within the proposed project site, consisted of asparagus (*Asparagus officinalis* ssp. *officinalis*), alfalfa (*Medicago sativa*), and wheat (*Triticum aestivum*) during surveys in spring and summer 2005 conducted as part of the AIP EIR/EIS (CCWD and Reclamation 2006). Tomato and silage (fodder converted into succulent feed for livestock through processes of anaerobic acid fermentation) also comprise acreages at the proposed project site.

Agricultural habitats such as those present at Victoria Island generally provide limited value for wildlife species. However, alfalfa fields can be used by a number of wildlife species. Alfalfa often supports small mammals, such as Botta's pocket gopher (*Thomomys bottae*), western harvest mouse (*Reithrodontomys megalotis*), and California meadow vole (*Microtus californicus*). These small mammals are prey for a variety of raptor species known to be present in the Victoria Island/Byron Tract area, including American kestrel (*Falco sparverius*), northern harrier (*Circus cyaneus*), red-tailed hawk (*Buteo jamaicensis*), and Swainson's hawk (*Buteo swainsonii*).

Fallow Fields and Ruderal Habitat

Several agricultural fields on Byron Tract are not in active agricultural production and are fallow. Dominant vegetation in the fallow agricultural fields is Italian ryegrass (*Lolium multiflorum*) and perennial ryegrass (*Lolium perenne*). The fallow fields on Byron Tract have almost 100% vegetative cover.

3.3 Habitats and Vegetation

Agricultural fields (asparagus and alfalfa) on Victoria Island (April 18, 2005)

Emergent freshwater marsh and open water on west side of Victoria Island, across from existing Old River Intake and Pump Station (April 18, 2005)

Source: EDAW 2005

Representative Photographs from Victoria Island/Byron Tract **Exhibit 3.3-1**

Typical drainage ditch on Victoria Island with scant freshwater marsh, aquatic vegetation, and open water (April 18, 2005)

Byron Tract: fallow fields, ruderal habitat, and irrigation canal (April 18, 2005)

Source: EDAW 2005

Representative Photographs from Victoria Island/Byron Tract **Exhibit 3.3-2**

3.3 Habitats and Vegetation

The agricultural field boundaries, roadsides, and banks and levees along Old River and Victoria Canal are primarily devoid of vegetation. Where vegetation is present, it is dominated by nonnative grasses and forbs. These ruderal areas often include patches of invasive weeds, including Himalayan blackberry (*Rubus discolor*), poison hemlock (*Conium maculatum*), milk thistle (*Silybum marianum*), and artichoke thistle (*Cynara cardunculus*). Also present are species such as shepherd's purse (*Capsella bursa-pastoris*), wild radish (*Raphanus sativa*), perennial pepperweed (*Lepidium latifolium*), annual bluegrass (*Poa annua*), and common cudweed (*Gnaphalium luteo-album*). Agricultural field boundaries, roadsides, and banks and levees on Byron Tract are also dominated by the same suite of nonnative grasses and forbs that dominate similar areas on Victoria Island; however, the total cover of such species is much higher on Byron Tract.

As with agricultural habitats, low vegetation diversity in fallow fields and ruderal habitats limits their value to wildlife. However, these habitats are expected to support common mammals, such as California ground squirrel (*Spermophilius beecheyi*), western harvest mouse, California meadow vole, and desert cottontail (*Sylvilagus audubonii*). They also provide habitat for birds, such as white-crowned sparrow (*Zonotrichia leucophrys*), western meadowlark (*Sturnella neglecta*), and American goldfinch (*Carduelis tristis*).

Tidal Freshwater Emergent Habitat

Most tidal freshwater emergent habitats in the Sacramento–San Joaquin Delta (Delta) occur as narrow bands along island levees and small to large swaths on in-channel islands and along shorelines. Freshwater emergent habitat within the Victoria Island/Byron Tract area is found along the shorelines of Old River and Victoria Canal, along in-channel islands, and in irrigation ditches. It ranges from sparse pockets of emergent vegetation in some areas to almost complete coverage of smaller drainages in other areas. Dominant vegetation includes California bulrush (*Scirpus californicus*), tule (*S. acutus*), common three-square (*S. robustus*), broadleaf cattail (*Typha latifolia*), narrowleaf cattail (*T. angustifolia*), Nevada bulrush (*S. nevadensis*), river bulrush (*S. fluviatilis*), slenderbeaked sedge (*Carex athrostachya*), southern cattail (*T. domingensis*), and umbrella flatsedge (*Cyperus eragrostis*).

Wildlife diversity in irrigation ditches that are regularly cleared to improve water flow is limited due to the repeated disturbance and absence of natural vegetation in uplands adjacent to the ditches (e.g., agricultural lands). Areas that are not regularly disturbed, such as shorelines of Old River and Victoria Canal and along in-channel islands, provide more valuable habitat for wildlife. Marsh wrens (*Cistothorus palustris*) and song sparrows (*Melospiza melodia*) were observed in the freshwater marsh during field surveys; western aquatic garter snake (*Thamnophis couchii*) and Pacific tree frog (*Hyla regilla*) also could occur in areas with marsh vegetation.

Tidal Perennial Aquatic Habitat

Old River and Victoria Canal provide open water habitat. This habitat type is generally unvegetated, but it does support some aquatic vegetation, especially in permanently to intermittently inundated shallow areas. Aquatic vegetation is commonly differentiated into two categories: submerged vegetation that grows below the water surface and is rooted to the substrate, and floating vegetation that floats freely and does not attach to a substrate (Cowardin et al. 1979). The boundaries for vegetated areas within the drainages and waterways are difficult to delimit because of seasonal variations in extent and presence. Native floating aquatic species at the Victoria Island/Byron Tract project site include water primrose (*Ludwigia peploides* ssp. *peploides*), duckweed (*Lemna* spp.), water-meal (*Wolffia* spp.), mosquito fern (*Azolla filiculoides*), and algae.

Open water areas provide habitat for pond turtle (*Actinemys marmorata*), Pacific treefrog, and bullfrog (*Rana catesbeiana*). Both submerged vegetation and floating aquatic vegetation are used as basking or foraging habitat and provide cover for aquatic wildlife species. Deeper open water areas without vegetation provide habitat for species that forage for fish, crayfish, or other aquatic organisms, such as terns (*Sterna* spp.), gulls (*Larus* spp.), river otter (*Lutra canadensis*), and sea lion (*Zalophus californianus*).

Managed Seasonal Wetland

Managed seasonal wetland habitat includes wetlands dominated by native or nonnative herbaceous plants. Ditches and drains associated with the upland cropland are also included in this category. Submerged aquatic vegetation within drainages on Victoria Island is dominated by two nonnative invasive species: parrot feather watermilfoil (*Myriophyllum aquaticum*) and water hyacinth (*Eichhornia crassipes*). Floating aquatic vegetation is found in most perennially inundated drainages. The ditches and drains on Victoria Island are rigorously managed for irrigation conveyance and appear to be dredged and recontoured frequently.

The managed seasonal wetlands, and ditches and drains, may provide habitat for wildlife species associated with shallow water. However, their active management substantially reduces their habitat value and use. Few amphibian, reptile, or fish species were observed in the ditches and drains during a habitat assessment conducted by Eric Hansen in October 2005 (Hansen, pers. comm., 2005) or during EDAW reconnaissance-level biological surveys for the AIP EIR/EIS (CCWD and Reclamation 2006).

Riparian Scrub

Very small patches of riparian scrub are present on Victoria Island/Byron Tract. Riparian scrub consists primarily of shrubs and short trees such as sandbar willow (*Salix exigua*), arroyo willow (*S. lasiolepis*), and red alder (*Alnus rubra*) in the Victoria Island/Byron Tract area. A few larger trees, including valley oak (*Quercus lobata*) and California buckeye (*Aesculus californica*), are present on Victoria Island along Old River. Nonnative Himalayan blackberry, which commonly creates dense, impenetrable thickets along levee surfaces, and nonnative arundo (*Arundo donax*) are present in patches along the levees.

Riparian habitat provides nesting habitat for a variety of bird species, including black phoebe (*Sayornis nigricans*), western kingbird (*Tyrannus verticalis*), western scrub-jay (*Aphelocoma californica*), oak titmouse (*Baeolophus inornatus*), and Bewick's wren (*Thryomanes bewickii*). Riparian trees and shrubs also may provide nest sites for raptors, such as Swainson's hawk, red-tailed hawk, white-tailed kite (*Elanus leucurus*), and great horned owl (*Bubo virginianus*). Other wildlife observed during field surveys or expected to occur in riparian habitat in the Victoria Island/Byron Tract area include western fence lizard (*Sceloporus occidentalis*), coyote (*Canis latrans*), raccoon (*Procyon lotor*), and opossum (*Didelphis viginiana*).

Sensitive Natural Communities and Waters of the United States
Two sensitive natural communities and waters of the United States occur in the Proposed Action project area.

Coastal and Valley Freshwater Marsh. This wetland plant community is recognized as a sensitive habitat by the California Department of Fish and Game (DFG) and the U.S. Army Corps of Engineers (USACE). This sensitive natural community occurs on and adjacent to Victoria Island and Byron Tract and is described above (page 3.3-4) under "Tidal Freshwater Emergent Habitat."

Waters of the United States. Waters of the United States, including wetlands, are subject to USACE jurisdiction under Section 404 of the Clean Water Act (CWA). Section 404 establishes a requirement to obtain a permit prior to any activity that involves any discharge of dredged or fill material into waters of the United States, including wetlands. Based on preliminary wetland delineation field work conducted as part of the AIP EIR/EIS, Old River and Victoria Canal, numerous small drainages, several seasonal wetlands and swales, and freshwater marshes on Victoria Island and Byron Tract may be under the jurisdiction of USACE. The preliminary wetland delineation was verified by USACE on July 19, 2007, for the AIP EIR/EIS (CCWD and Reclamation 2006). CCWD has obtained 404 approval for the AIP project, including the transmission line and interconnection. If it is not feasible to avoid waters of the United States as part of the Proposed Action, then such activities would be covered as part the 404 approvals obtained for construction of the AIP itself.

Special-status Plants
For the purpose of this EA, special-status plant species are defined as plants that are legally protected or that are otherwise considered sensitive by Federal or State resource conservation agencies and organizations. Specifically, this includes species that are Federally and/or State listed as rare, threatened, or endangered; those considered as candidates for listing as threatened or endangered; species identified by the U.S. Fish and Wildlife Service (USFWS) as species of concern, and/or by DFG as species of special concern and plants considered by the California Native Plant Society (CNPS) to be threatened, endangered, or rare (i.e., plants on CNPS Lists 1 and 2).

The Delta is home to several special-status species, many of which are endemic. The emergent tidal freshwater marsh, mud banks, and other wet places at the proposed project site (Victoria Island/Byron Tract) provide potential habitat for 11 special-status plant species. Focused special-status plant surveys were conducted in July 2005 at the Victoria Island/Byron Tract project site. Two special-status species, Mason's lilaeopsis (*Lilaeopsis masonii*) and rose-mallow (*Hibiscus lasiocarpus*), were documented.

Mason's lilaeopsis (*Lilaeopsis masonii*). Mason's lilaeopsis is a Federal species of concern and is considered rare by DFG. It also is listed on CNPS List 1B (considered rare, threatened, or endangered in California and elsewhere). It is a small, rhizomatous perennial herb in the carrot family that flowers from April to November. It produces narrow, grass-like, bright green leaves and small inconspicuous flowers in umbels. This species grows in freshwater and brackish marshes, generally found in tidal zones on depositional soils. At the proposed project site, it grows in linear colonies in silt in the grooves of logs that have washed up on the shore or riprap along the west bank of Old River. The first occurrence was documented adjacent to a remnant of tule marsh on the west bank of Old River, south of the existing intake and pump station. The second occurrence was documented south of the first occurrence on the riprap of the west bank of Old River.

Rose-mallow (*Hibiscus lasiocarpus*). Rose-mallow is on CNPS List 2 (considered rare, threatened, or endangered in California, but more common elsewhere). It is an erect, rhizomatous perennial herb in the mallow family that flowers from June through September. It produces heart-shaped leaves and large white flowers that are rose-colored at the base. This species grows in freshwater marshes, generally found on wet riverbanks and low peat islands in sloughs. At the proposed project site, four occurrences of rose-mallow were observed along Old River and Victoria Canal at the base of the riprap. The first occurrence (one plant) was documented on the north bank of Victoria Canal, growing with common bog rush (*Juncus effusus*). The second occurrence (one plant) was documented growing on the west bank of Old River, in a mud flat adjacent to a large fragment of tule marsh (*Scirpus acutus*). The third occurrence (15 plants) was documented in several locations on the east bank of Old River adjacent to a large stand of blackberry. The fourth occurrence (one plant) was documented on the east bank of Old River by a small fragment of tule marsh. It also has the potential to occur in the freshwater marsh on Victoria Island and Byron Tract.

No other Federal or State special-status plants were observed during focused surveys, conducted in July 2005 as part of the AIP EIR/EIS (CCWD and Reclamation 2006), and no other special-status plants are likely to be present at the proposed project site.

3.3.1.2 Designations, Policies, and Regulations

For discussion of designations, policies, and regulations for habitats and vegetation, see Appendix A, Section A.3.

3.3.2 Environmental Consequences

3.3.2.1 Methods and Assumptions

The impact analysis for habitats and vegetation was based on consideration of: (1) construction, operation, and maintenance activities and the area anticipated to be disturbed, (2) existing habitat conditions in the areas proposed for construction and operation/maintenance activities and nearby areas, and (3) known or presumed occurrence of protected species near construction and operation/maintenance areas.

All available information regarding sensitive and special status resources that could be affected by the Proposed Action was reviewed. The 50-foot-wide transmission ROW defines the footprint for installing, operating, and maintaining the Proposed Action and all sensitive habitats (e.g., jurisdictional waters of the United States and freshwater marsh) can be easily avoided by siting the project features along or adjacent to existing access roads that avoid all impacts on sensitive habitats. Potential impacts on sensitive habitats are discussed in terms of potential direct and indirect effects. Focused surveys for special-status plants were conducted on Victoria Island/Byron Tract in July 2005 as part of the AIP EIR/EIS. (Note: These activities were conducted as part of the AIP EIR/EIS and also apply to this EA.) Impacts on special-status species were assessed in terms of potential changes in the amount and distribution of suitable habitat and the relative importance of affected habitats.

3.3.2.2 Significance Criteria

Significance under NEPA is determined by assessing the impact of a proposed action in terms of its context and the intensity of its effects. An alternative was determined to result in a significant effect on habitats and vegetation if it would:

- have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in Federal or regional plans, policies, or regulations or by USFWS or DFG;
- have a substantial adverse effect on Federally protected wetlands as defined by Section 404 of the CWA (including, but not limited to, marsh, vernal pool, rivers, etc.) through direct removal, filling, hydrological interruption, or other means;
- conflict with the provisions of an adopted HCP/NCCP, or other approved regional or State habitat conservation plan, to the extent applicable; or
- substantially degrade the quality of the environment, substantially reduce the habitat of a fish and wildlife species, threaten to eliminate a plant or animal community, reduce the number or restrict the range of an endangered, rare or threatened species.

3.3.2.3 No-Action Alternative

The No-Action Alternative would result in no changes to plant communities, or wildlife habitats in or near the proposed project site. Therefore, no impacts would occur on habitats, wetlands, or other sensitive habitats, including jurisdictional waters of the United States. The No-Action Alternative would not conflict with any approved HCPs or NCCPs, to the extent applicable, nor would it substantially degrade the quality of the environment.

3.3.2.4 Proposed Action

The Proposed Action could potentially affect the habitat and vegetation types listed above, within the 50-foot-wide transmission ROW. This section identifies potential impacts of the Proposed Action on jurisdictional waters of the United States, sensitive habitat, and special-status plants. A number of conservation measures for habitat and vegetation have been incorporated into the Proposed Action (see Table 7.4-1 for expanded descriptions), including:

- Minimize Potential Fill of Jurisdictional Waters of the United States and Loss of Sensitive Habitat, and Compensate for Unavoidable Impacts
- Minimize Potential Effects on Special-status Plants, and Mitigate for Loss if Required

Potential Fill of Jurisdictional Waters of the United States and Loss of Sensitive Habitat during Construction

Victoria Island and Byron Tract contain many irrigation ditches, which may be considered jurisdictional wetlands by USACE. Although the exact location of the support poles for the transmission line has not been determined, installation of the support poles would not result in fill of wetlands and loss of freshwater marsh vegetation along Old River and Victoria Canal. Specifically, the transmission line steel support structures on each side of the Old River would be sited such that they would not result in fill of jurisdictional waters and loss of sensitive habitats.

In more than 33 miles of ditches and canals on Victoria Island and Byron Tract within the AIP project area, less than 0.2 acre of potential wetlands was identified. Approximately 2.71 acres of potential wetlands, including freshwater marsh, seasonal wetlands, and swales, were observed along Old River from the confluence with Victoria Canal to the SR 4 bridge. No acreage of jurisdictional waters would be affected by the Proposed Action as the transmission line steel support structures can be easily sited to avoid any impacts. Additionally, with the implementation of the conservation measures identified above, the potential impact would be **less than significant**. No mitigation is required.

Potential Loss of Special-status Plants

A special-status plant species, rose-mallow, was documented on Victoria Island/Byron Tract during focused botanical surveys in July 2005 conducted for the AIP EIR/EIS (CCWD and Reclamation 2006). Several rose-mallow plants were observed in four locations: on the north bank of Victoria Canal, on the west bank of Old River, in several locations on the east bank of Old River south of the CCWD Old River intake, and on the east bank of Old River directly across from the intake station.

Ground-disturbing construction activities could destroy individual plants, their root system, or seed bank. Installation of the 60–70 transmission poles along the dirt access road and SR 4 and construction of the transmission line steel support structures on both sides of Old River could disturb identified rose-mallow populations. Loss of one or more of these special-status plant populations would be a potentially significant direct impact. However, with the implementation of the conservation measures identified above, any potential impact would be **less than significant**. No mitigation is required.

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3.4 Wildlife

This section describes the existing wildlife present in the project area. Based on the review of existing special-status species, potential impacts of the Proposed Action and No-Action Alternative on existing wildlife are identified. Mitigation measures to offset any identified impacts are also provided, as applicable.

3.4.1 Affected Environment

3.4.1.1 Existing Wildlife

This section identifies common wildlife species found on the project site, including the 50-foot-wide transmission ROW, and in the general vicinity. The discussion primarily focuses on special-status wildlife species previously identified, or possible, in the area, based on existing habitat types (see Section 3.3, “Habitats and Vegetation”). For the purpose of this EA, special-status wildlife species are defined as animals that are legally protected or that are otherwise considered sensitive by Federal or State resource conservation agencies. Specifically, this includes species that are Federally and/or State listed as rare, threatened, or endangered; those proposed for listing as threatened or endangered; species identified by USFWS or the National Marine Fisheries Service (NMFS) as species of concern and/or by DFG as species of special concern. Pursuant to the Supremacy Clause of the U.S. Constitution (Art. 6, C1.2), a State law—including the California Endangered Species Act (CESA)—may not directly regulate the Federal government or discriminate against it. However, it is Western’s policy to comply with the spirit of State laws (e.g., CESA) and to consider State-listed species.

Victoria Island/Byron Tract

A special-status species list was developed for the Proposed Action by conducting a records search of the California Natural Diversity Database (CNDDB) (California Natural Diversity Database 2005) for the Clifton Court Forebay and Woodward Island 7.5-minute U.S. Geological Survey (USGS) quadrangles. The CNDDB contained no sightings of special-status species within the Proposed Action’s 50-foot-wide transmission ROW footprint although western pond turtle and Swainson’s hawk were located within 1 mile of the project. A list of special-status species with the potential to occur in the area was also requested from USFWS and DFG and both are provided in Appendix D, “Biological Resources,” of the AIP EIR/EIS (CCWD and Reclamation 2006).

Several listed species were eliminated from further consideration because typical habitat required by the species does not occur on Victoria Island or Byron Tract. Explanation for elimination of listed species follows. No vernal pools or stockponds are present on Victoria Island or Byron Tract; therefore, there is no suitable habitat for vernal pool fairy shrimp (*Branchinecta lynchi*), longhorn fairy shrimp (*B. longiantenna*), vernal pool tadpole shrimp (*Lepidurus packardi*), or California tiger salamander (*Ambystoma californiense*). Elderberry shrubs, required by valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*), were not observed on Victoria Island or Byron Tract. California red-legged frog (*Rana aurora draytonii*) are not expected to occur because Old River and Victoria Canal are likely too deep and large and lack adequate emergent vegetation to support breeding red-legged frogs; in addition, the regular disturbance and variable hydrologic regime in the irrigation ditches likely make them unsuitable for red-legged frogs. The recently delisted bald eagle (*Haliaeetus leucocephalus*) is not expected to breed in the Delta due to a lack of suitable nesting habitat. Although the species may be present in the Delta during the nonbreeding season, Victoria Island and Byron Tract do not contain any historical sites where concentrated populations of eagles are known to winter. Typical habitat for California black rail (*Rallus longirostris obsoletus*), consisting of large patches of marsh with adjacent undisturbed uplands, is not present at the project site. Undisturbed grassland habitat is not present in the area and therefore San Joaquin kit fox (*Vulpes macrotis mutica*) is not expected to occur. Alameda whipsnake (*Masticophis lateralis euryxanthus*) is also not expected to occur due to a lack of chaparral habitat in or adjacent to Victoria Island and Byron Tract. In addition, the primary constituent elements of habitat for vernal pool fairy shrimp and Contra Costa goldfields (*Lasthenia conjugens*) are not present on Victoria Island or Byron Tract, and no areas within the proposed project site are designated as Critical Habitat for these or any other species.

Although a portion of Byron Tract is within the range of San Joaquin kit fox (*Vulpes macrotis mutica*) according to the CNDDB, the species is not likely to occur along the extreme eastern edge of Byron Tract. San Joaquin kit fox occurrences have been recently analyzed and habitat was modeled for eastern Contra Costa County during development of the *Eastern Contra Costa Habitat Conservation Plan/Natural Communities Conservation Plan* (HCP/NCCP) (Jones and Stokes 2006). A recent survey of Contra Costa and Alameda Counties within the known range of the San Joaquin kit fox found no evidence of recent occupancy (Clark et al. 2003 in Jones and Stokes 2006). Furthermore, the Proposed Action area does not include any areas identified as suitable habitat for San Joaquin kit fox. Areas identified as core habitat are almost 5 miles to the southwest of the Proposed Action area and low use habitat is more than 2 miles away (Jones and Stokes 2006). Therefore, San Joaquin kit fox was eliminated from further consideration in the analysis.

Special-status Wildlife

The existing habitat types at the Victoria Island/Byron Tract project site support potential habitat for three wildlife species that are State or Federally listed as threatened or endangered: giant garter snake (*Thamnophis gigas*), greater sandhill crane (*Grus canadensis tabida*), and Swainson's hawk. Seven nonlisted special-status wildlife species are known to or could potentially occur on Victoria Island/Byron Tract: western pond turtle, white-tailed kite, northern harrier, burrowing owl (*Athene cunicularia hypugaea*), California horned lark (*Eremophila alpestris actia*), loggerhead shrike (*Lanius ludovicianus*), and tricolored blackbird (*Agelaius tricolor*). Each of these species is evaluated in more detail below. Western's Proposed Action was considered as part of the consultation with USFWS and NMFS (Squires and Oppenheim, pers. comm., 2007).

Giant Garter Snake. The giant garter snake is State and Federally listed as threatened. The giant garter snake inhabits agricultural wetlands and associated waterways, including irrigation and drainage canals, rice fields, marshes, sloughs, ponds, low-gradient streams, and adjacent uplands. Giant garter snakes are believed to be most numerous in rice growing regions. Giant garter snakes are typically absent from the larger rivers; wetlands with sand, gravel, or rock substrates; and riparian areas lacking suitable basking sites or suitable prey populations (U.S. Fish and Wildlife Service 1999). They are primarily restricted to aquatic habitat and nearby basking areas during their active period (April 1–October 1). From late October to late March, giant garter snakes hibernate in underground refugia (e.g., abandoned rodent burrows and deep crevasses) above the high-water line.

Although the historical and current distribution of giant garter snake in the Delta is poorly understood, Victoria Island and the Proposed Action's 50-foot-wide transmission ROW lie well outside of the species' documented range. The nearest giant garter snake on record lies more than 9 air miles northeast of Victoria Island on Medford Island (CNDDB occurrence number 151). Although there is a scattering of additional giant garter snake occurrences to the north of Victoria Island spanning from east to west, all are 12 miles or farther from the project site. Furthermore, all are observations of individual snakes with none known to represent extant populations. Victoria Island is also south of the known boundary of the northern giant garter snake population clusters. The nearest locality record south of Victoria Island lies more than 50 air miles distant in Madera County; no giant garter snake occurrences are documented in Stanislaus County between Victoria Island and San Joaquin Valley populations (Hansen, pers. comm., 2005). Additionally, general biological surveys for numerous nearby CCWD projects, such as the Rock Slough and Old River Water Quality Improvement Projects, and numerous focused surveys for giant garter snake by giant garter snake expert Eric Hansen in the southern and central Delta, have failed to locate any giant garter snakes.

Although giant garter snake is not expected to occur within the 50-foot-wide transmission ROW because of a lack of known populations in the area and the high level of giant garter snake surveys that have been conducted in the south and central Delta without any observations of giant garter snake, potentially suitable habitat is present. A habitat assessment of the project site on Victoria Island was conducted by Eric Hansen in October 2005, as part of the AIP EIR/EIS (CCWD and Reclamation 2006), to evaluate habitat suitability for giant garter snake (Hansen, pers. comm., 2005). The assessment covered those areas with potential to provide habitat for this species (ditches and drains and adjacent upland areas). Most (64%) of the observed ditches and drains on Victoria Island were categorized as marginally suitable habitat for giant garter snake. A small area (0.9 mile or 3% of the surveyed area) along the inner toe of the levee along Victoria Canal was categorized as suitable habitat. The remainder of the surveyed area (33%) was categorized as unsuitable. (Hansen, pers. comm., 2005).

Both Victoria Canal and Old River demonstrate a species composition and flow regime characteristic of large rivers, which are generally unsuitable for giant garter snake because of the presence of predatory gamefish, diminished densities of prey species, and lack of suitable cover and foraging habitat. Therefore, while the outer levee banks of Victoria Island may possess characteristics associated with giant garter snake habitat, these characteristics occur in a proportion and configuration unlikely to support the species long-term (Hansen, pers. comm., 2005). The interior levee slopes, ditches, and drains are also largely unfavorable for giant garter snake because of lack of upland refuge and prey species and frequent disturbance from vigorous maintenance associated with Victoria Island's irrigation system.

Focused surveys for giant garter snake were not conducted, but no giant garter snakes were seen during the reconnaissance biological surveys in April and July 2005, or during the giant garter snake habitat assessment in October 2005. These surveys were conducted for the AIP EIR/EIS (CCWD and Reclamation 2006) and include the 50-foot-wide transmission ROW.

Greater Sandhill Crane. The greater sandhill crane is State-listed as threatened. This subspecies of the sandhill crane primarily winters in the Delta and forages and roosts in agricultural fields and pastures. Habitats used by the sandhill crane include seasonal and freshwater emergent wetlands, grasslands, and agricultural lands. Generally, crane wintering habitat consists of shallowly flooded grasslands that are used as loafing and roosting sites, and nearby agricultural areas that provide food sources, including rice, sorghum, barley, and corn. The fallow fields on Byron Tract are potential habitat for greater sandhill crane, but the quality of the potential habitat is low due to the lack of preferred types of agricultural crops nearby. No sandhill cranes were observed in the area during the reconnaissance-level field survey; however, the survey was conducted in spring, when sandhill cranes have already left central California for breeding grounds to the north.

Swainson's Hawk, White-Tailed Kite, Northern Harrier. Swainson's hawk is State listed as a threatened species. Swainson's hawks are known to nest throughout the Delta in the vicinity of Victoria Island (California Natural Diversity Database 2005). Potential nest trees for this species occur on and adjacent to Victoria Island. Grasslands, alfalfa fields, and other row crops provide suitable foraging habitat for Swainson's hawks. This species was observed foraging on Victoria Island during the field surveys conducted for the AIP EIR/EIS (CCWD and Reclamation 2006). The CNDDB reports two Swainson's hawk nests near the confluence of Old River and Victoria Canal, well outside the 50-foot-wide transmission ROW.

White-tailed kite is fully protected by DFG and is a Federal species of concern. Northern harrier is a California species of special concern. The trees along the western and northern side of Victoria Island provide suitable nesting habitat for white-tailed kite. Northern harrier could nest in the agricultural fields and fallow fields on Victoria Island and Byron Tract.

Western Burrowing Owl. Western burrowing owl is a California species of special concern. Burrowing owl typically use burrows made by fossorial animals, such as ground squirrels. One burrowing owl was observed on Victoria Island during the field surveys conducted for the AIP EIR/EIS (CCWD and Reclamation 2006). Pellets and whitewash were also observed at several burrow entrances, but a complete survey was not conducted as part of the site reconnaissance. Burrowing owl was also identified on Victoria Island during a levee habitat assessment conducted by DFG in September 2002. Focused surveys for burrowing owl were not conducted for the Proposed Action, but would be required, and will be implemented, prior to construction. Suitable habitat for burrowing owl occurs along the edges of the agricultural fields, irrigation ditches and drains, roadways, and levees.

Western Pond Turtle. Western pond turtle is a California species of special concern. Suitable habitat consists of ponds, marshes, rivers, streams, and irrigation ditches supporting aquatic vegetation. The irrigation ditches, Victoria Canal, and Old River provide suitable aquatic habitat. The riprapped banks and in-channel vegetation in Victoria Canal, Old River, and irrigation ditches could provide basking sites for pond turtle. The CNDDB reports several western pond turtle individuals in Old River within 0.5 mile of the confluence with Victoria Canal; therefore, both Old River and Victoria Canal are considered occupied habitat for western pond turtle. Focused surveys for western pond turtle were not conducted, but none were seen during the reconnaissance survey.

Loggerhead Shrike and California Horned Lark. The loggerhead shrike is a Federal species of concern. The loggerhead shrike and California horned lark are both California species of special concern. Loggerhead shrikes require open grassland or agricultural areas with scattered shrubs or small trees for perching, hunting, and nesting. Horned larks nest on the ground in open areas, grasslands, or agricultural areas. The ruderal grassland and fallow fields provide suitable nesting and foraging habitat for loggerhead shrike and California horned lark. Shrikes may also nest in the riparian shrub habitat on Victoria Island and Byron Tract. Focused surveys for loggerhead shrike and California horned lark were not conducted, but none were seen during the reconnaissance survey.

Tricolored Blackbird. The tricolored blackbird is a Federal species of concern and a California species of special concern. Tricolored blackbirds nest in small (hundreds of birds) to large colonies (hundred-thousands of birds) and typically use marsh habitats or thorny shrubs such as blackberry brambles or thistle stands. The larger patches of emergent marsh and blackberry brambles on Victoria Island and Byron Tract provide suitable nesting for tricolored blackbird. No tricolored blackbirds were observed during the site visit. Because tricolored blackbird colonies may move to different locations between years, it is possible in future years for tricolored blackbirds to nest in suitable habitat in the area.

3.4.1.2 Designations, Policies, and Regulations

For discussion of designations, policies, and regulations for wildlife, see Appendix A, Section A.4.

3.4.2 Environmental Consequences

3.4.2.1 Methods and Assumptions

The impact analysis for wildlife species was based on consideration of: (1) construction, operation, and maintenance activities and the area anticipated to be disturbed, (2) existing habitat conditions in the areas proposed for construction and operation/maintenance activities and nearby areas, and (3) known or presumed occurrence of protected species near construction and operation/maintenance areas.

All available information regarding sensitive biological resources that could be affected by the Proposed Action was reviewed. All sensitive habitats (e.g., jurisdictional waters of the United States and freshwater marsh), located within the 50-foot-wide transmission ROW, can be easily avoided by siting the project features along or adjacent to existing access roads that avoid all impacts on sensitive habitats. Specifically, the transmission line steel support structures on each side of the Old River, as well as at other locations, would be sited such that they would not result in fill of jurisdictional waters and loss of sensitive habitats as a result of construction or operation and maintenance activities.

Reconnaissance-level surveys for special-status wildlife were conducted at Victoria Island/Byron Tract as part of the CCWD and Reclamation AIP EIR/EIS (CCWD and Reclamation 2006). For this evaluation, the analysis of impacts on special-status wildlife was based on the habitat types that would be affected. Impacts on special-status species were assessed in terms of potential changes in the amount and distribution of suitable habitat, the relative importance of affected habitats, and the potential for direct loss of individuals. Focused preconstruction wildlife surveys would be required and conducted, as appropriate, prior to any construction activities. Although not anticipated, if surveys identify special-status species, then appropriate measures would be taken to avoid, minimize, or mitigate impacts.

3.4.2.2 Significance Criteria

Significance under NEPA is determined by assessing the impact of a proposed action in terms of its context and the intensity of its effects. An alternative was determined to result in a significant effect on special status wildlife species if it would:

- 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 USFWS or DFG;
- interfere substantially with the movement of any native resident or migratory wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites;
- conflict with the provisions of an adopted HCP/NCCP, or other approved regional or State HCP, to the extent applicable; or
- substantially degrade the quality of the environment, substantially reduce the habitat of a wildlife species, cause a wildlife species to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of an endangered, rare or threatened wildlife species.

3.4.2.3 No-Action Alternative

The No-Action Alternative would result in no changes to the existing facilities, plant communities, or wildlife habitats in or near the proposed project site. Therefore, no impacts would occur to special-status species or their habitats, wetlands, or other sensitive habitats, including jurisdictional waters of the United States. In addition, movement corridors for wildlife or wildlife nursery sites would not be adversely affected. The No-Action Alternative would not conflict with any Federal, State, or local policies or ordinances protecting biological resources or approved HCPs or NCCPs, nor would it substantially degrade the quality of the environment.

3.4.2.4 Proposed Action

The Proposed Action could potentially affect the wildlife resource listed above. This section identifies potential impacts of the Proposed Action on the giant garter snake, raptors (including Swainson's hawk, white-tailed kite, northern harrier), burrowing owls, and tricolored blackbirds. A number of conservation measures for wildlife species were adopted as part of the AIP and have been integrated into the Proposed Action (see Table 7.4-1 for expanded descriptions). These measures will be communicated to construction and operation crews, who will be trained prior to ground disturbing activities by CCWD and/or Western, as applicable. These conservation measures include:

- Implement Avoidance Measures as Needed to Minimize Potential Effects on Giant Garter Snake

- Conduct Surveys and Implement Protective Measures, if Needed, to Minimize Potential Effects on Swainson's Hawk, White-Tailed Kite, Northern Harrier, and Other Raptors

- Follow Avian Protection Plan guidelines for power lines, to the extent feasible (Edison Electric Institute's Avian Power Line Interaction Committee and U.S. Fish and Wildlife Service 2005): (1) provide 60-inch minimum horizontal separation between energized conductors and/or energized conductors and grounded hardware, (2) insulate hardware or conductors against simultaneous contact if adequate spacing is not possible, (3) use Western-approved poles that minimize impacts on birds, and/or (4) increase the visibility of conductors or shield wires to prevent avian collisions

- Conduct Surveys and Implement Protective Measures to Minimize Potential Effects on Burrowing Owl

- Conduct Surveys and Minimize Potential Impacts on Tricolored Blackbird

Giant Garter Snake

Although the presence of giant garter snake on Victoria Island/Byron Tract is highly unlikely and giant garter snakes have never been documented in the south Delta despite numerous biological surveys, certain aspects of the Proposed Action may result in an increased risk of mortality or species take should a giant garter snake occur on the project site, well beyond its current range. Giant garter snakes could be injured during the installation and maintenance of the transmission poles along the dirt access road and SR 4, wherever they intersect with potential habitat. During construction activities, potential take of giant garter snake, which is a Federally listed and State-listed threatened species, would be a potentially significant direct impact. However, with the implementation of the conservation measures identified above in Section 3.4.2.4, the potential impact would be **less than significant**.

Swainson's Hawk, White-Tailed Kite, Northern Harrier, and Other Raptors
A few isolated trees that provide potential nesting habitat for Swainson's hawk, white-tailed kite, or other raptors are present on the west side of Victoria Island within the 50-foot-wide ROW footprint of the Proposed Action. No active raptor nests were observed on Victoria Island during the reconnaissance survey conducted for the AIP EIR/EIS (CCWD and Reclamation 2006), but an active red-tailed hawk nest was observed on Byron Tract adjacent to the SR 4 bridge. Red-tailed hawk and Swainson's hawk were also observed foraging on Victoria Island. Construction-related disturbance resulting from the installation of transmission poles and steel structures (8-foot- to 10-foot-square base), and periodic maintenance activities, along Old River could disturb nearby nesting pairs, potentially resulting in nest abandonment, which would be a potentially significant direct impact. However, with the implementation of the conservation measures identified above in Section 3.4.2.4, the potential impact would be **less than significant**.

Suitable nesting habitat also exists for northern harrier. Construction-related and maintenance activities in these areas also could result in destruction or abandonment of northern harrier nests if such nests are present in or near the construction area. This would be a potentially adverse effect on raptor nesting. However, with the implementation of the conservation measures identified above in Section 3.4.2.4, the potential impact would be **less than significant**.

Power transmissions lines would be constructed from the Western distribution system to the new power substation to be constructed on-site in the Proposed Action. Utility poles can benefit most raptors by providing perching and/or nesting structures in areas where few natural perches or nest sites exist. However, utility structures and lines can also pose a threat to raptors and other birds through electrocutions or collisions. Mortality is most common with large birds, such as eagles or cranes. Electrocution can occur when a bird simultaneously touches two energized parts or an energized part and a grounded part of the electrical equipment. Western will follow Avian Protection Guidelines for power lines and incorporate other conservation measures discussed above in Section 3.4.2.4, to minimize bird electrocutions. Consequently, this impact would be **less than significant**.

Burrowing Owl
Burrowing owl is known to be present on Victoria Island in at least one location. Signs of burrowing owl activity (e.g., whitewash and pellets) were observed at several burrow entrances. Suitable habitat occurs throughout Victoria Island and Byron Tract along the levee banks and edges of agricultural fields and irrigation ditches. Although focused surveys have not been conducted for the Proposed Action, burrowing owl could occur in suitable habitat within the 50-foot-wide transmission ROW. Installation of the proposed transmission poles and steel structures (8-foot- to 10-foot-square base) along Old River could destroy burrows occupied by burrowing owl if such burrows are present in the construction area, resulting in loss of adults, young, or eggs. Construction and maintenance activities occurring adjacent to active burrows could also disturb individuals resulting in nest abandonment by the adults and loss of eggs or young. Loss of adult,

eggs, or young burrowing owls from construction activities would be a potentially significant direct impact. However, with the implementation of the conservation measures identified above in Section 3.4.2.4, the potential impact would be **less than significant**.

Tricolored Blackbird

Although no nesting colonies are known to have historically occurred on Victoria Island or Byron Tract, the emergent marsh and blackberry brambles in the area could provide suitable nesting habitat. In particular, the large patch of emergent marsh across Old River from the existing pump station could be used by nesting tricolored blackbirds. Other smaller patches of emergent marsh in the irrigation ditches are likely too small to provide adequate cover and protection from predators required for successful nesting. The blackberry brambles on Byron Tract, lining the large irrigation ditch, and on the east bank of Old River also could provide nesting substrate for tricolored blackbirds.

Construction of the transmission line steel support structures (8-foot- to 10-foot-square base) along Old River, and maintenance of the towers and ROW, could cause ground disturbance and vibrations that would cause nesting tricolored blackbirds to abandon a colony. The failure of a nesting tricolored blackbird colony, if present in or near the construction area, could represent a substantial loss to the local population of tricolored blackbirds and would be a potentially significant direct impact. However, with the implementation of the conservation measures identified above in Section 3.4.2.4, the potential impact would be **less than significant**.

With implementation of the conservation measures, all impacts would be less than significant. Therefore, no mitigation is required.

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3.5 Fisheries

Common and sensitive Delta fisheries resources that occur or potentially occur at the proposed project site (Victoria Canal/Old River) are discussed in this section, along with potential impacts on these resources. The assessment was based primarily on extensive fishery data compiled from studies and monitoring reports prepared by DFG, USFWS, and the California Department of Water Resources (DWR); the *Vernalis Adaptive Management Plan* (VAMP) San Joaquin River salmon survival studies; and others. This section summarizes more extensive fisheries data and analyses contained in Appendix E-1 of the EIR/EIS ("Action Specific Implementation Plan") (CCWD and Reclamation 2006), which provides the requisite information for NMFS, USFWS, and DFG to make findings regarding fisheries effects as required by the Federal Endangered Species Act (ESA), Magnuson-Stevens Fisheries Conservation and Management Act, California Endangered Species Act (CESA), and Natural Community Conservation Planning Act (NCCPA), consistent with CALFED's *Multi-Species Conservation Strategy* (MSCS). Pursuant to the Supremacy Clause of the U.S. Constitution (Art. 6, C1.2), a State law—including CESA—may not directly regulate the Federal government or discriminate against it. However, it is Western's policy to comply with the spirit of State laws (e.g., CESA) and to consider State-listed species. Based on the review of existing special-status species, potential impacts of the Proposed Action and No-Action Alternative on fisheries are identified. Mitigation measures to offset any identified impacts are also provided, as applicable.

3.5.1 Affected Environment

3.5.1.1 Existing Fisheries Resources

The estuary and Delta provide habitat for a variety of resident and migratory fish species, several of which have been listed for protection under the Federal and/or State ESA, including delta smelt, winter-run Chinook salmon, spring-run Chinook salmon, and Central Valley steelhead. The Delta has been designated as critical habitat for delta smelt and Central Valley steelhead and as essential fish habitat (EFH) by NMFS for managed species, including Pacific salmon.

The fish community inhabiting the Bay-Delta estuary is diverse and dynamic (Table 3.5-1). Special-status fish species, several of which have been listed for protection under the Federal and/or California ESA, are shown in Table 3.5-2. Abundance of the species may fluctuate substantially within and among years (Baxter et al. 1999) in response to both population dynamics and environmental conditions. Life-history strategies and habitat requirements also vary substantially among species within the fish community. The Alternative Intake Project Action Specific Implementation Plan (ASIP) was prepared in lieu of a biological assessment and includes the construction, operation, and maintenance of the transmission line within the 50-foot-wide transmission line ROW. The ASIP contains substantially more detailed information on Delta fish communities and aquatic habitat function and use (see EIR/EIS Appendix E-1, "Action Specific Implementation Plan") (CCWD and Reclamation 2006). Western's Proposed Action was considered as part of the consultation with USFWS and NMFS (Squires and Oppenheim, pers. comm., 2007).

3.5 Fisheries

Table 3.5-1
Fish Species Inhabiting the Delta Potentially Affected by Construction or Operation of the Proposed Action

Common Name	Scientific Name
Pacific lamprey*	*Lampetra tridentate*
River lamprey*	*Lampetra ayersi*
White sturgeon*	*Acipenser transmontanus*
Green sturgeon*	*Acipenser medirostris*
American shad	*Alosa sapidissima*
Threadfin shad	*Dorosoma petenense*
Central Valley steelhead*	*Oncorhynchus mykiss*
Chum salmon	*Oncorhynchus keta*
Chinook salmon (winter, spring, fall, and late-fall runs)*	*Oncorhynchus tshawytscha*
Longfin smelt*	*Spirinchus thaleichthys*
Delta smelt*	*Hypomesus transpacificus*
Wakasagi	*Hypomesus nipponensis*
Northern anchovy*	*Engraulis mordax*
Pacific sardine*	*Sardinops sagax*
Starry flounder*	*Platichthys stellatus*
Hitch*	*Lavinia exilicauda*
Sacramento blackfish*	*Orthodon microlepidotus*
Sacramento splittail*	*Pogonichthys macrolepidotus*
Hardhead*	*Mylopharodon conocephalus*
Sacramento pikeminnow*	*Ptychocheilus grandis*
Fathead minnow	*Pimephales promelas*
Golden shiner	*Notemigonus chrysoleucas*
Common carp	*Cyprinus carpio*
Goldfish	*Carassius auratus*
Sacramento sucker*	*Catostomus occidentalis*
Black bullhead	*Ameiurus melas*
Brown bullhead	*Ameiurus nebulosus*
Yellow bullhead	*Ameiurus natalis*
White catfish	*Ameiurus catus*
Channel catfish	*Ictalurus punctatus*
Western mosquitofish	*Gambusia affinis*
Rainwater killfish	*Lucania parva*
Striped bass	*Morone saxatilis*
Inland silverside	*Menidia beryllina*
Bigscale logperch	*Percina macrolepida*
Bluegill	*Lepomis macrochirus*
Redear sunfish	*Lepomis microlophus*
Green sunfish	*Lepomis cyanellus*
Warmouth	*Lepomis gluosus*
White crappie	*Pomoxis annularis*
Black crappie	*Pomoxis nigromaculatus*
Largemouth bass	*Micorpterus salmoides*
Smallmouth bass	*Micropterus dolomieui*
Bigscale logperch	*Percina macrolepida*
Tule perch*	*Hysterocarpus traski*
Threespine stickleback*	*Gasterosteus aculeatus*
Yellowfin goby	*Acanthogobius flavimanus*
Chameleon goby	*Tridentiger trigonocephalus*
Prickly sculpin*	*Cottus asper*

* indicates a native species
Source: DFG unpublished data

Table 3.5-2
Special-status Fish Species of Interest for the Alternative Intake Project

Common Name	Scientific Name	Listing Status[2]			Designated Habitat
		USFWS	NMFS	DFG	
Winter-run Chinook salmon	*Oncorhynchus tshawytscha*	--	FE	SE	Critical Habitat
Central Valley spring-run Chinook salmon	*Oncorhynchus tshawytscha*	--	FT	ST	Critical Habitat
Central Valley fall/late fall-run Chinook salmon	*Oncorhynchus tshawytscha*	--	FSC	CSC	--
Pacific Salmon[1]	--	--	--	--	Essential Fish Habitat[3]
Central Valley steelhead	*Oncorhynchus mykiss*	--	FT	CSC	Critical Habitat
Delta smelt	*Hypomesus transpacificus*	FT	--	ST	Critical Habitat
Longfin smelt	*Spirinchus thaleichthys*	FSC	--	CSC	--
Green sturgeon	*Acipenser medirostris*	--	FT	CSC	--
River lamprey	*Lampetra tridentate*	FSC	--	CSC	--
Hardhead	*Mylopharcodon concephalus*	--	--	CSC	--
Sacramento splittail	*Pogonichthys macrolepidotus*	FSC	--	CSC	--

Notes:
1 Pacific salmon includes winter-run, spring-run, and fall/late fall-run Chinook salmon.
2 Listing Status:
3 Covered under the amended Magnuson-Stevens Fisheries Conservation and Management Act.

U.S. Fish and Wildlife Service (USFWS) Federal Listing Categories
FE Endangered (legally protected)
FT Threatened (legally protected)
FP Proposed (legally protected)
FSC Federal Species of Concern (no formal protection)

California Department of Fish and Game (DFG) State Listing Categories
SE Endangered (legally protected)
ST Threatened (legally protected)
CSC California Species of Special Concern (no formal protection)

Sources: Data Compiled by EDAW in 2005, updated 2007 (National Marine Fisheries Service 2007)

Delta smelt are listed as a threatened species under both the Federal and California ESAs. There is an emergency petition to USFWS to relist delta smelt as endangered. Delta smelt are endemic to the Sacramento–San Joaquin Delta estuary and inhabit the freshwater portions of the Delta, Sacramento and San Joaquin Rivers, and the low-salinity portions of Suisun Bay.

3.5 Fisheries

Winter-run Chinook salmon are listed as an endangered species under both the Federal and California ESA. NMFS has recently proposed downgrading the listing status of winter-run Chinook salmon from endangered to threatened status under the Federal ESA.

Spring-run Chinook salmon are listed as a threatened species under both the Federal and California ESAs.

Central Valley steelhead have been listed as a threatened species under the Federal ESA. Steelhead are not listed for protection under the California ESA.

Fall-run Chinook salmon are the most abundant species of Pacific salmon inhabiting the Sacramento and San Joaquin river systems. Fall-run Chinook salmon are not listed for protection under either the Federal or California ESA, but are a Federal species of concern and a California species of special concern. In addition to fall-run Chinook salmon, the group of Pacific salmon is comprised of late fall-run Chinook salmon (which are not listed under either the Federal or California ESA), spring-run Chinook salmon, and winter-run Chinook salmon, which are discussed above. Although fall-run and late fall-run Chinook salmon are not listed for protection under the ESA, they are included in this analysis because they occur seasonally within the central Delta within the area identified as EFH for Pacific salmon. In 1998, NMFS proposed that Central Valley fall-run and late fall-run Chinook salmon be listed under the Federal ESA as a threatened species. Based upon further analysis and public comment, NMFS decided that fall-run and late fall-run Chinook salmon did not warrant listing but should remain a Federal species of concern for further analysis and evaluation.

The green sturgeon is listed as threatened under the Federal ESA and is a California species of special concern. The green sturgeon is anadromous, spending its adult life in the ocean, but ascending coastal streams in the winter where it remains to spawn the following summer. San Francisco Bay, San Pablo Bay, Suisun Bay, and the Delta support the southernmost reproducing population of green sturgeon. Indirect evidence indicates that green sturgeon spawn mainly in the Sacramento River in March through July, peaking from mid-April to mid-June. Juveniles migrate to sea before 2 years of age, primarily during summer and fall.

The longfin smelt, a Federal species of concern and a California species of special concern, is a small, planktivorous fish found in several Pacific coast estuaries. The seasonal occurrence of longfin smelt in CVP and State Water Project (SWP) salvage is considered to be representative of the seasonal periods when juvenile and adult longfin smelt would be in the vicinity of the Proposed Action.

The Sacramento splittail is a Federal species of concern and a California species of special concern. The Sacramento splittail is a large minnow endemic to the Bay-Delta Estuary. Although the Sacramento splittail is generally considered a freshwater species, the adults and sub-adults have an unusually high tolerance for saline waters (up to 18 ppt [24,000 microSiemens per centimeter (μS/cm)]) for a member of the minnow family.

The river lamprey is a Federal species of concern and a California species of special concern. The river lamprey has been captured mostly in the upper portion of the Sacramento–San Joaquin estuary and its tributaries in California. The ammocoetes, transforming adults, and newly transformed adults have been collected in plankton nets in Suisun Bay, Montezuma Slough, and Delta sloughs (DFG unpublished data). The presence of river lamprey in collections made above dams, such as upper Sonoma Creek, indicate that some river lamprey may spend their entire life in fresh water. The adults are parasitic in California rivers; the most common prey are herring and salmon. River lampreys can apparently feed in either salt or fresh water.

3.5.1.2 Designations, Policies, and Regulations

For discussion of designations, policies, and regulations for fisheries, see Appendix A, Section A.5.

3.5.2 Environmental Consequences

3.5.2.1 Methods and Assumptions

The impact analysis for fishery and aquatic resources was based on consideration of: (1) construction, operation, and maintenance activities and the area anticipated to be disturbed, (2) existing habitat conditions in the project area, and (3) known or presumed occurrence of protected species near the proposed location for structures and facilities adjacent to Victoria Canal.

3.5.2.2 Significance Criteria

Significance under NEPA is determined by assessing the impact of a proposed action in terms of its context and the intensity of its effects. An alternative was determined to result in a significant effect on special status fisheries species if it would:

- have a substantial adverse effect, either directly or through habitat modifications, on any fish species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations or by USFWS or DFG;
- 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;
- conflict with the provisions of an adopted HCP, NCCP, or other approved regional or State HCP, to the extent applicable; or
- substantially degrade the quality of the environment, substantially reduce the habitat of a fish and wildlife species, cause a fish or wildlife species to drop below self-sustaining levels, threaten to eliminate an animal community, reduce the number or restrict the range of an endangered, rare or threatened species.

3.5.2.3 No-Action Alternative

The No-Action Alternative would result in no changes to the existing facilities or their operations. There would be no new transmission lines or interconnection. Therefore, no impacts would occur to special-status fish species or their habitats, or any other fish species. The No-Action Alternative would not conflict with any approved HCPs or NCCPs, nor would it substantially degrade the quality of the environment.

3.5.2.4 Proposed Action

The Proposed Action should not affect the fisheries resources listed above since the transmission line structures will not be located within the Old River levees and construction activities should not result in temporary degradation of surface water quality. A conservation measure has been incorporated into the Proposed Action (see Table 7.4-1 for expanded description) to minimize this potential effect in the event there are unexpected and inadvertent impacts during construction:

- Prepare and Implement a Stormwater Pollution Prevention Plan (SWPPP) that Minimizes the Potential Contamination of Surface Waters, and Comply with the Central Valley Regional Water Quality Control Board (RWQCB) Requirements to Protect Water Quality

Temporary Degradation of Surface Water Quality as a Result of Contaminant Releases and Runoff during Construction, Operation, and Maintenance Activities

Construction activities should not degrade water quality and adversely affect fisheries resources in Old River. However, if soil is disturbed during construction-related activities it may be dispersed by wind, rain, and surface flow and carried into Old River. In addition, chemicals associated with the operation of heavy machinery, such as fuels, oils, lead solder, solvents, and glues, would be used, transported, and stored on-site during drilling and construction activities. These substances could be inadvertently introduced into Old River through site runoff or on-site spills. Sediment and chemicals could degrade water quality in the ditches and their receiving waters and adversely affect agricultural water uses.

Although unlikely, the potential exists for the release of sediment and spilled chemical substances into Old River that could temporarily degrade water quality and adversely affect fish species. This direct impact would be temporary with the implementation of the conservation measure identified above, the potential impact would be **less than significant**. No mitigation is needed, other than implementation of the conservation measures that are part of the Project Action.

3.6 Geology and Soils

This section describes Federal and State regulations and local policies related to seismic conditions and geologic hazards; existing topographic, geologic, soil, and seismic conditions in the areas where the Proposed Action would be implemented; and potential effects of the Proposed Action and alternatives related to these conditions.

3.6.1 Affected Environment

3.6.1.1 Existing Geology and Soils

Information on earth resource conditions relevant to this study was compiled from on-site observations; photographs; maps of Alquist-Priolo Fault Zones and USGS quadrangles; and reports and documents, including general plans, the U.S. Soil Conservation Service (SCS) soil surveys for Contra Costa and San Joaquin Counties (SCS 1977, 1992), and a report prepared for the CCWD Seismic and Reliability Improvements Project (CCWD 1997).

Topography

The proposed project site is nearly level. In general, the topography of the Delta ranges from elevations of 6–30 feet above sea level at the tops of levees to 15–45 feet below sea level in the deepest channels. The elevation of Delta islands varies from 10–20 feet above sea level to approximately 20 feet below sea level at deeply subsided islands (Mount and Twist 2005). Levee elevations are typically 10 feet above sea level.

Geology

Eastern Contra Costa County and western San Joaquin County are within the Central Valley (Great Valley) geologic province. The Central Valley is a trough that extends over 400 miles from north to south and consists primarily of the alluvial, flood, and delta plains of its two major rivers and their tributaries. The Central Valley has been filled with a thick sequence of sedimentary rocks of Jurassic to Recent age. A very thick Mesozoic stratum is present and is probably underlain by a basaltic or ultramafic basement (Bailey 1966, p. 217).

The surface of the Central Valley is composed of unconsolidated Quaternary sediments, with lesser amounts of Tertiary sedimentary rock and Cretaceous shales. This geologic base is overlain with alluvium and fill deposits, including peat and detrital sediments that are interbedded with glacial sands and gravel washed down from the Sierra Nevada. Because of its proximity to the Sierra Nevada, the Delta is one of the few places in the world where glacially derived deposits merge with marine deltaic deposits (Norris and Webb 1990, pp. 412–418).

The Delta was part of the inland sea of Tertiary and post-Tertiary times, but during the Post-Pleistocene, the Delta became filled with many islands formed by waters moving through this region. During flooding, sediments were deposited along the islands' shores, forming natural levees. Each island's interior subsided and seasonal ponds provided an ideal environment for tule (*Scirpus* spp.). These tule marshes have formed significant peat deposits throughout the Delta (Center for Design Research and EDAW 1988, cited in California Department of Water Resources 2005).

Landslides

One of the major hazards associated with unstable geologic conditions is landslide potential. The strong ground motions that occur during earthquakes are capable of inducing landslides and related forms of slope adjustments.

Byron Tract is a filled reclaimed area with almost flat topography (Contra Costa County 2005, pp. 10-20–21). The probability of a landslide on slopes of 15% or less is low. Victoria Island is not specifically identified in the *San Joaquin County General Plan* as an area subject to landslides; however, the general plan indicates that a significant number of Delta levees are susceptible to failure because of slope movement (San Joaquin County 1992, p. III.A-11). The use of unconsolidated materials such as peat and silt for levee construction increases the risk of slope failure, liquefaction, and flooding.

Seismicity and Seismic Hazards

Fault Systems and Probability of Seismic Activity

The project area is subject to the effects of seismic activity generated on both nearby and distant fault systems.

There are no active faults in the Delta; however, several large faults outside the Delta area could affect Delta islands. Victoria Island is located in Seismic Zone 3, as defined by the Uniform Building Code. Building standards and regulations for this zone assume earthquakes with the potential to make standing difficult and to cause stucco and some masonry walls to fall. (San Joaquin County 1992, p. III.A-1). Byron Tract, across Old River from Victoria Island and across the Contra Costa/San Joaquin County line, is in Seismic Zone 4.

Eastern Contra Costa County is located in a seismically active region. Concord and Contra Costa County are included on the California Geological Survey list of cities and counties affected by Alquist-Priolo Earthquake Fault Zones as of June 1, 1997, because of their proximity to the Concord-Green Valley fault (Hart and Bryant 1997). Major earthquakes have occurred in the vicinity of the city of Pittsburg in the past and can be expected to occur again in the future (City of Pittsburg 2004, p. 10-5).

Seismic Ground Shaking

The intensity of seismic ground shaking depends on the distance from the earthquake epicenter to the site, the magnitude of the earthquake, site soil conditions, and the characteristic of the source. Deep unconsolidated materials amplify earthquake waves. Seismic activity on these faults is projected to cause light to moderate ground shaking in the Victoria Island/Byron Tract area. According to the distribution of ground-shaking intensity mapped by the Association of Bay Area Governments (ABAG), a large earthquake on the Concord-Green Valley fault would produce the maximum ground-shaking intensities in Bay mud deposits along Suisun Bay, which could cause damage to poorly built structures (City of Pittsburg 2004, p. 10-8).

Soil Liquefaction
Soil liquefaction occurs when ground shaking from an earthquake causes a sediment layer saturated with groundwater to lose strength and take on the characteristics of fluids. Primary factors in determining liquefaction potential are soil type, soil consistency, the level and duration of seismic ground motions, and the depth to groundwater. Age is also a factor in the potential of soils to liquefy, with the younger (less than 11,000 years old) Holocene deposits being the most sensitive to liquefaction.

One consequence of liquefaction is the migration of liquefied soils toward the surface. If not mitigated, this phenomenon can result in ground settlement and heave. Two additional types of ground failure can result from liquefaction: lateral spread and loss of bearing strength.

Soils and Associated Hazards

Soil Types
Soils in the Delta region are generally described as organic Delta soils, estuarine soils, and flatland soils.

The Delta islands contain soils that are very poorly drained, nearly level, and very deep. Some peat and organic silt remain near the ground surface on many portions of Victoria Island. These organic soils were formed from hydrophytic plant remains derived from reeds and tules. The underlying alluvium was derived from mixed rock sources, including granitic rock sources (Delta Protection Commission 1995, p. 25). Because much of the land on the Delta islands is below sea level, drainage ditches and pumps are needed in most areas to maintain the water table below the rooting depth of crops.

Hultgren-Tillis Engineers reviewed previous geotechnical explorations along Victoria Canal and Old River for several different projects. In addition, soil borings were drilled on Victoria Island during the initial phase of site characterization for the AIP EIR/EIS (CCWD and Reclamation 2006). Results of these explorations indicate that the subsurface soils can be divided into three units: the uppermost unit (Unit 1) consists of fill, peat and/or other highly organic soils, the second unit (Unit 2) is “Less Stiff” soil, and the third unit (Unit 3) is “Stiffer.” These three soil units are discussed below.

Unit 1, Peat and Highly Organic Soils/Fills. Fills make up much of the perimeter levee and farm roads. For the most part, fills were likely derived from excavations immediately adjacent to the fill areas. Levee and farm road fills consist of intermixed sands, silts, clays and peat. At the levee along Victoria Canal, about 13 feet of fill overlies 6 feet of peat. Up to 7 feet of fill and peat occurs beneath roads of the interior portions of the island.

Peat is weak and highly compressible. Where present, the base of peat was generally between elevations -10 and -20 feet. Peat may no longer exist in the vicinity of the 50-foot-wide transmission ROW. Where peat or highly organic soil was encountered beneath the interior of Victoria Island, it ranged from about 2 to 4.5 feet thick.

Unit 2, "Less Stiff" Soils. Alluvial soils that underlie the peaty/highly organic materials generally consist of interbedded clays, silts and sands. These alluvial soils can be broadly subdivided into zones based upon stiffness or relative density of the material. The upper portions of the alluvium are labeled "Less Stiff" soils because they are generally weaker than the deeper alluvium and represent possible concerns for stability, settlement, and liquefaction potential.

The "Less Stiff" soil unit includes mostly fine-grained material (clay and silt with rare peat) and occasional sand and silty sand layers. The base of the Less Stiff unit was typically found between elevations -30 and -40 feet near Victoria Canal, and from elevations -55 to -65 feet near Old River.

Unit 3, "Stiffer" Soils. Lower portions of the alluvial soil profile generally include stiff clays and silts, and dense to very dense sands. These soils were encountered below elevations ranging between -30 and -40 feet along the eastern portion of Victoria Canal. However, this unit is not conclusively delineated below the western portion of Victoria Island's southeast perimeter adjacent to Victoria Canal. For initial planning purposes, the transition between the "Less Stiff" and "Stiffer" units may be considered to be between elevations -30 to -40 feet in the more probable locations of the intake structure.

Groundwater was encountered in borings at depths ranging from 0.5 feet to more than 10 feet below existing grades. At the various times when the borings were drilled, these groundwater depths corresponded to approximate elevations of -7 to -18 feet. Recent hand auger borings encountered groundwater at depths of 2 to 5 feet beneath the Victoria Island fields. Groundwater levels on Victoria Island may be affected by agricultural irrigation and drainage pumping practices.

Table 3.6-1 summarizes the soil types and characteristics found at the proposed project site. The proposed project site contains soil types that are of low strength. Special design features are necessary to protect structures in these soil types from damage.

Expansive Soils

Expansive soils shrink and swell as a result of moisture changes. Shrinking and swelling of soil causes volume changes that can damage building foundations, underground utilities, and other subsurface facilities if they are not designed and constructed to resist the changing soil conditions. The hazards associated with expansive soils can be avoided through proper drainage and foundation design. Soils with expansive properties are present at the proposed project site, as identified in Table 3-6.1.

Subsidence

By 1920, it was recognized that the drained Delta lands were subsiding (CALFED 2000, p. 5.5-5). Subsidence of the peat soils (organic or highly organic mineral soils) in the Delta has caused the tidally influenced islands to become areas in which the land surfaces are now 10–25 feet below sea level (USGS 2000, p. 1-4). The dominant cause of land subsidence in the Delta is decomposition of organic carbon in the peat soils. Drainage for agriculture led to aerobic (oxygen rich) conditions that favor rapid microbial oxidation of the carbon in the peat soil. This process results in soil decomposition and subsidence.

Elevation measurements made from 1922 to 1981 indicate that land-use practices on peat soils tended to cause from 1 to 3 inches of subsidence per year (CALFED 2000, p. 5.5-5).

Settlement

Settlement of the ground surface is a chief geologic constraint to development in areas of unconsolidated soils. Settlement includes the gradual downward movement of a structure resulting from one or more of the following: (1) consolidation of soft, normally consolidated soils from new surface loads or lowered groundwater levels, (2) compaction of loose silt and sand and of poorly compacted fill upon becoming wet, (3) shrinkage of expansive soils upon drying, and (4) lateral deformation of weak foundation soils. Secondary (creep) settlement may continue after consolidation is complete. More rapid settlement may be caused by seismically induced compaction.

Table 3.6-1
Soils Types and Associated Hazards at the Proposed Site

Soil Symbol and Name	Soil Description/Hazards	Project Location	Shrink-Swell Potential	Corrosivity to Uncoated Steel	Seasonal High Water Table (Feet)
Victoria Island/Byron Tract					
179 Itano silty clay loam	Moderately slow permeability. The hazard of water erosion is slight. Subject to subsidence and rare flooding during abnormally high precipitation years. Low strength. 0–2% slope.	Victoria Canal pump station and transmission line	Moderate	High (high with concrete as well)	3–4.5
190 (Kb) Kingile muck	Slow permeability. The hazard of water erosion is slight and soil blowing is severe. Subject to subsidence and rare flooding during abnormally high precipitation years. Low strength. 0–2% slope.	Victoria Canal pump station and transmission line	Low to moderate	Moderate (moderate with concrete as well)	3–4
191 Kingile-Ryde complex	Slow to moderately slow permeability. The hazard of water erosion is slight and soil blowing is severe. Subject to subsidence and rare flooding during abnormally high precipitation years. Low strength. 0–2% slope.	Transmission line	Low to moderate	Moderate (moderate with concrete as well)	3–4
231 Ryde silty clay loam, organic substratum	Moderately slow permeability in the upper part of the Ryde soil and rapid in the organic substratum. The hazard of water erosion is slight and soil blowing is moderate. Subject to subsidence and rare flooding during abnormally high precipitation years. Low strength. 0–2% slope.	Transmission line	Moderate to low	Moderate (moderate with concrete as well)	3–4

Source: SCS 1977, 1992

Settlement is most extreme over peat and fine-grained sediments that have high water content. In general, peat has low density and is highly compressible and weak, and can fail because of imposed loads. Settlement can result in vertical or horizontal separation of structures; cracks in foundations, roads, sidewalks, and walls; and, in severe situations, building collapse and bending or breaking of underground utility lines.

Erosion

Soil erosion is the physical removal of material by agents such as water, wind, or ice and is a naturally occurring process on the earth's surface. The impact of raindrops on the soil surface can break down and dislodge soil particles, which can then be transported by water flow across the surface. Runoff occurs whenever excess water on a slope cannot be absorbed into the soil or trapped on the surface. Over time, the force of water flow can cut into the land surface, creating small channels (called rills) and eventually larger channels (called gullies). If the surface water flow makes its way into stream channels, the suspended soil particles are transported downstream and later deposited as sediment. Soil erosion rates vary depending on location, soil characteristics, climate, slope, and type of vegetation. Soil erosion can result in damage to structures (e.g., by exposing foundations), the loss of valuable cropland, and stream channel impairment (including the loss of aquatic habitat).

Wind erosion is a major factor affecting soil loss in the Delta. The Delta organic soils and highly organic mineral soils have wind erodibility ratings of 2–4 on a scale where 1 is most erodible, and 8 is least erodible. The high wind erodibility of Delta soils is due to their organic matter content. The rate of wind erosion is estimated at 0.1 inch per year (CALFED 2000, p. 5.5-6).

Soil removal by wind is generally less significant than by water. Victoria Island has been identified in the *San Joaquin County General Plan* (San Joaquin County 1992, p. III.A-11 to A-14) as having a high wind erosion hazard and low water erosion potential.

3.6.1.2 Designations, Policies, and Regulations

For discussion of designations, policies, and regulations for geology and soils, see Appendix A, Section A.6.

3.6.2 Environmental Consequences

3.6.2.1 Methods and Assumptions

The analysis presented in this section is qualitative and is based on the general information on geologic, seismic, and soil conditions documented for the region and the Proposed Action project site as reported in Section 3.6.1, "Affected Environment." The analysis is also based on the results of the soil borings performed on Victoria Island, which are summarized in that section. Because the specific footprints of individual transmission poles have not yet been sited within the 50-foot-wide ROW, it is assumed that the worst-case conditions that are noted in Section 3.6.1 may apply.

3.6.2.2 Significance Criteria

Significance under NEPA is determined by assessing the impact of a proposed action in terms of its context and the intensity of its effects. An alternative was determined to result in a significant effect on geologic and soils resources if it would:

- expose people or structures to potential substantial adverse effects, involving rupture of known, active faults, strong seismic ground shaking, or seismically-induced ground failure, including liquefaction;

- result in substantial soil erosion or loss of topsoil; or

- present a substantial risk to people or property due to geologic hazards such as landslides, lateral spreading, liquefaction, land subsidence, collapse, or expansive soils.

The Proposed Action would not include components, such as long-term groundwater withdrawal, that could cause land subsidence. Construction of facilities for the Proposed Action may require dewatering on Victoria Island and Byron Tract; however, such activities would be temporary and would not permanently change the groundwater recharge rate.

3.6.2.3 No-Action Alternative

Under the No-Action Alternative, no new facilities would be constructed. Therefore, the No-Action Alternative would have no impact associated with geological hazards or soil erosion. All of the geotechnical hazards described in Section 3.6.1.1, “Environmental Setting,” would remain as under existing conditions. The No-Action Alternative would not create any conditions to increase those hazards or reduce the risks to people, structures, or the environment.

3.6.2.4 Proposed Action

The Proposed Action could potentially affect the geologic and soil resources listed above. This section identifies potential impacts of the Proposed Action. No specific conservation measures for geologic and soil resources have been incorporated into the Proposed Action.

Potential Hazards from Seismically-Induced or Soil-Related Structural Failure of Project Facilities

Seismic Activity and Liquefaction Potential

The 50-foot-wide transmission ROW is not located within an Alquist-Priolo Earthquake Fault Zone, and there are no active faults in their vicinity. Risks associated with surface rupture at the proposed project site are therefore very low. However, the site is located between 9 and 55 miles from the active Concord-Green Valley, Greenville, Great Valley, Mount Diablo Thrust, Calaveras, Hayward, Rodgers Creek, and San Andreas faults, for which the maximum moment magnitude is considered to be 6.2 or higher. Seismic activity on any of these faults could generate strong ground shaking in the project area. Movement associated with the 1989 Loma Prieta earthquake on the San Andreas fault, 55 miles from the project site, was felt in the Delta area (Delta Protection Commission 1995). A USGS-led study concluded that there is a 27% probability that a large-magnitude (greater than 6.7) earthquake will occur by 2032 on the Hayward fault, located about 35 miles from the project site (USGS 2003b).

3.6 Geology and Soils

Because of the potential for major earthquake activity in the region, ground shaking would be a potential hazard associated with the proposed project facilities. Ground-shaking intensity would depend on the magnitude of the earthquake, the distance from the epicenter, and the duration of shaking. The damage sustained at any given location would depend on the earthquake intensity, soil type, type of structure and its building materials, and construction quality.

Loose sands and silty sands occur within 40 feet below existing grade along Victoria Canal and Old River, and beneath the interior of Victoria Island. These materials may liquefy during a large earthquake. The soils present on Byron Tract are also categorized as having generally high liquefaction potential (Contra Costa County 2005, p. 10-15).

Strong ground shaking could result in equipment or structural failure of the transmission poles and lines along the road ROWs, and of steel structures located along both sides of Old River. However, the risk of exposing people or structures to substantial or long-term service disruptions is low. The potential impacts would be of limited occurrence, duration, and intensity and would be **less than significant**. No mitigation is required.

Shrink-Swell Soil Properties
As shown in Table 3.6-1, the proposed project site is underlain by four different soil types: Itano silty clay loam, Kingile muck, Kingile-Ryde complex, and Ryde silty clay loam. These soils range from low to moderate shrink-swell potential. The shrinking and swelling of expansive soils as a result of moisture changes can damage tower foundations and other subsurface facilities, if these facilities are not designed and constructed to resist the changing soil conditions.

Overall, earthquake-induced liquefaction and shrink-swell soil issues could result in some loss of load-bearing capacity for pole and tower foundations which could temporarily disrupt electrical transmission and interconnection. However, the potential impact would be of limited occurrence, duration, and intensity and would be **less than significant**. No mitigation is required.

Soil Erosion
Construction activities during project implementation would involve grading and excavation along the dirt access roads. As shown in Table 3.6-1, all of the soils present at the proposed project site are rated as having a slight hazard of water erosion (SCS 1992). The hazard of wind erosion, however, is listed as moderate to severe for soils at the project site.

Construction would include standard best management practices (BMPs), such as applying water or other dust minimization techniques as necessary to prevent or alleviate dust nuisance generated by construction activities, or covering small stockpiles of earth. For this reason, it is not expected that wind-caused erosion on the project site would be greater than existing erosion under farming operations and the indirect impact would be **less than significant**. No mitigation is required.

3.7 Air Quality

This section includes a description of existing air quality conditions in the project area, a summary of air quality regulations that may apply to the Proposed Action, and an analysis of potential short- and long-term air quality impacts that could result from project implementation. The method of analysis is consistent with the recommendations of the Bay Area Air Quality Management District (BAAQMD) and the San Joaquin Valley Air Pollution Control District (SJVAPCD). Most of the project area (Victoria Island) is located within the jurisdiction of the SJVAPCD. Only the portion of the project located across Old River (on Byron Tract) lies within Contra Costa County and falls within the jurisdiction of the BAAQMD. Mitigation measures are recommended, as necessary, to reduce potentially significant air quality impacts.

3.7.1 Affected Environment

3.7.1.1 Existing Air Quality

Air quality in the San Francisco Bay Air Basin (SFBAB) and San Joaquin Valley Air Basin (SJVAB) is determined by such natural factors as topography, climate, and meteorology, in addition to the presence of existing air pollution sources and ambient conditions. These factors are discussed below.

Topography, Climate, and Meteorology

The SFBAB and SJVAB are characterized by complex terrain, consisting of coastal mountain ranges, inland valleys, and bays, which distort normal wind flow patterns. In this area, the Coast Range splits, resulting in the western (Golden Gate) coast gap and the eastern (Carquinez Strait) coast gap. These gaps allow air to flow in and out of the SFBAB and SJVAB. Air flows into the project area through the Carquinez Strait, moving across the Sacramento–San Joaquin River Delta, and transporting pollution from the Bay Area. Regional flow patterns affect air quality patterns by moving pollutants downwind of sources. Localized meteorological conditions, such as moderate winds, disperse pollutants and reduce pollutant concentrations. An inversion layer develops when a layer of warm air traps cooler air close to the ground. Such temperature inversions hamper dispersion by creating a ceiling over the area and trapping air pollutants near the ground. During summer mornings and afternoons, these inversions are present over the project area. During summer’s longer daylight hours, plentiful sunshine provides the energy needed to fuel photochemical reactions between reactive organic gases (ROG) and oxides of nitrogen (NO_X), which result in ozone formation.

Local meteorology of the project area is represented by measurements recorded at the Antioch and Stockton stations. The normal annual precipitation, which occurs primarily from November through March, is approximately 13 inches. January temperatures range from a normal minimum of 36°F to a normal maximum of 53°F. July temperatures range from a normal minimum of 56°F to a normal maximum of 91°F (National Oceanic and Atmospheric Administration 2007). The predominant wind direction and speed is from the northwest at 10 miles per hour (mph) (California Air Resources Board 1994).

3.7 Air Quality

Existing Air Quality

Criteria Air Pollutants

Regulatory agencies primarily focus on the criteria air pollutants as indicators of ambient air quality (i.e., ozone, carbon monoxide [CO], nitrogen dioxide [NO_2], sulfur dioxide [SO_2], particulate matter [PM], and lead). A brief description of each criteria air pollutant including source types, health effects, and future trends is provided below, along with the most current area designations and monitoring data for the project area.

Ozone

Ozone is a photochemical oxidant, a substance whose oxygen combines chemically with another substance in the presence of sunlight, and the primary component of smog. Ozone is not directly emitted into the air, but is formed through complex chemical reactions between precursor emissions of ROG and NO_X in the presence of sunlight. ROG are volatile organic compounds that are photochemically reactive. ROG emissions result primarily from incomplete combustion and the evaporation of chemical solvents and fuels. NO_X are a group of gaseous compounds of nitrogen and oxygen that results from the combustion of fuels.

Ozone located in the lower atmosphere (troposphere) is a major health and environmental concern. The adverse health effects associated with exposure to ozone pertain primarily to the respiratory system. Emissions of ozone precursors have decreased in the SFBAB over the past several years due to more stringent motor vehicle standards, cleaner burning fuels, and stationary source emission controls. Consequently, peak 1-hour and 8-hour ozone concentrations in the SFBAB have declined overall by about 21% during the last 20 years. However, the SFBAB can be identified as a transport contributor of pollutants to other air basins such as the SJVAB (California Air Resources Board 2005a). Emissions of ozone precursors have declined in the SJVAB from mobile and stationary sources as well; however, the ozone problem in the San Joaquin Valley ranks among the most severe in the State. This is because the SJVAB is identified as both a receptor of pollutants transported from the SFBAB and a contributor of pollutants within itself (California Air Resources Board 2005a).

Carbon Monoxide

CO is a colorless, odorless, and poisonous gas produced by incomplete burning of carbon in fuels, primarily from mobile (transportation) sources. In fact, 77% of the nationwide CO emissions are from mobile sources. The other 23% consists of CO emissions from wood-burning stoves, incinerators, and industrial sources.

Adverse health effects associated with exposure to CO concentrations include such symptoms as dizziness, headaches, and fatigue. CO exposure is especially harmful to individuals who suffer from cardiovascular and respiratory diseases (U.S. Environmental Protection Agency 2005). The highest concentrations are generally associated with cold, stagnant weather conditions that occur during the winter. In contrast to ozone, which is considered a regional pollutant, CO problems tend to be localized.

Nitrogen Dioxide

NO_2 is a brownish, highly reactive gas that is present in all urban environments. The major human-made sources of NO_2 are combustion devices, such as boilers, gas turbines, and mobile and stationary reciprocating internal combustion engines. Combustion devices emit primarily nitric oxide (NO), which reacts through oxidation in the atmosphere to form NO_2 (U.S. Environmental Protection Agency 2005). The combined emissions of NO and NO_2 are referred to as NO_X, which are reported as equivalent NO_2. Because NO_2 is formed and depleted by reactions associated with photochemical smog (ozone), the NO_2 concentration in a particular geographical area may not be representative of the local NO_X emission sources. Inhalation is the most common route of exposure to NO_2. The severity of the adverse health effects depends primarily on the concentration inhaled rather than the duration of exposure. An individual may experience a variety of acute symptoms, including coughing, difficulty with breathing, vomiting, headache, and eye irritation during or shortly after exposure.

Sulfur Dioxide

SO_2 is produced by such stationary sources as coal and oil combustion, steel mills, refineries, and pulp and paper mills. The major adverse health effects associated with SO_2 exposure pertain to the upper respiratory tract. SO_2 is a respiratory irritant with constriction of the bronchioles occurring with inhalation of SO_2 at 5 ppm or more. On contact with the moist mucous membranes, SO_2 produces sulfurous acid, which is a direct irritant. Concentration rather than duration of the exposure is an important determinant of respiratory effects. Exposure to high SO_2 concentrations may result in edema of the lungs or glottis and respiratory paralysis.

Particulate Matter

Respirable particulate matter with an aerodynamic diameter of 10 micrometers or less is referred to as PM_{10}. PM_{10} consists of particulate matter emitted directly into the air, such as fugitive dust, soot, and smoke from mobile and stationary sources, construction operations, fires and natural windblown dust, and particulate matter formed in the atmosphere by condensation and/or transformation of SO_2 and ROG (U.S. Environmental Protection Agency 2005). $PM_{2.5}$ includes a subgroup of finer particles that have an aerodynamic diameter of 2.5 micrometers or less (California Air Resources Board 2005a).

Generally, adverse health effects associated with PM_{10} may result from both short-term and long-term exposure to elevated concentrations and may include breathing and respiratory symptoms, aggravation of existing respiratory and cardiovascular diseases, alterations to the immune system, carcinogenesis, and premature death (U.S. Environmental Protection Agency 2005). $PM_{2.5}$ poses an increased health risk because the particles can deposit deep in the lungs and contain substances that are particularly harmful to human health.

In addition to health effects, fugitive dust can also pose a nuisance to agriculture because emissions of fugitive dust can result in the transmission of dust to nearby agricultural crops. Based on available information, the application of standard construction BMPs for the control of fugitive dust (e.g., the application of water or soil stabilizers) is an effective method of reducing dust-related impacts on agricultural crops.

Table 3.7-1
Summary of Annual Ambient Air Quality Data (2002–2004)[3]

	2002	2003	2004
OZONE			
State standard (1-hr avg, 0.09 ppm) National standard (1-hr[5]/8-hr avg, 0.12/0.08 ppm)			
Maximum concentration (1-hr/8-hr avg, ppm)	0.107/ 0.096	0.103/ 0.089	0.109/ 0.097
Number of days State standard exceeded 1-hr	11	5	4
Number of days national 1-hr/8-hr standard exceeded	0/3	0/2	0/1
CARBON MONOXIDE			
State standard (8-hr avg, 9.1 ppm) National standard (8-hr avg, 9.5 ppm)			
Maximum concentration (8-hr avg, ppm)	1.30	0.89	0.91
Number of days State standard exceeded	0	0	0
Number of days national standard exceeded	0	0	0
FINE PARTICULATE MATTER ($PM_{2.5}$)			
No separate State standard National standard (24-hr avg, 65 $\mu g/m^3$)			
Maximum concentration 4 ($\mu g/m^3$)	64.0	45.0	41.0
Number of days national standard exceeded (measured [2])	0	0	0
RESPIRABLE PARTICULATE MATTER (PM_{10})			
State standard (24-hr avg, 50 $\mu g/m^3$) National standard (24-hr avg, 150 $\mu g/m^3$)			
Maximum concentration 4 ($\mu g/m^3$)	61.2	51.3	42.3
Number of days State standard exceeded (calculated [1])	3	1	0
Number of days national standard exceeded (calculated [1])	0	0	0

1 Measured days are those days that an actual measurement was greater than the level of the State daily standard or the national daily standard. Measurements are typically collected every 6 days. Calculated days are the estimated number of days that a measurement would have been greater than the level of the standard had measurements been collected every day. The number of days above the standard is not necessarily the number of violations of the standard for the year.

2 The number of days a measurement was greater than the level of the national daily standard. Measurements are collected every day, every 3 days, or every 6 days, depending on the time of year and the site's monitoring schedule. The number of days above the standards is not directly related to the number of violations of the standard for the year.

3 Measurements for ozone are from the Tracy-24371 Patterson Pass Road station, for $PM_{2.5}$ are from the Stockton-Hazelnut Street station, and for CO and PM_{10} are from Bethel Island Road station.

4 State of California measurements.

5 EPA revised the ozone standard on July 17, 1997 and began phasing out and replacing the previous 1-hour primary ozone standard with the new 8-hour standard. The 0.12 ppm 1-hour standard will not be revoked in a given area until that area has achieved 3 consecutive years of air quality data meeting the 1-hour standard.

Source: California Air Resources Board 2005b; California Air Resources Board 2006

Direct emissions of both PM_{10} and $PM_{2.5}$ increased in the SFBAB between 1975 and 2000 and are projected to increase through 2020. Direct emissions of $PM_{2.5}$ in the SJVAB decreased between 1975 and 2000 but are projected to increase through 2020, while emissions of PM_{10} are showing a downward trend. This decrease could be attributed to meteorology or incomplete monitoring network data. These emissions are dominated by area-wide sources, primarily due to development. Direct emissions of PM from mobile and stationary sources have remained relatively steady (California Air Resources Board 2005a).

Lead

Lead is a metal found naturally in the environment as well as in manufactured products. The major sources of lead emissions have historically been mobile and industrial sources. As a result of the phase-out of leaded gasoline metal processing is currently the primary source of lead emissions. Other stationary sources are waste incinerators, utilities, and lead-acid battery manufacturers. Because the Proposed Action and alternatives would not involve any sources of lead emissions, this pollutant is not discussed further in this study.

Criteria Air Pollutant Concentrations

Criteria air pollutant concentrations are measured at several monitoring stations in the SJVAB and SFBAB. The Tracy–24371 Patterson Pass Road and Bethel Island Road stations are the closest in proximity to the project site with recent data for ozone, PM_{10}, and $PM_{2.5}$. In general, the ambient air quality measurements from these stations are representative of the air quality in the project area. Table 3.7-1 summarizes the air quality data during 2002–2004, the most recent air quality data available when the EIR/EIS (CCWD and Reclamation 2006) was being prepared.

Both the California Air Resources Board (ARB) and the U.S. Environmental Protection Agency (EPA) use this type of monitoring data to designate areas according to their attainment status for criteria air pollutants. The purpose of these designations is to identify those areas with air quality problems and thereby initiate planning efforts for improvement. The three basic designation categories are nonattainment, attainment, and unclassified. Unclassified is used in an area that cannot be classified on the basis of available information as meeting or not meeting the standards. In addition, the California designations include a subcategory of the nonattainment designation, called nonattainment-transitional. The nonattainment-transitional designation is given to nonattainment areas that are progressing and nearing attainment. The most current (2006) attainment designations with respect to the project area are shown below in Table 3.7-2 for each criteria air pollutant.

Toxic Air Contaminants

The presence of toxic air contaminants (TACs), or, in Federal parlance, hazardous air pollutants (HAPs), is also an indicator of air quality conditions. TACs usually exist in minute quantities in the ambient air; however, their high toxicity or health risk may pose a threat to public health even at low concentrations. In general, for those TACs that may cause cancer, there is no concentration that does not present some risk. In other words, there is no threshold level below which adverse health impacts may not be expected to occur. This contrasts with the criteria air pollutants for which acceptable levels of exposure can be determined and for which the ambient standards have been established (see Table 3.7-2).

According to the *2005 California Almanac of Emissions and Air Quality* (California Air Resources Board 2005a), the majority of the estimated health risk from TACs can be attributed to relatively few compounds, the most important being PM from diesel-fueled engines (diesel PM). Diesel PM differs from other TACs in that it is not a single substance, but rather a complex mixture of hundreds of substances. Although diesel PM is emitted by diesel-fueled internal combustion engines, the composition of the emissions varies depending on engine type, operating conditions, fuel composition, lubricating oil, and whether an emission control system is present. Unlike the other TACs, no ambient monitoring data are available for diesel PM because no routine measurement method currently exists. However, ARB has made preliminary concentration estimates based on a PM exposure method. This method uses ARB emissions inventory's PM_{10} database, ambient PM_{10} monitoring data, and the results from several studies on chemical speciation to estimate concentrations of diesel PM. In addition to diesel PM, benzene, 1, 3-butadiene, acetaldehyde, carbon tetrachloride, hexavalent chromium, para-dichlorobenzene, formaldehyde, methylene chloride, and perchloroethylene pose the greatest existing ambient risk, for which data are available, in California.

Diesel PM poses the greatest health risk among the ten TACs mentioned. Based on receptor modeling techniques, ARB estimated its health risk to be 480 excess cancer cases per million people in the SFBAB in the year 2000. Since 1990, the diesel PM's health risk has been reduced by 36%. Overall, levels of most TACs have gone down since 1990 except for para-dichlorobenzene and formaldehyde (California Air Resources Board 2005a).

Table 3.7-2
Ambient Air Quality Standards and Designations

Pollutant	Averaging Time	California		National Standards [2]		
		Standards [1, 3]	Attainment Status (County) [9]	Primary [3,4]	Secondary [3,5]	Attainment Status [10]
Ozone[6]	1-hour	0.09 ppm (180 μg/m^3)	N		Same as Primary Standard	A
	8-hour	0.07 ppm (137 μg/m^3)	N	0.08 ppm (157 μg/m^3)		N
Carbon Monoxide (CO)	1-hour	20 ppm (23 mg/m^3)	A	35 ppm (40 mg/m^3)	–	U/A
	8-hour	6 ppm (7 mg/m^3)		9 ppm (10 mg/m^3)		
Nitrogen Dioxide (NO_2)	Annual Arithmetic Mean	0.030 ppm (56 μg/m^3)	–	0.053 ppm (100 μg/m^3)	Same as Primary Standard	U/A
	1-hour	0.18 ppm (338 μg/m^3)	A	–		–
Sulfur Dioxide (SO_2)	Annual Arithmetic Mean	–	–	0.030 ppm (80 μg/m^3)	–	U

Table 3.7-2
Ambient Air Quality Standards and Designations

Pollutant	Averaging Time	California		National Standards[2]		
		Standards[1, 3]	Attainment Status (County)[9]	Primary[3,4]	Secondary[3,5]	Attainment Status[10]
	24-hour	0.04 ppm ($105\ \mu g/m^3$)	A	0.14 ppm ($365\ \mu g/m^3$)	–	
	3-hour	–	–	–	0.5 ppm ($1300\ \mu g/m^3$)	
	1-hour	0.25 ppm ($655\ \mu g/m^3$)	A	–	–	–
Respirable Particulate Matter (PM_{10})	Annual Arithmetic Mean	$20\ \mu g/m^3$ *	N	$50\ \mu g/m^3$[6]	Same as Primary Standard	U (Contra Costa) N (San Joaquin)
	24-hour	$50\ \mu g/m^3$		$150\ \mu g/m^3$[6]		
Fine Particulate Matter ($PM_{2.5}$)[7]	Annual Arithmetic Mean	$12\ \mu g/m^3$*	N	$15\ \mu g/m^3$	Same as Primary Standard	N/A
	24-hour	–	–	$65\ \mu g/m^3$		
Lead[8]	30-day Average	$1.5\ \mu g/m^3$	A	–	–	–
	Calendar Quarter	–	–	$1.5\ \mu g/m^3$	Same as Primary Standard	
Sulfates	24-hour	$25\ \mu g/m^3$	A	No Federal Standards		
Hydrogen Sulfide	1-hour	0.03 ppm ($42\ \mu g/m^3$)	U			
Vinyl Chloride[7]	24-hour	0.01 ppm ($26\ \mu g/m^3$)	U/A			
Visibility-Reducing Particle Matter	8-hour	Extinction coefficient of 0.23 per kilometer — visibility of 10 miles or more (0.07—30 miles or more for Lake Tahoe) because of particles when the relative humidity is less than 70%.	U			

1 California standards for ozone, CO (except Lake Tahoe), SO_2 (1- and 24-hour), NO_2, PM, and visibility-reducing particles are values that are not to be exceeded. All others are not to be equaled or exceeded. CAAQS are listed in the Table of Standards in Section 70200 of Title 17 of the California Code of Regulations.

2 National standards (other than ozone, PM, and those based on annual averages or annual arithmetic means) are not to be exceeded more than once a year. The ozone standard is attained when the fourth highest 8-hour concentration in a year, averaged over 3 years, is equal to or less than the standard. The PM_{10} 24-hour standard is attained when 99% of the daily concentrations, averaged over 3 years, are equal to or less than the standard. The $PM_{2.5}$ 24-hour standard is attained when 98% of the daily concentrations, averaged over 3 years, are equal to or less than the standard. Contact EPA for further clarification and current Federal policies.

3 Concentration expressed first in units in which it was promulgated. Equivalent units given in parentheses are based upon a reference temperature of 25°C and a reference pressure of 760 torr. Most measurements of air quality are to be corrected to a

Table 3.7-2 Ambient Air Quality Standards and Designations						
Pollutant	Averaging Time	California		National Standards [2]		
		Standards [1, 3]	Attainment Status (County) [9]	Primary [3,4]	Secondary [3,5]	Attainment Status [10]

reference temperature of 25°C and a reference pressure of 760 torr; parts per million (ppm) in this table refers to ppm by volume, or micromoles of pollutant per mole of gas.

4 National Primary Standards: The levels of air quality necessary, with an adequate margin of safety, to protect the public health.

5 National Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.

6 New Federal 8-hour ozone and fine particulate matter standards were promulgated by EPA on July 18, 1997.

7 On June 20, 2002, ARB approved staff recommendation to revise the PM_{10} annual average standard to 20 μg/m^3 (micrograms per cubic meter) and to establish an annual average standard for $PM_{2.5}$ of 12 μg/m^3. These standards took effect on July 5, 2003. Information regarding these revisions can be found at http://www.arb.ca.gov/research/aaqs/std-rs.htm.

8 ARB has identified lead and vinyl chloride as toxic air contaminants with no threshold of exposure for adverse health effects determined. These actions allow for the implementation of control measures at levels below the ambient concentrations specified for these pollutants.

9 The attainment status is the same for San Joaquin and Contra Costa Counties. Definitions:
Unclassified (U): a pollutant is designated unclassified if the data are incomplete and do not support a designation of attainment or nonattainment.
Attainment (A): a pollutant is designated attainment if the State standard for that pollutant was not violated at any site in the area during a 3-year period.
Nonattainment (N): a pollutant is designated nonattainment if there was a least one violation of a State standard for that pollutant in the area.
Nonattainment/Transitional (NT): is a subcategory of the nonattainment designation. An area is designated nonattainment/transitional to signify that the area is close to attaining the standard for that pollutant.

10 The attainment status is the same for San Joaquin and Contra Costa Counties, except where noted. Definitions:
Nonattainment (N): any area that does not meet (or that contributes to ambient air quality in a nearby area that does not meet) the national primary or secondary ambient air quality standard for the pollutant.
Attainment (A): any area that meets the national primary or secondary ambient air quality standard for the pollutant.
Unclassifiable (U): any area that cannot be classified on the basis of available information as meeting or not meeting the national primary or secondary ambient air quality standard for the pollutant.

Source: California Air Resources Board 2006, U.S. Environmental Protection Agency 2005

3.7.1.2 Designations, Policies, and Regulations

For discussion of designations, policies, and regulations for air quality, see Appendix A, Section A.7.

3.7.2 Environmental Consequences

3.7.2.1 Methods and Assumptions

Due to the limited amount of construction and operational activity expected for the Proposed Action, short-term construction emissions of PM_{10}, emissions of ROG and NO_X, and long-term operational and maintenance emissions of ROG, NO_X, and PM_{10} are qualitatively discussed in this section. Generally, the analysis uses SJVAPCD's *Guide for Assessing and Mitigating Air Quality Impacts* (SJVAPCD 2002) and BAAQMD's CEQA Guidelines (BAAQMD 1999) as the basis for determining potential impacts. Potential short-term increases in pollutants were compared with applicable SJVAPCD and BAAQMD thresholds for determination of significance.

The analysis of other air quality impacts was conducted in accordance with the SJVAPCD and BAAQMD.

3.7.2.2 Significance Criteria

For the purpose of this analysis, the following applicable thresholds of significance, as identified by the BAAQMD and SJVAPCD, have been used to determine whether implementation of the Proposed Action would result in a potentially significant air quality impact. These thresholds encompass the factors taken into account under NEPA to determine the significance of an action in terms of its context and the intensity of its effects.

Generation of Short-Term Construction Criteria Air Pollutant Emissions

The BAAQMD emphasizes implementation of effective and comprehensive control measures rather than requiring a detailed quantification of construction emissions. Therefore, if effective and comprehensive control measures are implemented as appropriate, then short-term construction impacts would be reduced to a less-than-significant level. These conservation measures would prevent the project from resulting in or substantially contributing to emissions concentrations (e.g., ROG, NO_X, and PM_{10}) that exceed the NAAQS and CAAQS. The SJVAPCD's approach is similar for PM_{10} emissions. Complying with SJVAPCD Regulation VIII would reduce impacts to a less-than-significant level (e.g., limit visible dust emissions [VDE] to 20% opacity level). However, if construction emissions of ozone precursors (ROG and NO_X) exceed 10 tons per year (TPY), then the project would result in a potentially significant impact.

Generation of Long-Term Operational (Regional) Criteria Air Pollutant Emissions

Regional impacts would be considered significant if implementation of the project would result in emissions of ROG, NO_X, or PM_{10} that exceed BAAQMD or SJVAPCD thresholds (15 TPY of ROG, NO_X, and PM_{10} and 10 TPY of ROG and NO_X, respectively). In addition, regional impacts would be considered significant if the project would result in or substantially contribute to emissions concentrations (e.g., PM_{10}) that exceed the NAAQS and CAAQS.

Generation of Long-Term Operational (Local) Mobile-Source Carbon Monoxide Emissions

Local CO impacts would be considered significant if project implementation would result in or substantially contribute to CO concentrations that exceed the California 1-hour ambient air quality standard of 20 ppm or the 8-hour standard of 6 ppm.

Toxic Air Contaminant Impacts

Toxic air contaminant impacts would be considered significant if project implementation would result in the exposure of sensitive receptors to toxic air contaminant emissions that exceed 10 in 1 million for the maximally exposed individual (MEI) (one in one million if best available control technology [BACT] is not applied), or a Hazard Index (HI) of one.

Odor Impacts

Odor impacts would be considered significant if project implementation would result in excessive nuisance odors, as defined under the California Code of Regulations, Health & Safety Code Section 41700, "Air Quality Public Nuisance."

3.7.2.3 No-Action Alternative

Under the No-Action Alternative, no new facilities would be constructed. Therefore, the No-Action Alternative would have no impact associated with air pollutant or odorous emissions. Other projects in the project area would likely result in cumulative increases in air quality and odorous emissions associated with increased traffic and development, but the No-Action Alternative would not contribute to these emissions. Therefore, the No-Action Alternative would have no direct or indirect impacts on air quality.

3.7.2.4 Proposed Action

The Proposed Action could potentially affect air quality. This section identifies potential impacts of the Proposed Action. To reduce the potential impact of the Proposed Action on air quality, a conservation measure has been integrated into the Proposed Action (see Table 7.4-1 for expanded description):

- Implement San Joaquin Valley Air Pollution Control District (SJVAPCD) and Bay Area Air Quality Management District (BAAQMD) Measures to Control Construction-Generated Air Pollution Emissions

Short-Term Construction Criteria Air Pollutant Emissions

Construction of the Proposed Action would result in the temporary generation of ROG, NO_X, and PM_{10} emissions associated with construction equipment, construction employee commute trips, material transport (especially on unpaved surfaces), and other construction activities. Although temporary increases in the generation of ROG and NO_X would result from construction, increases would not be expected to exceed the respective BAAQMD and SJVAPCD thresholds for ROG and NO_X. Similarly, construction emissions of PM_{10} would be considered less than significant with the incorporation of BAAQMD and SJVAPCD conservation measures for PM_{10}, as identified above. Therefore, with the implementation of the conservation measure identified above, the potential impact of PM_{10} emissions would be **less than significant**. No mitigation is required.

Exposure of Sensitive Receptors to Toxic Air Contaminants

Construction of the Proposed Action would result in short-term diesel exhaust emissions from on-site heavy duty equipment. Particulate exhaust emissions from diesel-fueled engines (diesel PM) were identified as a toxic air contaminant by ARB in 1998. Project construction would generate diesel PM emissions from the use of off-road diesel equipment required for transmission tower and pole installation, minor excavation, and other related construction activities. The dose to which sensitive receptors are exposed is the primary factor used to determine health risk. Dose is a function of the concentration of a substance or substances in the environment and the extent of exposure that person has with the substance. Dose is positively correlated with time, meaning that a longer exposure period would result in a higher exposure level for the maximally exposed individual. Thus, the risks estimated for a maximally exposed individual are higher if a fixed exposure occurs over a longer period of time. According to the Office of Environmental Health Hazard Assessment (OEHHA), health risk assessments, which determine the exposure of sensitive receptors to toxic emissions, should be based on a 70-year exposure period; however, such assessments should be limited to the period/duration of activities associated with the project. Thus, the duration of the proposed construction activities would only constitute approximately 2% of the total exposure period. Because the use of mobilized equipment would be temporary and there are no sensitive receptors located immediately adjacent to proposed areas of construction, diesel PM from construction activities would not be anticipated to result in the exposure of sensitive receptors to levels that exceed applicable standards.

In addition, the long-term operation and maintenance of the project would not result in any nonpermitted sources of toxic air emissions. As a result, exposure of sensitive receptors to substantial toxic air emissions from the Proposed Action would be **less than significant**. No mitigation is required.

Exposure of Sensitive Receptors to Odorous Emissions

The occurrence and severity of odor impacts depend on numerous factors, including the nature, frequency, and intensity of the source; wind speed and direction; and the presence of sensitive receptors. Although offensive odors rarely cause any physical harm, they can still be very unpleasant, leading to considerable distress and often generating citizen complaints to local governments and regulatory agencies.

The Proposed Action would not include the long-term operation of an odorous emission source, and no major stationary odorous emission sources have been identified in the project area. Thus, neither construction nor the operation and maintenance of the Proposed Action would result in the creation of, or frequent exposure to, an objectionable odor. Occasionally, diesel equipment exhaust can generate objectionable odors, but these dissipate very quickly and, because there are no sensitive receptors located immediately outside the project boundary, this impact would be **less than significant**. No mitigation is required.

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3.8 Water Quality

This section discusses local hydrology and water quality within the immediate vicinity of the Proposed Action. Based on the review of existing conditions, the potential impacts of the Proposed Action and No-Action Alternative on water quality are identified. Mitigation measures to offset any identified impacts also are provided, as applicable.

3.8.1 Affected Environment

3.8.1.1 Existing Water Quality

Climate and Precipitation

The general project area, encompassing the project sites of the Proposed Action, has a moderate climate, similar to a Mediterranean climate. Most of the precipitation occurs between December and April, with the summer months virtually rainless. Average annual rainfall ranges from 11 to 18 inches. The annual average air temperature is about 60ºF, with summer temperatures ranging from highs in the 90s to lows in the 50s and winter temperatures ranging from highs in the 60s to lows in the 20s.

Victoria Island/Byron Tract

Local Surface Water Bodies

The Proposed Action would be located along, and in the vicinity of, Victoria Canal and Old River. Victoria Canal is a constructed, linear canal located between Middle River and Old River. Victoria Canal forms the southeastern border of Victoria Island while Old River defines the western boundary. Middle River forms the northeast boundary of Victoria Island; the project site does not extend to Middle River.

The Proposed Action is located within the San Joaquin Delta Watershed. The San Joaquin Delta Watershed encompasses about 613,000 acres and includes 741.6 miles of naturally occurring waterways (California Rivers Assessment 1997). The San Joaquin Delta Watershed is a part of the larger San Joaquin River Hydrologic Region.

Groundwater

The Proposed Action is located within the Tracy Subbasin of the San Joaquin Valley Groundwater Basin. The Tracy Subbasin is defined by the areal extent of unconsolidated to semiconsolidated sedimentary deposits that are bounded by the Diablo Range on the west; the Mokelumne and San Joaquin Rivers on the north; the San Joaquin River to the east; and the San Joaquin-Stanislaus County line on the south. In general, areas of poor water quality exist throughout the subbasin. Constituents of concern are high total dissolved solids (TDS), chloride, nitrate, and boron. Review of hydrographs for the Tracy Subbasin indicates that except for seasonal variation resulting from recharge and pumping, the majority of water levels in wells have remained relatively stable over at least the last 10 years (California Department of Water Resources 2003).

Victoria Island is not considered to be a substantial groundwater recharge area (San Joaquin County 1992).

3.8.1.2 Designations, Policies, and Regulations

For discussion of designations, policies, and regulations for water quality, see Appendix A, Section A.8.

3.8.2 Environmental Consequences

3.8.2.1 Methods and Assumptions

Information for this section was compiled through visits; photographs; and review of reports and documents, including the general plans for Contra Costa and San Joaquin Counties and the Cities of Concord and Pittsburg.

3.8.2.2 Significance Criteria

Significance under NEPA is determined by assessing the impact of a proposed action in terms of its context and the intensity of its effects. An alternative was determined to result in a significant effect on hydrology and water quality if it would:

- violate any water quality standards or waste discharge requirements, create or contribute runoff water that would provide substantial additional sources of polluted runoff, or otherwise substantially degrade water quality;

- substantially alter the existing drainage pattern of the project site in a manner that would result in substantial erosion or siltation on or off the site, result in flooding on or off the site, or exceed the capacity of existing or planned stormwater drainage systems; or

- substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table such that the production rate of preexisting nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted.

The Proposed Action would not involve the use of groundwater or create facilities or conditions that could obstruct groundwater infiltration except in very localized areas (i.e., within the limited structure footprints). Therefore, the project would not substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a substantial lowering of the local groundwater table. Consequently, effects on groundwater supplies are not addressed further. Potential effects of the project on groundwater as related to agriculture are discussed in Section 3.2, "Land Use."

3.8.2.3 No-Action Alternative

Under the No-Action Alternative, the proposed transmission line and interconnection would not be constructed. Local hydrology and drainage in the project area would be expected to remain substantially the same, with ongoing agricultural activities unchanged. Therefore, the No-Action Alternative would not result in potential water quality degradation of surface water or groundwater.

3.8.2.4 Proposed Action

The Proposed Action could potentially affect water quality during construction, operation, and maintenance. This section identifies potential impacts of the Proposed Action. To reduce the potential impact of the Proposed Action on water quality, a conservation measure has been integrated into the Proposed Action (see Table 7.4-1 for expanded description):

- Prepare and Implement a Stormwater Pollution Prevention Plan (SWPPP) that Minimizes the Potential Contamination of Surface Waters, and Comply with the Central Valley Regional Water Quality Control Board (RWQCB) Requirements to Protect Water Quality

Temporary Degradation of Surface Water Quality as a Result of Contaminant Releases and Runoff during Construction, Operation, and Maintenance Activities

Soil disturbed during construction-related activities, including vegetation removal and grading and stockpiling of soil may be dispersed by wind, rain, and surface flow and carried into the irrigation/drainage ditches on Victoria Island and Byron Tract and their receiving water bodies, Old River and Victoria Canal. In addition, chemicals associated with the operation of heavy machinery, such as fuels, oils, lead solder, solvents, and glues, would be used, transported, and stored on-site during drilling and construction and maintenance activities. These substances could be inadvertently introduced into the irrigation/drainage system and Old River and Victoria Canal through site runoff or on-site spills. Sediment and chemicals could degrade water quality in the ditches and their receiving waters and adversely affect agricultural water uses.

Therefore, the potential exists for the release of sediment and spilled chemical substances into irrigation/drainage canals, Victoria Canal, and Old River that could temporarily degrade water quality and affect beneficial uses in localized areas. This direct impact would be potentially significant. However, with the implementation of the conservation measure identified above, the potential impact would be **less than significant**. No additional mitigation is required.

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3.9 Public Health

This section includes an evaluation of public health impacts, specifically hazardous materials and noise impacts, resulting from the Proposed Action. The hazardous materials analysis is based in part on regulatory database searches performed by Environmental Data Resources (EDR) in May 2005.

3.9.1 Affected Environment

3.9.1.1 Existing Public Health Environment

Hazardous Materials and Waste

Hazardous materials and hazardous wastes are classified by the State of California according to four properties: toxicity, ignitability, corrosivity, and reactivity. A material so classified is defined as a substance or combination of substances that may cause or significantly contribute to an increase in mortality or an increase in serious, irreversible, or incapacitating illness, or may pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, or disposed of, or otherwise managed (22 California Code of Regulations [CCR] Section 66261.10). Hazardous wastes are hazardous substances that no longer have practical use, such as materials that have been discarded, discharged, spilled, or contaminated or are being stored until they can be disposed of properly.

In addition to hazardous materials, wildfires also pose a threat to both persons and property in many areas of California. According to the *San Joaquin County General Plan*, human activities such as smoking, debris burning, and equipment operation are the major causes (90%) of wildland fires (San Joaquin County 1992). Wildland fires are a particularly dangerous hazard to development located in forest and shrub areas. The severity of wildland fires is influenced by four primary factors: vegetation, climate, slope, and people. The California Department of Forestry and Fire Protection (CalFire) developed a fire hazard severity scale, which considers vegetation, climate, and slope to evaluate the level of wildfire hazard in all State Responsibility Area lands. CalFire designates three levels of Fire Hazard Severity Zones (Moderate, High, and Very High) to indicate the severity of fire hazard in a particular geographical area (CalFire 2001).

Victoria Island/Byron Tract

Existing land uses on the proposed project site and in the surrounding area consist primarily of agriculture. An equipment yard and CCWD's Old River intake and pump station are located adjacent to Old River on Byron Tract. SR 4, which forms the northern boundary of the transmission corridor, is identified in the *San Joaquin County General Plan* (San Joaquin County 1992) as a hazardous waste transportation route. A petroleum product pipeline runs about 3 miles west of the proposed project site (Contra Costa County 2005).

3.9 Public Health

A hazardous materials records search of the proposed project site and areas within 0.25 mile of the site was performed by EDR for the AIP EIR/EIS (CCWD and Reclamation 2006). The purpose of the search was to identify documented "recognized environmental conditions" (RECs) at and near the proposed project site related to current and historical uses of the area and to evaluate the potential for a release of hazardous materials from on- or off-site sources that could significantly affect environmental conditions at the proposed project site. EDR searched a variety of Federal and State databases such as the National Priorities List; the Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLA); Resource Recovery and Conservation Act (RCRA) information; and the California Department of Toxic Substances Control's (DTSC's) Hazardous Waste & Substances Site (known as the "Cortese list"), among others. According to the EDR database search, there are no known or potentially hazardous waste sites, landfills, hazardous waste generators, or disposal facilities within 0.25 mile of the proposed project site (EDR 2005).

Byron Airport is about 3.5 miles south of the proposed project site, west of Clifton Court Forebay. No schools are located in the vicinity of the proposed project site.

Noise

Noise-sensitive land uses generally include those uses where exposure to noise would result in adverse effects, as well as uses where quiet is an essential element of the intended purpose of the land uses. Residential dwellings are of primary concern because of the potential for increased and prolonged exposure of individuals to both interior and exterior noise levels. Noise effects are evaluated according to the standards of the jurisdiction in which they are generated, regardless of where they are perceived.

Sound levels are represented throughout this section in terms of an "A-weighted" decibel (dBA) scale. The dBA scale is an expression of sound pressure levels in logarithmic units called decibels (dB) that discriminates among (i.e., "weighs") sound frequencies in a manner approximating the sensitivity of the human ear. Appendix F-3, "Acoustic Fundamentals," of the AIP EIR/EIS (CCWD and Reclamation 2006) provides an overview of acoustic fundamentals, including definitions of noise terminology used in this section and an explanation of the dBA scale, as background information for this section.

Victoria Island/Byron Tract

The vicinity of the proposed project site consists primarily of rural/agricultural land uses. Noise-sensitive land uses in the area include temporary agricultural worker housing on Victoria Island near SR 4, over 1 mile from the proposed intake site on Victoria Canal and on the west side of Victoria Island about 1 mile northwest of the intake site; a farm residence on Victoria Island north of SR 4, which is 2 miles or more from the proposed project site; residential, recreational, and commercial land uses in Discovery Bay, which are approximately 3 miles or more from the proposed intake site and the nearest of which is about 3,000 feet from the Byron Tract portion of the project site; and the Golden Gate Water-Ski Club, which is zoned for 16 residences and is located about one-half mile southwest of the location of the proposed connection to the new intake.

Noise in the vicinity of the proposed project site is principally generated by vehicular traffic, agricultural activity, trains, and occasional aircraft flyovers. Vehicular traffic on the roadways, primarily SR 4, is by far the dominant source of noise.

An ambient noise survey was conducted by EDAW on May 20, 2005, for the AIP EIR/EIS (CCWD and Reclamation 2006), to document the existing noise environment at locations surrounding the proposed project site. The dominant noise sources noted during the survey were vehicular traffic on SR 4 to the north of the site and agricultural equipment (tractors) in the vicinity of the proposed intake facility location. Short-term noise-level measurements were taken in accordance with the American National Standards Institute acoustic standards at two locations bordering the proposed project site during the nonpeak traffic hours using a Larson Davis model 820 sound-level meter at approximately 4.5 feet above ground level. The short-term L_{eq} value for each ambient noise measurement location is presented in Table 3.9-1 along with the L_{max} and L_{min}.[1]

Table 3.9-1
Ambient Noise Levels Near the Proposed Project Site

Noise Measurement Location	Date and Time	Noise Level (dBA)		
		L_{eq}	L_{max}	L_{min}
Southeast corner of Discovery Bay ▪ Approximately 2,700 feet from the Byron Tract portion of the proposed project site ▪ Approximately 50 feet from center line of SR 4 ▪ Approximately 300 feet from permanent sensitive receptors in Discovery Bay nearest to the proposed project site	May 20, 2005 10:30 a.m.–10:45 a.m.	75.1	91.4	42.0
On Union Island, directly south of and adjacent to Victoria Canal ▪ North end of Bonetti Road ▪ Approximately 3,000 feet from the proposed intake site	May 20, 2005 11:48 a.m.–12:03 p.m.	65.0	83.9	45.1
Source: Data collected by EDAW on May 20, 2005				

Average daytime noise levels in the vicinity of the proposed project site were found to range from 65.0 to 75.1 dBA L_{eq}, depending primarily on the type of activity occurring in the vicinity of the measurement. Traffic along SR 4 was moderate, with some semi-truck traffic. Although there was no vehicle traffic on Bonetti Road (on Union Island, south of Victoria Canal), noise sources encountered at the end of this road, directly adjacent to Victoria Canal, included agricultural equipment, somewhat frequent small airplane flyovers, and an irrigation ditch pump operating steadily. Maximum noise levels near the proposed project site range from 83.9 to 91.4 dBA L_{max}. Nighttime noise levels were not

[1] L_{max} (maximum noise level) is the maximum instantaneous noise level during a specific period of time. L_{min} (minimum noise level) is the minimum instantaneous noise level during a specific period of time. L_{eq} (equivalent noise level) is the energy mean (average) noise level. See Appendix F-3 for additional information regarding these terms.

measured as part of the ambient noise survey, but would be expected to be much less than daytime levels because the dominant noise sources in the area consist of roadway traffic and agricultural operations, which primarily occur in the daytime hours.

During the Bonetti Road measurement, small aircraft were observed passing over the site approaching and leaving Byron Airport. Thus, noise levels from aircraft activity were one dominant noise source at the proposed project site during the field survey on May 20, 2005.

3.9.1.2 Designations, Policies, and Regulations

For discussion of designations, policies, and regulations for public health, see Appendix A, Section A.9. San Joaquin County exterior, nontransportation noise level standards for projects that will create stationary noise sources or expand existing stationary noise sources are shown in Table 3.9-2.

Table 3.9-2
Exterior Nontransportation Noise Level Standards

Noise Level Descriptor	Daytime [a] (7 a.m. to 10 p.m.)	Nighttime [b] (10 p.m. to 7 a.m.)
Hourly L_{eq}	50 dBA	45 dBA
Maximum Sound Level (L_{max})	70 dBA	65 dBA

[a] Where the location of outdoor activity areas is unknown or not applicable, the noise standard shall be applied at the property line of the receiving land use. When determining the effectiveness of noise mitigation measures, the standards shall be applied on the receiving side of noise barriers or to the property-line noise mitigation measures.

[b] Each of the above noise levels may be lowered by 5 dBA for simple tone noises or for noises consisting primarily of speech or music.

Source: San Joaquin County Development Title 1999

3.9.2 Environmental Consequences

3.9.2.1 Methods and Assumptions

Hazardous Materials and Waste

EDR conducted a regulatory database search for the area within a 0.25-mile radius surrounding the proposed project site, which includes the southwest portion of Victoria Island and the eastern portion of Byron Tract (EDR 2005). The purpose of such a search is to identify sites in the target area that are associated with the documented use, generation, storage, or releases of hazardous materials or petroleum products. The report also includes regulatory agency lists of known or potential hazardous waste sites, landfills, hazardous waste generators, and disposal facilities, in addition to sites under investigation. Information provided in the EDR database search was obtained from publicly available sources, including the following:

- Cortese List—Governor's Office of Planning and Research;
- Leaking Underground Storage Tanks—Central Valley RWQCB;
- Comprehensive Environmental Response Compensation and Liability Information System—EPA Superfund Sites;
- National Priority List—EPA Priority Superfund Sites; and
- Annual Work Plan—California Environmental Protection Agency (Cal/EPA).

Noise

Noise-sensitive land uses and major noise sources in the vicinity of the proposed project site were identified based on existing documentation and site visits. To assess potential temporary short-term construction noise impacts, sensitive receptors and their relative exposure (considering topographic barriers and distance) were identified. Typical noise levels associated with the specific types of construction equipment anticipated to be used for project construction were determined, and resultant potential noise levels at those receptors were calculated. Most of the assessment addresses construction noise levels produced at the proposed site because the greatest levels of construction noise generation would be associated with construction. Predicted noise levels were compared with standards adopted by the local agencies where the Proposed Action would be located. The evaluation of potential long-term (operational) noise impacts considered the potential levels of operational noise, existing noise-sensitive land uses, documented noise levels, and attenuation rates. For nontransportation sources (e.g., stationary and construction equipment), a noise attenuation rate of 6 dBA per doubling of distance was assumed in all calculations, for both short- and long-term impacts.

3.9.2.2 Significance Criteria

Significance under NEPA is determined by assessing the impact of a proposed action in terms of its context and the intensity of its effects. An alternative was determined to result in a significant effect on public health if it would:

- create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials or through reasonably foreseeable upset or accident conditions involving their release into the environment;
- emit hazardous emissions or involve the handling of hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school;
- be located on a site that is included on a list of hazardous materials sites compiled pursuant to Government Code 65962.5;
- expose construction workers to hazardous materials that would create health risks during construction;

- expose people or structures to a significant risk of loss, injury, or death from wildland fires; or
- result in a safety hazard for people residing or working in a project area that is located within 2 miles of a public airport or public use airport.

Short-Term Construction Noise Impacts. Short-term noise impacts from construction on Victoria Island (San Joaquin County) would be considered significant if construction activities would be conducted before 6:00 a.m. or after 9:00 p.m., as specified in the exemptions to Table 3.9-2, and if noise levels would exceed the applicable performance standards identified in Table 3.9-2 or result in a noticeable increase (i.e., 5 dBA or greater) in ambient noise levels at nearby noise-sensitive land uses.

Short-term noise impacts from construction on Byron Tract and elsewhere in Contra Costa County would be considered significant if construction activities would be conducted outside of normal working hours Monday through Friday and if noise levels would result in a noticeable increase (i.e., 5 dBA or greater) in ambient noise levels at nearby noise-sensitive land uses.

Traffic Noise Impacts. Long-term traffic noise impacts would be significant if project-generated traffic would increase the average daily noise levels at a noise-sensitive land use by more than 5 dBA or cause the overall level to exceed the “normally acceptable” standard for land use compatibility established by the Contra Costa County and San Joaquin County general plans (60 dBA L_{dn} [day-night average] for the most noise-sensitive land uses considered by each jurisdiction in its general plan). The Proposed Action would generate only occasional traffic related to operation and maintenance activities (see Section 3.13.3, “Transportation Resources”) and would not exceed these standards.

Stationary and Area-Source Noise Impacts. Long-term stationary source noise impacts would be significant if the project would result in substantial permanent increases in ambient noise levels in the project vicinity.

This threshold would be exceeded in San Joaquin County if project-generated noise levels would result in a substantial permanent increase in ambient noise levels (i.e., 5 dBA), or exceed the Development Title standards for exterior stationary source noise (see Table 3.9-2). The standards generally limit exterior noise levels (measured at the property line of the sensitive land use) to a maximum of 50 dBA hourly L_{eq} during daytime hours (7:00 a.m. to 10:00 p.m.) and 45 dBA hourly L_{eq} during nighttime hours (10:00 p.m. to 7:00 a.m.).

The threshold would be exceeded in Contra Costa County if the project results in a substantial permanent increase in ambient noise levels (i.e., 5 dBA) at noise-sensitive receptors (i.e., residences).

Exposure of Sensitive Receptors to or Generation of Excessive Groundborne Vibration or Noise Impacts. For most structures, a peak particle velocity (ppv) threshold of 0.5 inch per second is sufficient to avoid structural damage; however, the California Department of Transportation recommends a more conservative threshold of 0.2 inch per second ppv for residential buildings (California Department of Transportation 2002). Impacts would be considered significant if 0.2 inch per second ppv were reached at nearby vibration-sensitive receptors.

3.9.2.3 No-Action Alternative

Under the No-Action Alternative, no new facilities would be constructed, no hazardous materials would be transported and/or inadvertently added to the environment, and no construction-related noise or wildland fire risk would result. Therefore, the No-Action Alternative would not result in any impacts on public health related to hazardous materials or noise.

3.9.2.4 Proposed Action

The Proposed Action could potentially affect public health. This section identifies potential impacts of the Proposed Action. To reduce the potential impact of the Proposed Action on public health, the following conservation measures have been integrated into the Proposed Action (see Table 7.4-1 for expanded descriptions):

- Coordinate with the Applicable Landowners and Land Managers to Ensure That Temporary Construction Workers and Western Personnel Are Not Exposed to Harmful Levels of Pesticides from Adjacent Agricultural Practices

- Implement Measures to Control Generation of Short-Term Construction Noise

Hazardous Materials and Waste

Potential Creation of a Public Health Hazard Through the Use of Hazardous Materials

Construction of the Proposed Action would involve the storage, use, and transport of potentially hazardous materials (e.g., fuel, lubricants, and paint) that are commonly used during construction activities. There are no schools or other sensitive receptors within close proximity (1 mile) of the proposed project site; therefore, there would be no potential effects on sensitive receptors from the use of hazardous materials at the site. Transportation of hazardous materials on area roadways is regulated by the California Highway Patrol (CHP) and Caltrans, and use of these materials is regulated by the DTSC, as outlined in Title 22 of the CCR. Construction contractors would be required to use, store, and transport hazardous materials in compliance with local, State, and Federal regulations during project construction.

Only minimal amounts of hazardous materials would be needed to operate and maintain the transmission line. Use of such materials would be controlled by required permits and compliance with appropriate regulatory agency standards designed to avoid hazardous waste releases. Western would update its existing *Emergency Response Plan* and *Hazardous Materials Business Plan*, as necessary, to address risks associated with the operation of the new facilities. Implementation and compliance with existing hazardous material regulations would minimize impacts related to the creation of significant hazards to the public through routine transport, use, disposal, and risk of upset. Therefore, this impact would be **less than significant**. No mitigation is required.

Potential Exposure of Construction Workers to Hazardous Materials and Conditions
No evidence of RECs or hazardous material contamination has been reported on or within 0.25 mile of the proposed project site. The records review conducted by EDR (2005) did not find documentation of any known or potentially hazardous waste sites, landfills, hazardous waste generators, or disposal facilities in the search area. Project construction activities would not involve the demolition of any buildings, and thus would not expose workers to health risks from asbestos or lead-based paint. Therefore, potential exposure of construction workers to hazardous waste sites of construction-related materials would be a **less-than-significant** impact. No mitigation is required.

Under existing conditions, pesticides are applied periodically to crops on Victoria Island and Byron Tract as part of normal agricultural operations. Farming operations are expected to continue during the construction period with routine periodic aerial and land application of pesticides, and farming practices on both islands are expected to be the same as under existing conditions after construction. A wide range of pesticides may be used on the local crops depending on seasonal crop and pest conditions. Pesticides typically used on asparagus, for example, include numerous insecticides, herbicides, fungicides, and nematicides. The potential effects of individual substances on humans depend on many factors, including pesticide type, amount of exposure, and individual responses and can range from mild headache to nausea and respiratory problems to temporary or prolonged neurological impairment.

Applications of some pesticides on Victoria Island and Byron Tract could pose a potential health and safety hazard to construction workers if they occur at or near the construction work zones when workers are present or if workers return to work sites before the substances have dispersed sufficiently. Similarly, Western maintenance staff could be exposed to harmful levels of pesticides during routine maintenance and monitoring visits to the new transmission line and interconnection facilities. Because of the potential for human health hazards posed by the proximity of the proposed facility sites to active agricultural areas where pesticides are sometimes used, this impact would be potentially significant. However, with the implementation of the conservation measures identified above, the potential impact would be **less than significant**. No mitigation is required.

Potential Wildfire Hazard
Land at the proposed project site is under agricultural cultivation for asparagus, alfalfa, and wheat. These agricultural crops are not considered to be prime fuel sources for wildland fires. CalFire identifies wildland fire areas and Very High Fire Hazard Severity Zones for all counties in California. The 50-foot-wide transmission ROW is not located in or near these designated areas or zones. Implementation of the Proposed Action would not expose people or structures to significant risk of loss or injury involving wildland fires. Therefore, this impact would be **less than significant**. No mitigation is required.

Noise

Generation of Short-Term Construction Noise

Construction of facilities under the Proposed Action would include site clearing and grading; construction of various structures, including steel supporting structures; and the installation of electrical transmission lines along the dirt access road and SR 4, in addition to other construction operations.

On-site equipment required for construction may include excavators, backhoes, bulldozers, scrapers, rollers, graders, loaders, haul trucks, water trucks, pile drivers, and cranes. According to EPA, the noise levels of primary concern are typically associated with the site preparation phase because of the on-site equipment associated with clearing, grading, and excavation. Among the different types of construction equipment that would be used to construct the project facilities, if a pile driver is used to install the transmission supports and poles, it would generate the highest noise levels. Depending on the operations conducted, individual equipment noise levels can range from 79 to 101 dBA at 50 feet, as indicated below in Table 3.9-3.

The decibel scale is logarithmic, and noise levels measured in decibels therefore are not directly additive. For example, a 65-dBA source of sound, such as a truck, when joined by another 65-dBA source results in a sound amplitude of 68 dBA, not 130 dBA (i.e., doubling the source strength increases the sound pressure by 3 dBA). Laboratory measurements correlate a 10-dBA increase in amplitude with a perceived doubling of loudness. See Appendix F-3, “Acoustic Fundamentals,” of the AIP EIR/EIS (CCWD and Reclamation 2006) for additional information. Consequently, the perceived noise level shown in Table 4.11-3 for a pile driver is about two to four times the noise level of the other pieces of equipment listed in the table.

Table 3.9-3
Typical Construction Equipment Noise Levels

Type of Equipment	Noise Level in dBA at 50 feet[b]	
	Without Feasible Noise Control	With Feasible Noise Control[a]
Pile Driver	101	95
Dozer or Tractor	80	75
Excavator	88	80
Scraper	88	80
Front-end Loader	79	75
Backhoe	85	75
Grader	85	75
Crane	83	75
Truck	91	75

[a] Feasible noise control includes the use of intake mufflers, exhaust mufflers, and engine shrouds in accordance with manufacturer’s specifications.

[b] Estimates correspond to a distance of 50 feet from the noisiest piece of equipment and 200 feet from the other equipment.

Sources: EPA 1971

Based on these equipment noise levels and assuming a noise attenuation rate of 6 dBA per doubling of distance from the source, no noise-control devices, and no intervening barriers, worst-case exterior noise levels at the sensitive receptors nearest to the project site (Golden Gate Water-Ski Club), located approximately 2,500 feet away, could be 67 dBA. San Joaquin County exempts construction operations that occur during the hours of 6:00 a.m. and 9:00 p.m. on any day from the applicable noise standards (San Joaquin County 1999). However, if construction activities in San Joaquin County were carried out during noise-sensitive hours (9:00 p.m. to 6:00 a.m.), the nighttime exterior standard of 45 dBA hourly L_{eq} would apply. Union Island levees between the project site location and receptors would help to attenuate the noise level; however, worst-case levels may still exceed 45 dBA. The next nearest permanent sensitive receptors are the residences in Discovery Bay to the northwest and a farm residence to the northeast, which are approximately 8,000 feet and across SR 4 from the project site. These residences could experience worst-case sound levels from construction of approximately 52 dBA, which would exceed the 45 dBA hourly L_{eq} noise standard for noise sources in San Joaquin County in effect outside of exempt hours. It is possible that the sound wall on the north side of SR 4 would further reduce perceived construction noise levels at the Discovery Bay residences to below the threshold. However, construction activities are not expected to occur outside of exempt hours.

Because Byron Tract is in Contra Costa County, construction activity there would be subject to the thresholds for short-term construction noise in Contra Costa County. The receptors in Discovery Bay are the closest sensitive receptors. The nearest of them would be located approximately 3,000 feet from construction taking place on Byron Tract. These receptors could experience combined worst-case noise levels of approximately 65 dBA associated with construction equipment at this site (specifically, pile driving equipment if it is used to install poles in some locations). This level of construction noise would likely result in a 5-dBA or greater increase in ambient noise levels at Discovery Bay residences.

Because these circumstances could result in noise levels that exceed the applicable standards and result in increased annoyance to occupants of residential dwellings, this impact would be potentially significant. However, construction activities are not expected to occur outside of exempt hours. With the implementation of the conservation measures identified above, the potential noise impact would be **less than significant**. No mitigation is required.

Exposure of Sensitive Receptors to or Generation of Excessive Groundborne Vibration or Noise

Construction activities have the potential to result in varying degrees of temporary ground vibration, depending on the specific construction equipment used and operations involved. Ground-vibration levels associated with various types of construction equipment are summarized in Table 3.9-4. Vibration generated by construction equipment typically spreads through the ground and diminishes in magnitude with increases in distance. While effects of ground vibration may be imperceptible at low levels, they may result in detectable vibrations and slight damage to nearby structures at moderate and high levels, respectively. At the highest levels of vibration, damage to structures is primarily architectural (e.g., loosening and cracking of plaster or stucco coatings) and rarely results in structural damage.

Table 3.9-4
Representative Vibration Source Levels for Construction Equipment

Equipment		Peak Particle Velocity at 25 feet (in/sec)
Pile Driver (impact)	upper range	1.518
	Typical	0.644
Pile Driver (sonic)	upper range	0.734
	Typical	0.170
Large Bulldozer		0.089
Caisson or Well Drilling		0.089
Loaded Trucks		0.076
Jackhammer		0.035
Small Bulldozer		0.003

Source: Federal Transit Administration 1995

Construction operations associated with the Proposed Action may include pile drivers, bulldozers, backhoes, loaders, and trucks. Groundborne noise and vibration resulting from construction of the Proposed Action would primarily be associated with the use of pile drivers and drilling of holes and operating bulldozers to install the transmission poles, which typically result in some groundborne vibration at 25 feet from the work, as shown in Table 3.9-4. However, because the nearest residential structures would be located approximately 0.5 mile from the construction site at the nearest point, vibration levels would not surpass the most conservative threshold of 0.2 inch per second ppv at these nearby structures. In addition, no other structures would be located within 25 feet of construction activities. Therefore, it would not be expected that the 0.5 ppv threshold for structural damage to most structures would be exceeded at any nearby structure. Thus, the temporary construction vibration associated with on-site equipment would not be anticipated to expose sensitive receptors to or generate excessive groundborne vibration or groundborne noise levels. Therefore, this direct impact would be **less than significant**. No mitigation is required.

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3.10 Recreation

This section describes the existing recreational setting of the proposed project site and analyzes the potential impacts of the Proposed Action on recreational resources. Effects of project construction on aesthetic resources are addressed in Section 3.12, "Aesthetics."

3.10.1 Affected Environment

3.10.1.1 Existing Parks and Recreation

Victoria Island/Byron Tract
Located in the southern part of the Delta, both Victoria Canal and Old River are popular boating, water-skiing, and fishing locations. Victoria Canal has 12 miles of navigable waterways and Old River has 42 miles. Old River (as well as Middle River, which can be accessed via Victoria Canal from areas near Clifton Court Forebay and farther south) is considered a boating route (California Department of Boating and Waterways 2002).

Recreational boating is the primary use of Victoria Canal and the portion of Old River at the proposed project site, but there are no boating facilities at Victoria Canal or Old River. The closest boating facilities are located at nearby marinas, including Lazy M Marina near Clifton Court Forebay, Discovery Bay Yacht Club off of Old River, and Union Point Resort on Middle River near Victoria Canal. Table 3.10-1 lists the facilities at each of these marinas. Boaters that use these marinas likely use Old River and Victoria Canal as recreational boating sites or, particularly for larger cruising boats, as thoroughfares to facilities in northern parts of the Delta and Middle River.

Table 3.10-1
Marinas near Victoria Island and Byron Tract

Marina Name	Location	Number of Slips	Amenities
Discovery Bay Yacht Harbor	Discovery Bay off Old River	266	Restrooms, electricity, snack bar, mail/message, water, dry storage, pumpout, dock boxes, phones, launch ramp, ice, fuel dock, restaurant, showers, groceries, security, guest facilities, parking, canvas shop, boat supplies, water ski, boat brokerage
Union Point Resort	Middle River	None	Restrooms, some electricity, phones, ice, fuel dock, self-serve restaurant, day use docks only
Lazy M Marina	Italian Slough	Unknown	Launch ramp, gas, restrooms, outdoor storage, wet berths, snack bar, ice

Source: The Log 2005; Mygrant, pers. comm., 2005

Additionally, Old River and Victoria Canal are likely used as recreational boating areas and/or thoroughfares by the residential communities that are located approximately 1 mile away from the proposed intake site on an island south of Victoria Canal.

3.10 Recreation

Water-skiing is also popular at both Victoria Canal and Old River, with heaviest use during summer. The south Delta has many sheltered and quiet waters due to the areas' position on the leeward side of the Diablo Range. This characteristic provides for excellent water-skiing opportunities. The *Sacramento–San Joaquin Delta Boating Needs Assessment* (California Department of Boating and Waterways 2002) identifies the portion of Old River between Woodward/North Victoria Canal and Victoria Canal, as well as Victoria Canal itself, as preferred water-skiing locations. The study also notes that organized water-ski groups tend to use the Discovery Bay area and other private facilities within the south Delta for their activities. The Widow Island Ski Club is located on Old River south of the existing Intake and Pump Station, and the Discovery Bay Wakeboard and Ski Center is located off of Old River north of the existing Intake and Pump Station. Both likely use Old River and Victoria Canal for their activities.

The *Sacramento–San Joaquin Delta Boating Needs Assessment* (California Department of Boating and Waterways 2002) identifies Old River as a preferred fishing site. Boat fishing is possible in Old River and Victoria Canal, and fishing spots are likely the best along the tule reeds located on the edges of Old River and down the center of Victoria Canal. Anglers can fish for several species including salmon, striped bass, largemouth bass, sturgeon, and catfish. For further details on fisheries resources at the proposed project site, refer to Section 3.5, "Fisheries."

Land-based activities such as hunting, picnicking, and shoreline fishing are not legal in the immediate area due to prohibition of public access to the surrounding levees by RDs 800 and 2040; therefore, these activities do not occur on-site. There are no existing trails or hunting access points at the proposed project site. There is a community park located in nearby Discovery Bay, and a bike trail is proposed along SR 4. The *San Joaquin County General Plan* (1992) does not list the proposed project site as a significant resource area for recreation.

3.10.1.2 Designations, Policies, and Regulations

There are no Federal or State recreation laws or policies that are relevant to the Proposed Action. For a summary of related policies, see designations, policies, and regulations for recreation, Appendix A, Section A.10.

3.10.2 Environmental Consequences

3.10.2.1 Methods and Assumptions

Recreation resources analyzed for this section include waterways, parks, trails, and other recreational resources potentially affected by any of the components of the Proposed Action. This evaluation is based on a general understanding of the uses and seasonality of use at the proposed project site.

3.10.2.2 Significance Criteria

Significance under NEPA is determined by assessing the impact of a proposed action in terms of its context and the intensity of its effects. An alternative was determined to result in a significant effect on recreational resources if it would:

- 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; or

- include recreational facilities or require the construction or expansion of recreational facilities that might have an adverse physical effect on the environment.

In addition, an alternative was determined to result in a significant effect on recreational resources if it would:

- substantially reduce recreational opportunities or substantially degrade recreational experiences.

The Proposed Action would not include recreational facilities or require the construction or expansion of recreational facilities. Therefore, the second significance threshold listed above is not relevant to this analysis.

3.10.2.3 No-Action Alternative

Under the No-Action Alternative, no new facilities would be constructed and no existing facilities would be altered, expanded, or demolished. Implementation of the No-Action Alternative would neither temporarily nor permanently affect existing recreational resources, opportunities, or experiences. The No-Action Alternative would have no direct or indirect effect on recreational resources.

3.10.2.4 Proposed Action

The Proposed Action could potentially affect parks and recreation resources. This section identifies potential impacts of the Proposed Action. No recreation-related conservation measures have been integrated into the Proposed Action because they are not necessary.

Temporary Changes in Recreational Opportunities during Project Construction

Land-based activities such as hunting, picnicking, and shoreline fishing are not legal due to prohibition of public access to the surrounding levees by RDs 800 and 2040, and therefore do not occur. There are no existing trails or hunting access points at the proposed project site.

Several water-related recreational opportunities exist along Old River and Victoria Canal, including boating, water skiing, and boat fishing, and could be temporarily affected by construction activities associated with the Proposed Action, particularly by construction activities along Old River. Specifically, construction noise could negatively affect the recreational setting, in turn negatively affecting the recreational experience and causing boaters, especially boat anglers, to avoid this area during loud construction periods. Although these temporary disturbances may affect the recreation experience for boaters, displaced recreational uses could be accommodated by other nearby waterways and facilities in the Delta. For this reason, and because of the temporary nature of this effect, this impact would be **less than significant**. No mitigation is required.

3.10 Recreation

Due to the distance between construction activities and waterways, no direct conflict with boaters and anglers would be expected. Installation of the transmission line structures and transmission lines along and across Old River, respectively, may, for short periods, limit the use of Old River by recreationists. However, the duration of such limitations is expected to be short enough that the potential impact would be **less than significant**. No mitigation is required.

Any potential impacts on navigation caused by the presence of new transmission lines across Old River would be addressed by the Rivers and Harbors Act Section 10 review, as discussed in Section A.8 of Appendix A, and would be **less than significant**. No mitigation is required.

3.11 Cultural Resources

This section includes an evaluation of the potential impacts on cultural resources that could result from project implementation. Cultural resources include features of the physical environment that relate to human culture and society. Additionally, cultural resources include expressions of the human culture and history in the physical environment, such as early Native American occupation sites and artifacts, historic-era buildings and structures, and places used for traditional Native American observances or places with special cultural significance. These materials can be found at many locations on the landscape, and along with prehistoric and historic-era human remains and associated grave-goods, are protected under various Federal statutes, including Section 106 of the National Historic Preservation Act (NHPA) and the Native American Graves Protection and Repatriation Act (NAGPRA).

3.11.1 Affected Environment

Cultural resources may include prehistoric period sites, historical period sites, and areas of sacred and traditional concern to Native American tribes and other ethnic groups. A detailed description of the prehistoric setting of the general project area, and ethnographic and historical contexts of the proposed project site and Desalination Alternative project sites, are included in the confidential technical reports: *Cultural Resources Survey for the Contra Costa Water District's Alternative Intake Project, Contra Costa and San Joaquin Counties, California* (CCWD 2005) and *Cultural Resources Inventory and Evaluation Report to the Contra Costa Water District Alternative Intake Project, Contra Costa and San Joaquin Counties, California* (CCWD February 2007; revised June 2007). An assessment of the types of cultural resources that may be affected by implementation of the Proposed Action is provided in these confidential technical reports on file at Reclamation's Sacramento office.

Victoria Island/Byron Tract

Ethnographic Context

The Northern Valley Yokuts occupied the proposed project area, that is, the land on each side of the San Joaquin River from the Delta to south of Mendota. The Yokuts' occupation of the northern parts of the range may be relatively recent, as linguistic evidence points toward an earlier Miwok occupation. Euro-American contact with the Northern Valley Yokuts began with infrequent excursions by Spanish explorers in the late 1700s to early 1800s. Many Yokuts were lured or captured by missionaries and scattered among the various missions. However, major impacts on the native peoples of the region came with the malaria epidemic of 1833, and the influx of Europeans during the gold rush era further reduced the population.

Historical Context

The proposed project site is situated on what was originally the *Paso del Pescadero* land grant. The development of agriculture in this region began in the 19th century, and both San Joaquin and Contra Costa Counties are still considered agriculturally rich regions in California.

Land reclamation, an integral part of agriculture, began as early as 1849 in the Delta with the construction of levees around Grand Island. Land reclamation in the project vicinity was initiated by the Tide Land Reclamation Company, which partially reclaimed Union Island, of which Victoria Island was once a part, before selling it in 1875. By winter 1876, approximately 45 miles of levees were under construction. Land reclamation of Byron Tract began with a 4.5-foot levee along Old River in 1870–1874. Flooding in 1875 led to the enlargement of the levee to the south in 1877; however, it would be several years later (ca. 1900) before the land would be fully reclaimed.

Cultural Resource Study Methodology and Findings

Cultural resource investigations for the Victoria Island and Byron Tract project site, including the 50-foot-wide transmission ROW, consisted of a staged approach that included Native American consultation, prefield research, field surveys, and resource documentation. All aspects of the cultural resource study were conducted in accordance with the *Secretary of the Interior's Guidelines for Identification of Cultural Resources* (48 FR 44720-23).

Native American Consultation

Implementing regulations for Section 106 require that Federal agencies identify potentially affected Indian tribes that might have knowledge of sites of religious and cultural significance in the area of potential effects (APE) (36 CFR 800.3[f][2]). If any such properties exist, the regulations require that Federal agencies invite Indian tribes to participate in the Section 106 process as consulting parties. In accordance with Section 106 requirements, and prior to conducting fieldwork, EDAW consulted with the Native American Heritage Commission (NAHC) as part of the AIP EIR/EIS (CCWD and Reclamation 2006). Responses from the NAHC indicated that a record search of the sacred land files did not indicate the presence of Native American cultural resources or areas of cultural sensitivity in the immediate vicinity of the Victoria Island/Byron Tract APE. Input from the NAHC-designated Native American contacts for San Joaquin and Contra Costa Counties was also solicited. One telephone response, from Ohlone representative Katherine Erolinda Perez, was received with regard to the Victoria Island/Byron Tract APE. Ms. Perez expressed concern regarding the overall sensitivity of the Delta area for containing early Native American resources.

Prefield Research

EDAW's research into cultural resource issues for the Proposed Action began with a records search of pertinent cultural resource information conducted at the Northwest and Central California Information Centers (NWIC and CCIC) as part of the AIP EIR/EIS (CCWD and Reclamation 2006) and included the 50-foot-wide transmission ROW. The records search included review of the California Historical Resources Information System (CHRIS), the National Register of Historic Places (NRHP) (National Park Service 1996), the California Register of Historical Resources (CRHR) (State of California 1976), numerous other State and county historic resource listings, and historic plat maps and USGS maps.

Previous Archaeological Investigations

The files maintained at the NWIC and CCIC illustrated previously conducted archaeological investigations that occurred within one-half mile of the proposed project site. A list of past investigations directly related to the Victoria Island/Byron Tract area is presented in Table 3.11-1.

Table 3.11-1
Previous Cultural Resource Investigations of the Victoria Island/Byron Tract Area

Report Title	Author and Date
Sacramento–San Joaquin Delta, California, Historical Resources Overview	Owens 1991
A Class III Archeological Survey of the South Delta Water Management Program Area, San Joaquin and Contra Costa Counties, California	West 1994
Cultural Resources Inventory of Caltrans District 10, Rural Conventional Highways, Volume I	Leach-Palm et al. 2004a
Cultural Resources Inventory of Caltrans District 10 Rural Conventional Highways, Volume III	Rosenthal and Meyer 2004
Cultural Resources Inventory of Caltrans District 10 Rural Conventional Highways, Volume II	Leach-Palm et al. 2004b
Source: Data compiled by EDAW in 2005	

Victoria Island/Byron Tract

The work conducted by Owens (1991) did not include any field surveys but consisted of an overview of historical resources based upon archival research. James West (1994) conducted field investigations for the South Delta Water Management Program, which included a section of the levee along the east side of Old River and the north side of Victoria Canal, as well as a survey within the proposed project site. Recent work conducted for Caltrans (Leach-Palm et. al. 2004a, 2004b; Rosenthal and Meyer 2004) occurred directly adjacent to and north of the project area. None of these studies identified resources at the proposed project site; however, one site that is eligible for NRHP listing, the bridge on SR 4 spanning Old River, is listed on the CRHR and is located immediately to the north of the proposed transmission line. As such, the Proposed Action could have a visual effect on this historic resource.

This bridge (Bridge No. 29-45) was constructed in 1915 by Tibbetts Pacific Company and was evaluated as part of the Caltrans statewide bridge inventory in the mid-1980s. The bridge was determined to be eligible for listing in the NRHP at the State level of significance in 1985. According to the Truss Bridge Rating Sheet, the bridge is one of the oldest unmodified swing bridges in the State, and is significant under NRHP Criterion A (as a key link on an important highway) and under Criterion C as a distinctive example of this particular bridge type. The evaluation of the bridge did not specify information on the integrity of the structure and its setting, feeling, and association, which are relevant topics when addressing indirect effects on historic properties.

Field Survey Results

EDAW archaeologists conducted an intensive field survey of the accessible portions of the proposed AIP site in June 2005 as part of the EIR/EIS (CCWD and Reclamation 2006). This survey incorporated pedestrian transects spaced no greater than 50 feet and included the 50-foot-wide transmission ROW. The survey methodology consisted of 15-

meter transects encompassing a 500-foot-wide survey area along the transmission line corridor. Although the field survey identified a historic-era artifact scatter and one isolate biface within the AIP project area, no cultural resources were identified within the 50-foot-wide transmission ROW.

It is important to note that while no cultural resources were documented during the intensive survey, significant resources could be present in subsurface contexts. Given the agriculturally altered and uniform nature of the present-day topography, it is not possible to predict whether or where such resources could be encountered during project-related ground-disturbing activities. Exhibit 3.11-1 shows the 500-foot-wide survey corridor that was subjected to intensive field surveys.

State Historic Preservation Officer Consultation

Implementing regulations for Section 106 require that Federal agencies consult with the State Historic Preservation Officer (SHPO) (36 CFR 800) about the effect that the Proposed Action would have on historic properties. The SHPO has concurred with the APE established for the AIP. The SHPO also has concurred that the Victoria Island Historic Artifact Scatter archaeological site is not eligible for the NRHP, that the Victoria Island Isolate Biface is not historic property for Section 106 purposes, and (most recently) that Victoria Canal is not eligible for the NRHP (SHPO 2007a).

SHPO has concurred with Reclamation's previous determination that the AIP would have no effect on historic properties. This determination included the APE for the 50-foot-wide transmission line ROW. While the Proposed Action would not have any direct adverse effects on historic properties, there is concern that the construction of the proposed transmission line may have an indirect visual effect on the historic Bridge No. 29-45. Western has determined, however, that the construction of the proposed transmission line would not introduce a new visual intrusion as transmission lines already exist in the immediate area, within the viewshed of the bridge, and the Project would therefore have no adverse effect on historic properties.

By letter dated November 30, 2007, Western initiated consultation with SHPO and requested its concurrence with Western's determination that the construction of the proposed 69-kV line would not adversely affect Bridge No. 29-45. SHPO (letter dated December 14, 2007) has requested additional supporting documentation before making its determination (SHPO 2007b). By letter dated September 16, 2008, Western provided this documentation which further demonstrated that the proposed 69-kV line does not adversely affect Bridge No. 29-45.

By letter dated October 1, 2008, SHPO concurred with Western's determination that the proposed 69-kV line would not adversely affect the significance of the historic bridge. No mitigation is required

3.11.1.2 Designations, Policies and Regulations

For discussion of designations, policies, and regulations for cultural resources, see Appendix A, Section A.11.

3.11.2 Environmental Consequences

3.11.2.1 Methods and Assumptions

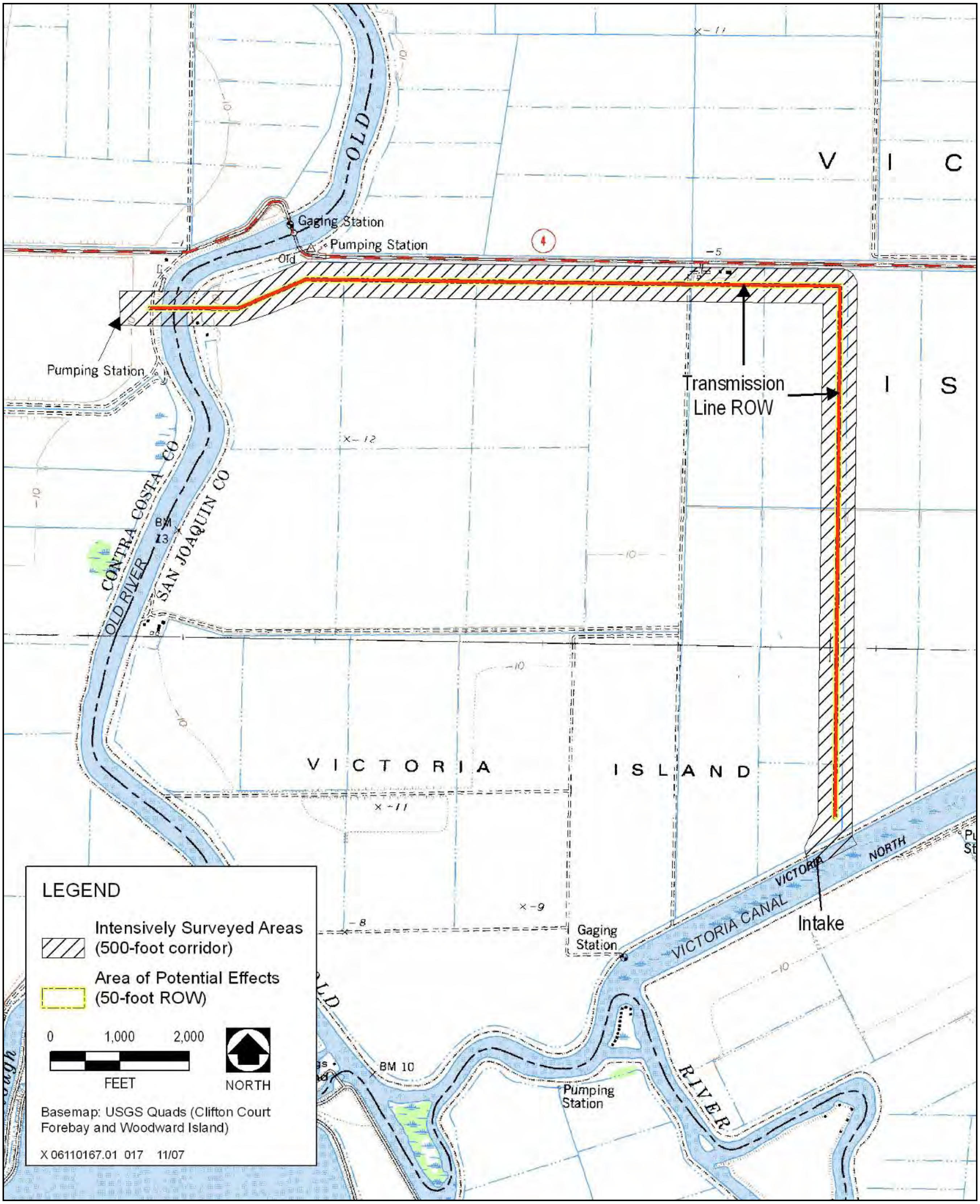
The assessment of direct and indirect impacts of installing individual power poles and long-term operation and maintenance activities conducted within the 50-foot-wide transmission ROW was conducted using the significance criteria presented below. Existing information sources cited above and field survey results were used as the baseline data upon which to analyze project effects.

3.11.2.2 Significance Criteria

Under the NHPA and the 36 CFR Part 800 regulations, the criteria for assessing adverse effects on cultural resources is guided by the specific legal context of the site's significance as set out in Section 106 of the NHPA (16 United States Code [USC] 470), as amended. A property may be listed in the NRHP if it meets criteria for evaluation defined in 36 CFR 60.4:

> The quality of significance in American history, architecture, archaeology, engineering and culture is present in districts, sites, buildings, structures and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association and:
>
> (a) that are associated with events that have made a significant contribution to the broad patterns of our history; or
>
> (b) that are associated with the lives of persons significant in our past; or
>
> (c) that embody the distinctive characteristics of a type, period or method of construction, or that represent the work of a master, or that possess a artistic value, or that represent a significant and distinguishable entity whose components may lack individual distinction; or
>
> (d) that have yielded, or may be likely to yield, information important in prehistory or history.

Most prehistoric archaeological sites are evaluated with regard to Criterion D of the NRHP, which refers to site data potential. Such sites typically lack historical documentation that might otherwise adequately describe their important characteristics. Archaeological methods and techniques are applied to gain an understanding of the types of information that may be recovered from the deposits. Data sought are those recognized to be applicable to scientific research questions or to other cultural values. For example, shellfish remains from an archaeological deposit can provide information about the nature of prehistoric peoples' diet, foraging range, exploited environments, environmental conditions, and seasons during which various shellfish species were taken. These are data of importance to scientific research that can lead to the reconstruction of prehistoric life-ways. Some archaeological sites may be of traditional or spiritual significance to contemporary Native Americans or other groups, particularly those sites that are known to contain human burials.



Source: EDAW 2007

Survey Areas **Exhibit 3.11-1**

Site integrity is also a consideration for the NRHP eligibility of an archaeological locale. The aspects of prehistoric resources for which integrity is generally assessed include location, setting design, workmanship, feeling, association, and materials. These may be compromised to some extent by cultural and post-depositional factors (e.g., highway construction, erosion, bioturbation), yet the resource may still retain its integrity for satisfying Criterion D if the important information residing in the site survives. Conversely, archaeological materials such as shell may not be present in sufficient quantity or may not have adequate preservation for accurate identification. Thus, their potential as data to address important research questions is significantly reduced. Assessment of these qualities is particularly important for archaeological properties where the spatial relationships of artifacts and features are necessary to determine the patterns of past human behavior.

3.11.2.3 No-Action Alternative

No ground-disturbing activities would occur as a result of this alternative. Consequently, no indirect or direct impacts on cultural resources would occur.

3.11.2.4 Proposed Action

The Proposed Action could potentially affect previously undetected cultural resources beneath the surface through ground-disturbing activities or indirect effects related to changes in the setting, feeling, and association of Bridge No. 29-45, a resource determined eligible for inclusion in the NRHP under Criteria A and C. This section identifies potential impacts of the Proposed Action. To reduce the potential impact of the Proposed Action on cultural resources, the following conservation measures have been integrated into the Proposed Action (see Table 7.4-1 for expanded descriptions). CCWD and/or Western will convey this information to construction and operation crews and provide training, as applicable, prior to ground disturbing activities so that crews can monitor their activities. These conservation measures include:

- Stop Work within 100 feet of any unanticipated Find and Implement Measures to Protect Archaeological Resources if Discovered during Surveys or Ground-Disturbing Activities

- Stop Work within 100 feet if Human Remains Are Uncovered during Construction

Damage to or Destruction of Previously Undiscovered Cultural Resources on the Project Site

The proposed project site is located in the Delta region, where significant prehistoric and historic-era cultural resources have been documented. Cultural resource investigations conducted to date have not identified the presence of any significant or potentially significant cultural resources on the proposed project site. There is a potential for unrecorded significant cultural resources to be unearthed or otherwise discovered during ground-disturbing construction activities in areas that were covered in the field survey. Damage to or destruction of previously unidentified significant cultural resources would be a significant impact. Because there is the potential for such damage to occur, this impact would be potentially significant. However, with the implementation of the conservation measures identified above, the potential impact would be **less than significant**. No mitigation is required.

Discovery of Human Remains during Construction

While no evidence for prehistoric or early historic interments was found in the proposed project site in surface contexts, this does not preclude the existence of buried human remains. Federal law recognizes the need to protect historic era and Native American human burials, skeletal remains, and items associated with Native American interments from vandalism and inadvertent destruction. The procedures for the treatment of Native American human remains are contained in NAGPRA and implementing regulations. Pursuant to the Supremacy Clause of the U.S. Constitution (Art. 6, C1.2), a State law may not directly regulate the Federal government or discriminate against it. However, it is Western's policy to comply with the spirit of State laws and compliance with NAGPRA also ensures compliance with California Health and Safety Code Section 7050.5 and Section 7052 and California Public Resources Code Section 5097.

It is possible that previously unknown buried human remains could be unearthed and damaged or destroyed during excavation activities associated with the Proposed Action, such as grading, preparation, and use of staging areas, and stockpiling. Damage to or destruction of human remains during project construction or other project-related activities would be considered significant. Because there is potential for such damage to occur, this direct impact would be potentially significant. However, with the implementation of the conservation measures identified above, the potential impact would be **less than significant**. No mitigation is required.

Indirect Effects on Bridge No. 29-45

Victoria Island is characterized by generally flat agricultural uses and expansive views. The historically significant bridge is on SR 4, just north of the proposed alignment of the overhead transmission line. Recent photographs of the bridge, taken in 2005, document existing conditions near the bridge. Exhibit 3.11-2 shows the truss bridge and the general setting of this historic resource. The remaining two photographs (Exhibits 3.11-3 and 3.11-4) depict existing overhead transmission lines that have already altered the visual setting of this resource. However, even with these modern intrusions, Bridge No. 29-45 still conveys the important historical associations of its origins as a linkage on SR 4 under Criterion A. While the proposed project would create an additional visual intrusion to the setting of this structure, this indirect impact would not adversely affect the historic values of the bridge. The proposed project would involve a new overhead transmission line to the south of the bridge, but this line would be installed on smaller towers that are more characteristic of the general region. The significant value of Bridge No. 29-45 under Criterion C as an early and distinctive, unmodified swing truss bridge is inherent in the design, materials, and workmanship of the structure itself, and would be unaltered by the proposed project.

Given the previous alterations to the visual setting in the form of the large overhead transmission line towers shown in Exhibits 3.11-2 and 3.11-3, the proposed project would not represent an adverse effect to the significant values of Bridge 29-45 under NRHP Criteria A and C. The effects are considered to be **less than significant** under NEPA.

State Route 4 Bridge Over Old River **Exhibit 3.11-2**

State Route 4 Bridge Over Old River Setting (a) **Exhibit 3.11-3**

State Route 4 Bridge Over Old River Setting (b) **Exhibit 3.11-4**

3.12 Aesthetics

This section focuses on aesthetic resources that may be affected by project elements. Effects of project construction on recreational uses are addressed in Section 3.11, “Recreation.” Temporary effects of project construction on the noise environment are evaluated in Section 3.9, “Public Health.”

3.12.1 Affected Environment

3.12.1.1 Existing Aesthetic Resources

Victoria Island/Byron Tract
Victoria Island and Byron Tract are in the agricultural region of the northwestern San Joaquin Valley and are bisected by SR 4. Brentwood is the nearest city to the west and is located approximately 6 miles away in Contra Costa County. Discovery Bay is about 1 mile west of Byron Tract, north of SR 4. Stockton is the nearest city to the east and is located approximately 11 miles away in San Joaquin County.

The regional landscape is defined by expansive, flat agricultural lands, which, from SR 4, appear to recede into the northern, eastern, and southern horizons. The eastern slope of Mount Diablo and the foothills that make up the Morgan Territory Regional Park are visible in medium-range views to the west and provide a dominant visual backdrop.

The immediate landscape is similarly dominated by agricultural uses completely contained within flood control features. In addition to cultivated fields, local features in views of Victoria Island include Victoria Canal and the adjacent levees; irrigation canals and ditches alongside dirt roads; agricultural support facilities (carport and a small group of structures providing farm employee housing); and irrigation pumps, siphons, and pipelines.

Victoria Island and Byron Tract are separated by Old River. CCWD’s existing Old River intake and pump station facilities are located on the west bank of Old River on Byron Tract, which is similarly dominated by agricultural uses. Southwest of CCWD’s Old River facility is an agricultural pump station, from which pipelines extend over the Old River east levee. Between SR 4 and the Old River facility is a private business with a large equipment yard. Existing transmission lines supported by wooden poles extend across both Victoria Island and Byron Tract. Metal-frame transmission towers also extend across Victoria Island.

Exhibits 3.12-1 through 3.12-4 present representative photographs of Victoria Island and Byron Tract.

3.12.1.2 Designations, Policies, and Regulations

For discussion of designations, policies, and regulations for aesthetics, see Appendix A, Section A.12.

View of Victoria Canal (potential intake locations) from the levee road on Victoria Island, facing so uthwest (April 18, 2005)

View of agricultural fields and private access roads at Victoria Island, facing northwest (April 18, 2005)

G 02110048.01 0014

Source: EDAW 2005

Representative Photographs from Victoria Island **Exhibit 3.12-1**

View of Victoria Island agricultural fields, structures, and power lines from Byron Tract, facing east (April 18, 2005)

View of Victoria Island agricultural fields, structures, and power lines from a private access road approaching SR 4, facing east (April 18, 2005)

G 04110048.01 015

Source: EDAW 2005

Representative Photographs from Victoria Island/Byron Tract **Exhibit 3.12-2**

View of Old River Intake and Pump Station from the levee road on Victoria Island, facing northwest (April 18, 2005)

View of Old River Bridge from the levee road on Victoria Island, facing northwest (April 18, 2005)

G 04110048.01 016

Source: EDAW 2005

Representative Photographs from Victoria Island/Byron Tract **Exhibit 3.12-3**

View of Byron Tract and Discovery Bay (visible in distance) from the levee road, facing northwest (April 18, 2005)

View of Byron Tract agricultural fields and private access roads, facing west (April 18, 2005)

G 04110048.01 017

Source: EDAW 2005

Representative Photographs from Byron Tract **Exhibit 3.12-4**

3.12 Aesthetics

3.12.2 Environmental Consequences

3.12.2.1 Methods and Assumptions

The aesthetic quality of an area is determined through the variety and contrasts of the area's visual features, the character of those features, and the scope and scale of the scene. The aesthetic quality of an area depends on the relationships between its features and their importance in the overall view. Evaluating scenic resources requires a method that objectively characterizes visual features, assesses their quality in relation to the visual character of the surrounding area, and identifies their importance to the individuals viewing them. This process is derived from established Federal procedures for visual assessment and is commonly used for a variety of project types.

Both natural and created features in a landscape contribute to its perceived visual quality. A commonly used set of criteria includes the concepts of vividness, intactness, and unity. None of these is itself equivalent to visual quality; all three must be high to indicate high quality. These terms are defined as follows (Federal Highway Administration 1983):

- "Vividness" is the visual power or memorability of landscape components as they combine in striking and distinctive visual patterns.
- "Intactness" is the visual integrity of the natural and human-built landscape and its freedom from encroaching elements.
- "Unity" is the visual coherence and compositional harmony of the landscape considered as a whole.

The analysis of this study uses a qualitative descriptive method for characterizing and evaluating the visual resources of the areas that could be affected by the project. The quality of views of areas that could be affected by the Proposed Action is evaluated based on the relative degree of vividness, intactness, and unity apparent in views and also on viewer sensitivity. Viewer sensitivity is a function of several factors, including:

- visibility of the landscape,
- proximity of viewers to the visual resources,
- frequency and duration of views,
- number of viewers,
- types of individuals and groups of viewers, and
- viewers' expectations.

The sensitivity of a view of the landscape is also determined by the extent of the public's concern for a particular view. Areas of high visual sensitivity are highly visible to the general public. Scenic highways, tourist routes, and recreation areas are considered more visually sensitive than more urbanized locations. A view's distance from landscape elements also affects perceptions of visual quality. Generally, the closer a resource is to the viewer, the more dominant, and therefore visually important, it is to the viewer.

3.12.2.2 Significance Criteria

Significance under NEPA is determined by assessing the impact of a proposed action in terms of its context and the intensity of its effects. An alternative was determined to result in a significant effect on aesthetics if it would:

- have a substantial, demonstrable negative aesthetic effect on a scenic vista;
- substantially damage scenic resources including, but not limited to, scenic waterways, trees, rock outcroppings, and historic buildings within a State scenic highway;
- substantially degrade the existing visual character or quality of the site and its surroundings; or
- create a new source of substantial light or glare that would adversely affect day or nighttime views in the area.

3.12.2.3 No-Action Alternative

Under the No-Action Alternative, no new facilities would be constructed, and existing facilities would not be altered, expanded, or demolished. Implementation of the No-Action Alternative would not affect scenic vistas, scenic resources, or the existing visual character of the surrounding area, and would not create any additional source of light or glare. The No-Action Alternative would have no direct or indirect effect on visual resources and would not contribute to any cumulative impact.

3.12.2.4 Proposed Action

The Proposed Action could potentially affect the aesthetics of the project site and surrounding area. This section identifies potential impacts of the Proposed Action. No aesthetics-related conservation measures have been integrated into the Proposed Action because they are not necessary.

Temporary Changes in Scenic Vistas, Scenic Resources, and Existing Visual Character

The presence and movement of heavy construction equipment and potential construction-related generation of dust could temporarily degrade the existing visual character and/or quality of the area. Most viewers of the construction areas would be travelers along SR 4, workers in nearby farming areas, occupants of a few scattered residences across Old River and Victoria Canal from Victoria Island, and recreationists on Old River and Victoria Canal. Of these groups, recreationists and residents are considered the most sensitive to aesthetic qualities. However, of these viewer groups, residents would be the farthest (at a distance of 1 mile or more) from Victoria Island, where most of the construction activity would take place. Recreationists' views of land-side construction would largely be blocked by the levees. Views of the construction areas from SR 4 would be brief and long distance, with normal agricultural activities in much of the foreground. Agricultural workers would have longer term views of construction areas but are not considered a sensitive viewer group. For these reasons, and because of the temporary nature of this effect, this impact would be **less than significant**. No mitigation is required.

Long-Term Changes in Scenic Vistas, Scenic Resources, and Existing Visual Character

As a result of the Proposed Action, new supporting towers and electrical transmission lines would be visible after construction is completed. The facilities would be within the viewshed of travelers along SR 4, workers in nearby farming areas, occupants of distant residences, and recreationists on Old River and Victoria Canal. These views are of moderate to low vividness and have a high overall degree of intactness and unity, consisting mainly of agricultural, flood control, and water diversion features.

The new structures that would be visible would be typical of existing facilities throughout the Delta that are a recognized and generally accepted part of the landscape. Within the context of the surrounding setting—an entirely developed agricultural environment containing elevated levees, water pumping facilities, and metal transmission towers and lines—the proposed facilities would include wood poles and non-glare steel monopoles that would not have a substantial, demonstrable negative effect on the overall vividness or intactness of views or the unity of elements within those views. The Proposed Action would not substantially damage scenic vistas or scenic resources or degrade the existing visual character of the area. This impact would be **less than significant**. No mitigation is required.

Changes in Light or Glare

Equipment staging areas may be temporarily lit for security reasons during the construction period, and portions of the construction areas may need to be lit if construction work needs to be conducted at night. However, views of the construction areas from SR 4 and nearby residences would be largely shielded due to the proposed project site’s distance from these sensitive receptors. For this reason, and because of the temporary nature of this effect, this impact would be **less than significant**. No mitigation is required.

The proposed new transmission poles would be constructed of materials such as wood or non-glare steel that would not create a new source of substantial light or glare that would affect day or nighttime views in the area. New lighting may be installed as part of the new transmission poles for security and safety; however, directional shielding and other such measures would be implemented to minimize the encroachment of project-related lighting to nearby land uses. For this reason, and because of the proposed project site’s distance from sensitive receptors, this impact would be **less than significant**. No mitigation is required.

3.13 Summary of Environmental Consequences

3.13.1 Overview of the Environmental Effects of the Alternatives

Table 3.13-1, "Summary of the Environmental Effects of the Alternatives," summarizes the potential environmental effects of the Proposed Action and the No-Action Alternative.

Table 3.13-1
Summary of the Environmental Effects of the Alternatives

Environmental Effect	No-Action	Alternative 1: Proposed Action
Land Use		
Conflicts with existing land use goals and policies	-	LTS
Permanent conversion of Prime Farmland and Farmland of Statewide Importance	-	LTS
Conflicts with agricultural zoning or Williamson Act Contracts	-	LTS
Habitats and Vegetation		
Potential fill of jurisdictional waters of the United States and loss of sensitive habitat	-	LTS
Potential loss of special-status plants	-	LTS
Wildlife		
Effects on giant garter snake	-	LTS
Effects on Swainson's hawk, white-tailed kite, northern harrier, and other raptors	-	LTS
Effects on burrowing owl	-	LTS
Effects on tricolored blackbird	-	LTS
Fisheries		
Potential chemical spill during construction	-	LTS
Effects on Delta fisheries and aquatic habitat as indicated by changes in key hydrologic indicators	-	LTS
Soils		
Seismically-induced or soil-related structural failure of facilities	-	LTS
Project-related soil erosion	-	LTS
Air Quality		
Short-term construction criteria air pollutant emissions	-	LTS
Exposure of sensitive receptors to toxic air contaminants	-	LTS
Exposure of sensitive receptors to odorous emissions	-	LTS

3.13 Summary of Environmental Consequences

Table 3.13-1 Summary of the Environmental Effects of the Alternatives		
Environmental Effect	**No-Action**	**Alternative 1: Proposed Action**
Water Quality		
Temporary degradation of surface water quality	-	LTS
Public Health (Hazardous Materials and Noise)		
Potential creation of a public health hazard	-	LTS
Potential hazardous materials exposure	-	LTS
Potential wildfire hazard	-	LTS
Short-term construction noise	-	LTS
Exposure of sensitive receptors to or generation of excessive groundborne vibration or noise	-	LTS
Recreation		
Temporary changes in recreational opportunities	-	LTS
Cultural Resources		
Damage to/destruction of undiscovered cultural resources	-	LTS
Discovery of human remains	-	LTS
Aesthetics		
Temporary visual effects	-	LTS
Long-term visual effects	-	LTS
Changes in light or glare	-	LTS
Transportation Resources		
Increased traffic during construction	-	LTS
Long-term increase in traffic	-	LTS
- = no impact B = beneficial or potentially beneficial impact LTS = less-than-significant impact SU = significant impact, despite mitigation (i.e., significant and unavoidable)		

A summary of the main points of comparison between the environmental effects of the No-Action Alternative and the Proposed Action for each resource area is provided below.

3.13.2 No-Action Alternative Effects

As indicated in Table 3.13-1, the No-Action Alternative would have no environmental impacts to the resources evaluated.

3.13.3 Proposed Action Effects

Land Use: Establishing two steel support structures (8-foot- to 10-foot-square base) on either side of Old River could potentially affect a very small portion of agricultural land adjacent to Old River. Except for the structures closest to Old River, the transmission line poles would be located adjacent to the existing dirt farm access roads. The potential impact, over the long-term and short-term, would be less than significant.

Habitats and Vegetation: The Proposed Action, with the implementation of conservation measures, is expected to result in less-than-significant direct and indirect impacts on jurisdictional waters of the United States, sensitive habitat, and special-status plant species.

Wildlife: The Proposed Action, with the implementation of conservation measures, is expected to result in less-than-significant direct and indirect impacts on sensitive habitat and special-status wildlife species.

Fisheries: The Proposed Action, with the implementation of conservation measures, would not adversely affect fisheries and aquatic resources during construction and after project implementation.

Geology and Soils: The Proposed Action could result in potentially significant impacts related to geologic hazards resulting from seismically induced or soil-related structural failure of proposed facilities, but with implementation of the conservation measures, these potential impacts are less than significant. Similarly, the Proposed Action would result in less-than-significant impacts related to soil erosion.

Air Quality: The Proposed Action could result in significant direct impacts related to the generation of short-term construction criteria air pollutant emissions. With the implementation of identified conservation measures, specifically, SJVAPCD and BAAQMD measures, these impacts are less than significant. The Proposed Action would result in less-than-significant impacts related to the exposure of sensitive receptors to toxic air contaminants and odorous emissions.

Water Quality: The Proposed Action could result in a temporary degradation of surface water quality as a result of contaminant releases and runoff during construction. However, with the implementation of the water quality-related conservation measures included in the Proposed Action, the potential impact would be less than significant.

Public Health: The Proposed Action would result in less-than-significant impacts related to the potential creation of a public health hazard through the use of hazardous materials and a potential wildfire hazard. Coordination with the applicable landowners and land managers will occur to ensure that temporary construction workers and Western personnel are not exposed to harmful levels of pesticides from adjacent agricultural practices (included as a conservation measure in the Proposed Action).

The Proposed Action would result in potentially significant impacts related to the generation of short-term construction noise. These potential impacts, however, are less than significant with implementation of the Proposed Action's noise-related conservation measures, including use of feasible noise-control devices on construction equipment and adherence to a construction schedule that minimizes construction noise during noise-sensitive times of the day.

The Proposed Action would result in less-than-significant impacts related to the exposure of sensitive receptors to or generation of excessive groundborne vibration or noise.

3.13 Summary of Environmental Consequences

Recreation: The Proposed Action would result in less-than-significant impacts related to temporary and long-term changes in recreation opportunities.

Cultural Resources: The Proposed Action could result in potentially significant impacts related to damage to or destruction of undiscovered cultural resources and discovery of human remains during construction within the proposed 50-foot-wide transmission line ROW; however, with implementation of the cultural resources-related conservation measures, the potential for these impacts would be less than significant.

Surveys have concluded that there are no cultural resources or historic properties at the project site. Therefore, the Proposed Action would have no impacts related to cultural resources or historic properties.

Aesthetics: The Proposed Action would result in less-than-significant impacts related to temporary and long-term changes in scenic vistas, scenic resources, and existing visual character, and changes in light and glare.

Transportation Resources: The Proposed Action would result in minor additional traffic within the project site during construction as construction vehicles go to and from the site. Additionally, a very small increase in traffic for periodic operations and maintenance visits would be expected. With the implementation of a traffic control and safety assurance plan, as prescribed in the Proposed Action's conservation measures, all potential impacts on transportation are less than significant.

3.14 Intentional Destructive Acts

3.14.1 General Effects

Transmission line projects may be subject to intentional destructive acts ranging from vandalism and theft to sabotage and acts of terrorism intended to disable a line. The former, more minor, type of act is far more likely in general and particularly for projects like the Proposed Action, which are somewhat remote and serve a specific, limited purpose. Intentional sabotage or terrorist acts would be expected to target much larger electrical facilities, where a loss of service would have substantial regional impacts.

Theft is most likely to involve substation and switchyard equipment that contains salvageable metal (e.g., copper and aluminum) when metal prices are high. Vandalism, on the other hand, is more likely to occur in remote areas and, perhaps, more likely to involve acts of opportunity (e.g., shooting out transmission line insulators) than premeditated acts.

Protection against theft includes fencing around substations and the use of locks and alarm systems where expensive equipment is housed. The presence of high voltage transmission lines also would discourage theft and vandalism. Vigorous prosecution of thieves and monitoring of metal recycling operations also might deter theft. Similarly, the prosecution of vandals who damage or destroy transmission line equipment might discourage vandalism if it becomes a problem.

3.14.2 Project-Specific Effects

The effects of intentional destructive acts would be wide ranging, depending on the nature and location of the acts, and would be similar to outages caused by natural phenomena such as storms and ice buildup. If the transmission line becomes disconnected from the system or is not in service, then the new pump station at the alternative intake would not operate. Under such circumstances, CCWD would revert to relying solely on water from the Old River Pump Station, rather than the higher quality water from the new Victoria Canal Pump Station. The result would be a less dependable water source, especially during times of drought.

Power loss would be limited to the pump station, alternative intake, and related facilities (e.g., control and communication devices, lighting, alarms, water quality monitoring equipment, fish screen cleaning mechanisms, and storm drain pump); and the effect of such a disruption would be similar to the current situation. Since this electric transmission line would not serve other commercial, industrial, or residential users, loss of the electric service would not cause wide-spread inconvenience or safety concerns.

The transmission line would tie into an electrical substation (owned by CCWD) at the intake site that would be protected from theft and vandalism by fencing and alarm systems. The presence of high voltage also would deter casual attacks. The remote location of the transmission line might encourage a rare act of opportunistic vandalism, such as someone shooting out an insulator. Such occurrences would be infrequent and would be vigorously investigated and prosecuted to discourage further acts.

3.14 Intentional Destructive Acts

The impacts from an intentional destructive act affecting the project would be similar to those from natural acts, such as storms, ice buildups, or falling trees. Repair crews would be sent to the site of the damage to restore service as soon as possible. Because the transmission line and interconnection is limited to providing power to the new, alternative water intake, the effect would be similar to the No-Action Alternative.

In addition to the effects from loss of service, destructive acts could cause environmental effects as a result of damage to the facilities. Two such possible effects are fire ignition, should conductors be brought down, and oil spills from equipment (e.g., mineral oil in transformers) in the electrical substation, should some of the equipment be damaged or breached. Fires would be fought in the same manner as those caused by, for example, an electrical storm. The substation would be designed for spill containment, and oil spills probably would be confined to the soil surrounding the electrical equipment. Any spills would be treated by removing and properly disposing of contaminated soil and replacing it with clean soil consistent with the *Hazardous Response Plan* and *Hazardous Materials Business Plan* discussed in Section 3.9, "Public Health."

4 Cumulative Effects

Chapter 4 provides an analysis of cumulative impacts that could result from implementing the Proposed Action, as required by NEPA (United States Code [USC] 4321 et seq.). NEPA (40 Code of Federal Regulations [CFR] 1508.7) defines cumulative impact as:

> *…the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) undertakes such other actions.*

This chapter describes the potential cumulative effects of the Proposed Action and, as such, considers the project effects within the context of other projects currently underway or planned in the area compared to baseline conditions without these projects.

4.1 Projects Contributing to Potential Cumulative Effects

NEPA guidelines identify scoping and general geographic analysis as determinants for projects that may contribute to cumulative impacts. For this environmental document, projects that may affect similar resources as affected by the Proposed Action were considered and described below.

- **CALFED Bay-Delta Program (CALFED) Old River Water Quality Improvement Project—**This project involved constructing a new pump station to provide a longer outfall for the agricultural drainage from Byron Tract into Old River, near CCWD's Old River Intake. The purpose of the project is to improve the quality of water (with respect to salinity, organic carbon, turbidity, nutrients, and pathogens) diverted at CCWD's existing Old River intake structure.

- **CALFED Rock Slough Water Quality Improvement Project—**This project moved the discharge 2 miles from its previous location to an area on the south side of Veale Tract, where local currents convey the drainage farther away from Rock Slough. The purpose of the project is to improve the quality of the water (with respect to salinity, organic carbon, turbidity, nutrients, and pathogens) diverted at CCWD's Pumping Plant No. 1 at Contra Costa Canal (west of Rock Slough).

- **CCWD Contra Costa Canal Encasement Project—**CCWD is pursuing the Contra Costa Canal Encasement Project to protect and improve water quality in the unlined Contra Costa Canal from nonpoint source degradation. The project entails modifying the unlined portion of the canal by replacing the existing canal with a buried pipeline within Reclamation's right of way (ROW) or immediately adjacent to it. Improvements in water quality will result in reduced formation of regulated disinfection byproducts (DBPs) in drinking water. The project will also improve water operations of the Central Valley Project (CVP) and State Water Project (SWP) because the project area includes a water quality compliance location at Pumping Plant No. 1 (reducing local degradation allows the export projects to use less water to meet existing water quality requirements). Construction began in summer 2007 and will be completed within 5 years.

- **Development Projects—**A substantial number of planned local and regional development and transportation projects may have effects that could interact with those of the Proposed Action. These projects are planned within San Joaquin County, where Victoria Island is located, or in CCWD's service area or in nearby areas. These projects were identified using information obtained from county and city planning documents, review of Delta Protection Commission annual reports, and CCWD planning reports. These projects are listed in the AIP EIR/EIS Appendix F1, "Local Development Projects Considered in Cumulative Impact Analysis" (CCWD and Reclamation 2006).

4.2 Cumulative Effects of Proposed Action

4.2.1 Land Use

Impacts involving land use plans or policies generally would not combine to result in cumulative impacts. The determination of significance for impacts related to these issues is whether a project would conflict with any applicable land use plan or policy. Such a conflict is site specific; it is addressed on a project-by-project basis.

Most of the agricultural lands in Contra Costa County are in the eastern portion of the county. Most of the land in San Joaquin County is in agricultural production. The total acreages of Prime Farmland, Unique Farmland, and Farmland of Statewide Importance in Contra Costa County and San Joaquin County are 44,501 and 566,307 acres, respectively (California Department of Conservation 2005).

With or without the Proposed Action, the trend of land conversion from agricultural uses to urban and other nonagricultural uses (e.g., wildlife habitat enhancement) in the Central Valley would continue. In San Joaquin County, the acreage of remaining Important Farmland (including Farmland of Local Importance) is expected to decrease from approximately 630,000 in 2000 to 520,000 in 2040 and 270,000 in 2080 as a result of urbanization (San Joaquin County 2000, p. 20). San Joaquin County estimates that conversion of farmland to nonfarmed wildlife habitat as a result of CALFED projects could reduce the acreage of Important Farmland (including Farmland of Local Importance) to 360,000 acres in 2040 and 90,000 acres in 2070 (San Joaquin County 2000, p. 20).

It is likely that other future projects, particularly large development projects that would require large tracts of land, would convert agricultural lands to nonagricultural uses. As most of the proposed projects listed in AIP EIR/EIS Appendix F-1, "Local Development Projects Considered in Cumulative Impact Analyses" (CCWD and Reclamation 2006) are not yet in the environmental planning stage, the acreage of farmland that could be converted by these projects is not known. However, in general, the acreage of Prime Farmland, Unique Farmland, and Farmland of Statewide Importance in San Joaquin County is expected to decline.

Because no farmland is expected to be converted as a result of the Proposed Action, it would not contribute to this decline. Therefore, no cumulative impact would result.

4.2.2 Habitats and Vegetation

The Proposed Action would have less-than-significant direct and indirect impacts on habitats and vegetation, including jurisdictional waters of the United States and special-status plants.

The only other known projects having similar potential adverse effects on any of the special-status plants at the proposed project site are the other water resource projects in the Sacramento–San Joaquin Delta (Delta) being planned and implemented by CCWD and others identified above. In addition to these projects, numerous development projects are planned within the region (see AIP EIR/EIS Appendix F-1, “Local Development Projects Considered in Cumulative Impact Analysis”) (CCWD and Reclamation 2006), and many of these are likely to have the potential to contribute to adverse effects on these species through temporary disturbance or permanent conversion of potential habitat (e.g., open ruderal and grassland areas and ditches and adjacent lands). With implementation of the conservation measures, cumulative effects on special-status plant species would be less than significant.

Jurisdictional waters of the United States, including wetlands, have declined regionally in large part as a result of urban development and associated land uses (e.g., recreation and vehicular use in wetland areas) and agricultural land uses such as grazing. It is expected that the Proposed Action would have no effects on jurisdictional waters because of the ability to site project features away from these features. Therefore, the Proposed Action would not contribute to this potential cumulative impact.

4.2.3 Wildlife

Populations of giant garter snake, burrowing owl, raptors, and tricolored blackbird have declined for numerous reasons, most significantly because of the loss and fragmentation of habitat as a result of urban development; for wildlife species, because of the loss of movement corridors; and, in the case of giant garter snake, because of increased predation resulting from the introduction of exotic species.

Construction activities associated with the Proposed Action, however, would have a less-than-significant effect on local wildlife species identified or potentially present on and around the project site, including the giant garter snake; burrowing owl; Swainson’s hawk, white-tailed kite, and other raptors; and tricolored blackbird, with the implementation of the wildlife-related conservation measures identified in Section 2.1.2. As a result, the Proposed Action would not contribute to a cumulative effect on wildlife species.

4.2.4 Fisheries

The Proposed Action would have less-than-significant direct and indirect impacts on local fisheries resources. Any effects of the Proposed Action on these resources are expected to be relatively minor with the implementation of the conservation measure and limited to the construction period. As a result, the Proposed Action would not contribute to a cumulative effect on fisheries resources.

4.2.5 Geology and Soils

The proposed project site would be exposed to potentially significant impacts resulting from seismically induced or soil-related structural failure of project facilities. The potential of the project to increase soil erosion is low. Effects of the Proposed Action related to geology and soils would be localized on Victoria Island and Byron Tract, and there are no other planned projects identified above, with which the effects of the Proposed Action would combine to result in cumulative hazards on Victoria Island and Byron Tract related to geology and soils. Therefore, the Proposed Action would not make a considerable contribution to any cumulative impact related to geology and soils resources.

4.2.6 Air Quality

A large number of future projects may contribute to air pollutant emissions in San Joaquin and Contra Costa Counties and contribute to the nonattainment status of the Bay Area Air Quality Management District (BAAQMD) and the San Joaquin Valley Air Basin (SJVAB for ozone and respirable particulate matter (PM_{10}) (see, e.g., AIP EIR/EIS Appendix F-1, “Local Development Projects Considered in Cumulative Impact Analysis” [CCWD and Reclamation 2006], for a list of reasonably foreseeable projects that are planned for construction and that may contribute to emissions). As described in Section 3.7.2.4, project-related construction emissions could result in a significant air quality impact, but with the implementation of air quality-related conservation measures the impact would be less than significant. Construction-related emissions and long-term operational emissions associated with the Proposed Action would be negligible and would not make a cumulatively significant contribution to air quality effects.

4.2.7 Water Quality

Construction activities associated with the Proposed Action could cause erosion, sedimentation, and contamination of adjacent waterways (Victoria Canal and Old River) by toxic substances, as described above. However, with the implementation of the conservation measure, the potential effect of the Proposed Action on water quality would be less than significant. Construction of CCWD’s Old River and Rock Slough Water Quality Improvement Projects were completed at the end of 2005, well in advance of any construction activities for the Proposed Action and, therefore, any impact to water quality caused by those projects would not be present when the Proposed Action is constructed. Therefore, there would be no adverse cumulative construction-related impacts from the combination of these CCWD, or other, projects.

4.2.8 Public Health

4.2.8.1 Hazardous Materials

Most construction projects, like the Proposed Action, would involve the storage, use, disposal, and transport of hazardous materials to varying degrees during construction and operation. Impacts related to these activities are considered less than significant under the Proposed Action because the storage, use, disposal, and transport of hazardous materials are extensively regulated by various Federal, State, and local agencies. Those implementing other construction projects in the region (see the AIP EIR/EIS Appendix F-1, “Local Development Projects Considered in Cumulative Impact Analysis”) (CCWD and Reclamation 2006) would be required to comply with the existing hazardous materials regulations. Therefore, it is assumed that significant cumulative hazards to the public related to the storage, use, disposal, or transport of hazardous materials would not occur.

While the Proposed Action could result in some risk of hazards to the health of workers through their accidental exposure to agricultural pesticides, there are no other projects that would subject these workers to a similar type of risk. It is concluded that no significant cumulative risk of pesticide exposure exists. The Proposed Action, therefore, would not make a cumulatively considerable contribution to any significant cumulative impact related to hazardous materials.

4.2.8.2 Wildfire Hazard

The 50-foot-wide transmission ROW is not located within an area identified by CalFire as a Very High Fire Hazard Severity Zone. Implementation of the Proposed Action would not expose people or structures to significant risk of loss or injury involving wildland fires and the Project Action would not result in any significant cumulative effect related to wildfire hazard.

4.2.8.3 Noise

The Proposed Action could result in a potentially significant noise impact associated with short-term construction activities, but these impacts would be reduced to less-than-significant levels as a result of the conservation measures identified in Section 2.1.2. Impacts associated with long-term operational traffic and stationary noise sources would be minor, as would excessive groundborne vibration or noise impacts.

Noise is a localized occurrence and attenuates with distance. Therefore, only future cumulative development projects in the direct vicinity of the project site would have the potential to add to anticipated stationary project-generated noise, thus resulting in cumulative noise impacts. No related projects are known to be planned in the direct vicinity of the Proposed Action (see AIP EIR/EIS Appendix F-1, “Local Development Projects Considered in Cumulative Impact Analysis”) (CCWD and Reclamation 2006). Because no related projects would be under construction in the direct vicinity of the proposed project site concurrent with construction of the Proposed Action, no cumulative noise impact would occur.

4.2.9 Recreation

The Proposed Action would have no impact on recreation resources and, therefore, no cumulative effects would result from implementation.

4.2.10 Cultural Resources

No known historic or archaeological resources have been identified on the project site and, therefore, the Proposed Action would not be expected to contribute to any cumulative effects on similar types of cultural resources. Additionally, no related or similar projects would be under construction concurrently with construction of the Proposed Action in the direct vicinity of the project site. Therefore, the Proposed Action would not make a cumulatively considerable contribution to any significant effect on cultural or historic resources.

4.2.11 Aesthetics

The Proposed Action would have less-than-significant direct and indirect impacts on aesthetics. Any effects of the Proposed Action on visual resources are expected to be relatively minor. No related or similar projects in the direct vicinity of the project site identified above are expected to result in cumulative impacts with the Proposed Action. Therefore, the Proposed Action would not contribute to a cumulative effect on fisheries resources.

5 Compliance with Environmental Laws and Regulations

Also see Appendix A for a more extensive description of designations, policies, and regulations.

5.1 Federal

The following sections describe some of the relevant Federal laws, executive orders, and policies related to Western's Proposed Action.

5.1.1 Prime and Unique Farmland—Farmland Protection Policy Act

The Farmland Protection Policy Act (FPPA) is intended to minimize the impact of Federal programs with respect to the conversion of farmland to nonagricultural uses. It ensures that, to the extent possible, Federal programs are administered to be compatible with state, local, and private programs and policies to protect farmland. The Natural Resources Conservation Service (NRCS) is the agency primarily responsible for implementing the FPPA.

Western will submit this EA to the NRCS for comment.

5.1.2 Federal Endangered Species Act

Pursuant to the Federal Endangered Species Act (ESA), the U.S. Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS) have authority over projects that may result in take of a Federally listed species. Under ESA, the definition of "take" is to "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct." USFWS has also interpreted the definition of "harm" to include significant habitat modification that could result in take. If there is a likelihood that a project would result in take of a Federally listed species, either an incidental take permit, under Section 10(a) of ESA, or a Federal interagency consultation, under Section 7 of ESA, is required. The USFWS and NMFS have completed consultation and biological opinions for the AIP and address Western's Proposed Action (see Appendix B). The USFWS and NMFS considered Western's Proposed Action, with prescribed conservation measures, as part of the larger AIP EIR/EIS (CCWD and Reclamation 2006), and they have determined that no further consultation is needed (Squires and Oppenheim, pers. comm., 2007).

5.1.3 Fish and Wildlife Coordination Act

The Fish and Wildlife Coordination Act (FWCA) ensures that fish and wildlife receive equal consideration during planning and construction of Federal water projects. The FWCA requires that USFWS's views be considered when evaluating impacts and determining mitigation needs. USFWS has completed FWCA compliance for the entire AIP, including covering Western's Proposed Action in this EA.

5.1.4 Executive Order 12898 (Environmental Justice)

Executive Order 12898, Section 2-2, requires all Federal agencies to conduct programs, policies, and activities that substantially affect human health or the environment, in a manner that ensures that such programs, policies, and activities do not have the effect of excluding persons (including populations) from participation in, denying persons the benefits of, or subjecting persons to discrimination because of their race, color or national origin. Section 1-101 requires Federal agencies to identify and address, as appropriate, disproportionately high and adverse human health or environmental effects of programs on minority and low-income populations.

The Proposed Action would not affect the seasonal farm employee housing on Victoria Island (located immediately adjacent to the transmission line route). Existing housing would be avoided and conflicts between construction activities minimized. No residents would be displaced with implementation of the Proposed Action. Therefore, the Proposed Action would not cause a disproportionately high and adverse impact on minority or low-income populations or contribute to any cumulative disproportionately high and adverse impact on such populations.

5.1.5 Section 106 of the National Historic Preservation Act

Section 106 of the National Historic Preservation Act (NHPA) of 1966 (as amended August 5, 2004) requires Federal agencies to consider the effects of Federal undertakings on historic properties and to consult with the Advisory Council on Historic Preservation concerning potential effects of Federal actions on historic properties. Before approval of a particular project, the effect of the project on any district, site, building, structure, or object that is included in or eligible for inclusion in the National Register shall be evaluated.

To comply with the NHPA, Western will consult with the State Historic Preservation Officer (SHPO), which acts as an intermediary for the Advisory Council on Historic Preservation, on the potential effects of the Proposed Action on historic properties. In addition, a copy of this EA will be sent to SHPO, as a unit of the California Department of Parks and Recreation, requesting its review and soliciting input on the project. SHPO (2007) has concurred with Reclamation’s previous determination that the AIP would have no effect on historic properties. This determination included the direct area of potential effects (APE) for the 50-foot-wide transmission line ROW. Western will build on the consultation conducted by Reclamation and CCWD to include potential indirect visual quality effects on the historic Old River bridge and will coordinate with the Advisory Council on Historic Preservation and SHPO, consistent with Section 106 of the NHPA. Appendix C presents past relevant correspondence with SHPO.

5.1.6 Interagency Agreements/Coordination

CCWD submitted an Application for Interconnection for the AIP to Western (part of the U.S. Department of Energy) in October 2006. Western’s Sierra Nevada Region executed a letter of agreement with CCWD (November 2006) for preliminary planning and technical work, including preparation of the EA to meet all NEPA requirements for Western’s actions related to the AIP Transmission Line and Interconnection.

5.1.7 U.S. Department of Energy Policies, Orders, and Memorandums

5.1.7.1 U.S. Department of Energy, Part 1021—National Environmental Policy Act Implementing Procedures

This document establishes procedures that DOE shall use to comply with Section 102(2) NEPA (42 United States Code [USC] 4332[2]) and the Council on Environmental Quality (CEQ) regulations for implementing the procedural provisions of NEPA (40 Code of Federal Regulations [CFR] 1500–1508). Part 1021 supplements, and is to be used in conjunction with, the CEQ Regulations.

5.1.7.2 Guidance on Preparation of Environmental Assessments and Environmental Impacts Statements for DOE

DOE's Environment, Safety, and Health Office of NEPA Policy and Compliance has developed guidance on the preparation of EAs and EISs that DOE prepares under NEPA in its *Recommendations for the Preparation of Environmental Assessments and Environmental Impact Statements*, *Second Edition* (December 2004). Intended to supplement the aforementioned document, DOE has developed guidance on the preparation of an EIS summary in its *Guidance on an Environmental Impact Statement Summary*, which also may be applied to writing a (optional) summary of an EA.

5.1.8 Western's Orders, Manuals, and Guidance

As an entity within DOE, Western is required to assess the potential environmental impacts of any proposed interconnection in accordance with NEPA and other environmental regulations. Western's guidance describes criteria that dictate the level of NEPA compliance, and the environmental review process as it relates to an interconnection request in its technical document, *General Requirements for Interconnection* (September 1999).

5.2 State

5.2.1 Prime and Unique Farmland

Consistent with the Federal administration of the FPPA, the California Department of Conservation's Land Resource Protection Division, through its Farmland Mapping and Monitoring Program, maps the location of "Important Farmland" throughout the state. Important farmland is defined as any land categorized as Prime Farmland, Unique Farmland, or Farmland of Statewide Significance (State of California Division of Land Resource Protection 2005). The definitions of these three farmland types are as follows:

- **Prime Farmland**—Agricultural land determined to have the best physical and chemical features for long-term agricultural production. Specifically, the land is defined by good soils, a lengthy growing season, and adequate moisture for agricultural production.

- **Farmland of Statewide Importance—**Land similar in character to Prime Farmland, but with more constraints, such as greater slopes, reduced levels of moisture, or other factors.

- **Unique Farmland—**Farmland of lesser quality, but producing the State's leading agricultural crops. These lands are commonly irrigated, but, in some cases, may include nonirrigated orchards or vineyards.

In addition to these three statewide categories, the California Division of Land Resource Protection also maps agricultural land defined as important to the local economy by each county's board of supervisors and advisory committee. These areas are categorized as Farmland of Local Importance (State of California Division of Land Resource Protection 2006). The effect of the Proposed Action on these agricultural resources is discussed in Section 3.2, "Land Use."

5.2.2 California Endangered Species Act

Pursuant to the California Endangered Species Act (CESA) and Section 2081 of the Fish and Game Code, a permit from the California Department of Fish and Game (DFG) is required for non-federal projects that could result in the take of a State-listed threatened or endangered species. Under CESA, "take" is defined as an activity that would directly or indirectly kill an individual of a species, but the definition does not include "harm" or "harass," as the Federal act does.

5.2.3 California Fish and Game Code Section 1602 – Streambed Alteration

Non-federal diversions, obstructions, or changes to the natural flow or bed, channel, or bank of any river, stream or lake in California that supports wildlife resources are subject to regulation by DFG, pursuant to Section 1602 of the California Fish and Game Code. The regulatory definition of stream is a body of water that flows at least periodically or intermittently through a bed or channel having banks and supports wildlife, fish, or other aquatic life. This includes watercourses having a surface or subsurface flow that supports or has supported riparian vegetation. DFG's jurisdiction within altered or artificial waterways is based on the value of those waterways to fish and wildlife.

5.2.4 Hazardous Materials Handling

The California Hazardous Materials Release Response Plans and Inventory Law of 1985 (Business Plan Act) requires preparation of hazardous materials business plans (Business Plans) and disclosure of hazardous materials inventories. A Business Plan includes an inventory of hazardous materials handled, facility floor plans showing where hazardous materials are stored, an emergency response plan, and provisions for employee training in safety and emergency response procedures (California Health and Safety Code, Division 20, Chapter 6.95, Article 1). Statewide, the California Department of Toxic Substances Control (DTSC) has primary regulatory responsibility for management of hazardous materials, with delegation of authority to local jurisdictions that enter into agreements with the State. Local agencies, including the San Joaquin and Contra Costa County Departments of Environmental Health, administer laws and regulations under DTSC's authority.

5.3 Federal and State Water Quality Regulations and Programs

5.3.1 Federal Clean Water Act

The Clean Water Act (CWA) is the country's primary surface water protection legislation. By employing a variety of regulatory and nonregulatory tools, including establishing water quality standards, issuing permits, monitoring discharges, and managing polluted runoff, CWA aims to restore and maintain the chemical, physical, and biological integrity of surface waters to support "the protection and propagation of fish, shellfish, and wildlife and recreation in and on the water." EPA is the Federal agency with primary authority for implementing regulations adopted pursuant to CWA, and has delegated the State of California as the authority to implement and oversee most of the programs authorized or adopted for CWA compliance.

Under CWA Section 303(d) and California's Porter-Cologne Water Quality Control Act of 1969, the State of California is required to establish beneficial uses of State waters and to adopt water quality standards to protect those beneficial uses. Section 303(d) establishes the total maximum daily load (TMDL) process to assist in guiding the application of State water quality standards, requiring the states to identify streams whose water quality is "impaired" (affected by the presence of pollutants or contaminants) and to establish the TMDL or the maximum quantity of a particular contaminant that a water body can assimilate without adverse effect.

The Delta has been identified as impaired for numerous constituents (including dioxin compounds, selenium, dissolved oxygen, and electrical conductivity), as listed on the combined and most recent 303(d) listed impaired water bodies by the Central Valley Regional Water Quality Control Board (RWQCB). Construction and operation of proposed project facilities would need to be conducted within the constraints established by this law.

5.3.2 Clean Water Act Section 401 Water Quality Certification

Under CWA Section 401, applicants for a Federal license or permit to conduct activities that may result in the discharge of a pollutant into waters of the United States must obtain certification from the State in which the discharge would originate or, if appropriate, from the interstate water pollution control agency with jurisdiction over affected waters at the point where the discharge would originate. Therefore, all projects with a Federal component that may affect State water quality (including projects that require Federal agency approval such as issuance of a Section 404 permit) also must comply with CWA Section 401. Construction of the Proposed Action would require CWA water quality certification.

5.3.3 Clean Water Act Section 402 Permits for Stormwater Discharge

CWA Section 402 regulates construction-related stormwater discharges to surface waters through the National Pollutant Discharge Elimination System (NPDES) program, which is administered by EPA. In California, the State Water Resources Control Board (SWRCB) is authorized by EPA to oversee the NPDES program through the RWQCBs.

Construction of proposed project facilities could result in stormwater discharges that would require compliance with CWA Section 402.

5.3.4 Clean Water Act Section 404 Permits for Fill Placement in Waters and Wetlands

Section 404 of the CWA regulates the discharge of dredged and fill materials into "waters of the United States," which include oceans, bays, rivers, streams, lakes, ponds, and wetlands. Projects subject to Section 404 must obtain a permit from the U.S. Army Corps of Engineers (USACE) for all discharges of dredged or fill material into waters of the United States, including wetlands, before proceeding with a proposed activity. Before any action that may affect surface waters is carried out, a delineation of jurisdictional waters of the United States must be completed according to USACE protocol to determine whether the project area encompasses wetlands or other waters of the United States that qualify for CWA protection. Construction of the Proposed Action is not expected to fill any waters of the United States. While important to water quality, the Section 404 program also addresses overall aquatic habitat functions and is therefore addressed in more detail in Section 3.3, "Habitats and Vegetation."

5.3.5 Executive Order 11990 (Protection of Wetlands)

The purpose of Executive Order 11990 is to "minimize the destruction, loss or degradation of wetlands and to preserve and enhance the natural and beneficial values of wetlands." To meet these objectives, the Order requires Federal agencies, in planning their actions, to consider alternatives to wetland sites and limit potential damage if an activity affecting a wetland cannot be avoided. The Order applies to:

- acquisition, management, and disposition of Federal lands and facilities construction and improvement projects which are undertaken, financed or assisted by Federal agencies; and

- Federal activities and programs affecting land use, including but not limited to water and related land resources planning, regulation, and licensing activities.

CCWD and Western have considered Executive Order 11990 in their development of this EA and have complied with this order. Western has taken a number of actions to minimize project effects on wetlands (see Section 3.3, "Habitats and Vegetation"); any work effecting wetlands would be comply with the requirements of the 404 permit granted for the AIP including the transmission line and interconnection.

5.3.6 Executive Order 11988 (Floodplain Management)

Executive Order 11988—Floodplain Management (May 24, 1977) directs Federal agencies to issue or amend existing regulations and procedures to ensure that the potential effects of any action it may take in a floodplain are evaluated and that its planning programs and budget requests reflect consideration of flood hazards and floodplain management. Guidance for implementation of the Order is provided in the floodplain management guidelines of the U.S. Water Resources Council (40 CFR 6030; February 10, 1978) and in *A Unified National Program for Floodplain Management*, prepared by the Federal Interagency Floodplain Management Taskforce.

CCWD and Western have considered Executive Order 11988 in their development of this EA and have complied with this order.

5.3.7 Porter-Cologne Water Quality Control Act of 1969

The Porter-Cologne Water Quality Control Act of 1969 complements and establishes the State policies subject to CWA; it also established the SWRCB and nine RWQCBs. SWRCB is the primary State agency responsible for protecting the quality of the State's surface and groundwater supplies, but much of its daily implementation authority is delegated to the nine RWQCBs.

The Victoria Island/Bryon Tract project site is under the jurisdiction of the Central Valley RWQCB, Region 5 (California Regional Water Quality Control Board 1998).

5.3.8 Regional Water Quality Control Board Construction Requirements

Under the statewide NPDES stormwater permit for general construction activity (SWRCB Order No. 99-08-DWQ), the RWQCBs are responsible for authorizing stormwater discharges from construction activities that involve greater than 1 acre of land disturbance. A storm water pollution prevention plan (SWPPP) must be prepared that identifies the erosion and sediment control best management practices (BMPs), means of waste disposal, implementation of approved local plans, postconstruction sediment and erosion control BMPs and maintenance responsibilities, and nonstormwater "good housekeeping" management BMPs. The NPDES regulations also require implementation of appropriate hazardous materials management practices to reduce the possibility of chemical spills or releases of contaminants.

The Central Valley RWQCB also adopted a general order for dewatering and other low-threat discharges to surface waters (Order No. 500-175) that requires implementation of water quality control measures for construction dewatering activity. If dewatering discharges can be confined to land and are not allowed to enter surface water (i.e., are used entirely for dust control, irrigation, disposed of through evaporation or percolation, etc.), then authorization for these discharges can be obtained under a waiver for low-threat discharges to land (Order R5-2003-0008). The primary eligibility requirements for authorization under the waiver are that discharge water quality (with exception of suspended sediment or other constituents effectively filtered by discharge to soil) is as good as or better than the underlying groundwater quality, and any discharges to containment basins not cause nuisance conditions. These construction permits will be required of CCWD for project construction.

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6 Coordination and Review of the Environmental Assessment

Since the initial phases of project development for the AIP, CCWD and Reclamation engaged and consulted with agencies, stakeholders, landowners, and the general public. These consultations helped them determine the scope of the AIP EIR/EIS (CCWD and Reclamation 2006), identify the range of alternatives and mitigation measures, and define potential environmental impacts and impact significance. Consultation included informal agency communications, formal interagency meetings, and public meetings. Western will continue to solicit public and agency input on the Proposed Action by encouraging review of this EA. Western is the lead agency pursuant to NEPA.

This chapter summarizes public and agency involvement activities undertaken by CCWD and Reclamation for the AIP EIR/EIS, and by Western for the Transmission Line and Interconnection EA, which satisfy NEPA requirements for agency consultation and coordination.

6.1 Scoping

Scoping, under NEPA, is intended to assist in identifying the final range of actions, alternatives, site design options, environmental resources, and mitigation measures that will be analyzed in an environmental document. The scoping process helps ensure that problems are identified early and properly studied; it also helps to eliminate from detailed study, those issues that are not critical to the decision at hand.

Numerous outreach efforts were undertaken as part of the AIP EIR/EIS (CCWD and Reclamation 2006) to inform stakeholders about the broader AIP (which includes the Transmission Line and Interconnection), the NEPA scoping process, and the salient environmental issues, and to solicit stakeholder input. The AIP EIR/EIS scoping activities were formally initiated with the release of the notice of preparation (NOP) and notice of intent (NOI) in January 2005. Scoping activities informed the NEPA process and the detailed analysis in the EIR/EIS.

Generally, this EA builds upon the scoping activities completed for the EIR/EIS. However, the specific scope of this EA has been refined through subsequent analysis of project characteristics and discussions with relevant Federal and State agencies and with CCWD.

6.2 Ongoing Agency and Stakeholder Consultation and Coordination

Western will proactively engage interested agencies and stakeholders throughout the NEPA and project permitting processes and build on consultation undertaken by CCWD and Reclamation as part of the AIP EIR/EIS. The U.S. Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS) considered Western's Proposed Action, with prescribed conservation measures, as part of the larger AIP, and they have determined that no further consultation is needed (Squires and Oppenheim, pers. comm., 2007). Western will continue to confer with NMFS, USFWS, and the California Department of Fish and Game (DFG), as appropriate. Western also will meet as needed with other agencies with potential permitting authority over the Proposed Action, including the U.S. Army Corps of Engineers (USACE), Central Valley Regional Water Quality Control Board, State Water Quality Control Board, Reclamation Districts 2040 and 800, State Lands Commission, Bay Area Air Quality Management District, San Joaquin Valley Air Pollution Control District, and others. Although the Environmental Protection Agency (EPA) is the Federal agency with primary authority for implementing regulations adopted pursuant to the Clean Water Act (CWA) and the Clean Air Act (CAA), it has delegated the State of California as the authority to implement and oversee most of the programs authorized or adopted for CWA and CAA compliance.

As part of the AIP EIR/EIS (CCWD and Reclamation 2006), the State Historic Preservation Officer (SHPO) concurred with Reclamation's previous determination that the AIP would have no effect on historic properties (SHPO 2007, and see Appendix D). This determination included the area of potential effects for the transmission line ROW. Western recently initiated consultation with the SHPO, in compliance with Section 106 of the National Historic Preservation Act.

6.3 Additional Steps in the Environmental Assessment Process

In accordance with NEPA requirements, the Draft EA was circulated for public and agency review and comment for a 14-day period following publication of the notice of availability (NOA) of the EA by the U.S. Environmental Protection Agency (EPA). Written comments from the public, reviewing agencies, and stakeholders were accepted during the public comment period. Following consideration of these comments by Western, this Final EA was prepared and circulated according to NEPA requirements and includes responses to comments (Appendix E). Western will use the Final EA when considering approval of the Proposed Action, and will issue either a finding of no significant impact (FONSI) or require the preparation of an EIS, if significant impacts are identified.

7 Project Monitoring and Adaptive Management Plan

7.1 Introduction

In accordance with NEPA, Western prepared this EA that identifies any potentially significant effects from the AIP Transmission Line and Interconnection (Proposed Action). The Proposed Action incorporates a number of conservation measures that result in impacts being less than significant. Therefore, no mitigation is warranted. CCWD already has adopted and will implement the conservation measures presented below as part of the larger AIP. Western also will implement applicable conservation measures as part of its construction, operation, and maintenance of the transmission line and interconnection.

7.2 Purpose of Project Monitoring and Adaptive Management Plan

The project monitoring and adaptive management plan (Plan) has been prepared to ensure that all of the incorporated conservation measures are implemented and completed according to schedule and maintained in a satisfactory manner during project design, construction, operation, and maintenance, as required. The Plan may be modified by CCWD and/or Western during project implementation, as necessary, in response to changing conditions or other refinements. The Plan, shown in the following table, describes individual conservation measures (identified by AIP mitigation number and EA section number) and provides for tracking of implementation timing, responsible person/agency, and verification that measure implemented. To facilitate coordination between Western and CCWD, the agency responsible for constructing and operating the AIP, the numbering of conservation measures follows the numbering sequence found in the AIP EIR/EIS (CCWD and Reclamation 2006), with cross reference to the applicable sections of this EA. CCWD is responsible for implementing the conservation measures for the AIP. Western is responsible for implementing conservation measures for constructing, operating, and maintaining the transmission line and interconnection.

7.3 Roles and Responsibilities

Unless otherwise specified herein, CCWD is responsible for taking all actions necessary to implement the conservation measures related to the larger AIP, according to the specifications provided for each measure and for demonstrating that the action has been successfully completed. Western is responsible for construction, operation, and maintenance of the transmission line and interconnection. CCWD and Western, at their discretion, may delegate implementation responsibility or portions thereof to a licensed contractor.

CCWD will be responsible for overall administration of the Plan and for verifying that CCWD or Western staff or a qualified construction contractor has completed the necessary actions for each measure. Western will designate a project manager to coordinate with CCWD and to oversee implementation of the Plan during construction of the transmission line and interconnection. Duties of the project manager include the following:

- Ensure that routine inspections of the construction site are conducted by appropriate CCWD or Western staff; and check plans, reports, and other documents required by the Plan.

- Serve as a liaison between CCWD and Western and the construction contractor regarding conservation monitoring issues.

- Complete forms and maintain records and documents required by the Plan.

- Coordinate and ensure that corrective actions or enforcement measures are taken, if necessary.

In addition, Western or its licensed contractors would be responsible for implementing conservation measures that apply to operation and maintenance activities of the Proposed Action.

7.4 Conservation Measures

Table 7.4-1 shows the conservation measures to be implemented as part of the Proposed Action. This table also should guide CCWD and Western, respectively, in their evaluation and tracking of the implementation of conservation measures. Where CCWD already has conducted the necessary studies and/or obtained the necessary permits applicable to the AIP and to the Proposed Action, no further action by Western is warranted, once compliance is confirmed.

The column categories identified in Table 7.4-1 are described below:

AIP Mitigation Number: Lists the conservation measures by number as defined in the AIP EIR/EIS (CCWD and Reclamation 2006) with cross reference to the applicable sections of this EA.

Conservation Measure: Provides the text of the conservation measures, which are each incorporated into the Proposed Action, as described in this EA.

Timing/Schedule: Lists the time frame for implementing the conservation measures.

Implementation Responsibility: Identifies the entity responsible for complying with the requirements of the conservation measure.

Implementation and Verification: Verifies compliance. The “Action” column describes the type of action taken to verify implementation. The “Date Completed” column is to be dated and initialed by the project manager, or his/her designee, based on the documentation provided qualified contractors, or through personal verification by CCWD’s and/or Western’s representatives.

Table 7.4-1
Proposed Action Conservation Measures

AIP Mitigation Number[2]	Conservation Measure	Timing/Schedule	Implementation Responsibility	Implementation & Verification	
				Action	Date Completed
4.5-d EA 3.5.2.4 and 3.8.2.4	Prepare and Implement a Storm Water Pollution Prevention Plan (SWPPP) that Minimizes the Potential Contamination of Surface Waters, and Comply with Regional Water Quality Control Board (RWQCB) Requirements to Protect Water Quality Before the start of any ground-disturbing construction activity, CCWD and/or Western shall ensure that the construction contractor for the transmission line and interconnection and associated facilities prepares a SWPPP that identifies best management practices (BMPs) to prevent or minimize the introduction of contaminants into surface waters. Several BMPs have already been incorporated into the project design. The SWPPP would include, but would not be limited to, the following measures to minimize project-related erosion and sedimentation: ▸ use sedimentation basins and straw bales or other measures to trap sediment and prevent sediment and silt loads to waterways during project construction; ▸ cover graded areas adjacent to levees and in other areas that may be subject to erosion (as appropriate) with protective material, such as mulch, and reseed with adapted native plant species after project construction is complete; ▸ minimize project construction-related surface disturbance of soil and vegetation and restore terrestrial habitats immediately after construction to the extent feasible; ▸ place any project construction-related stockpiled soil where it would not be subject to accelerated erosion; and	Prior to and during construction	CCWD, Western, and Contractor(s) (as applicable)		

[2] With cross reference to applicable sections of this EA.

Table 7.4-1
Proposed Action Conservation Measures

AIP Mitigation Number[2]	Conservation Measure	Timing/Schedule	Implementation Responsibility	Implementation & Verification	
				Action	Date Completed
	▸ commence revegetation with grasses native to the Delta and placement of erosion control devices, such as crushed rock, as soon as a graded area has attained finish grade. CCWD and/or Western shall ensure that a certified erosion control specialist or California-registered civil engineer prepare the plan. A project field manager would be responsible for monitoring in accordance with established protocols/procedures. If needed, RWQCB staff would review the plan prior to project construction to verify that physical BMPs have been incorporated to reduce project construction-related erosion and sedimentation to the maximum extent possible and ensure compliance with this measure. In addition, to minimize the potential for spills of potential water contaminants to be introduced into drainages and waterways, the SWPPP shall establish specific fueling areas for construction vehicles and equipment (located at least 200 feet from drainages) and identify the locations of sensitive habitats, which shall be avoided. It shall also specify procedures for handling hazardous materials establish the need for catch basins and absorbent pads for refueling of sedentary equipment within 100 feet of a drainage or water body. Under standard SWPPP procedures, grading areas must be clearly marked, and equipment and vehicles must remain within the grading areas. Additional requirements of the SWPPP shall include monitoring and reporting to show compliance. Implementation of this measure, together with the measures already incorporated into the project design, are expected to reduce the potential direct contribution of the project construction activities to a less-than-significant level.				

Table 7.4-1
Proposed Action Conservation Measures

AIP Mitigation Number[2]	Conservation Measure	Timing/Schedule	Implementation Responsibility	Implementation & Verification	
				Action	Date Completed
4.6-a EA 3.3.2.4, 3.5.2.4 and 3.8.2.4	Minimize Potential Fill of Jurisdictional Waters of the United States and Loss of Sensitive Habitat, and Compensate for Unavoidable Impacts CCWD and/or Western shall implement the following measures: ▸ CCWD and/or Western shall minimize fill of waters of the United States and loss of freshwater marsh habitat to the greatest extent feasible. ▸ For those waters of the United States that cannot be avoided during construction, authorization for fill of jurisdictional waters of the United States shall be secured from the U.S. Army Corps of Engineers (USACE) via the Section 404 permitting process prior to project implementation. Any measures determined necessary during the 404 permitting process shall be implemented. (Note: CCWD has obtained 404 approvals for the AIP that include the Proposed Action.) ▸ To mitigate for permanent impacts on wetlands and other waters of the United States, CCWD (and Western, should it become necessary) proposes to use an existing USACE-approved mitigation bank to fully compensate for the acreage that is determined to be permanently affected by the Proposed Action on Victoria Island/Byron Tract, using standard and appropriate mitigation ratios. All jurisdictional waters of the United States, including wetlands, would be mitigated to achieve a no-net-loss ratio as required by USACE. ▸ CCWD shall obtain a Letter of Permission or permit from the USACE under Section 10 of the Rivers and Harbors Act prior to any work being completed within (or over) navigable waters. Any conditions associated with the authorization shall be implemented by CCWD and/or Western.	Prior to, during, and following construction.	CCWD, Western, Contractor(s), and qualified biologists (as applicable)		

Table 7.4-1
Proposed Action Conservation Measures

AIP Mitigation Number[2]	Conservation Measure	Timing/Schedule	Implementation Responsibility	Implementation & Verification	
				Action	Date Completed
	▸ Water quality certification pursuant to Section 401 of the Clean Water Act will be required as a condition of issuance of the 404 permit. CCWD and/or Western shall obtain water quality certification from the RWQCB prior to project implementation. Any measures required as part to the issuance of water quality certification shall be implemented. ▸ If the Proposed Action results in loss of freshwater marsh habitat in an area that is not a jurisdictional wetland, a wetland mitigation plan shall be developed by a qualified biologist, in consultation with the U.S. Fish and Wildlife Service (USFWS) and California Department of Fish and Game (DFG). The mitigation plan shall quantify the total freshwater marsh acreage lost, describe creation/replacement ratios for habitat lost, annual success criteria, mitigation sites, and monitoring and maintenance requirements. Implementation of the plan would be required to compensate for any loss of freshwater marsh habitat and result in no net loss of such habitat.				
4.6-b EA 3.3.2.4	Minimize Potential Effects on Special-status Plants, and Compensate for Loss If Required The following measures shall be implemented to protect the documented populations of Mason's lilaeopsis and rose-mallow at the proposed project site: ▸ Information on the special-status plant populations shall be recorded in the field on California Natural Diversity Database (CNDDB) data forms. These forms shall be submitted to the CNDDB upon completion of the survey; ▸ If the populations can be avoided during project implementation, they shall be clearly marked in the field by a qualified botanist	Prior to, during, and following construction If compensation is required, maintenance and monitoring for 3 years post-construction is required	CCWD, Western, Contractor(s), and qualified biologists (as applicable)		

Table 7.4-1
Proposed Action Conservation Measures

AIP Mitigation Number[2]	Conservation Measure	Timing/Schedule	Implementation Responsibility	Implementation & Verification: Action	Implementation & Verification: Date Completed
	for avoidance during construction activities. Before ground disturbance, all on-site construction personnel shall be given instruction regarding the presence of this species and the importance of avoiding impacts on this species and its habitat; and ▸ If special-status plant populations cannot be avoided, consultations with DFG would be required. CCWD shall develop a plan to compensate for the loss of Mason's lilaeopsis and rose-mallow at a 3:1 ratio as part of the overall AIP. Because CCWD would not own the land outside the project ROW, compensation through replacement is likely to be impractical at the project site and would need to be achieved at an appropriate off-site location. If compensation is required, CCWD and/or Western shall maintain and monitor the compensation area for 3 years following the completion of construction and restoration activities with the goal of an 80% survival rate at the end of 3 years. Monitoring reports documenting the restoration effort should be submitted to DFG upon the completion of the restoration implementation and 3 years after the restoration implementation. Monitoring reports should include photo-documentation, when restoration was completed, a description of materials that were used, specified plantings, and justifications of any substitutions to the plan.				
4.6-c EA 3.4.2.4	Implement Avoidance and Conservation Measures as Needed to Minimize Potential Effects on Giant Garter Snake Although it is highly unlikely for giant garter snake to be present in the aquatic or upland areas on Victoria Island, there is potentially suitable and marginal habitat present within the potential impact area. For any work that has the potential to affect giant garter snake or its	Prior to, during, and following construction	CCWD, Western, Contractor(s), and qualified biologists (as applicable)		

Table 7.4-1
Proposed Action Conservation Measures

AIP Mitigation Number[2]	Conservation Measure	Timing/Schedule	Implementation Responsibility	Implementation & Verification	
				Action	Date Completed
	habitat, CCWD shall consult with the U.S. Fish and Wildlife Service (USFWS) and USACE under the Endangered Species Act (ESA) Section 7 to develop conservation measures. Minimization and avoidance measures may include the following: (Note: CCWD has conducted Section 7 consultation for the AIP, including the transmission line and interconnection.) ▸ All project-related construction activity within giant garter snake habitat (aquatic habitat and adjacent suitable upland habitat within 200 feet) shall be conducted between May 1 and October 1 to the extent feasible. For any project-related construction outside of the May 1–October 1 period, CCWD shall contact the USFWS Sacramento Fish and Wildlife Office to determine if additional measures are necessary to minimize and avoid take. ▸ Dewatering of aquatic habitat for project-related construction purposes shall not occur between October 1 and April 15, unless authorized by USFWS. Any dewatered habitat must remain dry for at least 15 consecutive days after April 15 and prior to excavating or filling of the dewatered habitat. If complete dewatering is not possible, potential snake prey (i.e., fish and tadpoles) will be removed so that snakes and other wildlife are not attracted to the project construction area. ▸ Within 24 hours prior to commencement of project-related construction activities, the site shall be inspected by a qualified biologist who is approved by the USFWS Sacramento Fish and Wildlife Office. The construction area shall be reinspected whenever a lapse in project-related construction activity of 2 weeks or greater has occurred. If a giant garter snake is encountered during project-related construction, all project-related construction activities shall cease in the immediate area				

Table 7.4-1
Proposed Action Conservation Measures

AIP Mitigation Number[2]	Conservation Measure	Timing/Schedule	Implementation Responsibility	Implementation & Verification	
				Action	Date Completed
	until appropriate corrective measures have been completed or it has been determined by the biologist that the snake will not be harmed. USFWS shall be contacted by telephone immediately. ▸ Movement of heavy equipment to and from the project site during project-related construction activities shall be restricted to established roadways and haul routes to minimize habitat disturbance, and project construction equipment shall be stored in established staging areas. ▸ Before ground disturbance, all on-site project-related construction personnel shall be given instruction regarding the presence of the giant garter snake and the importance of avoiding impacts on this species and its habitat. ▸ After completion of project-related construction activities, any temporary fill and construction debris shall be removed, and wherever feasible, disturbed areas shall be restored to preproject conditions. ▸ No plastic, monofilament, jute, or similar erosion control matting that could entangle snakes will be placed on the project site when working within 200 feet of potential snake habitat.				
4.6-e EA 3.4.2.4	Conduct Surveys and Implement Protective Measures, If Needed, to Minimize Potential Effects on Swainson's Hawk, White-Tailed Kite, Northern Harrier, and Other Raptors CCWD and/or Western shall implement the following conservation measures: If feasible, in order to avoid impacts on northern harrier, all vegetation within the project's construction footprint and on-site borrow areas shall be cleared in the nonbreeding season.	Prior to and during construction	CCWD, Western, Contractor(s), and qualified biologists (as applicable)		

Table 7.4-1
Proposed Action Conservation Measures

AIP Mitigation Number[2]	Conservation Measure	Timing/Schedule	Implementation Responsibility	Implementation & Verification	
				Action	Date Completed
	Complete avoidance of project construction-related activity during the breeding and nesting season is not feasible. Consequently, preconstruction surveys shall be conducted by a qualified biologist to identify active Swainson's hawk nests within ½ mile of the proposed project site and nests of other raptors within 500 feet of the proposed project site. The survey shall be conducted no less than 14 days and no more than 30 days prior to the beginning of construction. To the extent feasible, guidelines provided in the *Recommended Timing and Methodology for Swainson's Hawk Nesting Surveys in the Central Valley* (Technical Advisory Committee 2000) shall be followed. If active nests are found, project-related construction impacts shall be avoided by establishment of appropriate buffers to limit project-related construction activities. The size of the buffers shall be determined by a qualified biologist in consultation with DFG. No project-related construction activity shall commence within the buffer area until a qualified biologist confirms that the nest is no longer active or consultations with DFG specifically allow certain construction activities to continue. Monitoring of the nest by a qualified biologist may be required if the project-related construction activity has potential to adversely affect the nest. To the extent feasible, CCWD and/or Western will follow *Avian Protection Plan* guidelines for power lines (Edison Electric Institute's Avian Power Line Interaction Committee and U.S. Fish and Wildlife Service 2005): ▸ provide 60-inch minimum horizontal separation between energized conductors and/or energized conductors and grounded hardware, ▸ insulate hardware or conductors against simultaneous contact if adequate spacing is not possible,				

Table 7.4-1
Proposed Action Conservation Measures

AIP Mitigation Number[2]	Conservation Measure	Timing/Schedule	Implementation Responsibility	Implementation & Verification	
				Action	Date Completed
	▸ use Western-approved poles that minimize impacts on birds, and/or ▸ increase the visibility of conductors or shield wires to prevent avian collisions.				
4.6-f EA 3.4.2.4	Conduct Surveys and Implement Protective Measures, If Required, to Minimize Potential Effects on Burrowing Owl Prior to any ground-disturbing project-related construction activity, CCWD and/or Western shall retain a qualified biologist to conduct preconstruction surveys for burrowing owls in suitable habitat within 250 feet of the project footprint, including the ruderal areas, and along the levees, roads, channel banks, and irrigation ditches on Victoria Island/Byron Tract. Surveys shall be conducted in accordance with DFG protocol (California Department of Fish and Game 1995). If no occupied burrows are found in the survey area, a letter report documenting survey methods and findings shall be submitted to DFG, and no further measures are necessary. If occupied burrows are found, impacts on them shall be avoided by establishing a buffer of 165 feet during the nonbreeding season (September 1 through January 31) or 250 feet during the breeding season (February 1 through August 31) for all project-related construction activities. The size of the buffer area may be adjusted if a qualified biologist and DFG determine project-related construction activities would not be likely to have adverse effects. No project-related construction activity shall commence within the buffer area until a qualified biologist confirms that the burrow is no longer occupied, or consultations with DFG specifically allow certain construction activities to continue.	Prior to and during construction	CCWD, Western, Contractor(s), and qualified biologists (as applicable)		

Table 7.4-1
Proposed Action Conservation Measures

AIP Mitigation Number[2]	Conservation Measure	Timing/Schedule	Implementation Responsibility	Implementation & Verification	
				Action	Date Completed
	If avoidance of occupied burrows is infeasible for project-related construction activities, on-site passive relocation techniques approved by DFG shall be used to encourage owls to move to alternative burrows outside of the impact area. However, no occupied burrows shall be disturbed by project-related construction activities during the nesting season unless a qualified biologist verifies through noninvasive methods that the burrow is no longer occupied.				
4.6-i EA 3.4.2.4	Conduct Surveys and Minimize Potential Effects on Tricolored Blackbird, If Required To minimize potential project-related construction disturbance to nesting tricolored blackbirds during the breeding season, vegetation within the impact area footprint shall be removed during the nonbreeding season (August to mid-April). Project-related construction disturbance to vegetation outside of the impact area shall be avoided. If project-related construction activities are expected to occur during the breeding season for tricolored blackbirds (mid-April to July), preconstruction surveys shall be conducted by a qualified biologist in any areas of potentially suitable habitat. These areas specifically include emergent marsh in Old River across from existing pump station and blackberry brambles on Byron Tract and along Old River. If no nesting tricolored blackbirds are observed during the preconstruction surveys, then no further measures are required. If tricolored blackbirds are observed nesting on Victoria Island or Byron Tract, project-related construction impacts shall be avoided and minimized by establishment of a 0.25-mile buffer around the colony during the nesting period (mid-April to July) for all project-related construction activities.	Prior to and during construction	CCWD, Western, Contractor(s), and qualified biologists (as applicable)		

Table 7.4-1
Proposed Action Conservation Measures

AIP Mitigation Number[2]	Conservation Measure	Timing/Schedule	Implementation Responsibility	Implementation & Verification	
				Action	Date Completed
4.8-a EA 3.2.2.4	**Preserve the Agricultural Productivity of Prime Farmland and Farmland of Statewide Importance to the Extent Feasible** To support the continued productive use of Prime Farmland and Farmland of Statewide Importance at the proposed project site on Victoria Island and Byron Tract, CCWD and/or Western shall ensure that the following measures are taken, to the extent feasible and practicable, in the design and implementation of the project: ▸ To the extent feasible, ensure that existing drainage systems at the proposed project site that are needed for agricultural uses are functioning as necessary so that agricultural uses are not disrupted. ▸ Minimize the disturbance of Prime Farmland and Farmland of Statewide Importance, and continuing agricultural operations, during construction by locating construction access and staging areas in areas that are fallow and using existing roads to access construction areas to the extent possible. ▸ Perform soil density monitoring during backfill and ripping to minimize excessive compaction and minimize effects on future agricultural land use. Remove topsoil prior to excavation in fields and return it to top of fields to avoid detrimental inversion of soil profiles. Avoid excessive compaction of trench backfill. Rip excessively compacted soils to prevent adverse compaction effects. Control compaction to minimize changes to lateral groundwater flow which could affect both irrigation and internal drainage. ▸ Coordinate construction scheduling as feasible and practicable so as to minimize disruption of agricultural operations.	During project design and construction	CCWD, Western, and Contractor(s) (as applicable)		

Table 7.4-1
Proposed Action Conservation Measures

AIP Mitigation Number[2]	Conservation Measure	Timing/Schedule	Implementation Responsibility	Implementation & Verification	
				Action	Date Completed
4.9-c EA 3.13.3	Prepare and Implement a Traffic Control and Safety Assurance Plan To reduce hazards to vehicles on local roadways, CCWD and/or Western shall ensure that the construction contractor prepares and implements a traffic control and safety assurance plan for project-affected roadways and intersections in the project area. The plan shall be submitted to the local public agency with jurisdiction over local transportation issues (e.g., public works department) for review before the initiation of construction-related activities. The plan shall include the following elements: ▸ Provide flagger control at the access roads to the project site from SR 4 to manage traffic control and flows as necessary during periods of heavy project construction-related truck traffic. ▸ Maintain access for emergency vehicles at all times. Provide prenotification to local police, fire, and emergency service providers of the timing, location, and duration of construction activities that could affect the movement of emergency vehicles on SR 4. ▸ Post advance warnings about the potential presence of slow-moving vehicles on SR 4, as appropriate. ▸ Place and maintain barriers and install traffic control devices necessary for safety, as specified in Caltrans' Traffic Controls for Construction and Maintenance Work Zones and in accordance with the guidance provided by the affected local jurisdictions. ▸ Limit the accumulation of project-generated mud or dirt on SR 4. Actions may include using wheel-washers or installing gravel beds at exit points from unpaved roads onto SR 4 to remove soil buildup on tires and reduce track-out. ▸ Train construction personnel in appropriate safety measures as described in the plan.	Prior to and during project construction	CCWD, Western, and Contractor(s) (as applicable)		

Table 7.4-1
Proposed Action Conservation Measures

AIP Mitigation Number[2]	Conservation Measure	Timing/Schedule	Implementation Responsibility	Implementation & Verification	
				Action	Date Completed
4.10-a EA 3.7.2.4	Implement San Joaquin Valley Air Pollution Control District (SJVAPCD) and Bay Area Air Quality Management District (BAAQMD) Measures to Control Construction-Generated Air Pollution Emissions The Proposed Action involves construction activities in both San Joaquin and Contra Costa Counties, and air pollution in both counties would be affected by project construction activities in the other county. Therefore, the following measures apply to all of the Proposed Action's construction activities irrespective of the specific location of each construction activity. **Criteria Air Pollutant Emissions.** To the extent feasible, CCWD and/or Western shall implement the following measures to reduce construction-related air quality impacts from heavy duty equipment for NO_X emissions in San Joaquin County (SJVAPCD 2002): ▸ Use alternative fueled or catalyst-equipped diesel construction equipment. ▸ Minimize idling time. ▸ Limit the hours of operation of heavy duty equipment and/or the amount of equipment in use. ▸ Replace fossil-fueled equipment with electrically driven equivalents (provided they are not run by portable generator). ▸ Implement activity management (e.g., rescheduling activities to reduce short-term impacts). **SJVAPCD Enhanced Mitigation/Conservation Measures.** To further reduce PM_{10} emissions, CCWD and/or Western shall implement the following measure to the extent feasible: ▸ Install sandbags or other erosion control measures to prevent silt runoff to public roadways from sites with a slope greater than 1%.	During project construction	CCWD, Western, and Contractor(s) (as applicable)		

Table 7.4-1
Proposed Action Conservation Measures

AIP Mitigation Number[2]	Conservation Measure	Timing/Schedule	Implementation Responsibility	Implementation & Verification	
				Action	Date Completed
	SJVAPCD Additional Mitigation/Conservation Measures. The SVAPCD strongly recommends that the following additional emissions control measure be implemented at large construction sites. CCWD and/or Western shall implement this measure to the extent feasible: ▸ Limit area subject to excavation, grading, and other construction activity at any one time. **BAAQMD Basic Mitigation/Conservation Measures.** CCWD and/or Western shall implement the following measures to reduce construction-related air quality impacts of the project to a less-than-significant level for PM_{10} emissions in Contra Costa County (BAAQMD 1999): ▸ Water all active construction areas at least twice daily. ▸ Cover all trucks hauling soil, sand, and other loose materials or require all trucks to maintain at least 2 feet of freeboard. ▸ Pave, apply water three times daily, or apply (nontoxic) soil stabilizers on all unpaved access roads, parking areas, and staging areas at construction sites. ▸ Sweep daily (with water sweepers) all paved access roads, parking areas, and staging areas at construction sites, if applicable. ▸ Sweep streets daily (with water sweepers) if visible soil material is carried onto adjacent public streets. [Not feasible to sweep SR 4, the only adjacent public roadway.] **BAAQMD Enhanced Mitigation/Conservation Measures.** The BAAQMD directs that the following additional measures should be implemented for project sites greater than 4 acres. CCWD and/or				

Table 7.4-1
Proposed Action Conservation Measures

AIP Mitigation Number[2]	Conservation Measure	Timing/Schedule	Implementation Responsibility	Implementation & Verification	
				Action	Date Completed
	Western shall implement these additional measures to reduce PM_{10} emissions to a less-than-significant level: ▸ Hydroseed or apply (nontoxic) soil stabilizers to inactive construction areas (previously graded areas inactive for 10 days or more). ▸ Enclose, cover, water twice daily, or apply (nontoxic) soil binders to exposed stockpiles (dirt, sand, etc.). ▸ Limit traffic speeds on unpaved roads to 15 mph. ▸ Replant vegetation in disturbed areas as quickly as possible. **BAAQMD Optional Mitigation/Conservation Measures.** CCWD and/or Western shall implement the following optional conservation measures to the extent feasible: ▸ Install wheel washers for all exiting trucks, or wash off the tires or tracks of all trucks and equipment leaving the site. ▸ Limit the area subject to excavation, grading, and other construction activity at any one time.				
4.11-a 3.9.2.4	Implement Measures to Control Generation of Short-Term Construction Noise CCWD and/or shall ensure that the following measures are implemented during construction: ▸ Construction equipment shall be fitted with feasible noise-control devices as presented in Table 3.9-3. ▸ Where practical and feasible given other construction sequencing constraints, all construction operations on Victoria Island (San Joaquin County) shall be limited to the hours between 6:00 a.m. and 9:00 p.m. any day, and on Byron Tract (Contra Costa County) shall be limited to daytime hours.	During project construction	CCWD, Western, and Contractor(s) (as applicable)		

Table 7.4-1
Proposed Action Conservation Measures

AIP Mitigation Number[2]	Conservation Measure	Timing/Schedule	Implementation Responsibility	Implementation & Verification	
				Action	Date Completed
	For situations in which it is deemed necessary to construct outside of exempt hours, all of the following limitations shall apply to prevent construction-generated noise from exceeding the applicable standards: (1) Pile driving shall not be conducted before 6:00 a.m. or after 9:00 p.m. on Victoria Island or outside daytime hours on Byron Tract. (2) No more than two pieces of equipment that generate noise levels of 75 dBA each with the use of feasible noise control devices shall operate simultaneously at the intake site. (3) No more than one piece of equipment that generates a noise level of 80 dBA with the use of feasible noise control devices shall operate at one time within 2,900 feet of a sensitive receptor. Fitting construction equipment with feasible noise-control devices would reduce worst-case construction noise generated at the intake location to approximately 52 dBA at Discovery Bay and the farm residence approximately 15,000 feet from the intake location. At the nearest sensitive receptors to the intake site (Golden Gate Water-Ski Club), the worst-case noise level would be reduced to approximately 57 dBA. These levels would still be well above the applicable standard (i.e., 45 dBA) for construction activities occurring outside of exempt hours and would likely increase ambient noise levels by at least 5 dBA. With the use of feasible noise-control devices and without operation of a pile driver, a likely worst-case noise level—for example, the combined noise level produced by a truck, excavator, backhoe, and scraper being used simultaneously in the same vicinity—would be approximately 84 dBA at 50 feet, 50 dBA at the				

Table 7.4-1
Proposed Action Conservation Measures

AIP Mitigation Number[2]	Conservation Measure	Timing/Schedule	Implementation Responsibility	Implementation & Verification	
				Action	Date Completed
	nearest sensitive receptor, and 35 dBA at Discovery Bay and the farm residence 15,000 feet away. Limiting construction activity at the intake site that occurs outside of the San Joaquin County hours of exemption such that it entails the use of no more than two pieces of equipment that generate noise levels of 75 dBA each and no single piece of equipment that generates a noise level of 80 dBA with the use of feasible noise control devices would reduce noise levels at the nearest sensitive receptors to 45 dBA. For construction activity on Byron Tract, the worst-case combined noise level from construction equipment experienced at Discovery Bay, in the absence of pile driving, would be approximately 55 dBA. This noise level could be produced by simultaneous operation of machinery that includes two pieces of heavy equipment, such as an excavator and a scraper, both of which produce noise levels of about 88 dBA at 50 feet. This level of construction noise likely would not result in a 5-dBA increase in ambient noise levels at Discovery Bay residences, as roadway traffic along SR 4 would be the dominant noise source at this location and is likely to be louder than the perceived construction-generated noise, even during nighttime hours.				
4.13-b EA 3.9.2.4	Coordinate with the Applicable Landowners and Land Managers to Ensure That Temporary Construction Workers and CCWD and Western Personnel Are Not Exposed to Harmful Levels of Pesticides from Adjacent Agricultural Practices CCWD and/or Western shall regularly coordinate with the owners and/or farm managers of the lands on Victoria Island and Byron Tract that are in the vicinity of the proposed project site to obtain information on the timing and type of planned pesticide applications.	Prior to and during project construction; Prior to project maintenance activities.	CCWD, Western, and Contractor(s) (as applicable)		

Table 7.4-1
Proposed Action Conservation Measures

AIP Mitigation Number[2]	Conservation Measure	Timing/Schedule	Implementation Responsibility	Implementation & Verification	
				Action	Date Completed
	Construction work in and near areas where pesticides are applied shall be scheduled in coordination with the owners/farm managers as needed to prevent the exposure of construction workers to harmful levels of pesticides. Similarly, after construction of the proposed facilities is completed, Western shall routinely coordinate with the owners/farm managers to obtain information on pesticide use, including pesticide types, application locations, and timing of application, and shall curtail staff visits to the project facilities when they would result in potentially harmful exposure of personnel to pesticides.				
4.16-a(1) EA 3.11.2.4	**Survey Previously Unexamined Areas before the Beginning of Any Project–Related Ground Disturbance in These Areas, and Implement Further Conservation Measures as Necessary** Before the beginning of any project construction activity that could affect the previously unsurveyed portions of the project site, qualified archaeologists shall survey all portions of the site that were not examined during intensive surveys for the current effort. The survey shall be conducted during a time when vegetation can be reduced or cleared from the affected area, so the natural ground surface can be examined for traces of prehistoric and/or historic-era cultural resources. Surveys of these areas would not be necessary if it is determined that they would not be affected by any project construction-related activity, including equipment staging or material stockpiling. If the survey reveals the presence of cultural resources on the project site, the procedures outlined in AIP Mitigation Measure 4.16-a(2) shall be followed.	Prior to construction	CCWD, Western, Contractor(s), and qualified archaeologists (as applicable)		

Table 7.4-1
Proposed Action Conservation Measures

AIP Mitigation Number[2]	Conservation Measure	Timing/Schedule	Implementation Responsibility	Implementation & Verification	
				Action	Date Completed
4.16-a(2) EA 3.11.2.4	Stop Work within 100 feet of the Find and Implement Measures to Protect Archaeological Resources if Discovered during Surveys or Ground-Disturbing Activities If unrecorded cultural resources (e.g., unusual amounts of shell, animal bone, bottle glass, ceramics, structure/building remains, etc.) are encountered during surveys of previously unexamined areas where ground disturbance is planned or during project-related ground-disturbing activities, all ground-disturbing activities shall be restricted from being conducted within a 100-foot radius of the find. A qualified archaeologist shall identify the materials, determine their possible significance according to National Register of Historic Preservation (NRHP) and California Register of Historic Resources (CRHR) criteria, and formulate appropriate measures for their treatment, which shall be implemented by CCWD, Western, and their contractors. Potential treatment methods for significant and potentially significant resources may include, but would not be limited to, no action (i.e., resources determined not to be significant), avoidance of the resource through changes in construction methods or project design, and implementation of a program of testing and data recovery, in accordance with all applicable Federal and State requirements.	Prior to and during construction	CCWD, Western, Contractor(s), and qualified archaeologists (as applicable)		
4.16-b EA 3.11.2.4	Stop Potentially Damaging Work if Human Remains Are Uncovered During Construction, Assess the Significance of the Find, and Pursue Appropriate Management Federal law, specifically the Native American Graves Protection and Repatriation Act, and State law provide strong protection of human remains. Therefore, in the event human remains are uncovered during ground-disturbing activities, all such activities within a 100-foot	During construction	CCWD, Western, Contractor(s), and qualified archaeologists (as applicable)		

Table 7.4-1
Proposed Action Conservation Measures

AIP Mitigation Number[2]	Conservation Measure	Timing/Schedule	Implementation Responsibility	Implementation & Verification	
				Action	Date Completed
	radius of the find shall be halted immediately and the individuals performing the work (whether CCWD, Construction Contractors, or Western personnel or any other person) shall immediately contact Western's project manager. No further work shall commence at that site until receipt of further instruction from Western.				

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8 List of Environmental Assessment Preparers

This EA was prepared by Western with assistance from CCWD and EDAW, based largely but not solely on an earlier EIR/EIS prepared by CCWD and Reclamation, with assistance from EDAW.

A list of persons who prepared various sections of the EA and the earlier EIR/EIS significant background materials, or who participated to a significant degree in preparing the EA is presented below and in Table 8-1.

8.1 Western Area Power Administration (NEPA Lead Agency for EA)

Cherie Johnston-Waldear	Project Manager; Archaeologist
Stephen Tuggle	Natural Resource Manager

8.2 Contra Costa Water District (CEQA Lead Agency for previous EIR/EIS)

Samantha Salvia	Project Manager; Principal Engineer
Fran Garland	Principal Planner
Rachel Martin	Associate Engineer
Scott Weddle	Principal Engineer
Lucinda Shih	Associate Water Resources Specialist; Delta Water Resources
Matt Moses	Associate Water Resources Specialist; Delta Water Resources

8 List of Environmental Assessment Preparers

Table 8-1 List of Preparers		
Name	**Qualifications**	**Participation**
EDAW		
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Phil Dunn	B.S. Zoology; M.S. Fisheries Biology; 27 years experience.	EA and EIR/EIS Project Manager; Alternatives Analysis; Delta Fisheries and Aquatic Resources; overall EA and EIR/EIS review
Jan Mulder	B.A. Geology; graduate studies Planning; 25 years experience.	EA Assistant Project Manager; overall EA review
Jeff Caudill	B.A. Environmental Studies and Biology; M.U.R.P. Urban and Regional Planning; 7 years experience.	EA Primary Author
Linda Howard	B.S. Environmental Science and Conservation Biology; 5 years experience.	EA Project Coordinator
Roberta Childers	B.A. Politics; 12 years experience.	EIR/EIS Assistant Project Manager; overall EIR/EIS review
Sarah Henningsen	B.S. Community and Regional Development (with honors); 3 years experience.	EIR/EIS Project Coordinator; overall EIR/EIS review
Jeff Lafer	B.S. Environmental Science; M.S. Environmental Science; 15 years experience.	Delta Water Resources
Kerry McWalter	B.S. Environmental Engineering; M.E. Engineering; 5 years experience.	Delta Water Resources
Kara Demsey	B.A. Political Science and Environmental Science; M.S. Civil/Environmental Engineering; 2 years experience.	Earth Resources; Local Hydrology and Water Quality; Utilities and Service Systems; Hazardous Materials
Linda Leeman	B.S. Wildlife and Fisheries Biology; M.S. Natural Resources (with distinction); 13 years experience.	Terrestrial Biological Resources
Leo Edson	B.S. Biological Sciences; 18 years experience.	Terrestrial Biological Resources
Petra Unger	M.S. Botany (minors in Soil Science and Zoology); 12 years experience.	Terrestrial Biological Resources

8 List of Environmental Assessment Preparers

Table 8-1
List of Preparers

Name	Qualifications	Participation
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Suet Chau	B.A. Environmental Science; 8 years experience.	Land Use; Agriculture; Transportation and Circulation
Honey Walters	B.S. Environmental Science; M.S. Atmospheric Science; 9 years experience.	Air Quality; Noise
Heather Phillips	B.S. Atmospheric Science (concentration in Meteorology); M.S. Atmospheric Science (concentration in Environmental Sustainability); 2 years experience.	Air Quality; Noise
Joshua Hohn	M.A. Communication Arts and Sciences; Master of Urban Planning in Land Use Planning and Sustainability and Public Involvement; 3 years experience.	Visual Resources
Anne Ferguson	B.S. Natural Resources, Recreation, and Tourism; M.S. Environmental Sustainability; 3 years experience.	Recreation
Richard Deis	B.A. Business; M.A. Anthropology; 15 years experience.	Cultural Resources
Wendy Copeland	B.S. Plant Science; M.S. Plant Pathology; 7 years experience.	Paleontological Resources
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Megan Gosch	B.A. Geography (Emphasis on Planning); 12 years experience.	GIS
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8 List of Environmental Assessment Preparers

Table 8-1
List of Preparers

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Amber Giffin	12 years experience.	Word Processing
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Marvin del Fierro	A.A.S. Computer Technology; 2 years experience.	Document Production
Hanson Environmental		
Charles Hanson	B.S. Fisheries; M.S. Fisheries; Ph.D. Ecology; 30 years experience.	Delta Fisheries and Aquatic Resources
Kristie Karkanen	B.A.; 3 years experience.	Delta Fisheries and Aquatic Resources
Dellavalle Laboratory, Inc.		
Nat Dellavalle	B.S., Soil Science; 45 years experience.	Agriculture
Carollo Engineers		
Ken Wilkins, P.E.	M.S. Civil/Environmental Engineering; 18 years experience.	Carollo Project Manager; Engineering Support
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Hultgren-Tillis Engineers		
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Surface Water Resources, Inc.		
Dave Schuster	B.S. Civil Engineering; 40 years experience.	SWRI Project Manager; Water Resources Modeling
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John Liu	B.S. Hydraulic and Hydroelectric Engineering; M.S. Water Resources Engineering; 13 years experience.	Water Resources Modeling

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Appendix A

Designations, Policies, and Regulations

A.1 Regulatory Authority

Appendix A summarizes designations, policies, and regulations applicable to environmental elements discussed in Chapter 3 of this EA.

A.2 Land Use

U.S. Farmland Protection Policy Act

The Farmland Protection Policy Act (FPPA) is intended to minimize the impact of Federal programs with respect to the conversion of farmland to non-agricultural uses. It ensures that, to the extent possible, Federal programs are administered to be compatible with State, local, and private programs and policies to protect farmland. The Natural Resources Conservation Service (NRCS) is the agency primarily responsible for implementing the FPPA.

The FPPA established the Farmland Protection Program (FPP) and the Land Evaluation and Site Assessment (LESA) system, which are discussed below in further detail. The NRCS administers the FPP, which is a voluntary program that provides funds to help purchase development rights to keep productive farmland in agricultural uses. The LESA system is a tool used to rank lands for suitability and inclusion in the FPP. LESA evaluates several factors, including soil potential for agriculture, location, market access, and adjacent land use. These factors are used to rank land parcels for inclusion in the FPP based on local resource evaluation and site considerations (NRCS 2005).

California Important Farmland Inventory System and Farmland Mapping and Monitoring Program

The California Department of Conservation, Office of Land Conservation, maintains a statewide inventory of farmlands. These lands are mapped by the Division of Land Resource Protection as part of the Farmland Mapping and Monitoring Program (FMMP). The maps are updated every 2 years with the use of aerial photographs, a computer mapping system, public review, and field reconnaissance. Farmlands are divided into the following five categories based on their suitability for agriculture:

Prime Farmland—land that has the best combination of physical and chemical characteristics for crop production. It has the soil quality, growing season, and moisture supply needed to produce sustained high yields of crops when treated and managed.

Farmland of Statewide Importance—land other than Prime Farmland that has a good combination of physical and chemical characteristics for crop production.

Unique Farmland—land that does not meet the criteria for Prime Farmland or Farmland of Statewide Importance, but has been used for the production of specific crops with high economic value.

Farmland of Local Importance—land that is either currently producing crops or has the capability of production, but does not meet the criteria of the categories above.

Grazing Land—land on which the vegetation is suited to the grazing of livestock.

Other categories used in the FMMP mapping system are "urban and built-up lands," "lands committed to non-agricultural use," and "other lands" (land that does not meet the criteria of any of the other categories).

Williamson Act

The California Land Conservation Act of 1965, commonly known as the Williamson Act, enables local governments to enter into contracts with private landowners for the purpose of promoting the continued use of the relevant land in agricultural or related open space use. In return, landowners receive property tax assessments that are based on farming and open space uses instead of full market value. Local governments receive an annual subvention (subsidy) of forgone property tax revenues from the State via the Open Space Subvention Act of 1971.

The Williamson Act empowers local governments to establish "agricultural preserves" consisting of lands devoted to agricultural uses and other uses compatible therewith.

Upon establishment of such preserves, the locality may offer to owners of included agricultural land the opportunity to enter into annually renewable contracts that restrict the land to agricultural use for at least 10 years (i.e., the contract continues to run for 10 years following the first date upon which the contract is not renewed). In return, the landowner is guaranteed a relatively stable tax base, founded on the value of the land for agricultural/open space use only and unaffected by its development potential.

Cancellation of a Williamson Act contract involves an extensive review and approval process, in addition to payment of fees of up to 12.5% of the property value. The local jurisdiction approving the cancellation must find that the cancellation is consistent with the purpose of the California Land Conservation Act or is in the public interest. Several subfindings must be made to support either finding, as defined in California Government Code Section 51282.

Land Use and Zoning Designations

General Plan land use and zoning designations for Victoria Island are general agriculture and AG-80, respectively (San Joaquin County 2000, pp. 9-10). The characteristics of general agriculture, as defined by the *San Joaquin County General Plan*, include lands with soils that are capable of producing a wide variety of crops and/or that support grazing, that have parcel sizes large enough to support commercial agricultural activities, and where there exists a commitment to commercial agriculture in the form of Williamson Act contracts and/or capital investments (San Joaquin County 1992, p. VI-10).

The area is designated as Prime Farmland and Farmland of Statewide Importance as defined by the California Department of Conservation, with the areas of Farmland of

Statewide Importance extending in webs throughout the Prime Farmland (California Department of Conservation 2005a; San Joaquin County 2000). A portion of the tract south of SR 4 (excluding the developed portion of the land) is considered to be an important agricultural area by Contra Costa County, as specified in the *Contra Costa County General Plan* (Contra Costa County 2005, Exhibit 8-2, p. 8-28), and is designated as Farmland of Statewide Importance by the California Department of Conservation (California Department of Conservation 2005b). All of Victoria Island is under State of California Williamson Act contract.

The *Contra Costa County General Plan* designation for Byron Tract is primarily Delta Recreation and Resources, with the exception of two developed areas within the tract designated as Public and Semi-Public uses. The zoning designation is heavy agricultural use. The Delta Recreation and Resources land use designation encompasses the islands and adjacent lowlands of the Delta, which are generally located within the 100-year floodplain and currently in agricultural production (Contra Costa County 2005, p. 3-20 to 3-25). The Public and Semi-Public land use designation includes properties owned by public government agencies, such as CCWD (Contra Costa County 2005, p. 3-23).

A.3 Habitats and Vegetation

Federal Noxious Weed Act

The Federal Noxious Weed Act of 1974 provides for the control and management of non-indigenous weeds that injure, or have the potential to injure, the interests of agriculture, commerce, wildlife resources, or public health. Under this Act, no person may import or move any noxious weed identified by the U.S. Department of Agriculture (USDA) through the U.S. except in compliance with the regulations, which may require permits. No person may knowingly sell, purchase, barter, exchange, give, or receive any noxious weed moved in violation of these provisions or deliver or receive for transportation any advertisement to sell, purchase, barter, exchange, give, or receive a noxious weed whose movement is prohibited.

The Act also authorizes USDA inspectors to stop and inspect, without warrant, any product, article, or means of conveyance moving into or through the U.S. with probable cause. It also requires Federal agencies to develop management programs to control undesirable plants on Federal lands under the agency's jurisdiction, establish and adequately fund the program, implement cooperative agreements with state agencies to coordinate management of undesirable plants on Federal lands, and establish integrated management systems to control undesirable plants targeted under cooperative agreements. A Federal agency is not required to carry out management programs on Federal lands unless similar programs are being implemented on state or private lands in the same area.

California Native Plant Protection Act

The California Native Plant Protection Act (NPPA) provides protection to endangered and “rare” plant species, subspecies, and varieties of wild native plants in California. The NPPA’s definitions of “endangered” and “rare” closely parallel the California

Endangered Species Act (CESA) definitions of “endangered” and “threatened” plant species.

San Joaquin County Multi-Species Habitat Conservation and Open Space Plan

The San Joaquin County Multi-Species Habitat Conservation and Open Space Plan (SJMSCP), approved in 2000, applies to land within San Joaquin County (San Joaquin County 2000). Victoria Island is within San Joaquin County.

Ninety-seven species are covered by the SJMSCP, which is intended to provide comprehensive mitigation, pursuant to local, State, and Federal regulations, for impacts on these species from SJMSCP-permitted activities. The SJMSCP relies on minimization of potential take through implementation of take avoidance and minimization measures and compensation for incidental take and loss of habitat through payment of fees (or in-lieu land dedication) for conversion of open space lands. These fees are to be used to preserve and create natural habitats to be managed in perpetuity through the establishment of habitat preserves. Participation in the SJMSCP is voluntary for local jurisdictions and project proponents.

East Contra Costa County Habitat Conservation Plan

Planning efforts for the East Contra Costa County Habitat Conservation Plan/Natural Communities Conservation Plan (HCP/NCCP) have been underway since 2000; and it was finalized in late 2006 (Jones & Stokes 2006). The inventory area for the HCP/NCCP includes portions of Byron Tract that would be affected by the Proposed Action. The HCP/NCCP is intended to allow Contra Costa County and the cities of Brentwood, Clayton, Oakley, and Pittsburg to better control local land use decisions in the region while providing comprehensive species, wetlands, and ecosystem conservation and contributing to the recovery of endangered species in northern California.

A.4 Wildlife

Endangered Species Act

Pursuant to the Federal Endangered Species Act (ESA), USFWS and NMFS have authority over projects that may result in take of a Federally listed species. Under ESA, the definition of “take” is to “harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct.” USFWS has also interpreted the definition of “harm” to include significant habitat modification that could result in take. If there is a likelihood that a project would result in take of a Federally listed species, either an incidental take permit, under Section 10(a) of ESA, or a Federal interagency consultation, under Section 7 of ESA, is required. CCWD and Reclamation consulted with USFWS and NMFS as part of the AIP EIR/EIS. The USFWS and NMFS considered Western’s Proposed Action, with prescribed conservation measures, as part of the larger AIP and they have determined that no further consultation is needed (Squires and Oppenheim, pers. comm., 2007).

Migratory Bird Treaty Act

The Migratory Bird Treaty Act (MBTA) provides that it shall be unlawful, except as permitted by regulations, “to pursue, take, or kill…any migratory bird, or any part, nest or egg of any such bird, included in the terms of conventions” with certain other countries (16 U.S. Code [USC] 703). This prohibition includes direct and indirect acts, although harassment and habitat modification are not included unless they result in direct loss of birds, nests, or eggs. The current list of species protected by the MBTA includes several hundred species and essentially includes all native birds, including the recently de-listed bald eagle.

Bald and Golden Eagle Protection Act

The Bald and Golden Eagle Protection Act, originally passed in 1940, prohibits the take, possession, sale, purchase, barter, offer to sell, purchase, or barter, transport, export or import, of any bald or golden eagle, alive or dead, including any part, nest, or egg, unless allowed by permit (16U.S.C 668(a); 50 CFR 22). “Take” means to “pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb” a bald or golden eagle. The term “disturb” under the Bald and Golden Eagle Protection Act was recently defined within a final rule published in the Federal Register on June 5, 2007 (72 Fed. Reg. 31332). “Disturb” means to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available, (1) injury to an eagle; (2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior; or (3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior.

Clean Water Act

The U.S. Army Corps of Engineers (USACE) regulates discharges of fill or dredged materials into waters of the United States under Section 404 of the Clean Water Act (CWA). Waters of the United States include lakes, rivers, streams, and their tributaries and adjacent wetlands. Wetlands are defined under Section 404 as areas that are inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support (and do support under normal circumstances) a prevalence of vegetation typically adapted for life in saturated soil conditions. Activities that require a permit under Section 404 include, but are not limited to, placing fill or riprap, grading, mechanized land clearing, and dredging. Any activity that results in the deposit of dredged or fill material below the ordinary high-water mark of waters of the Unites States or within a jurisdictional wetland usually requires a Section 404 permit, even if the area is dry at the time the activity takes place.

Rivers and Harbors Act

Under Section 10 of the Rivers and Harbors Act of 1899, the construction of structures in, over, or under, excavation of material from, or deposition of material into “navigable waters” are regulated by the USACE. 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 or those that are currently used, have been used in the past, or may be susceptible to use to transport interstate or foreign commerce. A Letter of Permission or permit from the USACE is required prior to any work being completed within navigable waters.

California Endangered Species Act

Pursuant to the California Endangered Species Act (CESA) and Section 2081 of the Fish and Game Code, a permit from the DFG is required for projects that could result in the take of a State listed threatened or endangered species. Under CESA, “take” is defined as an activity that would directly or indirectly kill an individual of a species, but the definition does not include “harm” or “harass,” as the Federal act does. As a result, the threshold for take under CESA is higher than that under ESA.

California Fish and Game Code Sections 3503 and 3513 - Protection of Birds

Section 3503 of the Fish and Game Code states that it is unlawful to take, possess, or needlessly destroy the nest or eggs of any bird. Section 3503.5 specifically states that it is unlawful to take, possess, or destroy any raptors (i.e., eagles, hawks, owls, and falcons), including their nests or eggs. Section 3513 of the California Fish and Game Code provides for adoption of the MBTA’s provisions. It states that it is unlawful to take or possess any migratory nongame bird as designated in the MBTA or any part of such migratory nongame bird. These State codes offer no statutory or regulatory mechanism for obtaining an incidental take permit for the loss of nongame, migratory birds. Typical violations include destruction of active nests resulting from removal of vegetation in which the nests are located. Violation of Sections 3503.5 and 3513 could also include disturbance of nesting pairs that results in failure of an active raptor nest.

California Fish and Game Code Section 1602 - Streambed Alteration

Diversions, obstructions, or changes to the natural flow or bed, channel, or bank of any river, stream or lake in California that supports wildlife resources are subject to regulation by DFG, pursuant to Section 1602 of the California Fish and Game Code. The regulatory definition of stream is a body of water that flows at least periodically or intermittently through a bed or channel having banks and supports wildlife, fish, or other aquatic life. This includes watercourses having a surface or subsurface flow that supports or has supported riparian vegetation. DFG’s jurisdiction within altered or artificial waterways is based on the value of those waterways to fish and wildlife.

Fully Protected Species under the Fish and Game Code

Protection of fully protected species is described in four sections of the Fish and Game Code that list 37 fully protected species (Fish and Game Code Sections 3511, 4700, 5050, and 5515). These statutes prohibit take or possession at any time of fully protected species. DFG is unable to authorize incidental take of fully protected species when activities are proposed in areas inhabited by those species. DFG has informed non-Federal agencies and private parties that they must avoid take of any fully protected species in carrying out projects.

Natural Community Conservation Plan Act

This act authorizes the Natural Community Conservation Plan (NCCP) program, which is designed to use an ecosystem approach to conserve natural communities at the ecosystem scale while accommodating compatible land use.

San Joaquin County Multi-Species Habitat Conservation and Open Space Plan

The San Joaquin County Multi-Species Habitat Conservation and Open Space Plan (SJMSCP), approved in 2000, applies to land within San Joaquin County (San Joaquin County 2000). Victoria Island is within San Joaquin County.

Ninety-seven species are covered by the SJMSCP, which is intended to provide comprehensive mitigation, pursuant to local, State, and Federal regulations, for impacts on these species from SJMSCP-permitted activities. The SJMSCP relies on minimization of potential take through implementation of take avoidance and minimization measures and compensation for incidental take and loss of habitat through payment of fees (or in-lieu land dedication) for conversion of open space lands. These fees are to be used to preserve and create natural habitats to be managed in perpetuity through the establishment of habitat preserves. Participation in the SJMSCP is voluntary for local jurisdictions and project proponents.

East Contra Costa County Habitat Conservation Plan

Planning efforts for the East Contra Cost County HCP/NCCP have been underway since 2000; and it was finalized in late 2006 (Jones & Stokes 2006). The inventory area for the HCP/NCCP includes portions of Byron Tract that would be affected by the Proposed Action. The HCP/NCCP is intended to allow Contra Costa County and the cities of Brentwood, Clayton, Oakley, and Pittsburg to better control local land use decisions in the region while providing comprehensive species, wetlands, and ecosystem conservation and contributing to the recovery of endangered species in northern California.

A.5 Fisheries

Endangered Species Act

Pursuant to the Federal ESA, USFWS and NMFS have authority over projects that may result in take of a Federally listed species. Under ESA, the definition of “take” is to “harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct.” USFWS has also interpreted the definition of “harm” to include significant habitat modification that could result in take. If there is a likelihood that a project would result in take of a Federally listed species, either an incidental take permit, under Section 10(a) of ESA, or a Federal interagency consultation, under Section 7 of ESA, is required. CCWD and Reclamation consulted with USFWS and NMFS as part of the AIP EIR/EIS. The USFWS and NMFS considered Western’s Proposed Action, with prescribed conservation measures, as part of the larger AIP and they have determined that no further consultation is needed (Squires and Oppenheim, pers. comm., 2007).

Critical Habitat

The south and central Delta, Sacramento River, and the Bay-Delta estuary serve as a migration corridor for anadromous salmonids, which have been listed for protection under the California and/or Federal ESA. Listed salmonids that would potentially occur seasonally in the Delta include winter-run Chinook salmon, spring-run Chinook salmon, and steelhead trout. The Sacramento River and Bay-Delta estuary (but not the south and central Delta in the project area) are areas designated as critical habitat by NMFS for winter-run and spring-run Chinook salmon. In 2005, NMFS identified the Sacramento and San Joaquin rivers and the Delta, including the south and central Delta, as critical habitat for Central Valley steelhead. The Bay-Delta estuary, including the south and central Delta, has been designated as critical habitat by USFWS for delta smelt.

Magnuson-Stevens Fishery Conservation and Management Act – Essential Fish Habitat

The Delta, San Francisco Bay, Suisun Bay, and the western Delta have been designated as Essential Fish Habitat (EFH) by the Pacific Fisheries Management Council (PFMC) to protect and enhance habitat for coastal marine fish and macroinvertebrate species that support commercial fisheries such as Pacific salmon. The amended MSFCMA, also known as the Sustainable Fisheries Act (Public Law 104-297), requires all Federal agencies to consult with the Secretary of Commerce (National Oceanic and Atmospheric Administration [NOAA]/NMFS) on activities or proposed activities authorized, funded, or undertaken by that agency that may adversely affect EFH of commercially managed marine and anadromous fish species. The EFH provisions of the Sustainable Fisheries Act are designed to protect fishery habitat from being lost due to disturbance and degradation. The act requires that EFH must be identified for all species Federally-managed under PFMC. PFMC is responsible for managing commercial fisheries resources along the coasts of California, Oregon, and Washington. Three fisheries management plans all cover species that occur in the project area and could be affected by the Proposed Action, and include the entire San Francisco Bay-Delta estuary (which would include Victoria Canal) as EFH for species as follows:

- Pacific Salmon Fishery Management Plan: spring-, fall-, late fall-, and winter-run Central Valley Chinook salmon (Pacific salmon);

- Coastal Pelagic Fishery Management Plan: northern anchovy and Pacific sardine; and

- Pacific Groundfish Fishery Management Plan: starry flounder.

California Endangered Species Act

Pursuant to CESA and Section 2081 of the Fish and Game Code, a permit from DFG is required for projects that could result in the take of a State listed threatened or endangered species. Under CESA, “take” is defined as an activity that would directly or indirectly kill an individual of a species, but the definition does not include “harm” or “harass,” as the Federal act does. As a result, the threshold for take under CESA is higher than that under ESA.

California Fish and Game Code Section 1602 - Streambed Alteration

Diversions, obstructions, or changes to the natural flow or bed, channel, or bank of any river, stream or lake in California that supports wildlife resources are subject to regulation by DFG, pursuant to Section 1602 of the California Fish and Game Code. The regulatory definition of stream is a body of water that flows at least periodically or intermittently through a bed or channel having banks and supports wildlife, fish, or other aquatic life. This includes watercourses having a surface or subsurface flow that supports or has supported riparian vegetation. DFG's jurisdiction within altered or artificial waterways is based on the value of those waterways to fish and wildlife.

Fully Protected Species under the Fish and Game Code

Protection of fully protected species is described in four sections of the Fish and Game Code that list 37 fully protected species (Fish and Game Code Sections 3511, 4700, 5050, and 5515). These statutes prohibit take or possession at any time of fully protected species. DFG is unable to authorize incidental take of fully protected species when activities are proposed in areas inhabited by those species. DFG has informed non-Federal agencies and private parties that they must avoid take of any fully protected species in carrying out projects.

Natural Community Conservation Plan Act

This act authorizes the Natural Community Conservation Plan program, which is designed to use an ecosystem approach to conserve natural communities at the ecosystem scale while accommodating compatible land use.

CALFED Action Specific Implementation Plan

An Action Specific Implementation Plan (ASIP) is a project-level environmental document meant to ensure that projects implementing CALFED Program actions are in compliance with all CALFED regulatory requirements, including the ecosystem and recovery goals. An ASIP should provide all of the information necessary for obtaining authorizations under the ESA, CESA, and NCCPA in a single document. The Proposed Action is a part of CALFED's overall Delta Improvements Package and, therefore, CCWD has prepared an ASIP in conformance with regulatory guidance for preparing ASIPs (see EIR/EIS Appendix E-1, "Action Specific Implementation Plan") (CCWD and Reclamation 2006). The Alternative Intake Project ASIP has been developed to be consistent with the species goals, prescriptions, and conservation measures in the MSCS for covered species affected by the Proposed Action, but does not tier off of any of the CALFED programmatic documents; this ASIP is a stand-alone, project-specific document.

A.6 Geology and Soils

California Building Standards Code

The State of California provides minimum standards for building design and construction through the California Building Standards Code (CBC) (California Code of Regulations, Title 24). The CBC is based on the Federal Uniform Building Code used widely throughout the country (generally adopted on a state-by-state or district-by-district basis). The CBC accounts for seismic conditions in California by providing more detailed and/or more stringent regulations. The State earthquake protection law (Health and Safety Code Section 19100 et seq.) requires that structures be designed to resist stresses caused by wind and earthquakes. Specific minimum seismic safety and structural design requirements are set forth in Chapter 16 of the CBC. Appendix Chapter A33 regulates grading activities, including drainage and erosion control, and construction on unstable soils, such as expansive soils and liquefaction areas.

California Seismic Hazards Mapping Act

The California Seismic Hazards Mapping Act of 1990 (Public Resources Code Sections 2690 to 2699.6) addresses seismic hazards other than surface rupture, such as liquefaction and induced landslides. The Seismic Hazards Mapping Act specifies that the lead agency for a project may withhold development permits until geologic or soils investigations are conducted for specific sites and mitigation measures are incorporated into plans to reduce hazards associated with seismicity and unstable soils.

Alquist-Priolo Fault Zoning Act

The California legislature passed the Alquist-Priolo Earthquake Fault Zoning Act with the main purpose of preventing the construction of buildings used for human occupancy on the surface trace of active faults. The act requires the State to identify zones around active faults (i.e., those having evidence of surface displacement within Holocene time, or the last 11,000 years) in which special studies are required before development may occur. Where projects are proposed in designated Alquist-Priolo Fault Study Zones, local agencies must require investigations that demonstrate that the proposed buildings would not be constructed across active faults.

CCWD Standards

CCWD has outlined seismic standards for all CCWD facilities in its *Technical Memorandum No. 5, Seismic Criteria* (CCWD 1994). This document serves as a guideline for the design, repair, alteration, and rehabilitation of low-rise buildings, water retention structures, canals, small buried structures, underground piping, atmospheric storage tanks, and silos and pressure vessels. These standards incorporate codes and specifications published by the International Conference of Building Officials, the American Concrete Institute, and the American Water Works Association. Because the seismic environment in the CCWD area is more severe than the conditions anticipated by these publications, standards are modified accordingly. The purpose of CCWD standards is to provide greater reliability for CCWD facilities than would be obtained only by application of the Uniform Building Code standards.

A.7 Air Quality

Criteria Air Pollutants

Federal, State, and local air quality agencies, as discussed separately below, focus on the following air pollutants: ozone, carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), particulate matter (PM), and lead. Because these are the most prevalent air pollutants known to be harmful to human health and extensive documentation on health-effects criteria is available for these pollutants, they are commonly referred to as “criteria air pollutants.”

Federal Plans, Policies, Regulations, and Laws

At the Federal level, the U.S. Environmental Protection Agency (EPA) implements national air quality programs. EPA's air quality mandates are drawn primarily from the Federal Clean Air Act (CAA), which was enacted in 1963 and amended in 1970, 1977, and 1990.

As required by the CAA, EPA has established primary and secondary national ambient air quality standards (NAAQS) for the following criteria air pollutants: ozone, CO, NO_2, SO_2, respirable particulate matter (PM_{10}), fine particulate matter ($PM_{2.5}$), and lead (see Table 3.7-2 of this EA). The primary and secondary standards protect public health and welfare, respectively. The CAA also required each State to prepare an air quality control plan referred to as a State Implementation Plan (SIP). The Federal Clean Air Act Amendments (CAAA) added requirements for States with nonattainment areas to revise their SIPs to incorporate additional control measures to reduce air pollution.

The SFBAB and the SJVAB have been found to be in nonattainment with the Federal standards for certain pollutants. The BAAQMD and the SJVAPCD have prepared plans to address these pollutants within their jurisdictions to support the SIP, as described below.

State Plans, Policies, Regulations, and Laws

ARB is the agency responsible for coordination and oversight of State and local air pollution control programs in California and for implementing the California Clean Air Act (CCAA). As required by the CCAA, which was adopted in 1988, ARB has established California ambient air quality standards (CAAQS) for sulfates, hydrogen sulfide, vinyl chloride, visibility-reducing particulate matter, and the above mentioned criteria air pollutants (see Table 3.7-2 of this EA). In most cases, the CAAQS are more stringent than the NAAQS. Differences in the standards are generally explained by the health effects studies considered during the standard setting process and the interpretation of the studies. In addition, the CAAQS incorporate a margin of safety to protect sensitive individuals.

The CCAA requires that all air districts in the State endeavor to achieve and maintain the CAAQS by the earliest practical date. The act specifies that districts should focus particular attention on reducing the emissions from transportation and area-wide emission sources, and provides districts with the authority to regulate indirect sources.

Bay Area Air Quality Management District

The BAAQMD attains and maintains air quality conditions in Contra Costa County through a comprehensive program of planning, regulation, enforcement, technical innovation, and promotion of the understanding of air quality issues. With respect to applicable air quality plans, the BAAQMD prepared the *2001 Ozone Attainment Plan* for the previous national 1-hour ozone standard to address nonattainment of this standard in the SFBAB. The document included two commitments for further planning: (1) a commitment to conduct a mid-course review of progress toward attaining the previous national 1-hour ozone standard by December 2003, and (2) a commitment to provide a revised ozone attainment strategy to EPA by April 2004.

In April 2004, the EPA made a final finding that the SFBAB has attained the previous national 1-hour ozone standard. Because of this finding, the BAAQMD's previous planning commitments in the *2001 Ozone Attainment Plan* are no longer required. However, the finding of attainment does not mean the SFBAB has been reclassified as an attainment area for the 1-hour standard. The BAAQMD must submit a redesignation request to EPA to be reclassified as an attainment area. Consequently, the BAAQMD is currently preparing the Bay Area Ozone Strategy, which will address national and State air quality planning requirements. In addition, the CCAA requires the BAAQMD to update the Clean Air Plan for attaining the State 1-hour ozone standard every 3 years.

Construction activities within Contra Costa County must comply with all applicable BAAQMD rules and regulations, including Regulation 2 (Permits) and Regulation 6 (Particulate Matter and Visible Emissions) (BAAQMD 1999).

San Joaquin Valley Air Pollution Control District

The SJVAPCD attains and maintains air quality conditions in San Joaquin County in a manner similar to that of the BAAQMD, as discussed above.

In January 2002, the SJVAPCD released its *Guide for Assessing and Mitigating Air Quality Impacts* (SJVAPCD 2002), a revision to a previously adopted guidelines document. This guide serves as an advisory document and contains types of information similar to those in the BAAQMD CEQA Guide.

With respect to the applicable air quality plans, the SJVAPCD most recently adopted the *2004 Extreme Ozone Attainment Demonstration Plan*, which included the CCAA triennial progress report and plan revision, and the 2003 PM_{10} Plan. In coordination with ARB and other air districts, the SJVAPCD has begun preliminary work on developing the *8-hour Ozone Attainment Demonstration Plan*. In addition, the SJVAPCD is currently developing the *2005 Amendments to the 2003* PM_{10} *Plan* and the *2006* PM_{10} *Plan*.

Project construction activities in San Joaquin County must comply with all applicable SJVAPCD rules and regulations, including SJVAPCD Regulation II (Permits) and Regulation VIII (Fugitive PM_{10}). The purpose of Regulation VIII is to reduce ambient concentrations of fine particulate matter by requiring actions to prevent, reduce, or mitigate anthropogenic fugitive dust emissions (SJVAPCD 2004).

Toxic Air Contaminants

TACs are defined as air pollutants that may cause or contribute to an increase in mortality or in serious illness, or that may pose a hazard to human health. TACs are not considered criteria air pollutants and thus are not specifically addressed through the setting of ambient air quality standards. Instead, the EPA and ARB regulate HAPs and TACs, respectively, through statutes and regulations that generally require the use of the maximum available control technology (MACT) or best available control technology (BACT) to limit emissions. These, in conjunction with additional rules set forth by the BAAQMD and the SJVAPCD, establish the regulatory setting for TACs. For example, emissions of the TAC diesel particulate matter (diesel PM) would be associated with the

Proposed Action and would be subject to the applicable regulatory programs as discussed further below.

Federal Hazardous Air Pollutant Programs

Title III of the CAA requires the EPA to promulgate national emissions standards for HAPs (NESHAP). The NESHAP may be different for major sources than for area sources of HAPs. Major sources are defined as stationary sources with potential to emit more than 10 tons per year [TPY] of any HAP or more than 25 TPY of any combination of HAPs; all other sources are considered area sources.

The CAAA requires EPA to promulgate vehicle or fuel standards containing reasonable requirements that control toxic emissions, at a minimum for benzene and formaldehyde. Performance criteria were established to limit mobile-source emissions of toxics, including benzene, formaldehyde, and 1, 3-butadiene. In addition, Section 219 requires the use of reformulated gasoline in selected U.S. cities (those with the most severe ozone nonattainment conditions) to further reduce mobile-source emissions.

State and Local Toxic Air Contaminant Programs

California regulates TACs primarily through the Tanner Air Toxics Act (AB 1807 of 1984) (Tanner Act) and the Air Toxics Hot Spots Information and Assessment Act (AB 2588 of 1987) (Hot Spots Act). The Tanner Act sets forth a formal procedure for ARB to designate substances as TACs. This includes research, public participation, and scientific peer review before ARB can designate a substance as a TAC. To date, ARB has identified over 21 TACs and has adopted EPA's list of HAPs as TACs. Most recently, diesel PM was added to the ARB list of TACs.

Once a TAC is identified, ARB then adopts an Airborne Toxics Control Measure (ACTM) for sources that emit that particular TAC. If there is a safe threshold for a substance at which there is no toxic effect, the control measure must reduce exposure below that threshold. If there is no safe threshold, the measure must incorporate BACT to minimize emissions.

At the local level, air pollution control or management districts may adopt and enforce ARB control measures. Under SJVAPCD Rule 2010 and BAAQMD Regulation 2-Rule 1 (Permit Requirements), SJVAPCD Rule 2201 and BAAQMD Regulation 2-Rule 2 (New and Stationary Source Review), and SJVAPCD Rule 2520 (Federally Mandated Operating Permit), all stationary sources that possess the potential to emit TACs are required to obtain permits from the applicable district. Permits may be granted to these operations if they are constructed and operated in accordance with applicable regulations, including new source review standards and air toxics control measures. The SJVAPCD and BAAQMD limit emissions and public exposure to TACs through a number of programs. Both districts prioritize TAC-emitting stationary sources based on the quantity and toxicity of the TAC emissions and the proximity of the facilities to sensitive receptors.

Odors

The SJVAPCD's Rule 4102 (Nuisance) addresses odor exposure in the SJVAB. Rule 4102 states that no person shall discharge from any source whatsoever such quantities of air contaminants or other material which cause injury, detriment, nuisance, or annoyance to any considerable number of persons, or to the public, or which endanger the comfort, repose, health, or safety of any such persons, or that public, or which cause to have a natural tendency to cause injury or damage to business or property.

The BAAQMD's Regulation 7 (Odorous Substances) addresses odor exposure in the SFBAB. Regulation 7 generally limits the discharge of odorous substances based on dilution rates.

A.8 Water Quality

Clean Water Act Section 402 Permits for Stormwater Discharge

CWA Section 402 regulates construction-related stormwater discharges to surface waters through the National Pollutant Discharge Elimination System (NPDES) program, which is administered by the EPA. In California, the State Water Resources Control Board (SWRCB) is authorized by the EPA to oversee the NPDES program through the Regional Water Quality Control Boards (RWQCBs). Installation of individual power poles within the 50-foot ROW could result in stormwater discharges that would require compliance with CWA Section 402.

Clean Water Act Section 401 Water Quality Certification

Under CWA Section 401, applicants for a Federal license or permit to conduct activities that may result in the discharge of a pollutant into waters of the United States must obtain certification from the State in which the discharge would originate or, if appropriate, from the interstate water pollution control agency with jurisdiction over affected waters at the point where the discharge would originate. Therefore, all projects with a Federal component that may affect State water quality (including projects that require Federal agency approval such as issuance of a Section 404 permit) must also comply with CWA Section 401. Installation of individual power poles within the 50-foot ROW would require CWA water quality certification.

Rivers and Harbors Act

Section 10 of the Rivers and Harbors Act of 1899 regulates alteration of (and prohibits unauthorized obstruction of) any navigable waters of the United States. Projects that result in the construction of facilities within, over, or under a navigable water body are subject to the requirements of a Section 10 permit authorized by USACE. Project construction and operation would require a Section 10 permit because the transmission lines would cross Old River, a navigable waterway.

Porter-Cologne Water Quality Control Act of 1969

The Porter-Cologne Water Quality Control Act of 1969 complements and establishes the State policies subject to CWA; it also established the SWRCB and nine RWQCBs. SWRCB is the primary State agency responsible for protecting the quality of the State's surface and groundwater supplies, but much of its daily implementation authority is delegated to the nine RWQCBs. The Victoria Island/Bryon Tract, included the 50-foot wide transmission ROW, is under the jurisdiction of the Central Valley RWQCB, Region 5 (California Regional Water Quality Control Board 1998).

Regional Water Quality Control Board Construction Requirements

Under the statewide NPDES stormwater permit for general construction activity (SWRCB Order No. 99-08-DWQ), the RWQCBs are responsible for authorizing stormwater discharges from construction activities that involve greater than 1 acre of land disturbance. A Storm Water Pollution Prevention Plan (SWPPP) must be prepared that identifies the erosion and sediment control BMPs, means of waste disposal, implementation of approved local plans, post-construction sediment and erosion control BMPs and maintenance responsibilities, and non-stormwater “good housekeeping” management BMPs. The NPDES regulations also require implementation of appropriate hazardous materials management practices to reduce the possibility of chemical spills or releases of contaminants.

The Central Valley RWQCB also adopted a general order for dewatering and other low-threat discharges to surface waters (Order No. 500-175) that requires implementation of water quality control measures for construction dewatering activity. If dewatering discharges can be confined to land and are not allowed to enter surface water (i.e., are used entirely for dust control, irrigation, disposed of through evaporation or percolation, etc.), then authorization for these discharges can be obtained under a waiver for low-threat discharges to land (Order R5-2003-0008). The primary eligibility requirements for authorization under the waiver are that discharge water quality (with exception of suspended sediment or other constituents effectively filtered by discharge to soil) is as good as or better than the underlying groundwater quality, and any discharges to containment basins not cause nuisance conditions. These construction permits may be required to install individual power poles within the 50-foot wide transmission ROW.

A.9 Public Health

Hazardous Materials and Waste

EPA Hazardous Materials Handling

At the Federal level, the principal agency regulating the generation, transport, and disposal of hazardous substances is the EPA, under the authority of the Resource Conservation and Recovery Act (RCRA). RCRA established an all-encompassing Federal regulatory program for hazardous substances that is administered by EPA. Under RCRA, EPA regulates the generation, transportation, treatment, storage, and disposal of hazardous substances. RCRA was amended in 1984 by the Hazardous and Solid Waste Amendments of 1984, which specifically prohibits the use of certain techniques for the disposal of various hazardous substances. The Federal Emergency Planning and Community Right-to-Know Act of 1986 imposes hazardous materials planning requirements to help protect local communities in the event of accidental release.

Comprehensive Environmental Response, Compensation, and Liability Act

The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), commonly known as Superfund, provides broad Federal authority to respond directly to releases or threatened releases of hazardous substances that may endanger public health or the environment. Enacted by Congress in 1980, the law created a tax on the chemical and petroleum industries, which was placed in a trust fund for cleaning up abandoned or uncontrolled hazardous waste sites. CERCLA is administered by the EPA which maintains a National Priorities List (NPL) that identifies sites where CERCLA-related actions may occur.

The law authorizes two kinds of response actions. Short-term removals address releases or threatened hazardous releases requiring prompt response. Long-term remedial response actions are taken to permanently and significantly reduce the dangers associated with releases or threats of releases of hazardous substances that are serious, but not immediately life threatening.

CERCLA also enabled the revision of the National Contingency Plan (NCP). The NCP provided the guidelines and procedures needed to respond to releases and threatened releases of hazardous substances, pollutants, or contaminants. CERCLA was amended by the Superfund Amendments and Reauthorization Act (SARA) in 1986.

Federal Insecticide, Fungicide, and Rodenticide Act

The Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) of 1947 provides Federal control of pesticide sale, distribution, and use. Under FIFRA, pesticide users are required to register their activities prior to use and must pass exams prior to application of pesticides. FIFRA is administered by the EPA and subsequent amendments have clarified the duties and responsibilities of the EPA. In general, there has been a shift toward greater emphasis on minimizing risks associated with toxicity and environmental degradation, and away from pesticide efficacy issues. In addition, all pesticides available in the U.S. shall be approved prior to distribution to ensure environmental health and safety.

OSHA Worker Safety Requirements

The U.S. Department of Labor Occupational Safety & Health Administration (OSHA) is responsible at the Federal level for ensuring worker safety. OSHA sets Federal standards for implementation of workplace training, exposure limits, and safety procedures for the handling of hazardous substances (as well as other hazards). OSHA also establishes criteria by which each state can implement its own health and safety program.

State of California Hazardous Materials Handling

The California Hazardous Materials Release Response Plans and Inventory Law of 1985 (Business Plan Act) requires preparation of Hazardous Materials Business Plans and disclosure of hazardous materials inventories. A Business Plan includes an inventory of hazardous materials handled, facility floor plans showing where hazardous materials are stored, an emergency response plan, and provisions for employee training in safety and emergency response procedures (California Health and Safety Code, Division 20, Chapter 6.95, Article 1). Statewide, DTSC has primary regulatory responsibility for management of hazardous materials, with delegation of authority to local jurisdictions that enter into agreements with the State. Local agencies, including the San Joaquin and Contra Costa County Departments of Environmental Health, administer laws and regulations under DTSC's authority.

Cal-OSHA Worker Safety Requirements

The California Occupational Safety and Health Administration (Cal-OSHA) assumes primary responsibility for developing and enforcing workplace safety regulations within California. Cal-OSHA regulations pertaining to the use of hazardous materials in the workplace, as detailed in CCR Title 8, include requirements for safety training, availability of safety equipment, accident and illness prevention programs, hazardous substance exposure warnings, and emergency action and fire prevention plan preparation. Cal-OSHA enforces hazard communication program regulations that contain training and information requirements, including procedures for identifying and labeling hazardous substances, communicating hazard information related to hazardous substances and their handling, and preparing health and safety plans to protect workers and employees at hazardous waste sites. The hazard communication program requires that Material Safety Data Sheets be available to employees and that employee information and training programs be documented.

Noise

State of California Noise Standards

The State of California has adopted noise standards in areas of regulation not preempted by the Federal government. These regulate noise levels of motor vehicles and freeway noise affecting classrooms, set standards for sound transmission control and occupational noise control, and identify noise insulation standards. In addition, the Governor's Office of Planning and Research has developed the *State of California General Plan Guidelines*, which includes land use compatibility guidelines for community noise environments to assist local agencies in their preparation of general plan noise elements (State of California 2003). None of these standards are directly relevant to this study.

Contra Costa County Noise Standards

The *Contra Costa County General Plan* Noise Element establishes specific policies to ensure acceptable noise environments for each land use (Contra Costa County 1996). Most of these policies address land use compatibility guidelines for evaluating the acceptability of existing and future exterior noise levels (i.e., transportation) at new projects proposing noise-sensitive receptors (e.g., residential development) and are not directly applicable to the proposed project and alternatives. However, the following policies addressing noise levels at existing sensitive receptors and construction noise are applicable.

- **Policy 11-7.** Public projects shall be designed and constructed to minimize long-term noise impacts on existing residents.

- **Policy 11-8.** Construction activities shall be concentrated during the hours of the day that are not noise-sensitive for adjacent land uses and should be commissioned to occur during normal work hours of the day to provide relative quiet during the more sensitive evening and early morning periods.

Contra Costa County has not adopted a noise ordinance, or performance standards for stationary noise sources, under which construction noise is categorized. However, noise from construction activities in Contra Costa County is considered exempt from applicable standards during daytime hours (Seat, pers. comm., 2005).

San Joaquin County Noise Standards

The *San Joaquin County General Plan* Noise Element includes a policy that sets acceptable exterior noise levels (i.e., transportation) at new projects proposing noise-sensitive receptors (e.g., residential development and schools), which are not directly applicable to the proposed project (San Joaquin County 1996).

Chapter 9 of the San Joaquin County Development Title includes the following pertinent guidance concerning noise levels from stationary noise sources:

- <u>Standards for Stationary Sources.</u> For proposed projects that will create stationary noise sources or expand existing stationary noise sources, the exterior, non-transportation noise level performance standards set forth in Table 3.9-2 (of this EA) shall be applicable.

- <u>Exemptions.</u> The following shall be exempt from the provisions of Chapter 9:

Noise sources associated with construction, provided such activities do not take place before 6:00 a.m. or after 9:00 p.m. on any day.

Noise sources associated with work performed by private or public utilities in the maintenance or modification of its facilities.

Community Ambient Noise Degradation

In addition to the guidelines and standards presented above, another consideration is the degradation of the existing ambient noise environment due to an increase in the ambient noise levels. Generally, a 1-dBA increase is imperceptible except under special conditions; outside of the laboratory, a 3-dBA increase is just noticeable; a change of at least 5 dBA is required before any noticeable change in community response would be expected; and a 10-dBA increase is subjectively perceived as an approximate doubling in loudness and almost always causes an adverse community response (Contra Costa County 1996).

A.10 Recreation

While there are no specific Federal or State recreation laws or policies that are relevant to the Proposed Action, other policies and regulations apply to recreation. The Delta Protection Commission has developed a *Land Use and Resource Management Plan for the Primary Zone of the Delta* (Delta Plan) that addresses recreation, in addition to land uses and wildlife habitat, in the Primary Zone of the Delta, which includes Victoria Island. With regard to recreation, the plan guides local governments in promoting the development of facilities that will maintain public access to Delta recreational resources. In its comment letter during the scoping period for the AIP EIR/EIS (CCWD and Reclamation 2006), the commission indicated that the proposed facilities associated with the alternative intake project (including transmission lines, etc.) would be consistent with the planned uses of the Delta Primary Zone. See the EIR/EIS Appendix A-1, "Public Scoping Report" (CCWD and Reclamation 2006).

A.11 Cultural Resources

Section 106 of the National Historic Preservation Act

Section 106 of the National Historic Preservation Act of 1966 (NHPA) and its implementing regulations (36 CFR 800, as amended in 2004) require Federal agencies to consider the effects of their undertakings, or those they fund or permit, on properties that may be eligible for listing, or that are listed in, the National Register of Historic Places (NRHP). The 36 CFR Part 60.4 regulations describe the criteria to evaluate cultural resources for inclusion in the NRHP. Cultural resources can be significant on the national, state, or local level. Such resources are required to retain integrity and must exhibit an association with broad patterns of our history, be associated with an important person, embody a distinctive characteristic, or yield information important to prehistory or history. These criteria are described more fully in Section 3.11.2.2 below.

The 36 CFR Part 800 regulations, implementing Section 106, call for considerable consultation with the State Historic Preservation Officer (SHPO), Indian tribes, and interested members of the public throughout the process. The four principal steps are:

1. Initiate the Section 106 process (36 CFR Part 800.3).

2. Identify historic properties, resources eligible for inclusion in the NRHP (36 CFR Part 800.4).

3. Assess the effects of the undertaking to historic properties within the area of potential effect (APE) (36 CFR Part 800.5).

4. Resolve adverse effects (36 CFR Part 800.6).

Adverse effects to historic properties are often resolved through preparation of a memorandum of agreement (MOA) developed in consultation between Reclamation, the SHPO, Indian tribes, and interested members of the public. The Advisory Council on Historic Preservation (ACHP) is also invited to participate. The MOA describes stipulations that treat the historic property to mitigate adverse effects.

American Indian Religious Freedom Act

The American Indian Religious Freedom Act (AIRFA) of 1978 is also applicable. This act established "the policy of the United States to protect and preserve for American

Indians their inherent right of freedom to believe, express, and exercise the traditional religions…including but not limited to access to sites, use and possession of sacred objects, and the freedom to worship through ceremonials and traditional rites (P.L. 95-431)."

State of California Office of Historic Preservation

The Office of Historic Preservation (OHP), headed by the SHPO, is responsible for administration of Federally-mandated and State-mandated historic preservation programs in California. As noted above, Federal agencies must initiate consultation with the SHPO as part of the NHPA Section 106 review process. The State Historical Resources Commission, also headed by the SHPO, determines the eligibility of historic and archaeological resources for listing on the NRHP and the California Register of Historic Resources (CRHR). The eligibility criteria for listing in the CRHR are similar to those for NRHP listing but focus on importance of the resources to California history and heritage. The SHPO previously concurred with the no effect determination for the entire AIP (SHPO 2007).

Native American Heritage Commission

The Native American Heritage Commission identifies and catalogs places of special religious or social significance to Native Americans and known graves and cemeteries of Native Americans on private lands, and performs other duties regarding the preservation and accessibility of sacred sites and burials and the disposition of Native American human remains and burial items.

A.12 Aesthetics

California Scenic Highway Program

In 1963, the California legislature created the Scenic Highway Program to preserve and protect scenic highway corridors from changes that would diminish the aesthetic value of lands adjacent to the highways. The State regulations and guidelines governing the Scenic Highway Program are found in the Streets and Highways Code, Section 260 et seq. A highway may be designated as "scenic" depending on how much of the natural landscape can be seen by travelers, the scenic quality of the landscape, and the extent to which development intrudes upon the travelers' enjoyment of the view.

SR 4 is the only State highway from which the proposed project site (i.e., Victoria Island and Byron Tract) would be visible. SR 4 is not an officially designated State scenic highway in this area, although one segment of SR 4 within Contra Costa County, between the intersection with SR 160 near Antioch and SR 84 near Brentwood, is eligible for scenic highway designation (California Department of Transportation 2005). Because this segment is 6 or more miles from the proposed project site, it would not be affected by the construction of new facilities and is not considered further in this evaluation.

Contra Costa County

Scenic Routes and Corridors

Chapter 5, Transportation and Circulation Element, of the *Contra Costa County General Plan 2005–2020* (Contra Costa County 2005) identifies county-designated scenic routes and corridors within Contra Costa County. A scenic route is defined as "a road, street, or freeway which traverses a scenic corridor of relatively high visual or cultural value." A scenic corridor is described as "usually much wider than the road right-of-way and extends to the contiguous areas beyond it," consisting of much of the adjacent area that can be seen from the road. According to the general plan, "controls should be applied to retain and enhance scenic qualities, restrict unsightly use of land, control heights of structures, and provide site design and architectural guidance along the entire scenic corridor."

SR 4 from I-80 near Hercules to Bay Point and from Antioch to the San Joaquin County line (including the segment that crosses Byron Tract and Victoria Island) is designated by Contra Costa County as a scenic highway. SR 242 is also designated as a scenic highway from near Pleasant Hill to its intersection with SR 4 in Concord.

The Scenic Routes goal in the general plan is "to identify, preserve and enhance scenic routes in the county." The following related policies may be relevant to this aesthetics analysis:

- **Policy 5-34.** Scenic corridors shall be maintained with the intent of protecting attractive natural qualities adjacent to various roads throughout the county.

- **Policy 5-36.** Scenic views observable from scenic routes shall be conserved, enhanced, and protected to the extent possible.

Scenic Resources

Chapter 9, Open Space Element, of the *Contra Costa County General Plan 2005–2020* (Contra Costa County 2005) identifies scenic resources within Contra Costa County. Specifically, the San Francisco Bay/Delta estuary system is identified as one of the two main scenic resources in Contra Costa County. The Scenic Resources map included in the General Plan identifies resources that should be treated as aesthetic opportunities, including areas that have been given a Scenic Waterways designation, the intent of which is "to draw attention to [their] scenic character for consideration when reviewing projects."

The shoreline adjacent to Mallard Slough is a designated Scenic Waterway, as is Old River.

The following general plan goals and policies for scenic resources may be pertinent to this evaluation:

- **Goal 9-D.** To preserve and protect areas of identified high scenic value, where practical, and in accordance with the Land Use Element map.

- **Goal 9-F.** To preserve the scenic qualities of the San Francisco Bay/Delta estuary system and the Sacramento–San Joaquin River/Delta shoreline.

San Joaquin County

Scenic Resources

The *San Joaquin County General Plan 2010* (San Joaquin County 1992) includes in its Resources Element an Open Space section with the following objective: "to preserve open space land for the continuation of commercial agricultural and productive uses, the enjoyment of scenic beauty and recreation, the protection and use of natural resources, and for protection from natural hazards."

The following are the pertinent parts of related policies that may be relevant to this analysis:

- **Policy 10.** Views of waterways, hilltops, and oak groves from public land and public roadways shall be protected.

- **Policy 11.** Outstanding scenic vistas shall be preserved and public access provided to them whenever possible.

- **Policy 12.** The county should recognize the roads shown in Figure VI-2 [in the general plan] as scenic routes and as valuable in enhancing the recreational experience for county residents and non-residents.

Scenic Routes, as defined by the general plan, in the vicinity of the proposed project site include SR 4 as it crosses Victoria Island.

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Section A.10, Recreation

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Appendix B

Correspondence with, and Biological Opinions Issued by the U.S. Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS)

Email – AIP Biological Opinions cover WAPA Transmission Line and Interconnection Project

USFWS and NMFS emails re: WAPA transmission project

From: Kim_Squires@fws.gov [mailto:Kim_Squires@fws.gov]
Sent: Monday, April 30, 2007 5:14 PM
To: Bruce Oppenheim
Cc: Samantha Salvia; Steve Tuggle
Subject: Re: CCWD Alternative Intake Project - WAPA transmission lines

Bruce summed it up nicely. Let me know if we need to send a copy to WAPA. I think our BO was sent out today.
Kim

Bruce Oppenheim **Bruce.Oppenheim@NOAA.GOV**

04/27/2007 04:04 PM

To Samantha Salvia <ssalvia@ccwater.com>
cc Steve Tuggle <TUGGLE@wapa.gov>, "Squires, Kim" <kim_squires@fws.gov>
Subject Re: CCWD Alternative Intake Project - WAPA transmission lines

Samantha,
Your summary below is correct. WAPA's actions are covered as part of the AIP that has already been analyzed in the biological opinions. They do not have to request confirmation from NMFS or USFWS for the installation of overhead transmission lines, since this was described as part of the project description. As long as WAPA complies with the conservation measures pertaining to that part of the project, they have authorized take coverage. Reclamation is the lead agency, so they are ultimately responsible for the applicant, or other agencies that might be involved in the AIP. This type of relationship occurs often under ESA consultations, and it would be redundant on our part to issue separate opinions, or incidental take statements to each party impacted by the project. For example, the Army Corps of Engineers issues a permit for in water work based on the biological opinions, but does not request a separate confirmation or biological opinion. It may be a good idea in this case to c.c. WAPA on the opinions, so that they have something in hand while installing the lines. I can add them to the cover letter, if you send me Steve Tuggle's mailing address.

Bruce

PS. There is no need to request a concurrence letter.

Samantha Salvia wrote:
Hi Bruce,
As we've discussed on the phone, Western Area Power Administration is preparing to assist CCWD in designing and installing overhead transmission lines as part of the CCWD Alternative Intake Project. In our telephone conversations you've stated that no additional consultation by Western is necessary because their portion of the AIP was considered as part of NMFS consultation on the overall project with CCWD and Reclamation. Western has requested that I obtain written confirmation from NMFS that their actions associated with the project

are covered in the AIP's Environmental Impact Report/Environmental Impact Statement (EIR/EIS), Action Specific Implementation Plan (ASIP), and your soon-to-be-released Biological Opinion.

As you'll recall, the overhead transmission lines were included in the project description in the AIP EIR/EIS, which provided a substantial basis for the project’s ASIP. The potential terrestrial and aquatic biological effects of the transmission line were analyzed in the EIR/EIS and the ASIP and minimization measures were incorporated related to potential terrestrial affects as requested by USFWS and DFG agency biologists. The analysis found no aquatic impacts because the powerline will be overhead with all power poles on land and an aerial crossing above Old River. Thus, there are no affects to species of concern to NMFS and no additional consultation with NMFS by Western is needed for their portion of the overall Alternative Intake Project.

Please confirm this understanding in your response to this email. I've copied Steve Tuggle who is Western's environmental lead on the project. Give me a call if you have any questions.

Thanks,

Samantha

Samantha Salvia, P.E.
Principal Engineer
Contra Costa Water District
2411 Bisso Lane
PO Box H2O
Concord, CA 94602
tel (925) 688-8057
fax (925) 686-2187

Biological Opinion Issued by USFWS

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Sacramento Fish and Wildlife Office
2800 Cottage Way, Room W-2605
Sacramento, California 95825-1846

In reply refer to:
1-1-07-F-0044

APR 27 2007

MAY 2007
RECEIVED
CONTRA COSTA
DISTRICT

Memorandum

To: Regional Planning Officer, Mid-Pacific Regional Office, Bureau of Reclamation, Sacramento, California (Attn.: Alan Candlish)

From: Acting Field Supervisor, Sacramento Fish and Wildlife Office, Sacramento, California Cay C. Goude

Subject: Formal Consultation on the Contra Costa Water District Alternative Intake Project, Contra Costa County, California

This memorandum is in response to your August 14, 2006, request for formal section 7 consultation on the proposed Contra Costa Water District (CCWD) Alternative Intake Project, located on Victoria Canal in San Joaquin and Contra Costa Counties, California. Your letter was received in our office on August 16, 2006. This document represents the U.S. Fish and Wildlife Service's (Service) draft biological opinion on the effects of the action on the threatened delta smelt (*Hypomesus transpacificus*) and giant garter snake (*Thamnophis gigas*). This response is in accordance with section 7 of the Endangered Species Act of 1973, as amended (Act).

The Service has determined that the project is not likely to adversely affect the San Joaquin kit fox (*Vulpes macrotis mutica*) due to the minimal construction activity along the eastern edge of Byron Tract that lacks suitable habitat.

The following sources of information were used to develop this biological opinion: (1) the July 2005 *Draft Appendix E-1 Alternative Intake Project Action Specific Implementation Plan for the Contra Costa Water District Alternative Intake Project*; (2) the November 15, 2005 *Alternative Intake Project Administrative Draft Environmental Impact Report/ Environmental Impact Statement*; (3) the March 20, 2006 *Alternative Intake Project Action Specific Implementation Plan Appendix E-1 to the Draft Environmental Impact Report/ Environmental Impact Statement*; (4) the May 2006 *Alternative Intake Project Action Specific Implementation Plan Appendix E-1 to the Draft Environmental Impact Report/ Environmental Impact Statement*; (5) the May 2006 *Draft Environmental Impact Report/ Environmental Impact Statement*; (6) the October 2006 *Final Environmental Impact Report/ Environmental Impact Statement*; (7) various meetings and correspondence between the U.S. Bureau of Reclamation (Reclamation), the National Marine Fisheries Service (NMFS), the California Department of Fish and Game (DFG), CCWD, EDAW Inc., Hanson Environmental Inc., and the Service; and (8) other information available to the Service.

Consultation History

January-May 2005:	The Service participated in various delta fisheries meetings where the proposed project was discussed.
May 31, 2005:	The Service participated in the Alternative Intake Project Fisheries Coordination Meeting.
June 2, 2005:	The Service participated in an inter-agency pre-application meeting for the proposed project.
June 29, 2005:	The Service received a request for informal consultation and the July 2005 Administrative Draft Appendix E-1 Alternative Intake Project Action Specific Implementation Plan (ASIP) for the Contra Costa Water District Alternative Intake Project. Reclamation designated EDAW Inc. as the non-federal representative to conduct informal consultation, prepare the section 7 analysis, and provide information for the consultation.
September 19, 2005:	The Service participated in the Alternative Intake Project Fisheries Coordination Meeting.
September 2005-November 2006:	Reclamation, CCWD, NMFS, DFG, EDAW, Hanson Environmental Inc., and the Service engaged in various email and telephone correspondences.
November 15, 2005:	The Service participated in the Alternative Intake Project Fisheries Coordination Meeting.
December 7, 2005:	The Service received comments on the Alternative Intake Project Administrative Draft ASIP and Environmental Impact Report Environmental Impact Statement (EIR/EIS) from DFG.
December 16, 2005:	The Service participated in the Alternative Intake Project Fisheries Coordination Meeting.
January 12, 2006:	The Service received the Administrative Draft EIR/EIS components from EDAW, Inc.
January 26, 2006:	The Service participated in the Alternative Intake Project Fisheries Coordination Meeting.

February 2, 2006:	The Service received the City of Sacramento Fish Screen Replacement Project Fish Rescue/Salvage Plan that was discussed in prior meetings.
March 21, 2006:	The Service received the March 20, 2006 ASIP.
March 24, 2006:	The Service participated in the Alternative Intake Project Fisheries Coordination Meeting.
May 4, 2006:	The Service received the May 2006 Draft EIR/EIS, EIR/EIS Executive Summary, ASIP, and a request for comments on these documents.
August 16, 2006:	The Service received a request for formal consultation, a draft of the biological opinion, and the May 2006 ASIP.
October 5, 2006:	The Service participated in the Alternative Intake Project Fisheries Coordination Meeting.
October 27, 2006:	The Service received the Final EIR/EIS.
November 16, 2006:	CCWD called the Service stating that the CCWD Board of Directors certified the EIR/EIS and chose the agency preferred Alternative 3, Modified Operations Alternative.
December 14, 2006:	The Service transmitted a draft biological opinion to Reclamation.
February 8, 2007:	The Service received comments on the draft biological opinion from Reclamation.
March 8, 2007:	The Service received new design information for the intake and fish screen from CCWD.
April 12, 2007:	DFG emailed new compensation language to the Service, NMFS, and CCWD.

BIOLOGICAL OPINION

Description of the Proposed Action

Project Summary

The proposed action would be implemented in the Sacramento-San Joaquin Delta, in San Joaquin and Contra Costa Counties. Its main features would be a new, screened water intake and pump station located along the lower third of Victoria Canal on Victoria Island in the central Delta, and a pipeline that would extend from the new intake directly across Victoria Island and

Old River and tie into CCWD's existing Old River conveyance system on Byron Tract. The project's construction footprint is approximately 470 acres.

The proposed action would include a new intake at a location with better quality water, but would not increase CCWD's total diversion capacity (rate or average annual quantity). The new intake would have a capacity of up to 250 cubic feet per second (cfs) and would be a part of the Old River conveyance system. The existing Old River intake and pump station, with a current capacity of 250 cfs, would remain in use. The combined permitted capacity of the Old River conveyance system would remain 320 cfs. Rock Slough would continue to provide a portion of CCWD's water supply, but would be used less frequently under the proposed action because of the operational flexibility a new intake with better water quality would provide. The Mallard Slough intake would continue to provide a portion of CCWD's water supply in a manner similar to its current operations.

Implementation of the proposed action would provide CCWD with the operational flexibility to divert water from either the new intake on Victoria Canal or the existing Old River intake, or to blend waters from Victoria Canal and Old River, to provide the highest water quality for CCWD customers. The proposed action would involve adding a new point of diversion to certain existing water rights held by CCWD and by Reclamation. CCWD would not seek to increase its water rights, Central Valley Project (CVP) contract amounts, or permitted Los Vaqueros Reservoir filling rates through this action.

Proposed Facilities

Intake and Fish Screen

The new intake structure would consist of a reinforced concrete structure with side retaining walls; and a fish screen, open to Victoria Canal, supported on concrete columns. The intake structure would be approximately 100 feet to 200 feet long, depending on the depth of the screen, which is anticipated to be 10 feet to 15 feet. The final sizing will be based on confirmation of fish screen design details with fishery agencies, levee geotechnical design considerations, channel bathymetry, and costs (e.g., it may be preferable to construct a narrower, deeper screen than a shallow, wide screen).

The state-of-the-art fish screen would provide a positive barrier against entrainment of fish and debris into the wet well/pump bays. The fish screen would be regularly cleaned with a mechanical cleaning system. The facility would be designed for a maximum perpendicular flow-through design velocity for the fish screens of 0.2 foot per second for any flow in Victoria Canal, which is consistent with the most stringent fish screening requirements in the Delta (i.e., Service screening criteria for delta smelt).

One or two existing agricultural siphons in Victoria Canal and/or agricultural drainage pipes on Victoria Island may need to be temporarily removed or relocated during construction. At the completion of construction, any siphons that have been removed would be replaced and restored to their original operational condition or permanently relocated.

Pump Station and Ancillary Structures

A pump station would lift water from the new intake and convey it through the pipeline system and to the existing Old River pump station system on Byron Tract. The pump station and associated mechanical piping would occupy a footprint area approximately 140 feet long by 60 feet wide. Normal water surface elevations at the intake would vary with tide; however, the intake pumps would be designed to operate at high and low water levels. The pumps would discharge into a common pipeline.

The intake/pump station facilities would also include a smaller motor control center/maintenance building and an electrical substation. The substation would be an open area measuring approximately 120 feet by 80 feet surrounded by chain-link fencing.

Construction for the Intake, Fish Screen, Pump Station, and Ancillary Structures

Soil densification may be required beneath the intake and levee to reduce the liquefaction potential of the soil and to improve its lateral strength during seismic events. Preloading of the soils beneath the levee may also be required to reduce long-term settlement of the levee.

In-water construction activities for installation of the intake and fish screen would be conducted either from a barge or from the top of the levee road. Most of the construction activities would be conducted in a dewatered cofferdam and would be isolated from Victoria Canal. As part of the construction of the new intake structure, a sheet pile cofferdam would be installed in Victoria Canal to isolate the work area from the canal water and provide a means to conduct construction work in a dewatered environment. Following installation of the cofferdam, the water in the cofferdam enclosure would be treated (as necessary) and discharged back to Victoria Canal, and the remaining intake construction work would be conducted in a dewatered environment.

If material needs to be removed for bed preparation at the cofferdam site, this excavated material would be contained within a designated containment area or areas on the land side of the levee. An earthen dike or siltation fences would enclose the containment area(s). Retention of the excavated materials would promote settling of the suspended sediments. Any excess water (desilted supernatant) would be returned back into Victoria Canal or Old River.

To provide additional depth for the fish screen, excavation may be required in Victoria Canal in the immediate vicinity of the intake in an area up to 50,000 square feet to depths within 1 to 2 feet of existing channel bottom. The need for excavation would be determined during final design based on the results of field data. Excavated materials would be transferred to the designated containment or disposal areas on the land side of the levee.

Utilities

There are no utilities present at the proposed intake site. Electricity, non-potable water, a sanitary holding tank, and a telecommunications system would be provided as part of the proposed action.

A new power substation would be constructed on-site. Power transmission lines would be installed from either the Pacific Gas and Electric Company (PG&E) or the Western Area Power Administration (WAPA) distribution system to the substation. Power supply to the facility would be transmitted through the distribution system from a combination of available sources, which may include PG&E and/or Reclamation's CVP. Potential corridors for power lines are the same as for the pipeline, although the pipeline and power lines may not be on the same alignment.

Water from Victoria Canal would be pumped through a screening filter to provide non-potable service water for the pump seals and washrooms.

Sanitary services for CCWD personnel on site for maintenance activities would be provided through the use of a below-ground holding tank that would be regularly maintained.

Antennas would be installed at the site to allow the station programmable logic controller and security system to communicate with CCWD's supervisory control and data acquisition system.

Access and Security

Site access would be via the existing levee roads or an existing north-south dirt road located off of State Route 4. The levee access roads may be surfaced with aggregate base rock to improve access during all weather conditions, but otherwise would not be modified. The north-south dirt road may be improved to accommodate two-way traffic and to meet anticipated vehicular traffic loadings.

Site security would include chain-link fencing surrounding the pump station and intake, switchyard and ancillary buildings.

Levee Improvements

The existing levee would be reinforced and reconfigured to serve as the engineered soil platform for the proposed intake/pump station facilities and to allow installation of the new intake structure. The approximate footprint area of the levee improvements (i.e., measured at the base of the side slopes) would be 250–300 feet wide by 1,000–1,200 feet long. Approximately 6–8 acres at the intake site would be removed from agricultural use by the proposed levee modification.

The levee construction would require approximately 140,000 to 170,000 cubic yards of fill material. The top of the reconfigured levee would be surfaced with aggregate base to maintain vehicular traffic during rain events. A ramp would be provided to allow access to the pump station and ancillary buildings. Slope protection (i.e., riprap) would be installed on the water side of the levee for up to 400–500 feet on each side of the intake structure.

Construction of levee improvements would occur in two phases. First, an earthen setback levee would be constructed on the landward side of the existing levee. The setback levee would be integrated with the existing levee to provide continuity of the land/water barrier. Construction activities for the new intake would be initiated along the existing levee edge after the setback levee is completed. All new construction for the setback levee would incorporate modern techniques for soil compaction.

The new levee configuration would consist of additional earthen fill placed approximately 1,000–1,200 feet longitudinally and 250–300 feet laterally on the land side of the existing levee. Sheet piles would also be longitudinally placed approximately 320 feet upstream and downstream of the new intake, and would be integrated into the new setback levee to serve as a seepage barrier. A 36-inch layer of riprap would be installed on the water side of the existing levee for a distance of approximately 400–500 feet both upstream and downstream of the new intake, resulting in approximately 2,250 cubic yards of replaced riprap and 1,700 cubic yards of new riprap. The new fill behind the existing levee would be constructed to maintain continuity of the existing road system along the existing levee crest. The installation of the new intake and construction of the new levee would also result in permanent fill of approximately 900 linear feet of a drainage ditch at the toe of the levee. A new, 1,050-foot drainage ditch would be constructed at the toe of the levee. The elevation along the top of the new embankment fill would match the existing levee top elevation. Erosion control measures such as hydroseeding would be used on the landward side of the new setback levee.

<u>Conveyance Pipeline</u>

The new conveyance pipeline would cross Victoria Island and Old River to tie into CCWD's existing Old River distribution system.

Pipeline Across Victoria Island

The new conveyance pipeline would traverse Victoria Island buried within a trench from the new intake and pump facility on Victoria Canal to the Old River levee. The pipeline would transect Victoria Island diagonally and would be approximately 11,500 feet long. The pipeline would be sized to accommodate a flow rate of up to 250 cfs. The pipe diameter would be approximately 6 feet. Pipeline features such as air release, control valves, cathodic protection test stations, and access hatches would be installed in vaults or on pads above ground along the pipeline route.

The proposed pipeline routing may affect existing irrigation and drainage ditches that are used to irrigate existing fields and divert irrigation/storm water drainage from the fields (for discharge to Old River or Victoria Canal). Any ditches that potentially could be affected by the pipeline routing would be siphoned under, rerouted, crossed over, or replaced. The selected method for ditch crossings would be developed based on discussions with the landowner and considerations of both farming operations and construction costs. Nearly all effects on drainages would be temporary, as the ditches would be recontoured to their pre-project dimensions where possible.

The conveyance pipeline would be constructed across Victoria Island using a conventional trench design. Because the conveyance pipeline would likely be installed below the groundwater table, the trench is designed to provide enough earthen cover over the pipe to counter any buoyant forces that may occur. The pipeline would be buried in a trench that would be excavated to maintain a minimum cover of 5 feet over the pipeline. The as-built surface elevation would generally match the original ground surface elevation.

Dewatering would likely be required for construction of the pipeline across Victoria Island. Discharge of dewatering water could be to land or to Old River.

Old River Pipeline Crossing

The conveyance pipeline would be tunneled under Old River at an elevation determined to avoid unconsolidated soils and provide for sufficient protection of the pipeline, estimated to be at least 50 feet below ground surface elevation.

The pipeline would be installed under Old River using standard tunneling techniques. A large pit would be excavated on Byron Tract, west of the existing levee. A similar pit would be excavated on Victoria Island. One pit would operate as a launching pit while the other acts as a receiving pit, functioning as a drop shaft for the completed pipeline. The pit dimensions would be approximately 30 feet long by 15 feet wide by 80 feet deep. Once the new pipe is in place, concrete access vaults would be constructed within both the launching and receiving pits, prior to backfilling of the pits.

Pipeline Connection to the Old River Distribution System

A new pipeline, approximately 50–100 feet long, would connect the pipeline from the Old River crossing to CCWD's existing Old River delivery pipeline within the existing setback levee. Pipe would be installed on Byron Tract using the method described above for Victoria Island.

Easements

CCWD would acquire land and/or easements as needed for construction and long-term access to the project sites. On Victoria Island, CCWD would purchase or obtain a permanent easement up to 70 feet wide for the pipeline alignment. For the duration of project construction, a total construction easement (including the width of the permanent easement) of approximately 200 feet would also be required. Land and/or easements may also be required for the intake site, the levee crossings, and the river crossing (for in-river crossing alternative only).

Additional temporary construction easements of approximately 10 acres would also be required for construction staging areas. Additional temporary construction easements of approximately 25–40 acres for site access would be required on Victoria Island (range includes on-island road access and potential levee road access.

<u>Borrow Areas</u>

Borrow areas are sites where native materials are obtained for required construction activities. Borrow material would be required for both the construction of the setback levee and backfill for the pipeline trench. Approximately 140,000–170,000 cubic yards of borrow material would be required to construct the new setback levee. The amount of material needed for pipeline backfill depends on pipeline length, material, and depth of burial. An estimated 120,000–170,000 cubic yards of high-quality material would be required for the pipeline backfill. Depending on local soil conditions, this material may be available from the excavation of the pipeline trench itself, or may need to be borrowed from another location to backfill the pipeline. The excavation and backfill of the pipeline trench would result in a net excess of 20,000–60,000 cubic yards.

Preliminary soils data confirms that on-site soils are suitable for levee and pipeline backfill. Accordingly, an option for new embankment and trench fill would be to select native material obtained from Victoria Island. Based on preliminary field work, it is expected that select soils for the setback levee could be obtained by on-site shallow excavation (e.g., "land leveling") to depths of approximately 1 to 1.5 feet in an area of up to 135 acres.

If on-site borrow activity is not used, the contractor would obtain borrow material from an off-site borrow location. The contractor typically would select a source of off-site borrow. Potential borrow areas have been identified within 20 miles of the project site.

Construction Access and Staging

Construction staging areas would be located on both Victoria Island and Byron Tract. Staging areas for construction parking and the temporary stockpiling of excavated soils and storage of construction equipment and materials are expected to occupy approximately 10 acres on Victoria Island. Pipeline materials (e.g., piping, backfill material, and geogrids) would be stored along the pipeline route within the temporary easement. A smaller staging area would be located on Byron Tract.

Construction Workforce, Equipment, and Schedule

The total construction duration is estimated at 36 months. There would be overlap in the timing of construction of some of the components.

Anticipated Duration of Major Construction Components for the Proposed Action

Construction Phase	**Anticipated Duration**
Existing Victoria Canal Levee Improvements	6–8 months
New Victoria Canal Intake Structure/Fish Screen and Pump Station Installation	24 months
New Pipeline Installation	6–18 months
Old River Pipeline Crossing	7–9 months
New Pipeline Connection at the Existing Old River Pump	1 month

Anticipated Duration of Major Construction Components for the Proposed Action	
Construction Phase	**Anticipated Duration**
Station	
Total Construction Duration	36 months

At the construction sites, typical heavy construction equipment that may be used includes excavators, backhoes, bulldozers, scrapers, graders, sheepsfoot or tamping foot rollers, water trucks, a front-end loader, several dump trucks, a drill rig, a pump truck, truck-mounted cranes, pile drivers, pickup trucks, and miscellaneous equipment.

It is anticipated that approximately 50 to 75 truck round trips would be required to transport the contractor's equipment to the site. A similar number of round trips would be needed to remove the equipment from the site as the work is completed. About 200–300 highway truck trips would be needed to bring the riprap to the site from the quarry of origin. An additional 1,000–1,500 trips would be needed to bring aggregate surfacing to the site from the quarry of origin. About 300–400 concrete loads, transported by transit mixer truck, are also likely. About 150 trailer truck loads would be required to bring other permanent materials, such as geogrid, fish screens, sheet piles, masonry, piping, structural steel, utility poles, and ancillary equipment, to the site. I n addition, about 50 highway truckloads may be needed to carry construction debris and waste dump materials to a suitable landfill. If off-site borrow material is used to provide fill for the setback levee construction, up to an additional 11,500 trips may be needed. This would total about 14,000 total round trips during the construction period of approximately 30–36 months, or an average of about 15 round trips per day. The actual round trips per day during construction may range between 8 and 100 to meet specific construction sequencing needs. The construction labor force is estimated to average about 75 to 100 people over the total construction period. Peak staffing could be close to 125 people if major construction components are conducted simultaneously (e.g., if the intake and the conveyance pipeline are constructed at the same time).

Typical construction would occur during daylight hours Monday through Friday. However, the construction contractor may extend the hours and may schedule construction work on weekends if necessary to complete aspects of the work within a given timeframe. An exception to the typical construction timing would be tunneling to install the pipeline under Old River, which would not depend on daylight and may be conducted around the clock.

Operations and Maintenance

CCWD currently delivers water using the three Delta intakes based on a goal of delivering water with chloride concentrations of 65 mg/l or better to its untreated- and treated-water customers, as described in the background section of this document. The May 2006, Draft EIR/EIS contains a complete background of CCWD facilities and operations. With implementation of the proposed action, CCWD would have the flexibility to relocate some of its pumping from the existing Old

River intake to the new location during certain periods of the year to obtain better water quality. In general, Old River water quality is best in late spring and early summer. Victoria Canal water quality is better than Old River water quality in late summer and fall.

The addition of the proposed intake on Victoria Canal would provide CCWD with the flexibility to divert water for conveyance to the Los Vaqueros Reservoir and the Contra Costa Canal using the existing Old River intake, the new Victoria Canal intake, or a combination of the two intakes. The preferred alternative (Alternative 3, Modified Operations), would relocate a portion of the current Rock Slough pumping as well as some of the Old River pumping to the new intake on Victoria Canal. CCWD will immediately apply to change its permits to allow diversion of up to 320 cfs through the Old River conveyance system. Combined diversions from the 250-cfs Old River pump station and the proposed 250-cfs alternative intake would be limited to 320 cfs by the capacity of the pipeline connecting the Old River pump station to CCWD's transfer station that routes water either to the Los Vaqueros Reservoir or the Contra Costa Canal. CCWD would not increase the total annual quantity diverted from the Delta. This change would enable CCWD to relocate up to half of the current unscreened Rock Slough diversions to the screened Old River conveyance system in the near term. Rock Slough would continue to provide a portion of CCWD supply, but would be used less frequently. Mallard Slough intake would continue to provide a portion of CCWD's water supply in a manner similar to its current operations.

The proposed intake would tie into CCWD's existing water supply and would not divert additional water out of the Delta; it would simply allow CCWD to shift the location and timing of pumping between the existing Old River intake and a new location based on water quality. CCWD would not seek to increase its water rights, contract amounts, or permitted Los Vaqueros Reservoir filling rates through this project.

The pump station for the new intake on Victoria Canal would be operated similarly to the existing Old River pump station. The Old River pump station is normally operated remotely from the Bollman Water Treatment Plant but can be locally operated at the pump station itself. CCWD personnel sequentially start the Old River pumps to initiate diversion from Old River. The number of pumps operating at any given time depends on CCWD's flow requirements and diversion strategy. When the pump station is taken off line, the pumps are turned off and the wet well remains flooded.

Maintenance activities at the proposed new intake and pump station would be similar to maintenance activities currently conducted at the Old River pump station, including pump and equipment inspections and maintenance, water quality monitoring, and fish monitoring activities. Periodic maintenance dredging may also be required at the new intake facility. The existing Old River facility has not required any maintenance dredging to date, but an intake on Victoria Canal could experience different sedimentation conditions. Because the proposed new pump station would be unstaffed, CCWD personnel would monitor the station via telemetry as well as through regular inspections.

Operation and maintenance activities will be necessary to maintain function of the fish screen and the pumping plant for the life of the facility. The fish screen structure will be constructed to permit vehicle access for screen panel removal and maintenance. The fish screen will be operated and maintained to reduce debris and sediment accumulation that will adversely affect the magnitude and uniformity of approach velocities by creating turbulence in front of the screen.

The fish screen will be mechanically cleaned using a traveling rake. The cleaning system will operate continuously to reduce and avoid accumulation of debris so that the screen operates in accordance with the approach velocity design criteria. Each screen panel will be removable to allow for annual pressure washing, cleaning and maintenance, as well as inspections of screen integrity. A portable, high pressure wash water system will be used for the panel cleaning. Screen panels will be removed annually (at a minimum) for inspection, repair, and high pressure washing. Back-up panels would be available on-site to replace screen panels that require maintenance or repair. A floating log-boom will be provided in Victoria Canal to deflect floating debris that may otherwise impinge on the screen, damage screen panels, or damage the traveling rake cleaning system.

The intake structure top elevation would be two feet higher than the 100 year floodwater surface elevation in Victoria Canal. The facility is designed to withstand flood events, and to drain naturally into the canal as flows recede.

Conservation Measures

1. To reduce turbidity in Victoria Canal during project-related construction activities (primarily excavation and cofferdam installation), CCWD shall:

    a. obtain and comply with Regional Water Quality Control Board (RWQCB) Section 401 Water Quality Certification and DFG Streambed Alteration Agreement, as needed;

    b. monitor periods of construction activity and coordinate with the contractor to identify periods when localized increases in turbidity may occur;

    c. install a silt curtain to reduce the dissipation of suspended sediments during dredging and cofferdam installation; and

    d. conduct cofferdam installation and removal, to the extent possible, during summer to avoid the potential risk of adverse impacts to Chinook salmon, steelhead, and delta smelt, which are all more abundant in the area during fall, winter, and spring. Installation of the cofferdam will occur during the designated in-water work window between August 1 and November 30, unless modified by written agreement with NMFS, Service, and DFG.

2. In addition, successful project-related turbidity control shall be accomplished by installation and subsequent removal of the temporary cofferdam, while maintaining suspended sediment and turbidity levels to the extent possible within the water quality criteria established by

RWQCB. CCWD would be required to comply with water quality criteria established by applicable State and Federal permits and approvals for the proposed action. In addition, CCWD shall implement the following measures during project-related dredging and soil disposal that comply with the Fisheries Management Plan for Essential Fish Habitat (EFH) for Pacific Salmon:

a. monitor project construction-related dredging activities especially any contaminated sediments, regularly report effects on EFH, and re-evaluate activities based on monitoring results;

b. employ best engineering and management practices for all project construction-related dredging projects to minimize water-column discharges; and

c. consider upland disposal options as an alternative to open water disposal during project construction activities. Dredged sediments removed during intake construction will be used beneficially on-site or disposed of at an upland site.

3. Avoidance and minimization measures would be implemented in accordance with standard RWQCB requirements that have been used in other similar fish screen construction projects. CCWD shall be responsible for implementing the following measures to the extent practicable during project construction activities:

a. The discharge of petroleum products or other excavated materials to surface waters is prohibited;

b. Project construction activities shall minimize substrate disturbance;

c. Project construction activities shall not cause turbidity increases in surface waters as follows:

(1) where natural turbidity is between 0 and 5 Nephelometric Turbidity Units (NTUs), increases shall not exceed 1 NTU; (2) where natural turbidity is between 5 and 50 NTUs, increases shall not exceed 20%; (3) where natural turbidity is between 50 and 100 NTUs, increase shall not exceed 10 NTUs; and (4)where natural turbidity is greater than 100 NTUs, increases shall not exceed 10%.

These limits would be eased during in-water working periods to allow a turbidity increase of 15 NTU over background turbidity as measured in surface waters 300 feet downstream from the working area. In determining compliance with the above limits, appropriate averaging periods may be applied provided that beneficial uses would be fully protected;

d. Project construction activities shall not cause settleable matter to exceed 0.1 ml/l in surface waters as measured in surface waters 300 feet downstream from the project;

e. Project construction activities shall not cause visible oil, grease, or foam in the work area or downstream;

f. All areas disturbed by project construction activities shall be protected from washout or erosion;

g. In the event that project construction activities create a visible plume in surface waters, CCWD will initiate monitoring of turbidity levels at the discharge site and 300 feet downstream, taking grab samples for analysis of NTU levels twice per day during the work period while the visible plume persists;

h. CCWD shall notify RWQCB, DFG, Service, and NMFS immediately if the above criteria for turbidity, oil/grease, or foam are exceeded; and

i. CCWD shall notify RWQCB, DFG, Service, and NMFS immediately of any spill of petroleum products or other organic or earthen materials.

4. CCWD shall prepare a soil erosion control plan and stormwater pollution prevention plan (SWPPP) prior to project grading and excavation activities to minimize potential project construction-related silt from entering waterways and increasing turbidity. The plans would include, but would not be limited to, the following measures to minimize project-related erosion and sedimentation:

   a. use sedimentation basins and straw bales or other measures to trap sediment and prevent sediment and silt loads to waterways during project construction;

   b. cover graded areas adjacent to levees and in other areas that may be subject to erosion (as appropriate) with protective material, such as mulch, and re-seed with adapted native plant species after project construction is complete;

   c. incorporate bank stabilization (riprap) into the project design on both the east and west sides of the intake to minimize channel margin erosion of soils into Victoria Canal. To the extent practicable, the aerial extend of riprap will be minimized and small (<8 inch diameter) riprap will be used for levee protection;

   d. minimize project construction-related surface disturbance of soil and vegetation and restore terrestrial habitats immediately after construction to the extent feasible;

   e. place any project construction-related stockpiled soil where it would not be subject to accelerated erosion; and

   f. commence re-vegetation with grasses native to the Delta and placement of erosion control devices, such as crushed rock, as soon as a graded area has attained finish grade.

   g. CCWD shall ensure that a certified erosion control specialist or California-registered civil engineer prepare the plan. A project field manager would be responsible for monitoring in accordance with established protocols/procedures. If needed, RWQCB staff would review the plan prior to project construction to verify that physical best management practices (BMPs) have been incorporated to reduce project construction-related erosion and sedimentation to the maximum extent possible and ensure compliance with this measure.

5. Implement measures to reduce and/or avoid underwater sound pressure impacts. Potential risk of adverse impacts and incidental take of steelhead (*Onchorynchus mykiss)*, Chinook salmon (*Onchorynchus tshawytscha*), delta smelt, and other fish species shall be avoided by installing the sheet pile cofferdam using a vibration hammer that minimizes underwater sound pressure levels to the greatest extent feasible to minimize effects to sensitive fish species. If it is determined that a higher intensity percussion hammer would be required for installing the cofferdam, avoidance of potential adverse effects would be achieved by consulting with Service, NMFS, and DFG to determine the appropriate actions, which may include surveying Victoria Canal at the intake site to determine fish presence prior to installation, and possibly modifying the work window accordingly. Installation of the cofferdam, however, is expected to occur during the designated in-water work-window in summer and early fall when water temperatures within the central and south Delta are seasonally elevated and aquatic habitat in these areas is considered to be generally unsuitable for both salmonids and delta smelt. Chinook salmon and delta smelt avoid habitats, including Victoria Canal, when seasonal water temperatures increase during late spring and early summer reaching levels above 77°F. Installation of the cofferdam using percussion hammers during summer would reduce and avoid potential adverse effects to these species.

6. CCWD shall prepare and implement a hazardous materials control and spill prevention and response plan prior to construction. Measures that would be included in the plan to minimize project construction-related effects will include the following:

   a. establish a spill prevention and countermeasure plan before the commencement of project construction that includes strict on-site handling rules to keep construction and maintenance materials out of drainages and waterways;

   b. prevent project-related raw cement, concrete, or concrete washings; asphalt, paint, or other coating material; oil or other petroleum products; or any other substances that could be hazardous to aquatic life from contaminating the soil or entering watercourses, including Victoria Canal;

   c. clean up all project-related spills immediately according to the spill prevention and countermeasure plan, and notify RWQCB immediately of spills and cleanup procedures;

   d. provide staging and storage areas for project-related equipment, materials, fuels, lubricants, solvents, and other possible contaminants away from watercourses and their watersheds; and

e. conduct periodic inspection during construction.

f. The Service, NMFS, DFG, and RWQCB shall review the plan prior to construction to verify that hazardous material control and spill response measures have been incorporated to control the use of hazardous materials and reduce the chance of spills to the maximum extent practicable. The Service, NMFS, and DFG shall have access to inspect construction activities to ensure compliance.

7. CCWD shall develop and implement a Fish Rescue Plan acceptable to DFG, Service, and NMFS. Installation of the cofferdam and dewatering a portion of the proposed intake structure site during fish screen construction may result in fish stranding. CCWD shall ensure that a qualified fishery biologist with a current DFG collections permit designs and conducts the fish rescue and relocation effort to collect fish from the area behind the cofferdam. The fish rescue effort would be implemented during the dewatering of the area behind the cofferdam and would involve capture and return of those fish to suitable habitat within Victoria Canal. To ensure compliance, a fisheries biologist shall be present on-site during initial pumping (dewatering) activities.

CCWD shall monitor progress of installation of the cofferdam and the schedule for dewatering. CCWD shall coordinate the dewatering schedule with the construction contractor and fishery biologist to allow for the fish rescue to occur prior to completely closing the cofferdam and again when water depths are approximately two feet. The Service, NMFS, and CDFG shall be notified at least 48 hours prior to the fish rescue. Information on the species and sizes of fish collected in the rescue and estimates of survival immediately before release would be recorded during the time of the fish rescue and provided in a letter report to be submitted within 30 days after the fish rescue to the Service, NMFS, and DFG.

8. To compensate for the loss of 0.7 acre of shallow water habitat, applicant shall acquire, conserve, fund and manage at least 2.1 acres (3:1 ratio) of shallow water habitat at a mitigation bank or other location approved by the Service, DFG, and NMFS. If 2.1 acres cannot be acquired prior to project impacts, CCWD shall provide DFG, prior to project impacts, the following:

a. an Irrevocable Letter of Credit or other form of Security approved by the Service, DFG, and NMFS in the amount of $73,500 ($35,000/acre), to cover the costs of land acquisition, land conservation, and land management planning. The Security shall allow DFG to draw on the principal sum if DFG, at its sole discretion, determines that CCWD has failed to acquire the required 2.1 acres of shallow water habitat within 1 year of project impacts;

b. payment in the form of a check in the amount of $10,500 ($5000/acre) for use as principal for a permanent capital endowment. Interest from this amount shall be available for the operation, management and protection of the mitigation lands, including reasonable administrative overhead, biological monitoring, improvements to carrying capacity, law enforcement measures, and any other action designed to protect or improve the habitat values of the mitigation lands. The endowment principal shall not be drawn upon unless such withdrawal is deemed necessary by DFG to ensure the continued viability of the species on the mitigation lands.

The 2.1 acres shall be conserved through fee title transfer or a conservation easement acceptable to the Service, DFG, and NMFS. A management plan acceptable to the Service, DFG, and NMFS is required for the mitigation site. The management plan shall be developed prior to acquisition of mitigation land and shall include, but not be limited to; description of the habitat, habitat enhancements to site, monitoring and management of invasive aquatic plant species, maintaining shallow water habitat depth criteria, success criteria and adaptive management if not met.

9. CCWD will install a state-of-the-art positive barrier fish screen that would minimize fish entrainment and impingement at the new Victoria Canal intake. To ensure that the fish screen operates as intended and the risk of incidental take associated with diversions at this facility are in conformance with the Act and the California Endangered Species Act, long-term monitoring of operation and maintenance of the positive barrier screen shall be conducted. Monitoring at the onset of diversions through the Victoria Canal intake would include approach velocity measurements immediately after initiation of the positive barrier screen operations, with fine-tuning of velocity control baffles or other modifications as necessary, to achieve uniformity of velocities in conformance with the screen criteria ($\leq$0.2 feet/second) established by DFG and NMFS, and mandated by the Service in a number of biological opinions. Long-term velocity tests have been scheduled at 5-year intervals for the Old River Fish Screen Facility, and a similar schedule to test for effectiveness will be implemented for ensuring proper functionality of the proposed action's positive barrier fish screen.

CCWD shall also monitor the condition of the positive barrier screen on an annual basis for as long as diversions are occurring at Victoria Canal. CCWD shall conduct periodic visual inspections at least monthly, during periods of the year when the intake is in operation, to remove accumulated debris and repair screen panels as necessary. NMFS, Service, and DFG shall have access to the positive barrier screen for underwater inspections following completion of intake screen construction. The standards for success would be long-term reliable operation of the fish screen, and conformance with intake screen design criteria.

CCWD will also operate the new Victoria Canal intake consistent with the existing Los Vaqueros Project biological opinion operational restrictions on filling Los Vaqueros Reservoir and diverting Delta water, and consistent with any future changes to that biological opinion. CCWD will also operate the new Victoria Canal intake consistent with any section 7 biological opinion issued for the proposed action.

In addition, CCWD will incorporate entrainment monitoring for fish eggs, larvae, and juveniles at the new Victoria Canal intake consistent with the on-going fishery monitoring being conducted at the Old River Fish Facility. Informal consultation with NMFS, Service, and CDFG has indicated that a monitoring program as frequent and long-term as that at the Old River Fish Screen Facility is likely not necessary due to the similarities in screen design and the proven effectiveness of the Old River screen. Consequently, entrainment monitoring will be conducted at the Victoria Canal intake for the first year of operation. Following one year of entrainment monitoring, CCWD will issue a performance report within 60 days to NMFS, Service, and DFG as a cumulative record of monitoring and communications with the regulatory agencies. Using the 1-year monitoring results, CCWD will recommend continuation, modification, or discontinuation of the biological monitoring program for approval by NMFS, Service, and DFG, and then an assessment will be made whether further sampling is necessary, or should be integrated with Old River intake sampling.

Previous monitoring conducted for the Old River Fish Screen Facility to evaluate the effectiveness of the screen to reduce and avoid entraining fish eggs and larvae has provided a technical basis for evaluating the effectiveness of the new Victoria Canal positive barrier fish screen. Juvenile Chinook salmon nor other species are being substantially entrained into the state-of-the-art positive barrier fish screen that was installed and fully operable at the Old River intake by 1998. This determination has been made by Morinaka (2000) following fishery sampling behind the screen with a large sieve net that caught few fish, and among them was only one delta smelt and no Chinook salmon. Morinaka concluded, "the results demonstrate that a properly designed and operated fish screen can reduce entrainment losses." The low approach velocities of these screens (e.g., at Victoria Canal and Old River intakes) designed to meet agency criteria is such that juvenile fish can usually escape entrainment.

Implementation of this multi-faceted measure will minimize adverse effects and the risk of incidental take related to increased fish losses through entrainment and impingement by ensuring that the positive barrier fish screen is operating effectively and efficiently.

10. CCWD shall implement measures to minimize effects on the giant garter snake. Work that may affect giant garter snake habitat includes constructing the new intake station and levee improvements on Victoria Canal, installing the conveyance pipeline across irrigation ditches, and connecting the conveyance pipeline to the existing facilities at the Old River intake and pump station (either by tunneling or crossing the levee). Minimization and avoidance measures may include the following:

    a. All project-related construction activity within giant garter snake habitat (aquatic habitat and adjacent suitable upland habitat within 200 feet) shall be conducted between May 1 and October 1 to the extent feasible. For any project-related construction outside of the May 1–October 1 period, CCWD shall contact the Service's Sacramento Fish and Wildlife Office to determine if additional measures are necessary to minimize and avoid take.

    b. Dewatering of aquatic habitat for project-related construction purposes shall not occur between October 1 and April 15, with the exception of the area within the cofferdam, unless authorized by the Service. Any dewatered habitat must remain dry for at least 15 consecutive days after April 15 and prior to excavating or filling of the dewatered habitat. If complete dewatering is not possible, potential snake prey (i.e., fish and tadpoles) will be removed so that snakes and other wildlife are not attracted to the project construction area.

c. Within 24 hours prior to commencement of project-related construction activities, the site shall be inspected by a qualified biologist who is approved by the Service's Sacramento Fish and Wildlife Office. The construction area shall be re-inspected whenever a lapse in project-related construction activity of two weeks or greater has occurred. If a giant garter snake is encountered during project-related construction, all project-related construction activities shall cease in the immediate area until appropriate corrective measures have been completed or it has been determined by the biologist that the snake will not be harmed and the Service shall be contacted by telephone immediately.

d. Movement of heavy equipment to and from the project site during project-related construction activities shall be restricted to established roadways and haul routes to minimize habitat disturbance, and project construction equipment shall be stored in established staging areas.

e. Before ground disturbance, all on-site project-related construction personnel shall be given instruction regarding the presence of the giant garter snake and the importance of avoiding impacts to this species and its habitat.

f. After completion of project-related construction activities, any temporary fill and construction debris shall be removed, and wherever feasible, disturbed areas shall be restored to pre-project conditions.

g. No plastic, monofilament, jute, or similar erosion control matting that could entangle snakes will be placed on the project site when working within 200 feet of potential snake habitat.

11. To minimize project effects to giant garter snakes during filling of the 900 foot drainage ditch, CCWD shall have a biological monitor, approved by DFG and the Service, onsite during all ditch filling activities. The biological monitor shall ensure that take of giant garter snakes is minimized during filling of the ditch by monitoring the ditch for giant garter snakes in advance of and during ditch filling. The biological monitor shall have full authority to stop project work if needed to ensure giant garter snakes are not taken. If CCWD does not have a biological monitor on-site during said activities, DFG and/or the Service shall have full authority to stop activities to fill the 900 foot ditch until an approved biological monitor is on-site.

12. To compensate for project effects to giant garter snake habitat by filling of 900 foot drainage ditch, CCWD shall create giant garter snake habitat at a ratio of at least 1.1:1 (compensation: effect). The created ditch shall be constructed prior to ditch filling OR the created ditch shall be completed within 6 months of initiation of ditch filling activities and prior to October 1 of

the year impacts to ditch occur. The created ditch shall be on-site and shall reconnect on-site drainage ditch adjacent to where 900 foot ditch previously existed. If the created ditch is not completed by October 1, then CCWD shall provide financial security to DFG, in the form of an Irrevocable Letter of Credit or other form acceptable to DFG and the Service, in the amount of $165,000 to cover the costs of ditch creation. The financial security shall be provided prior to November 1 of the year impacts to 900 foot ditch occurred and shall be in place until all ditch creation activities are completed.

Action Area

The action area is defined in 50 CFR § 402.02, as "all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action." For the proposed action, the action area includes: (1) Victoria Island, Victoria Canal, and Byron Tract; (2) the Sacramento-San Joaquin Delta; and (3) the Los Vaqueros Reservoir and the CCWD water conveyance system

Status of the Species

<u>Delta Smelt</u>

Delta smelt was federally listed as a threatened species on March 5, 1993 (Service 1993a). Critical habitat for delta smelt was designated on December 19, 1994 (Service 1994). The Sacramento-San Joaquin Delta Native Fishes Recovery Plan was completed in 1996 (Service 1996). The Five Year Status Review for the delta smelt was completed on March 31, 2004 (Service 2004).

Description. Delta smelt are slender-bodied fish that typically reach 60-70 mm standard length (measured from tip of the snout to origin of the caudal fin), although a few may reach 120 mm standard length. The mouth is small, with a maxilla that does not extend past the midpoint of the eye. The eyes are relatively large; with the orbit width contained approximately 3.5-4 times in the head length. Small, pointed teeth are present on the upper and lower jaws. The first gill arch has 27-33 gill rakers and there are 7 branchiostegal rays (paired structures on either side and below the jaw that protect the gills). Counts of branchiostegal rays are used by taxonomists to identify fish. The pectoral fins reach less than two-thirds of the way to the bases of the pelvic fins. There are 9-10 dorsal fin rays, 8 pelvic fin rays, 10-12 pectoral fin rays, and 15-17 anal fin rays. The lateral line is incomplete and has 53-60 scales along it. There are 4-5 pyloric caeca. Live fish are nearly translucent and have a steely-blue sheen to their sides. Occasionally there may be one chromatophore (cellular organelle containing pigment) between the mandibles, but usually there is none. Delta smelt belong to the family Osmeridae, a more ancestral member of the order Salmoniformes which also includes the family Salmonidae (salmon, trout, whitefish, and graylings) (Moyle and Cech 1988).

Distribution. Delta smelt are endemic to the upper Sacramento-San Joaquin estuary. They occur in the Delta primarily below Isleton on the Sacramento River, below Mossdale on the San Joaquin River, and in Suisun Bay. They move into freshwater when spawning (ranging from

January to July) and can occur in: (1) the Sacramento River as high as Sacramento, (2) the Mokelumne River system, (3) the Cache Slough region, (4) the Delta, and, (5) Montezuma Slough, (6) Suisun Bay, (7) Suisun Marsh, (8) Carquinez Strait, (9) Napa River, and (10) San Pablo Bay. It is not known if delta smelt in San Pablo Bay are a permanent population or if they are washed into the Bay during high outflow periods. Since 1982, the center of delta smelt abundance has been the northwestern Delta in the channel of the Sacramento River. In any month, two or more life stages (adult, larvae, and juveniles) of delta smelt have the potential to be present in Suisun Bay (Department of Water Resources (DWR) and Reclamation 1994; Molye 1976; Wang 1991). Delta smelt are also captured seasonally in Suisun Marsh.

Habitat Requirements. Delta smelt are euryhaline (a species that tolerates a wide range of salinities) fish that generally occur in water with less than 10-12 parts per thousand (ppt) salinity. However, delta smelt have been collected in the Carquinez Strait at 13.8 ppt and in San Pablo Bay at 18.5 ppt (DFG 2000). In recent history, they have been most abundant in shallow areas where early spring salinities are around 2 ppt. However, prior to the 1800's before the construction of levees that created the Delta Islands, a vast fluvial marsh existed in the Delta and the delta smelt probably reared in these upstream areas. During the recent drought (1987-92), delta smelt were concentrated in deep areas in the lower Sacramento River near Emmaton, where average salinity ranged from 0.36 to 3.6 ppt for much of the year (DWR and Reclamation 1994). During years with wet springs (such as 1993), delta smelt may continue to be abundant in Suisun Bay during summer even after the 2 ppt isohaline (an artificial line denoting changes in salinity in a body of water) has retreated upstream (Sweetnam and Stevens 1993). Fall abundance of delta smelt is generally highest in years when salinities of 2 ppt are in the shallows of Suisun Bay during the preceding spring ($p < 0.05$, $r = 0.50$) (Herbold 1994) (p is a statistical abbreviation for the probability of an analysis showing differences between variables, r is a statistical abbreviation for the correlation coefficient, a measure of the linear relationship of two variables). Herbold (1994) found a significant relationship between number of days when 2 parts per thousand was in Suisun Bay during April with subsequent delta smelt abundance ($p < 0.05$, $r = 0.49$), but noted that autocorrelations (interactions among measurements that make relationships between measurements difficult to understand) in time and space reduce the reliability of any analysis that compares parts of years or small geographical areas. It should also be noted that the point in the estuary where the 2 ppt isohaline is located (X2) does not necessarily regulate delta smelt distribution in all years. In wet years, when abundance levels are high, their distribution is normally very broad. In late 1993 and early 1994, delta smelt were found in Suisun Bay region despite the fact that X2 was located far upstream. In this case, food availability may have influenced delta smelt distribution, as evidenced by the *Eurytemora* found in this area by DFG. In Suisun Marsh, delta smelt larvae occur in both large sloughs and small dead end sloughs. New studies are under way to test the hypothesis that adult fall abundance is dependent upon geographic distribution of juvenile delta smelt. The core juvenile distribution, regardless of water year type, is usually centered upstream of X2 in eastern Suisun Bay and the lower Sacramento River to about Three-Mile Slough (Sweetnam 1999; Dege and Brown 2004).

Critical thermal maxima for delta smelt was reached at 25.4 degrees Celsius in the laboratory (Swanson et al., 2000); and at water temperatures above 25 degrees Celsius delta smelt are no longer found in the delta (DFG, pers. comm.).

Life History. Wang (1986) reported spawning taking place in fresh water at temperatures of about 7°-15° Celsius (C). However, ripe delta smelt and recently hatched larvae have been collected in recent years at temperatures of 15°-22°C, so it is likely that spawning can take place over the entire 7°-22° C range. Temperatures that are optimal for survival of embryos and larvae have not yet been determined, although R. Mager, University of California at Davis (UCD), (unpublished data) found low hatching success and embryo survival from spawns of captive fish collected at higher temperatures. Delta smelt of all sizes are found in the main channels of the Delta and Suisun Marsh and the open waters of Suisun Bay where the waters are well oxygenated and temperatures relatively cool, usually less than 20°-22°C in summer. When not spawning, they tend to be concentrated near the zone where incoming salt water and out flowing freshwater mix (mixing zone). This area has the highest primary productivity and is where zooplankton populations (on which delta smelt feed) are usually most dense (Knutson and Orsi 1983; Orsi and Mecum 1986). At all life stages delta smelt are found in greatest abundance in the top 2 m of the water column and usually not in close association with the shoreline.

Delta smelt inhabit open, surface waters of the Delta and Suisun Bay, where they presumably school. In most years, spawning occurs in shallow water habitats in the Delta. Shortly before spawning, adult smelt migrate upstream from the brackish-water habitat associated with the mixing zone to disperse widely into river channels and tidally-influenced backwater sloughs (Radtke 1966; Moyle 1976, 2002; Wang 1991). Migrating adults with nearly mature eggs were taken at the Central Valley Projects's (CVP) Tracy Pumping Plant, located in the south Delta, from late December 1990 to April 1991 (Wang 1991). In February 2000, gravid adults were found at both CVP and the State Water Projects' (SWP) fish facilities in the south Delta. Spawning locations appear to vary widely from year to year (DWR and Reclamation 1993). Sampling of larval smelt in the Delta suggests spawning has occurred in the Sacramento River, Barker, Lindsey, Cache, Georgiana, Prospect, Beaver, Hog, and Sycamore sloughs, in the San Joaquin River off Bradford Island including Fisherman's Cut, False River along the shore zone between Frank's and Webb tracts, and possibly other areas (Wang 1991). In years of moderate to high Delta outflow, smelt larvae are often most abundant in Suisun Bay and sloughs of Suisun Marsh, but it is not clear the degree to which these larvae are produced by locally spawning fish and the degree to which they originate upstream and are transported by river currents to the bay and marsh. Some spawning probably occurs in shallow water habitats in Suisun Bay and Suisun Marsh during wetter years (Sweetnam 1999 and Wang 1991). Spawning has also been recorded in Montezuma Slough near Suisun Bay (Wang 1986) and also may occur in Suisun Slough in Suisun Marsh (P. Moyle, UCD, unpublished data).

The spawning season varies from year to year, and may occur from late winter (December) to early summer (July). Pre-spawning adults are found in Suisun Bay and the western delta as early as September (DWR and Reclamation 1994). Moyle (1976, 2002) collected gravid adults from December to April, although ripe delta smelt were common in February and March. In 1989 and 1990, Wang (1991) estimated that spawning had taken place from mid-February to late June or early July, with peak spawning occurring in late April and early May. A recent study of delta smelt eggs and larvae (Wang and Brown 1993 as cited in DWR and Reclamation 1994) confirmed that spawning may occur from February through June, with a peak in April and May.

Spawning has been reported to occur at water temperatures of about 7° to 15° C. Results from a UCD study (Swanson and Cech 1995) indicate that although delta smelt tolerate a wide range of temperatures (<8° C to >25° C), warmer water temperatures restrict their distribution more than colder water temperatures.

Delta smelt spawn in shallow, fresh, or slightly brackish water upstream of the mixing zone (Wang 1991). Most spawning occurs in tidally-influenced backwater sloughs and channel edgewaters (Moyle 1976, 2002; Wang 1986, 1991; Moyle *et al.* 1992). Although delta smelt spawning behavior has not been observed in the wild (Moyle *et al.* 1992), some researchers believe the adhesive, demersal eggs attach to substrates such as cattails, tules, tree roots, and submerged branches in shallow waters (Moyle 1976, 2002; Wang 1991).

Laboratory observations have indicated that delta smelt are broadcast spawners (DWR and Reclamation 1994) and eggs are demersal (sinks to the bottom) and adhesive, sticking to hard substrates such as: rock, gravel, tree roots or submerged branches, and submerged vegetation (Moyle 1976, 2002; Wang 1986). At 14°-16° C, embryonic development to hatching takes 9 -14 days and feeding begins 4-5 days later (R. Mager, UCD, unpublished data). Newly hatched delta smelt have a large oil globule that makes them semi-buoyant, allowing them to maintain themselves just off the bottom (R. Mager, UCD, unpublished data), where they feed on rotifers (microscopic crustaceans used by fish for food) and other microscopic prey. Once the swimbladder (a gas-filled organ that allows fish to maintain neutral buoyancy) develops, larvae become more buoyant and rise up higher into the water column. At this stage, 16-18 mm total length, most are presumably washed downstream until they reach the mixing zone or the area immediately upstream of it. Growth is rapid and juvenile fish are 40-50 mm long by early August (Erkkila *et al.* 1950; Ganssle 1966; Radtke 1966). By this time, young-of-year fish dominate trawl catches of delta smelt, and adults become rare. Delta smelt reach 55-70 mm standard length in 7-9 months (Moyle 1976, 2002). Growth during the next 3 months slows down considerably (only 3-9 mm total), presumably because most of the energy ingested is being directed towards gonadal development (Erkkila *et al.* 1950; Radtke 1966). There is no correlation between size and fecundity, and females between 59-70 mm standard lengths lay 1,200 to 2,600 eggs (Moyle *et al.* 1992). The abrupt change from a single-age, adult cohort during spawning in spring to a population dominated by juveniles in summer suggests strongly that most adults die after they spawn (Radtke 1966 and Moyle 1976, 2002). However, in El Nino years when temperatures rise above 18° C before all adults have spawned, some fraction of the unspawned population may also hold over as two-year-old fish and spawn in the subsequent year. These two-year-old adults may enhance reproductive success in years following El Nino events.

In a near-annual fish like delta smelt, a strong relationship would be expected between number of spawners present in one year and number of recruits to the population the following year. Instead, the stock-recruit relationship for delta smelt is weak, accounting for about a quarter of the variability in recruitment (Sweetnam and Stevens 1993). This relationship does indicate, however, that factors affecting numbers of spawning adults (e.g., entrainment, toxics, and predation) can have an effect on delta smelt numbers the following year.

Delta smelt feed primarily on (1) planktonic copepods (small crustaceans used by fish for food),

(2) cladocerans (small crustaceans used by fish for food), (3) amphipods (small crustaceans used by fish for food) and, to a lesser extent, (4) on insect larvae. Larger fish may also feed on the opossum shrimp (*Neomysis mercedis*). The most important food organism for all sizes seems to be the euryhaline copepod (*Eurytemora affinis*), although in recent years the exotic species, *Pseudodiaptomus forbesi*, has become a major part of the diet (Moyle *et al.* 1992). Delta smelt are a minor prey item of juvenile and subadult striped bass (*Morone saxatilis*) in the Sacramento-San Joaquin Delta (Stevens 1966). They also have been reported from the stomach contents of white catfish (*Ameiurus catus*) (Turner 1966 *in* Turner and Kelley (eds) 1966) and black crappie (*Pomoxis nigromaculatus*) (Turner 1966 *in* Turner and Kelley 1966) in the Delta.

Abundance. The smelt is endemic to Suisun Bay upstream of San Francisco Bay and throughout the Delta, in Contra Costa, Sacramento, San Joaquin, Solano and Yolo counties, California. Historically, the smelt is thought to have occurred from Suisun Bay and Montezuma Slough, upstream to at least Verona on the Sacramento River, and Mossdale on the San Joaquin River (Moyle *et al.* 1992, Sweetnam and Stevens 1993).

Since the 1850s, however, the amount and extent of suitable habitat for the delta smelt has declined dramatically. The advent in 1853 of hydraulic mining in the Sacramento and San Joaquin rivers led to an increase in siltation and the alteration of the circulation patterns of the Estuary (Nichols *et al.* 1986, Monroe and Kelly 1992). The reclamation of Merritt Island for agricultural purposes, in the same year, marked the beginning of the present-day cumulative loss of 94% of the Estuary's tidal marshes (Nichols *et al.* 1986, Monroe and Kelly 1992). The extensive levee system in the Delta has led to a loss of seasonally flooded habitat and significantly changed the hydrology of the Delta ecosystem, restricting the ability of suitable habitat substrates to re-vegetate.

Delta smelt were once one of the most common pelagic (living in open water away from the bottom) fish in the upper Sacramento-San Joaquin estuary, as indicated by its abundance in DFG trawl catches (Erkkila *et al.* 1950; Radtke 1966; Stevens and Miller 1983). Delta smelt abundance from year to year has fluctuated greatly in the past, but between 1982 and 1992 their population was consistently low. The decline became precipitous in 1982 and 1983 due to extremely high outflows and continued through the drought years 1987-1992 (Moyle *et al.* 1992). In 1993, numbers increased considerably, apparently in response to a wet winter and spring. During the period 1982-1992, most of the population was confined to the Sacramento River channel between Collinsville and Rio Vista (D. Sweetnam, DFG unpublished data). This was still an area of high abundance in 1993, but delta smelt were also abundant in Suisun Bay. The actual size of the delta smelt population is not known. However, the pelagic life style of delta smelt, short life span, spawning habits, and relatively low fecundity indicate that a fairly substantial population probably is necessary to keep the species from becoming extinct. Recreation in the Delta has resulted in the presence and propagation of predatory non-native fish such as striped bass. Additionally, recreational boat traffic has led to a loss of habitat from the building of docks and an increase in the rate of erosion resulting from boat wakes. In addition to the loss of habitat, erosion reduces the water quality and retards the production of phytoplankton in the Delta.

In addition to the degradation and loss of estuarine habitat, delta smelt have been increasingly subject to entrainment, upstream or reverse flows of waters in the Delta and San Joaquin River, and constriction of low salinity habitat to deep-water river channels of the interior Delta (Moyle *et al.* 1992). These adverse conditions are primarily a result of the steadily increasing proportion of river flow being diverted from the Delta by the Projects, and occasional droughts (Monroe and Kelly 1992).

Reduced water quality from agricultural runoff, effluent discharge and boat effluent has the potential to harm the pelagic larvae and reduce the availability of the planktonic food source. When the mixing zone is located in Suisun Bay where there is extensive shallow water habitat within the euphotic zone (depths less than four meters), high densities of phytoplankton and zooplankton may accumulate (Arthur and Ball 1978, 1979, 1980). The introduction of the Asian clam (*Potamocorbula amurensis)*, a highly efficient filter feeder, presently reduces the concentration of phytoplankton in this area.

According to seven abundance indices which provide information on the status of the delta smelt, this species was consistently at low population levels through the 1980's (Stevens *et al.* 1990). These same indices also showed a pronounced decline from historical levels of abundance (Stevens *et al.* 1990). For a large part of its annual life span, this species is associated with the freshwater edge of the mixing zone, where the salinity is approximately 2 ppt. (also described as X2) (Ganssle 1966, Moyle *et al.* 1992, Sweetnam and Stevens 1993). The relationship between the portion of the smelt population west of the Delta as sampled in the summer townet survey and the natural logarithm of Delta outflow from 1959 to 1988, indicates the summer townet index increased dramatically when outflow was between 34,000 and 48,000 cubic feet per second, placing X2 between Chipps and Roe islands (DWR and Reclamation 1994).

Specifically, the summer townet abundance index constitutes one of the more representative indices because the data have been collected over a wide geographic area (from San Pablo Bay upstream through most of the Delta) for the longest period of time (since 1959) (DFG 2001). The summer townet abundance index measures the abundance and distribution of juvenile delta smelt and provides data on the recruitment potential of the species (DFG 2001). Since 1983, (except for 1986, 1993, and 1994), this index has remained at consistently lower levels than previously found (DFG 2001). These consistently lower levels correlate with the 1983 to 1992 mean location of X2 upstream of the confluence (DFG 2001). The final summer townet index for 2000 was 8.0, a decline from the 11.9 index for the 1999 summer townet. Both of these indices represent an increase from the 1998 index of 3.3. These higher townet indices were followed by the 2001 (3.5), 2002 (4.7), 2003 (1.6), 2004 (2.9) and 2005 (0.3) indices which were well below the pre-decline average of 20.4 (1959-1981, no sampling in 1966-68) (DFG 2005).

The second longest running survey (since 1967), the fall midwater trawl survey (FMWT), measures the abundance and distribution of late juveniles and adult delta smelt in a large geographic area from San Pablo Bay upstream to Rio Vista on the Sacramento River and Stockton on the San Joaquin River (Stevens *et al.* 1990, DFG 1999). The FMWT indicates the abundance of the adult population just prior to upstream spawning migration (DFG 1999). The index calculated from the FMWT uses numbers of sampled fish multiplied by a factor related to the volume of the area sampled (DFG 1999). Until recently, except for 1991, this index has declined irregularly over the past 20 years (DFG 1999). Since 1983, the delta smelt population has exhibited more low FMWT abundance indices, for more consecutive years, than previously recorded (DFG 1999). The 1994 FMWT index of 101.2 was a continuation of this trend (DFG 1999). This occurred despite the high 1994 summer townet index for reasons unknown (DFG 1999). The low 1995 summer townet index value of 3.3 was followed by a high FMWT index of 839 reflecting the benefits of higher flows due to an extremely wet year (DFG 1999, 2001). The 1999 FMWT index of 717, which is an increase from 1998's index (417.6), is the third highest since the start of decline of delta smelt abundance in 1982 (DFG 1999). The FMWT abundance index (127) for 1996 represented the sixth lowest on record (DFG 1999). The 1997 abundance index (360.8) almost tripled since the 1996 survey, despite the low summer townet index (4.0) (DFG 1999, 2001).

Both 2001 TNS and FMWT abundance indices for delta smelt decreased from 2000 (Souza and Bryant 2002, DFG 1999 and 2001). The 2001 TNS delta smelt index (3.5) is less than 1999 (11.9) and 2000 (8.0) but comparable to recent years (1995, 1997, and 1998) when the index ranged from 3.2 to 4.0 (Souza and Bryant 2002, DFG 2001). The 2001 FMWT delta smelt index (603) decreased by 20% from 2000 (756) (Souza and Bryant 2002, DFG 2001). Both surveys exhibited an overall trend of decline in the last three years, but this decline seems more pronounced in the TNS where the 2001 delta smelt index is 95% lower than the greatest index of record (62.5) in 1978 (Souza and Bryant 2002, DFG 2001). The 2002 TNS was 4.7 and then dropped to 1.6 in 2003. The 2002 FMWT index (139) was the seventh lowest on record and the 2003 index was 210. The 2004 TNS index increase to 2.9 but then fell in 2005 to 0.3. The 2004 and 2005 FMWT abundance indices fell to their lowest levels of 74 and 26 respectively. The lowest indices on record for both surveys occurred in 2005 (DFG 2005).

In response to the recent dramatic declines of several species in the Delta, the Interagency Ecological Program (IEP) was instructed to prepare and implement a series of studies to define and understand the nature of the declines, known as the Pelagic Organism Decline (POD). A conceptual model has been constructed based on three factors acting individually or in concert to lower pelagic productivity. They are: 1) contaminants, 2) introduced or invasive species, and 3) water project operations including diverting water for use in Southern California. A triage approach was chosen for 2005 to gain preliminary information that could identify potential causes of these population declines, and to help prioritize future investigations (DFG and DWR 2005).

The Delta Smelt Larval Survey (DSLS), an additional survey initiated in 2005 by DFG, will help determine timing, distribution, and abundance of larvae within the upper San Francisco Estuary. The new survey will also help estimate larval delta smelt losses and determine the magnitude of entrainment of larval delta smelt at the CVP and SWP intakes.

Swimming Behavior. Observations of delta smelt swimming in a swimming flume and in a large tank show that these fish are unsteady, intermittent, slow speed swimmers (Swanson and Cech 1995). At low velocities in the swimming flume (<3 body lengths per second), and during spontaneous, unrestricted swimming in a 1 m tank, smelt consistently swam with a "stroke and glide" behavior. This type of swimming is very efficient; Weihs (1974) predicted energy savings of about 50% for "stroke and glide" swimming compared to steady swimming. However, the maximum speed smelt are able to achieve using this mode of swimming is less than 3 body lengths per second, and the fish did not readily or spontaneously swim at this or higher speeds (Swanson and Cech 1995). Although juvenile delta smelt appear to be stronger swimmers than adults, forced swimming at 3 body lengths per second in a swimming flume was apparently stressful; the smelt were prone to swimming failure and extremely vulnerable to impingement (Swanson and Cech 1995). Delta smelt swimming performance was limited by behavioral rather than physiological or metabolic constraints (Brett 1976).

Summary of the Five Year Review. In summary, the threats of the destruction, modification, or curtailment of its habitat or range resulting from extreme outflow conditions, the operations of the State and Federal water projects, and other water diversions as described in the original listing remain. The only new information concerning the delta smelt's population size and extinction probability indicates that the population is at risk of falling below an effective population size and therefore in danger of becoming extinct. Although the Vernalis Adaptive Management Program and Environmental Water Account have helped to ameliorate these threats, it is unclear how effective these will continue to be over time based on available funding and future demands for water. In addition, there are increased water demands outside the CVP and the SWP, which could also impact delta smelt. The increases in water demands are likely to result in less suitable rearing conditions for delta smelt, increased vulnerability to entrainment, and less water available for maintaining the position of X2. The importance of exposure to toxic chemicals on the population of delta smelt is highly uncertain. Therefore, a recommendation to delist the delta smelt is inappropriate.

In addition, many potential threats have not been sufficiently studied to determine their effects, such as predation, disease, competition, and hybridization. Therefore, a recommendation of a change in classification to endangered is premature.

In his August 24, 2003, letter, the foremost delta smelt expert, Dr. Peter B. Moyle, stated that the delta smelt should continue to be listed as a threatened species (Moyle 2003). In addition, in their January 23, 2004, letter, DFG fully supported that the delta smelt should retain its threatened status under the Act (DFG 2004).

Delta Smelt Critical Habitat

In determining which areas to designate as critical habitat, the Service considers those physical and biological features that are essential to a species' conservation and that may require special management considerations or protection (50 **CFR** §424.12(b)).

The Service is required to list the known primary constituent elements together with the critical habitat description. Such physical and biological features include, but are not limited to, the following:

1. space for individual and population growth, and for normal behavior;

2. food, water, air, light, minerals, or other nutritional or physiological requirements;

3. cover or shelter;

4. sites for breeding, reproduction, rearing of offspring, germination, or seed dispersal; and

5. generally, habitats that are protected from disturbance or are representative of the historic geographical and ecological distributions of a species.

In designating critical habitat for the delta smelt, the Service identified the following primary constituent elements essential to the conservation of the species: physical habitat, water, river flow, and salinity concentrations required to maintain delta smelt habitat for spawning, larval and juvenile transport, rearing, and adult migration. Specific areas that have been identified as important delta smelt spawning habitat include Barker, Lindsey, Cache, Prospect, Georgiana, Beaver, Hog, and Sycamore sloughs and the Sacramento River in the Delta, and tributaries of northern Suisun Bay.

Larval and juvenile transport. Adequate river flow is necessary to allow larvae from upstream spawning areas to move to rearing habitat in Suisun Bay and to ensure that rearing habitat is maintained in Suisun Bay. To ensure this, X2 must be located westward of the confluence of the Sacramento-San Joaquin Rivers, located near Collinsville (Confluence), during the period when larvae or juveniles are being transported, according to historical salinity conditions. X2 is important because the "entrapment zone" or zone where particles, nutrients, and plankton are "trapped," leading to an area of high productivity, is associated with its location. Habitat conditions suitable for transport of larvae and juveniles may be needed by the species as early as February 1 and as late as August 31, because the spawning season varies from year to year and may start as early as December and extend until July.

Rearing habitat. An area extending eastward from Carquinez Strait, including Suisun, Grizzly, and Honker bays, Montezuma Slough and its tributary sloughs, up the Sacramento River to its confluence with Three Mile Slough, and south along the San Joaquin River including Big Break, defines the specific geographic area critical to the maintenance of suitable rearing habitat. Three Mile Slough represents the approximate location of the most upstream extent of historical tidal incursion. Rearing habitat is vulnerable to impacts of export pumping and salinity intrusion from the beginning of February to the end of August.

Adult migration. Adequate flow and suitable water quality is needed to attract migrating adults in the Sacramento and San Joaquin river channels and their associated tributaries, including Cache and Montezuma sloughs and their tributaries. These areas are vulnerable to physical disturbance and flow disruption during migratory periods.

The Service's 1994 and 1995 biological opinions on the operations of the CVP and SWP provided for adequate larval and juvenile transport flows, rearing habitat, and protection from entrainment for upstream migrating adults (Service 1994c, 1995). Please refer to 59 **FR** 65255 for additional information on delta smelt critical habitat.

Giant Garter Snake

Listing. The Service published a proposal to list the giant garter snake as an endangered species on December 27, 1991 (56 **FR** 67046). The Service reevaluated the status of the snake before adopting the final rule, which listed as a threatened species on October 20, 1993 (58 **FR** 54053).

Description. The giant garter snake is one of the largest garter snakes species reaching a total length of approximately 64 inches. Females tend to be slightly longer and proportionately heavier than males. Generally, the snakes have a dark dorsal background color with pale dorsal and lateral stripes, although coloration and pattern prominence are geographically and individually variable (Hansen 1980; Rossman *et al.* 1996).

Historical and Current Range. Giant garter snakes formerly occurred throughout the wetlands that were extensive and widely distributed in the Sacramento and San Joaquin Valley floors of California (Fitch 1940; Hansen and Brode 1980; Rossman and Stewart 1987). The historical range of the snake is thought to have extended from the vicinity of Chico, Butte County, southward to Buena Vista Lake, near Bakersfield, in Kern County (Fitch 1940; Fox 1948; Hansen and Brode 1980; Rossman and Stewart 1987). Early collecting localities of the giant garter snake coincide with the distribution of large flood basins, particularly riparian marsh or slough habitats and associated tributary streams (Hansen and Brode 1980). Loss of habitat due to agricultural activities and flood control have extirpated the snake from the southern one third of its range in former wetlands associated with the historic Buena Vista, Tulare, and Kern lake beds (Hansen 1980; Hansen and Brode 1980).

Upon federal listing in 1993, the Service identified 13 separate populations of giant garter snakes, with each population representing a cluster of discrete locality records (Service 1993). The 13 populations largely coincide with historical flood basins and tributary streams throughout the Central Valley: (1) Butte Basin, (2) Colusa Basin, (3) Sutter Basin, (4) American Basin, (5) Yolo Basin/Willow Slough, (6) Yolo Basin/Liberty Farms, (7) Sacramento Basin, (8) Badger Creek/Willow Creek, (9) Caldoni Marsh/White Slough, (10) East Stockton--Diverting Canal & Duck Creek, (11) North and South Grasslands, (12) Mendota, and (13) Burrel/Lanare.

The known range of the giant garter snake has changed little since the time of listing. In 2005, giant garter snakes were observed at the City of Chico's wastewater treatment facility, approximately ten miles north of what was previously believed to be the northernmost extent of the species' range (D. Kelly pers. comm. 2006; E. Hansen pers. comm. 2006). The southernmost known occurrence is at the Mendota Wildlife Area in Fresno County. No sightings of giant garter snakes south of Mendota Wildlife Area within the historic range of the species have been made since the time of listing (Hansen 2002).

Essential Habitat Components. Endemic to wetlands in the Sacramento and San Joaquin valleys, the giant garter snake inhabits marshes, sloughs, ponds, small lakes, low gradient streams, and other waterways and agricultural wetlands, such as irrigation and drainage canals, rice fields and the adjacent uplands (Service 1999). Essential habitat components consist of: (1) wetlands with adequate water during the snake's active season (early-spring through mid-fall) to provide food and cover; (2) emergent, herbaceous wetland vegetation, such as cattails and bulrushes, for escape cover and foraging habitat during the active season; (3) upland habitat with grassy banks and openings in waterside vegetation for basking; and (4) higher elevation uplands for over-wintering habitat with escape cover (vegetation, burrows) and underground refugia (crevices and small mammal burrows) (Hansen 1988). Snakes are typically absent from larger rivers and other bodies of water that support introduced populations of large, predatory fish, and from wetlands with sand, gravel, or rock substrates (Hansen 1988; Hansen and Brode 1980; Rossman and Stewart 1987). Riparian woodlands do not provide suitable habitat because of excessive shade, lack of basking sites, and absence of prey populations (Hansen 1988).

Foraging Ecology. Giant garter snakes are the most aquatic garter snake species and are active foragers, feeding primarily on aquatic prey such as fish and amphibians (Fitch 1941). Because the giant garter snake's historic prey species are either declining, extirpated, or extinct, the predominant food items are now introduced species such as carp (*Cyprinus carpio*), mosquito-fish (*Gambusia affinis*), larval and sub-adult bullfrogs (*Rana catesbiana*), and Pacific chorus frogs (*Pseudacris regilla*) (Fitch 1941; Hansen 1988; Hansen and Brode 1980, 1993; Rossman *et al.* 1996).

Reproductive Ecology. The giant garter snake breeding season extends through March and April, and females give birth to live young from late July through early September (Hansen and Hansen 1990). Although growth rates are variable, young typically more than double in size by one year of age, and sexual maturity averages three years in males and five years for females (Service 1993b).

Movements and Habitat Use. The giant garter snake is highly aquatic but also occupies a terrestrial niche (Service 1999; Wylie *et al.* 2004a). The snake typically inhabits small mammal burrows and other soil and/or rock crevices during the colder months of winter (i.e., October to April) (Hansen and Brode 1993; Wylie *et al.* 1995; Wylie *et al.* 2003a), and also uses burrows as refuge from extreme heat during its active period (Wylie *et al.* 1997; Wylie *et al.* 2004a). While individuals usually remain in close proximity to wetland habitats, the Biological Resource Division of the U.S. Geological Survey (BRD) has documented snakes using burrows as much as 165 feet away from the marsh edge to escape extreme heat, and as far as 820 feet from the edge of marsh habitat for over-wintering habitat (Wylie *et al.* 1997).

In studies of marked snakes in the Natomas Basin, snakes moved about 0.25 to 0.5 miles per day (Hansen and Brode 1993). Total activity, however, varies widely between individuals; individual snakes have been documented to move up to 5 miles over a few days in response to dewatering of habitat (Wylie *et al.* 1997) and to use up to more than 8 miles of linear aquatic habitat over the course of a few months. Home range (area of daily activity) averages about 61 acres in both the Natomas Basin and the Colusa National Wildlife Refuge (NWR) (Wylie 1998a; Wylie *et al.* 2002), yet can be as large as 9,252 acres (Wylie and Martin 2004).

Rice fields have become important habitat for giant garter snakes, particularly associated canals and their banks for both spring and summer active behavior and winter hibernation (Hansen 2004; Wylie 1998b). While within the rice fields, snakes forage in the shallow water for prey, utilizing rice plants and vegetated berms dividing rice checks for shelter and basking sites (Hansen and Brode 1993). In the Natomas Basin, habitat used consisted almost entirely of irrigation ditches and established rice fields (Wylie 1998a; Wylie *et al.* 2004b), while in the Colusa NWR, snakes were regularly found on or near edges of wetlands and ditches with vegetative cover (Wylie *et al.* 2003a). Telemetry studies also indicate that active snakes use uplands extensively, particularly where vegetative cover exceeds 50 percent in the area (Wylie 1998b).

Predators. Giant garter snakes are killed and/or eaten by a variety of predators, including raccoons (*Procyon lotor*), striped skunks (*Mephitis mephitis*), opossums (*Didelphis virginiansa*), bull frogs (*Rana catesbiana*), hawks (*Buteo* sp.), egrets (*Casmerodius albus, Egretta thula*), river otters (*Ludra canadensis),* and great blue herons (*Ardea herodias*) (Dickert 2003; Wylie *et al.* 2003c; G. Wylie pers. comm. 2006). Many areas supporting snakes have been documented to have abundant predators; however, predation does not seem to be a limiting factor in areas that provide abundant cover, high concentrations of prey items, and connectivity to a permanent water source (Hansen and Brode 1993; Wylie *et al.* 1995).

Reasons for Decline and Threats to Survival. The current distribution and abundance of the giant garter snake is much reduced from former times (Service 1999). Prior to reclamation activities beginning in the mid- to late-1800s, about 60 percent of the Sacramento Valley was subject to seasonal overflow flooding providing expansive areas of snake habitat (Hinds 1952). Now, less than 10 percent, or approximately 319,000 acres, of the historic 4.5 million acres of Central Valley wetlands remain (U.S. Department of Interior 1994), of which very little provides habitat suitable for the giant garter snake. Loss of habitat due to agricultural activities and flood control have extirpated the snake from the southern one-third of its range in former wetlands associated with the historic Buena Vista, Tulare, and Kern lakebeds (Hansen 1980; Hansen and Brode 1980).

Valley flood wetlands are now subject to cumulative effects of upstream watershed modifications, water storage and diversion projects, as well as urban and agricultural development. The CVP, the largest water management system in California, created an ecosystem altered to such an extent that remaining wetlands depend on highly managed water regimes (U.S. Department of Interior 1994). Further, the implementation of CVP has resulted in conversion of native habitats to agriculture, and has facilitated urban development through the Central Valley (Service 1999). For instance, residential and commercial growth with the Central Valley is consuming an estimated 15,000 acres of Central Valley farmland each year (American Farmland Trust 1999), with a project loss of more than one million acres by the year 2040 (USGS 2003). Environmental impacts associated with urbanization include loss of biodiversity and habitat, alternation of natural fire regimes, fragmentation of habitat from road construction, and degradation due to pollutants. Further, encroaching urbanization can inhibit rice cultivation (J. Roberts pers. comm. 2006). Rapidly expanding cities within the snake's range include Chico, Yuba City, the Sacramento area, Galt, Stockton, Gustine, and Los Banos.

Ongoing maintenance of aquatic habitats for flood control and agricultural purposes eliminates or prevents the establishment of habitat characteristics required by snakes (Hansen 1988). Such practices can fragment and isolate available habitat, prevent dispersal of snakes among habitat units, and adversely affect the availability of the snake's food items (Hansen 1988; Brode and Hansen 1992). For example, tilling, grading, harvesting and mowing may kill or injure giant garter snakes (Service 2003; Wylie *et al.* 1997). Biocides applied to control aquatic vegetation reduce cover for the snake and may harm prey species (Wylie *et al.* 1995). Rodent control threatens the snake's upland estivation habitat (Wylie *et al.* 1995; Wylie *et al.* 2004a). Restriction of suitable habitat to water canals bordered by roadways and levee tops renders snakes vulnerable to vehicular mortality (Wylie *et al.* 1997). Rolled erosion control products, which are frequently used as temporary berms to control and collect soil eroding from constriction sites, can entangle and kill snakes (Stuart *et al.* 2001; Barton and Kinkead 2005). Livestock grazing along the edges of water sources degrades water quality and can contribute to the elimination and reduction of available quality snake habitat (Hansen 1988; E. Hansen, pers. comm.. 2006), and giant garter snakes have been observed to avoid areas that are grazed (Hansen 2003). Fluctuation in rice and agricultural production affects stability and availability of habitat (Paquin *et al.* 2006; Wylie and Casazza 2001; Wylie *et al.* 2003b, 2004b).

Other land use practices also currently threaten the survival of the snake. Recreational activities, such as fishing, may disturb snakes and disrupt thermoregulation and foraging activities (E. Hansen pers. comm. 2006). While large areas of seemingly suitable snake habitat exist in the form of duck clubs and waterfowl management areas, water management of these areas typically does not provide the summer water needed by the species (Beam and Menges 1997; Dickert 2005; Paquin *et al.* 2006).

Nonnative predators, including introduced predatory game fish, bullfrogs, and domestic cats, can threaten snake populations (Dickert 2003; Hansen 1986; Service 1993; Wylie *et al.* 1996; Wylie *et al.* 2003c). Nonnative competitors, such as the introduced water snake (*Nerodia fasciata*) in the American River and associated tributaries near Folsom, may also threaten the giant garter snake (Stitt *et al.* 2005).

The disappearance of giant garter snakes from much of the west side of the San Joaquin Valley was approximately contemporaneous with the expansion of subsurface drainage systems in this area, providing circumstantial evidence that the resulting contamination of ditches and sloughs with drainwater constituents (principally selenium) may have contributed to the demise of giant garter snake populations. Dietary uptake is the principle route of toxic exposure to selenium in wildlife, including giant garter snakes (Beckon *et al.* 2003). Many open ditches in the northern San Joaquin Valley carry subsurface drainwater with elevated concentrations of selenium, and green sunfish (*Lepomis cyanellus*) have been found to have concentrations of selenium within the range of concentrations associated with adverse affects on predator aquatic reptiles (Hopkins *et al.* 2002; Saiki 1998). Studies on the effects of selenium on snakes suggest that snakes with high selenium loads in their internal organs can transfer potentially toxic quantities of selenium to their eggs (Hopkins *et al.* 2004) and also demonstrate higher rates of metabolic activity than uncontaminated snakes (Hopkins *et al.* 1999).

Status with Respect to Recovery. The draft recovery plan for the giant garter snake subdivides its range into three proposed recovery units (Service 1999): (1) Sacramento Valley Recovery Unit; (2) Mid-Valley Recovery Unit; (3) San Joaquin Valley Recovery Unit; and (4) South Valley Recovery Unit.

The Sacramento Valley Unit at the northern end of the species' range contains sub-populations in the Butte Basin, Colusa Basin, and Sutter Basin (Service 1999; Service 2006). Protected snake habitat is located on State refuges and refuges of the Sacramento National Wildlife Refuge (NWR) Complex in the Colusa and Sutter Basins. Suitable snake habitat is also found in low gradient streams and along waterways associated with rice farming. This northernmost recovery unit is known to support relatively large, stable sub-populations of giant garter snakes (Wylie *et al.* 1995; Wylie *et al.* 1997; Wylie *et al.* 2002; Wylie *et al.* 2003a; Wylie *et al.* 2004a). Habitat corridors connecting subpopulations, however, are either not present or not protected, and are threatened by urban encroachment.

The Mid-Valley Unit includes sub-populations in the American, Yolo, and Delta Basins (Service 1999; Service 2006). The status of Mid-Valley sub-populations is very uncertain; each is small, highly fragmented, and located on isolated patches of limited quality habitat that is increasingly threatened by urbanization (E. Hansen 2002, 2004; Service 1993b; Wylie 2003; Wylie and Martin 2004; Wylie *et al.* 2004b; Wylie *et al.* 2005; G. Wylie pers. comm. 2006). The American Basin sub-population, although threatened by urban development, receives protection from the Metro Air Park and Natomas Basin Habitat Conservation Plans, which share a regional strategy to maintain a viable snake sub-population in the basin.

The San Joaquin Valley Unit, which includes sub-populations in the San Joaquin Basin, formerly supported large snake populations, but numbers have severely declined, and recent survey efforts indicate numbers are extremely low compared to Sacramento Valley sub-populations (Dickert 2002, 2003; Hansen 1988; Williams and Wunderlich 2003; Wylie 1998a). Giant garter snakes currently occur in the northern and central San Joaquin Basin within the Grassland Wetlands of Merced County and the Mendota Wildlife Area of Fresno County; however, these sub-populations remain small, fragmented, and unstable, and are probably decreasing (Dickert 2003, 2005; G. Wylie pers. comm., 2006).

The South Valley Unit included sub-populations in the Tulare Basin, however, agricultural and flood control activities are presumed to have extirpated the snake from the Tulare Basin (Hansen 1995). Comprehensive surveys for this area are lacking and where habitat remains, the giant garter snake may be present.

Since 1995, BRD has studied snake sub-populations at the Sacramento, Delevan, and Colusa NWRs and in the Colusa Basin Drain within the Colusa Basin, at Gilsizer Slough within the Sutter Basin, at the Badger Creek area of the Cosumnes River Preserve within the Badger Creek/Willow Creek area of the Delta Basin, and in the Natomas Basin within the American Basin (Hansen 2003, 2004; Wylie 1998a, 1998b, 2003; Wylie *et al.* 1995; Wylie *et al.* 2002; Wylie *et al.* 2003a, 2004a; Wylie *et al.* 2003b, 2004b). These areas contain the largest extant giant garter snake sub-populations. Outside of protected areas, however, snakes are still subject to all threats identified in the final rule. The other sub-populations are distributed discontinuously in small, isolated patches, and are vulnerable to extirpation by stochastic environmental, demographic, and genetic processes (Goodman 1987).

The revised draft recovery criteria require multiple, stable sub-populations within each of the three recovery units, with sub-populations well-connected by corridors of suitable habitat. This entails that corridors of suitable habitat between existing snake sub-populations be maintained or created to enhance sub-population interchange to offset threats to the species (Service 2003). Currently, only the Sacramento Valley Recovery Unit is known to support relatively large, stable giant garter snake populations. Habitat corridors connecting sub-populations, even in the Sacramento Valley Recovery Unit, are either not present or not protected. Overall, the future availability of habitat in the form of canals, ditches, and flooded fields are subject to market-driven crop choices, agricultural practices, and urban development, and are, thus, uncertain and unpredictable.

Summary of the Five Year Review. The abundance and distribution of giant garter snakes has not changed significantly since the time of listing. Although some snakes have been rediscovered in several southern populations that were thought to be extirpated, these populations remain in danger of extirpation because their numbers remain very low and the habitat is of low quality.

By far the most serious threats to giant garter snake continue to be loss and fragmentation of habitat from urban and agricultural development and loss of habitat associated with changes in rice production. Activities such as water management that are associated with habitat loss are also of particular concern because they exacerbate the losses from development and from loss of rice production. The remaining threats (such as from introduced predators, roads, erosion control) are secondary to such habitat loss although habitat fragmentation could become a critical issue in the snake's survival should large scale habitat changes occur. Populations range-wide are largely isolated from one another and from remaining suitable habitat. Without hydrologic links to suitable habitat during periods of drought, flooding, or diminished habitat quality, the snake's status will decline.

Because the giant garter snake continues to be threatened by various forms of habitat loss, we believe that it continues to meet the definition of a threatened species and recommend that its status be unchanged.

Environmental Baseline

Delta Smelt

Adult delta smelt spawn in central Delta sloughs from February through August in shallow water areas having submersed aquatic plants and other suitable substrates and refugia. These shallow water areas have been identified in the Delta Native Fishes Recovery Plan (Recovery Plan) (Service 1996) as essential to the long-term survival and recovery of delta smelt and other resident fish. A no net loss strategy of delta smelt population and habitat is proposed in this Recovery Plan.

The delta smelt is adapted to living in the highly productive Estuary where salinity varies spatially and temporally according to tidal cycles and the amount of freshwater inflow. Despite this tremendously variable environment, the historical Estuary probably offered relatively consistent spring transport flows that moved delta smelt juveniles and larvae downstream to the mixing zone (Peter Moyle, U.C. Davis pers. comm.). Since the 1850's, however, the amount and extent of suitable habitat for the delta smelt has declined dramatically. The advent in 1853 of hydraulic mining in the Sacramento and San Joaquin rivers led to increased siltation and alteration of the circulation patterns of the Estuary (Nichols *et al.* 1986, Monroe and Kelly 1992). The reclamation of Merritt Island for agricultural purposes, in the same year, marked the beginning of the present-day cumulative loss of 94 percent of the Estuary's tidal marshes (Nichols *et al.* 1986, Monroe and Kelly 1992).

In addition to the degradation and loss of estuarine habitat, the delta smelt has been increasingly subject to entrainment, upstream or reverse flows of waters in the Delta and San Joaquin River, and constriction of low salinity habitat to deep-water river channels of the interior Delta (Moyle et al. 1992). These adverse conditions are primarily a result of drought and the steadily increasing proportion of river flow being diverted from the Delta by the CVP and SWP (Monroe and Kelly 1992). The relationship between the portion of the delta smelt population west of the Delta as sampled in the summer townet survey and the natural logarithm of Delta outflow from 1959 to 1988 (Department and Reclamation 1994). This relationship indicates that the summer townet index increased dramatically when outflow was between 34,000 and 48,000 cfs which placed X2 between Chipps and Roe islands. Placement of X2 downstream of the Confluence, Chipps and Roe islands provides delta smelt with low salinity and protection from entrainment, allowing for productive rearing habitat that increases both smelt abundance and distribution.

The results of seven surveys conducted by the IEP corroborate the dramatic decline in delta smelt. Existing baseline conditions, as mandated for delta smelt under the Service's consultations on CVP operations (Service 1994b, 1995), provide sufficient Delta outflows from February 1 through June 30 to allow larval and juvenile delta smelt to move out of the "zone of influence" of the CVP and SWP pumps, and provide them low salinity, productive rearing habitat. This zone of influence has been delineated by DWR's Particle Tracking Model and expands or contracts with CVP and SWP combined pumping increases or decreases, respectively (DWR and Reclamation 1993). With tidal effects contributing additional movement, the influence of the pumps may entrain larvae and juveniles as far west as the Confluence.

According to seven abundance indices designed to record trends in the status of the delta smelt, this species was consistently at low population levels during the last ten years (Stevens *et al.* 1990). These same indices also show a pronounced decline from historical levels of abundance (Stevens *et al.* 1990). The summer townet abundance index constitutes one of the more representative indices because the data have been collected over a wide geographic area (from San Pablo Bay upstream through most of the Delta) for the longest period of time (since 1959). The summer townet abundance index measures the abundance and distribution of juvenile delta smelt and provides data on the recruitment potential of the species. Except for three years since 1983 (1986, 1993, and 1994), this index has remained at consistently lower levels than experienced previously. As indicated, these consistently lower levels correlate with the 1983 to 1992 mean location of X2 upstream of the Confluence, Chipps and Roe islands.

The second longest running survey (since 1967), the fall midwater trawl survey (FMWT), measures the abundance and distribution of late juveniles and adult delta smelt in a large geographic area from San Pablo Bay upstream to Rio Vista on the Sacramento River and Stockton on the San Joaquin River (Stevens *et al.* 1990). The fall midwater trawl provides an indication of the abundance of the adult population just prior to upstream spawning migration. The index that is calculated from the FMWT survey uses numbers of sampled fish multiplied by a factor related to the volume of the area sampled. Until recently, except for 1991, this index has declined irregularly over the past 20 years. Since 1983, the delta smelt population has exhibited more low fall midwater trawl abundance indices, for more consecutive years, than previously recorded. The 1994 FMWT index of 101.7 is a continuation of this trend. This occurred despite the high 1994 summer townet index for reasons unknown. The 1995 summer townet was a low index value of 319 but resulted in a high FMWT index of 898.7 reflecting the benefits of large transport and habitat maintenance flows with the Bay-Delta Accord in place and a wet year. The abundance index of 128.3 for 1996 represented the fourth lowest on record. The abundance index of 305.6 for 1997 demonstrated that the relative abundance of delta smelt almost tripled over last years results, and delta smelt abundance continued to rise, peaking in 1999 to an abundance index of 863, only to fall back down to the low abundance. The lowest indices on record for both surveys occurred in 2005. The summer townet index was 0.3 and the fall midwater index was 26 (DFG 2005). The 2006 summer townet .index for delta smelt is 0.4. Additional sampling outside of the historical sampling area indicates that this index may be biased low due to fish outside the sampling area (DFG 2006).

The project is within delta smelt critical habitat. Service and DFG studies have recorded delta smelt in vicinity of the project site and other study sites. Therefore, the Service considers that delta smelt occur within the action area.

Giant Garter Snake

The overall status of the giant garter snake has not improved since its listing. Based on scarcity of suitable habitat and limited population size, at listing, threats to the Delta Basin population were considered imminent (Service 1993b). The status of the Delta Basin sub-population has been, and continues to be, impacted by past and present Federal, state, private, and other human activities.

A number of State, local, private, and unrelated Federal actions have occurred within the action area and adjacent regions affecting the environmental baseline of the species. Some of these projects have been subject to prior section 7 consultation. These actions have resulted in both direct and indirect effects to snake habitat within the region. Projects affecting the environment in and around the action area include the improvement of the Northgate Boulevard/Arden-Garden Connector Intersection, the widening of Bond Road, construction of the Interstate 5/Consumnes River Boulevard Interchange, the Freeport Regional Water Diversion project, the Rivermont Drive Bridge project, the Rio Vista Northwest Wastewater Treatment project, the widening of

Calvine Road, and the Kramer Ranch North project. In the past ten years, the Service has authorized take resulting in the permanent loss of more than 21 acres of aquatic and 53 acres of upland snake habitat, as well as temporary alteration of over 1,700 acres of aquatic and 650 acres of upland snake habitat in the Delta Basin.

Numerous recent development projects have been constructed in or near snake habitat in the rapidly developing areas in and around the cities of Sacramento, Elk Grove, Galt, and Stockton. Urban and commercial development results in direct habitat loss and also may expose snakes to secondary effects including water pollution from urban run-off and increased vehicular mortality, both of which act in concert with rapid habitat loss and degradation to further threaten the snake in the Delta Basin. Also, development promotes road widening and bridge replacements, such as those authorized under section 7, which result in direct alteration of snake habitat. Most documented snake localities and/or movement corridors have been adversely impacted by development, including freeway construction, flood control projects, and commercial development. Further, several former localities are known to have been lost and/or depleted to that extent that continued viability is in question (Brode and Hansen 1992). The scarcity of remaining suitable habitat, flooding, stochastic processes, and continued threats of habitat loss pose a severe imminent threat to giant garter snakes in the Delta Basin.

Ongoing agricultural and flood control activities in the Delta Basin may decrease and degrade the remaining snake habitat affecting the environmental baseline for the snake. Such activities are largely not subject to section 7 consultation. Although rice fields and agricultural waterways can provide valuable seasonal foraging and upland habitat for the snake, agricultural activities such as waterway maintenance, weed abatement, rodent control, and discharge of contaminants into wetlands and waterways can degrade snake habitat and increase the risk of snake mortality (Service 2003). On-going maintenance of agricultural waterways can also eliminate or prevent establishment of snake habitat, eliminate food resources for the snake, and fragment existing habitat and prevent dispersal of snakes (Service 2003).

Flood control and maintenance activities which can result in snake mortality and degradation of habitat include levee construction, stream channelization, and rip-rapping of streams and canals (Service 2003). Flood control programs are administered by the U.S. Army Corps of Engineers (Corps), and the Corps has typically consulted on previous projects and is expected to continue to do so for future projects. The ongoing nature of these activities and the administration under various programs, however, makes it difficult to determine the continuing and accumulative effects of these activities.

In addition to projects already discussed, projects affecting the environment in and around the action area include transportation projects with Federal, county, or local involvement. The Federal Highway Administration and/or the Corps have consulted with the Service on the issuance of wetland fill permits for several transportation-related projects within the Delta Basin that affected snake habitat. The direct effect of these projects is often small and localized, but the effects of transportation projects, which improve access and therefore indirectly affect snakes by facilitating further development of habitat in the area and by increasing snake mortality via vehicles, are not quantifiable.

The proposed project is located within the Delta Basin snake population, in the Mid Valley Recovery Unit (Service 1999). Twenty-five CNDDB (2006) records are known from the Delta Basin. These records include Laguna Creek, Morrison Creek, Snodgrass Slough, Beach Lake, creeks in the City of Elk Grove, Badger and Willow Creeks, Consumnes River Preserve, Caldoni Marsh, White Slough, Duck Creek and other locations within the Basin.

During a field reconnaissance in April 2002, a giant garter snake was observed on the southwestern levee of Webb Tract. Since then, habitat evaluations and snake surveys have been conducted on Webb Tract and Bacon Island (Patterson 2004; Patterson and Hansen 2003). Potential snake habitat in the area exists in the form of contiguous linear irrigation canals and ditches. However, although both islands possess the essential snake habitat components, two years of surveys resulted in no further sightings or capture of giant garter snakes.
Recent genetic work on giant garter snake population structure indicates three genetic entities within the species which follow the pattern of subdivision revealed by the snake's mitochondrial DNA and color pattern variants: north, central, and south (Paquin 2001; Paquin *et al.* 2006). Interestingly, evidence of historical gene flow between northern and southern populations exists; however, mitochondrial DNA data reveal that the central population, analogous to the Delta Basin, is genetically isolated from both northern and southern populations. High frequencies of unique mitochondrial DNA haplotypes in the central population increase the conservation value for the Delta Basin, particularly as a source for giant garter snake genetic diversity.

Laguna and Morrison Creek, Duck Creek, the Elk Grove creeks, as well as Beach Lake, Snodgrass Slough, Caldoni Marsh, White Slough and associated tributaries, are important snake habitat and movement corridors for the animal. Such waterways and associated wetlands provide vital permanent aquatic and upland habitat for snakes in areas with otherwise limited habitat. The recovery strategy for the snake includes maintenance and/or creation of habitat corridors between existing sub-populations to enhance population interchange and offset threats to the species (Service 2003).

According to the CNDDB (2006), the nearest snake record to the proposed project site is within 9 miles from the proposed project footprint. Snakes have been documented to move up to 5 miles over a few days in response to dewatering of habitat (Wylie *et al.* 1997) and to use up to more than 8 miles of linear aquatic habitat over the course of a few months (Wylie and Martin 2004). The action area contains habitat components that can be used by the snake for feeding, resting, mating, and other essential behaviors, as well as for a movement corridor. Because of the biology and ecology of the snake, the presence of suitable habitat within the proposed project, and observations of the species, the Service has determined that the snake is reasonably certain to occur within the action area.

Effects of the Proposed Action

Delta smelt

The proposed project will result in direct effects to approximately 0.7 acres of shallow water habitat SWH. SWH is defined as all waters between Mean High Water and 3-meters below Mean Lower Low Water mark. These waters are within the photic zone and are highly productive. A shadow zone is the shadow created by a structure placed over or in the waterways within the range of the delta smelt within the SWH zone. This causes a loss of productivity, thinning and loss of aquatic vegetation and prevention of its growth. The acquisition, conservation, funding, and management of at least 2.1 acres (3:1 ratio) of shallow water habitat at a mitigation bank or other location approved by the Service, DFG, and NMFS will minimize the effects of this loss of habitat. Areas of habitat modification have been reduced from those estimated in the ASIP due to design improvements based in input from the Anadromous Fish Screen Program Technical Team.

In water construction activities and maintenance would increase exposure of delta smelt and other species to sound pressure levels, turbidity, suspended sediment, and possibly other contaminants. While these levels are estimated to occur below levels that have been reported to cause adverse effects to Chinook salmon little is known about the sensitivity on delta smelt. The dewatering of the cofferdam has the potential to strand delta smelt and its food source. These effects would be minimized by working in the in-water work window and implementing the conservation measures in the project description.

The proposed fish screen and intake would physically exclude delta smelt from the area and modify habitat. The intake structure will modify hydraulic and habitat conditions adjacent to the intake structure and could attract predatory fish. Habitat modification in the immediate vicinity of the intake structure include changes in current patterns, sediment deposition, erosion, and riprap as part of construction and channel bank stabilization. The proposed project would minimize some of these effects by reducing pumping from the unscreened Rock Slough intake structure where predatory fish densities are high.

Although pumping diversions at the proposed intake structure would result in some impingement and entrainment of delta smelt, the modeling shows that the proposed action will reduce CCWD net impingement and entrainment losses as a result from the combination of the use of the positive barrier fish screen, reduced diversions at Rock Slough and Old River intakes, and timing shifts in some CCWD diversions. The operations of the proposed intake structure has the potential to entrain delta smelt eggs and larvae that are not excluded by the fish screen. An indirect effect of increased delta smelt impingement and entrainment from other water diversions could occur if the proposed action substantially modifies delta conditions. Modeling has shown that the proposed action would have minimal effects on other diversions. Shifting the timing of water diversions and/or relocating some diversions from the unscreened intake at Rock Slough to the screened Old River or proposed intakes could reduce entrainment and impingement.

Giant garter snake

Giant garter snakes could be injured or killed during excavation for levee improvements, during construction of proposed intake facilities or during the installation of the proposed pipeline. The entire pipeline length will be about 11,500 feet. The proposed route includes 10 ditch crossings. Any ditches that potentially could be affected by construction conveyance pipeline across

Victoria Island and Byron Tract would be siphoned under, rerouted, crossed over, or replaced. The temporal pipeline construction effects within potential giant garter snake aquatic and upland habitat would be approximately 30 acres. The levees would be temporarily disturbed during installation of the new intake structure. An existing ditch along the toe of the levee would have 900 feet filled but would be replaced with a 1,050-foot long ditch. These effects would be minimized by implementing the conservation measures in the project description.

Mats and rolled erosion control products containing net-like mesh made of fibers such as nylon, plastic or jute twine, which hold materials such as straw and jute, have been found to be hazardous to several species of snakes (Stuart *et al.* 2001, Barton and Kinkead 2005). The snakes' scales catch on the netting, preventing the snakes from escaping by backing out of the mesh; the snakes then move forward into the small mesh opening which can trap the animals. The resulting lacerations from trying to escape and subsequent overheating or exposure to predators can result in death of the snakes (Stuart *et al.* 2001, Barton and Kinkead 2005).

Cumulative Effects

Cumulative effects include the effects of future State, Tribal, local, or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

Delta smelt

Any continuing or future non-Federal diversions of water that may entrain adult or larval fish would have cumulative effects to the smelt. Water diversions through intakes serving numerous small, private agricultural lands contribute to these cumulative effects. These diversions also include municipal and industrial uses. State or local levee maintenance may also destroy or adversely modify spawning or rearing habitat and interfere with natural long term habitat-maintaining processes (Service 2000).

Additional cumulative effects result from the impacts of point and non-point source chemical contaminant discharges. These contaminants include but are not limited to selenium and numerous pesticides and herbicides as well as oil and gasoline products associated with discharges related to agricultural and urban activities. Implicated as potential sources of mortality for smelt, these contaminants may adversely affect fish reproductive success and survival rates. Spawning habitat may also be affected if submersed aquatic plants, used a substrates for adhesive egg attachment, are lost due to toxic substances.

Other cumulative effects could include: the dumping of domestic and industrial garbage may present hazards to the fish because they could become trapped in the debris, injure themselves, or ingest the debris; golf courses reduce habitat and introduce pesticides and herbicides into the environment; oil and gas development and production remove habitat and may introduce pollutants into the water; agricultural uses on levees reduce riparian and wetland habitats; and grazing activities may degrade or reduce suitable habitat, which could reduce vegetation in or near waterways. These cumulative effects further contribute to reducing the respective environmental baselines for the smelt.

Giant garter snake

Because the giant garter snake inhabits wetlands and adjacent uplands in highly modified portions of the Central Valley, the Service anticipates that a wide range of activities will affect this species. An undetermined number of future land use conversions and routine agricultural practices are not subject to Federal permitting processes and may convert or otherwise alter habitat or disturb, kill, or injure snakes. These cumulative effects include: (1) fluctuations in acres aquatic habitat due to water management or acres of ricelands in production; (2) diversion of water; (3) levee repairs; (4) riprapping or lining of canals and stream banks; (5) dredging, clearing and spraying to remove vegetation adjacent to canals and streams; (7) use of burrow fumigants on levees and other potential upland refugia; (8) release of contaminated runoff from agriculture and urbanization; (9) use of plastic erosion control netting; (10) use of herbicides and pesticides in ricelands and other agricultural lands that provide snake habitat, or which are adjacent to and/or drain into snake habitat; (11) increased vehicular traffic on roads and levees; (12) human intrusion into habitat; and (13) predation by feral animals and pets.

Conclusion

After reviewing the current status of the delta smelt and giant garter snake, environmental baselines for the species, the effects of the proposed action, and the cumulative effects on these species, it is the Service's biological opinion that the proposed construction of the Alternative Intake Project, as described herein, is not likely to jeopardize the continued existence of the delta smelt or giant garter snake. The proposed action is located in delta smelt critical habitat, but will not be adversely modified by the proposed action. Critical habitat for the giant garter snake has not been proposed or designated; therefore, none will be adversely modified or destroyed.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harass is defined by the Service as an intentional or negligent act or omission which creates the likelihood of injury to a listed species by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding or sheltering. Harm is defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by impairing behavioral patterns including breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act, provided that such taking is in compliance with this Incidental Take Statement.

The measures described below are nondiscretionary and must be implemented by Reclamation so they become binding conditions of any grant or permit issued to the applicant, as appropriate, in order for the exemption in section 7(o)(2) to apply. Reclamation has a continuing duty to regulate the activity that is covered by this incidental take statement. If Reclamation (1) fails to require the applicant to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, and/or (2) fails to retain oversight to ensure compliance with these terms and conditions, the protective coverage of section 7(o)(2) may lapse.

Amount or Extent of Take

The Service expects that incidental take of smelt will be difficult to detect or quantify for the following reasons: the small size of smelt eggs and larvae; their occurrence in aquatic habitat makes them difficult to detect; and the low likelihood of finding dead or impaired specimens. Due to the difficulty in quantifying the number of smelt that will be taken as a result of the proposed action, the Service is quantifying take incidental to the project in terms of acres of habitat that will become unsuitable for the species as a result of the action. Therefore, the Service estimates that 0.7 acres of shallow water habitat will become unsuitable as a result of the proposed project. In addition, an unquantifiable number of delta smelt eggs, larvae and adults may be killed, harmed, or harassed as a result of the construction activities and on-going operations of the water diversions at the proposed intake. Upon implementation of the following reasonable and prudent measures, incidental take associated with the construction and implementation of the proposed intake structure the form of 0.7 acres of shallow water habitat will become exempt from the prohibitions described under section 9 of the Act.

The Service anticipates that incidental take of the snake will be difficult to detect or quantify for the following reasons: giant garter snakes are cryptically colored, secretive, and known to be sensitive to human activities. Snakes may avoid detection by retreating to burrows, soil crevices, vegetation, or other cover. Individual snakes are difficult to detect unless they are observed, undisturbed, at a distance. Most close-range observations represent chance encounters that are difficult to predict. It is not possible to make an accurate estimate of the number of snakes that will be harassed or harmed during construction activities. In instances when take is difficult to detect, the Service may estimate take in numbers of species per acre of habitat lost or degraded as a result of the action. Therefore, the Service anticipates that all giant garter snakes inhabiting approximately 30 acres of aquatic and adjacent upland habitat may be harassed or harmed by loss and destruction of habitat as a result of the project. Upon implementation of the following reasonable and prudent measures, incidental take associated with the construction of the proposed project in the form of 30 acres of aquatic and adjacent upland habitat will become exempt from the prohibitions described under section 9 of the Act.

Effect of the Take

The Service has determined that this level of anticipated take is not likely to result in jeopardy to the delta smelt or giant garter snake. The proposed action is located in delta smelt critical habitat but will not be adversely modified. Critical habitat has not been proposed or designated for the giant garter snake; therefore, none will be affected.

Reasonable and Prudent Measures

The Service has determined that the following reasonable and prudent measures are necessary and appropriate to minimize the effects of the proposed project on the snake.

1. CCWD shall implement the project as described in the May 2006 ASIP and this biological opinion.

2. Reduce effects to the delta smelt.

3. Reduce effects to the giant garter snake.

4. Reclamation shall ensure CCWD's compliance with this biological opinion.

Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the Act, the Reclamation must ensure compliance with the following terms and conditions, which implement the reasonable and prudent measures described above. These terms and conditions are nondiscretionary.

1. The following Terms and Conditions implement Reasonable and Prudent Measure one (1):

   a. CCWD shall minimize the potential for harm, harassment, or killing of federally listed wildlife species resulting from project related activities by implementation of the Conservation Measures as described in the May 2006 ASIP and appearing in the Project Description of this biological opinion.

   b. CCWD shall make the terms and conditions in this biological opinion a required term in all contracts for the project that are issued by them to all contractors.

2. The following Terms and Conditions implement Reasonable and Prudent Measure two (2):

   a. The project proponent shall avoid areas having emersed or submersed plants to the maximum extent possible.

3. The following Terms and Conditions implement Reasonable and Prudent Measure three (3):

   a. Plastic mono-filament netting (erosion control matting) will not be used for erosion control or other purposes at the proposed project site. Snakes may become entangled in it. Acceptable substitutes include coconut coir matting or tackified hydroseeding.

b. Upon completion of the proposed action, all giant garter snake habitat subject to temporary ground disturbances, including storage and staging areas, temporary roads, etc. must be re-contoured, if appropriate, and revegetated with seeds and/or cuttings of appropriate plant species to promote restoration of the area to pre-project conditions. Areas of temporary disturbance are expected to be returned to pre-project conditions within one season following construction. An area subject to "temporary" disturbance means any area that is disturbed during the project, but that after project completion will not be subject to further disturbance and has the potential to be revegetated. To the maximum extent practicable (i.e., presence of natural lands), topsoil shall be removed, cached, and returned to the site according to successful restoration protocols. Loss of soil from run-off or erosion shall be prevented with straw bales, straw wattles, or similar means provided they do not entangle, block escape or dispersal routes of listed animal species. A biologist shall ensure that areas subject to temporary disturbance have been adequately restored, and this information is included under the final reports described in the Reporting Requirements of this biological opinion.

4. The following Terms and Conditions implement Reasonable and Prudent Measure four (4):

   a. If requested, during or upon completion of construction activities, the on-site biologist, and/or a representative from CCWD shall accompany Service or DFG personnel on an on-site inspection of the site to review project effects to the delta smelt, giant garter snake and their habitats.

   b. Reclamation shall ensure CCWD complies with the Reporting Requirements of this biological opinion.

Reporting Requirements

A post-construction compliance report prepared by the monitoring biologists must be submitted to the Deputy Assistant Field Supervisor of the Endangered Species Division at the Sacramento Fish and Wildlife Office within thirty (30) calendar days of the completion of construction activity or within thirty (30) calendar days of any break in construction activity lasting more than thirty (30) calendar days. This report shall detail (i) dates that groundbreaking at the project started and the project was completed; (ii) pertinent information concerning the success of the project in meeting compensation and other conservation measures; (iii) an explanation of failure to meet such measures, if any; (iv) known project effects on the delta smelt and giant garter snake, if any; (v) occurrences of incidental take of the snake; and (vi) other pertinent information.

Reclamation must require the project applicant to immediately report to the Service any information about take or suspected take of federally-listed species not authorized in this biological opinion. The project applicant must notify the Service within 24 hours of receiving such information. Notification must include the date, time, and location of the incident or of the finding of a dead or injured animal. Injured giant garter snakes must be cared for by a licensed veterinarian or other qualified person, such as the on-site biologist; dead individuals should be preserved according to standard museum techniques and held in a secure location. In the case of a dead animal, the individual animal should be preserved, as appropriate, and held in a secure location until instructions are received from the Service regarding the disposition of the specimen or the Service takes custody of the specimen. Any killed specimens of fish that have been taken should be properly preserved in accordance with Natural History Museum of Los Angeles County policy of accessioning (10% formalin in quart jar or freezing). Information concerning how the fish was taken, length of the interval between death and preservation, the water temperature and outflow/tide conditions, and any other relevant information should be written on 100% rag content paper with permanent ink and included in the container with the specimen. The Service contact persons are Chris Nagano, Deputy Assistant Field Supervisor, at (916) 414-6600, and Scott Heard, Resident Agent-in-charge of the Service's Law Enforcement Division at (916) 414-6660.

Any contractor or employee who during routine operations and maintenance activities inadvertently kills or injures a listed wildlife species must immediately report the incident to their representative. This representative must contact the California Department of Fish and Game immediately in the case of a dead or injured listed species. The California Department of Fish and Game contact for immediate assistance is State Dispatch at (916) 445-0045.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of Act directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities that can be implemented to further the purposes of the Act, such as preservation of endangered species habitat, implementation of recovery actions, or development of information and data bases.

1. The Service recommends the Reclamation develop and implement restoration measures in area designated in the Delta Fishes Recovery Plan (Service 1996).

2. The Service recommends the Reclamation develop procedures that minimize the effects of all other in-water activities on delta smelt.

3. The Reclamation should assist in the implementation of the draft, and when published, the final Recovery Plan for the garter snake.

To be kept informed of actions minimizing or avoiding adverse effects or benefiting listed and proposed species or their habitats, the Service requests notification of the implementation of any conservation recommendations.

REINITIATION - CLOSING STATEMENT

This concludes formal consultation on the proposed Alternative Intake Project. As provided in 50 CFR §402.16, re-initiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been maintained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded, as previously described, or the requirements under the incidental take section are not implemented; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in this opinion; and/or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending re-initiation.

If you have any questions regarding this biological opinion on the proposed action, please contact Kim Squires or Ryan Olah of the Sacramento Fish and Wildlife Office at (916) 414-6625.

cc:
Samantha Salvia, Contra Costa Water District, Concord, California
Bruce Oppenheim, NMFS, Sacramento, California
Anna Holmes, California Department of Fish and Game, Stockton, California

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PERSONAL COMMUNICATIONS

Hansen, Eric. 2006. Consulting Environmental Biologist. Provided information on population trends, threats, and recommendations for future actions. May 8, 2006, and August 22, 2006.

Kelly, David. 2006. U.S. Fish and Wildlife Service, Sacramento, California.

Roberts, John. 2006. The Natomas Basin Conservancy, Executive Director. Provided information on population trends, threats, and recommendations for future actions. May 8, 2006, and August 22, 2006.

Wylie, Glenn. 2006. USGS-BRD, Western Ecological Research Center, Dixon Field Station. Provided information on population trends, threats, and recommendations for future actions to benefit the giant garter snake. May 9, 2006.

Amendment to Biological Opinion Issued by USFWS

FILE

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Sacramento Fish and Wildlife Office
2800 Cottage Way, Room W-2605
Sacramento, California 95825-1846

In reply refer to:
1-1-07-F-0179

MAY 16 2007

Memorandum

To: Regional Planning Officer, Mid-Pacific Regional Office, Bureau of Reclamation, Sacramento, California (Attn.: Alan Candlish)

From: For ~~Acting~~ Field Supervisor, Sacramento Fish and Wildlife Office, Sacramento, California

Subject: Amendment to the Formal Consultation on the Contra Costa Water District Alternative Intake Project, Contra Costa County, California

This memorandum amends the April 27, 2007, biological opinion from the U.S. Fish and Wildlife Service (Service) (Service file: 1-1-07-F-0044) on the effects of the Contra Costa Water District Alternative Intake Project on the threatened delta smelt and giant garter snake (*Thamnophis gigas*). This amendment is in accordance with section 7 of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.*) (Act).

The following change is made on page 1 of the April 27, 2007, biological opinion.

Change:

This document represents the U.S. Fish and Wildlife Service's (Service) draft biological opinion on the effects of the action on the threatened delta smelt (*Hypomesus transpacificus*) and giant garter snake (*Thamnophis gigas*).

To:

This document represents the U.S. Fish and Wildlife Service's (Service) biological opinion on the effects of the action on the threatened delta smelt (*Hypomesus transpacificus*) and giant garter snake (*Thamnophis gigas*).

This concludes the reinitiation of the formal consultation on the Contra Costa Water District Alternative Intake Project. As provided in 50 CFR § 402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been maintained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action.

If you have any questions regarding this amendment to the biological opinion for Contra Costa Water District Alternative Intake Project, please contact Kim Squires or Ryan Olah of my staff at (916) 414-6625.

cc:
Samantha Salvia, Contra Costa Water District, Concord, California
Bruce Oppenheim, NMFS, Sacramento, California
Anna Holmes, California Department of Fish and Game, Stockton, California

Biological Opinion Issued by NMFS and Essential Fish Habitat Consultation

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southwest Region
501 West Ocean Boulevard, Suite 4200
Long Beach, California 90802- 4213

JUL 13 2007

In response refer to:
2005/00122

Alan Candlish
United States Bureau of Reclamation
Mid-Pacific Region
2800 Cottage Way
Sacramento, California 95825

Dear Mr Candlish:

This document transmits NOAA's National Marine Fisheries Service's (NMFS) biological opinion (Enclosure 1) based on our review of the Contra Costa Water District's (CCWD) proposed Alternative Intake project in San Joaquin County, California. The biological opinion addresses project effects on Federally listed endangered Sacramento River winter-run Chinook salmon (*Oncorhynchus tshawytscha*), threatened Central Valley spring-run Chinook salmon (*O. tshawytscha*), threatened Central Valley steelhead (*O. mykiss*), threatened North American green sturgeon (*Acipenser medirostris).* Also addressed are project effects on designated critical habitat for Central Valley steelhead, Sacramento River winter-run Chinook salmon, and Central Valley spring-run Chinook salmon in accordance with section 7 of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531 *et seq.*). Your August 14, 2006, request for formal consultation was received on August 17, 2006. Formal consultation was initiated on September 19, 2006.

This biological opinion is based on information provided in the May 2006, Action Specific Implementation Plan, supplemental information provided in March 2007, and discussions held at meetings with representatives of NMFS, U.S. Fish and Wildlife Service, California Department of Fish and Game, U.S. Bureau of Reclamation (BOR), and Contra Costa Water District. A complete administrative record of this consultation is on file at the NMFS Sacramento Area Office.

Based on the best available scientific and commercial information, the biological opinion concludes that the proposed action is not likely to jeopardize the continued existence of the above listed species, nor destroy or adversely modify designated critical habitat for Central Valley steelhead. Due to the likelihood of incidental take of listed species from the proposed construction and operations, NMFS has also included an incidental take statement with the biological opinion.

Also enclosed are Essential Fish Habitat (EFH) conservation recommendations for Pacific salmon and Groundfish as required by the Magnuson-Stevens Fishery Conservation and Management Act (MSA) as amended (16 U.S.C. 1801 *et seq.*; Enclosure 2). This document concludes that the proposed Alternative Intake Project will adversely affect EFH of Pacific Salmon and Groundfish in the action area and adopts certain terms and conditions of the incidental take statement and the ESA conservation recommendations with the biological opinion as the EFH conservation recommendations.

Section 305(b)4(B) of the MSA requires BOR to provide NMFS with a detailed written response to the EFH conservation recommendations within 30 days, and 10 days in advance of any action, including a description of measures adopted by BOR for avoiding, minimizing, or mitigating the impacts of the project (50 CFR §600.920(k)). In the case of a response that is inconsistent with our recommendations, BOR must explain its reasons for not following the recommendations, including the scientific justification for any disagreements with NMFS over the anticipated effects of the proposed action and the measures needed to avoid, minimize, or mitigate such effects.

If you have any questions regarding this correspondence please contact Mr. Bruce Oppenheim by telephone at (916) 930-3603 or via email at Bruce.Oppenheim@noaa.gov.

Sincerely,

for Rodney R. McInnis
Regional Administrator

Enclosures: (1) Biological Opinion, (2) Essential Fish Habitat Consultation

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Enclosure 1

BIOLOGICAL OPINION

ACTION AGENCY: U.S. Bureau of Reclamation
Mid-Pacific Region

ACTIVITY: Contra Costa Water District's Alternative Intake Project

CONSULTATION CONDUCTED BY: NOAA's National Marine Fisheries Service

DATE ISSUED: JUL 13 2007

I. CONSULTATION HISTORY

The U.S. Bureau of Reclamation (BOR) initiated formal consultation with NOAA's National Marine Fisheries Service (NMFS) on August 14, 2006, and authorized Contra Costa Water District (CCWD) as the applicant for the proposed Alternative Intake project (AIP). Operations of CCWD's three diversions (Old River, Rock Slough, and Mallard Slough) are currently integrated into BOR's Central Valley Project (CVP).

On March 15, 2005, NMFS provided comments on the "Notice of Preparation" of a joint project environmental impact report/environmental impact statement (EIR/EIS) for BOR and CCWD. At the same time NMFS provided a species list of Federally listed fish species within the action area.

On June 28, 2005, BOR initiated informal consultation and NMFS provided an updated species list.

On January 10, 2006, NMFS provided CCWD with comments on the Administrative Draft EIR/EIS and the Draft Action Specific Implementation Plan (ASIP), which would be used as a biological assessment.

On August 14, 2006, BOR requested formal consultation with NMFS for the AIP in San Joaquin County, California. The request for consultation included the final ASIP (CCWD and BOR 2006a) and a draft EIR/EIS for the proposed action.

On September 19, 2006, NMFS advised BOR that formal section 7 consultation was initiated upon receipt of BOR's August 14, 2006, letter.

On March 8, 2007, CCWD provided updates to the project description based on revisions to the preliminary fish screen design provided by the Anadromous Fish Screen Program (AFSP) Technical Team. At the same time, additions were made to one of the conservation measures in the project description to accommodate sound monitoring. The changes in screen design resulted in fewer shallow water habitat modifications than described in the ASIP and the final EIS/EIR.

This biological opinion is based on information provided in the ASIP and final EIS/EIR (CCWD and BOR 2006a, 2006b). NMFS has met to discuss the project several times with the applicant, consultants, U.S. Fish and Wildlife Service (FWS), and the California Department of Fish and Game (CDFG). In addition, screening criteria were discussed with the Central Valley Project Improvement Act (CVPIA) AFSP Technical Team in three meetings (January 19, 2005; June 8, 2005; and January 25, 2007). A complete administrative record of this consultation is on file at the NMFS Sacramento Area Office.

II. DESCRIPTION OF THE PROPOSED ACTION

The AIP would include construction of a new CCWD intake structure on Victoria Canal to function as part of the Old River Conveyance System. The new intake would provide for better quality water due to its location compared to the existing intake on Old River, but would not increase CCWD's total diversion capacity (rate or average annual quantity). The new intake would have a capacity of up to 250 cubic feet per second (cfs). The existing Old River intake and pump station, with a current capacity of 250 cfs, would remain in use; however, the combined permitted capacity of the Old River conveyance system would be limited by the 320 cfs pipeline capacity. Rock Slough would continue to provide a portion of CCWD's water supply, but would be used less frequently with the AIP because of the operational flexibility a new intake with better water quality would provide. The Mallard Slough intake would continue to provide a portion of CCWD's water supply in a manner similar to its current operations.

Implementation of the AIP would provide CCWD with the operational flexibility to divert water from either the new intake on Victoria Canal or the existing Old River intake, or to blend waters from Victoria Canal and Old River, to provide the highest water quality for CCWD customers. The AIP would involve adding a new point of diversion to certain existing water rights held by CCWD and by BOR. CCWD and BOR would immediately apply to change their permits to allow diversions of up to 320 cfs through the Old River conveyance system, but would not increase their water rights, CCWD's CVP contract amounts, or permitted Los Vaqueros Reservoir filling rates through this action. BOR will need to approve an additional point of diversion pursuant to CCWD's long-term renewal contract for CVP water service.

A. Proposed Facilities

The AIP would include the following facilities:

- Intake and pump station: a new water intake with a state-of-the-art fish screen, a pump station and ancillary structures, utilities, and access and security features.

- Levee improvements: reinforcement and reconfiguration of the levee at the intake/pump station site.

- Pipeline: a buried conveyance pipeline across Victoria Island, tunneled under Old River, and tying into CCWD's existing Old River conveyance facilities, and associated modifications of the existing agricultural irrigation and drainage system on Victoria Island as needed.

Facility construction is described in section II B, and proposed operations are described in section II C.

1. <u>Intake Structure and Pump Station</u>

a. *Intake and Fish Screen*

The new intake structure would consist of a reinforced concrete structure supported on concrete columns with side retaining walls and a fish screen open to Victoria Canal. The intake structure would be approximately 100 to 200 feet long, depending on the depth of the screen, which is anticipated to be 10 to 15 feet (see Appendix A, Figures 3 and 4). The final sizing will be based on confirmation of fish screen design details with fishery agencies, levee geotechnical design considerations, channel bathymetry, and costs (*e.g.*, it may be preferable to construct a narrower, deeper screen than a shallow, wide screen).

The state-of-the-art fish screen would provide a positive barrier against entrainment of fish and debris into the wet well/pump bays. The fish screen would be cleaned regularly with a mechanical cleaning system. The facility would be designed for a maximum perpendicular flow-through design velocity for the fish screens of 0.2 foot per second (fps) for any flow in Victoria Canal, which is consistent with the most stringent fish screening requirements (*i.e.*, 1.75 millimeter (mm) FWS criteria for delta smelt, *Hypomesus transpacificus*). Design parameters are described in Table 1.

The Victoria Canal channel cross section at the location of the proposed AIP is approximately 2,000 square feet. Site specific flow data confirm that the ambient sweeping velocity in the canal exceeds 0.4 fps greater than 70 percent of the time (*i.e.*, flows in Victoria Canal exceed 800 cfs greater than 70 percent of the time). The exposure time at a sweeping velocity of 0.4 fps is approximately 6.5 minutes.

Since flows in Victoria Canal are subject to tidal conditions, it is not possible to maintain a minimum sweeping velocity during slack tide (*i.e.*, four times per day). This is true of all fish screens in the Sacramento River/San Joaquin River Delta (Delta). The AFSP recommended increasing the minimum screen area by approximately 7-10 percent to offset the lack of the desired sweeping velocity during slack tide periods. This criteria has been incorporated into the proposed fish screen design with final design subject to confirmation with the AFSP (Table 1).

Table 1. Preliminary Alternative Intake Project Fish Screen Design, source: CCWD 2007

Design Requirement	Units	AFSP (1) Requirement	Basis of Design
Design flow	cfs	250	
Approach velocity	ft/sec	0.2	
Minimum effective screen area	ft^2	1,250 (2)	
Sweeping velocity	ft/sec	N/A (3)	
Recommended ratio of screen area provided to minimum effective screen area ($A_{provided}/A_{minimum}$)	ratio	1.07- 1.10 (4)	
Maximum screen opening size	mm	1.75	
Design minimum water surface elevation	ft		0.0
Screen invert elevation	ft		-10.0
Minimum wetted screen height	ft		10.0
Intake inside length	ft		150.0
Total width of supports (continuous screen)	ft		9.0
Panel width	ft		5.6
Total panels	no.		27
Screen width provided	ft		141.0
Wetted screen area provided	ft^2		1,410
Ratio of screen area provided to minimum effective screen area required ($A_{provided}/A_{required}$)	ratio		1.13

(1) CVPIA Anadromous Fish Screen Program, (2) Minimum effective screen area includes 7-10 percent recommended increase, (3) Sweeping velocity is not applicable in a tidal environment under all tidal conditions, (4) Includes AFSP recommendation to increase the screen area 7-10 percent above minimum required due to tidal conditions.

One or two existing agricultural siphons in Victoria Canal and/or agricultural drainage pipes on Victoria Island may need to be temporarily removed or relocated during construction. At the completion of construction, any siphons that have been removed would be replaced and restored to their original operational condition or permanently relocated.

b. *Pump Station and Ancillary Structures*

A pump station would lift water from the new intake and convey it through the pipeline system and to the existing Old River pump station system on Byron Tract. The pump station and associated mechanical piping would occupy a footprint area approximately 140 feet long by 60 feet wide. Normal water surface elevations at the intake would vary with tide; however, the intake pumps would be designed to operate at high and low water levels. The pumps would discharge into a common pipeline.

The intake/pump station facilities would also include a smaller motor control center/maintenance building and an electrical substation. The substation would be an open area measuring approximately 120 feet by 80 feet surrounded by chain-link fencing.

c. *Utilities*

There are no utilities present at the proposed intake site. Electricity, non-potable water, a sanitary holding tank, and a telecommunications system would be provided as part of the proposed AIP.

A new power substation would be constructed on-site. Power transmission lines would be installed from the Western Area Power Administration distribution system to the substation. Power supply to the facility would be transmitted through the distribution system from a combination of available sources, which may include Modesto Irrigation District and/or BOR's CVP. Potential corridors for power lines are the same as for the pipeline, although the pipeline and power lines may not be on the same alignment.

Water from Victoria Canal would be pumped through a screening filter to provide non-potable service water for the pump seals and washrooms.

Sanitary services for CCWD personnel on site for maintenance activities would be provided through the use of a below-ground holding tank that would be regularly maintained.

Antennas would be installed at the site to allow the station programmable logic controller and security system to communicate with CCWD's supervisory control and data acquisition system.

d. *Access and Security*

Site access would be via the existing levee roads or an existing north-south dirt road located off of Highway 4. The levee access roads may be surfaced with aggregate base rock to improve access during all weather conditions, but otherwise would not be modified. The north-south dirt road may be improved to accommodate two-way traffic and to meet anticipated vehicular traffic loadings.

Site security would include chain-link fencing surrounding the pump station and intake, switchyard and ancillary buildings.

2. Levee Improvements

The existing levee would be reinforced and reconfigured to serve as the engineered soil platform for the proposed intake/pump station facilities and to allow installation of the new intake structure (see Figures 3 and 4, Appendix A for proposed levee modifications). The approximate footprint area of the levee improvements (*i.e.*, measured at the base of the side slopes) would be 250 to 300 feet wide by 1,000 to 1,200 feet long. Approximately 6 to 8 acres at the intake site would be removed from agricultural use by the proposed levee modification.

The levee construction would require approximately 140,000 to 170,000 cubic yards of fill material as described below in section II B. The top of the reconfigured levee would be surfaced with aggregate base to maintain vehicular traffic during rain events. A ramp would be provided to allow access to the pump station and ancillary buildings. Slope protection (*i.e.*, riprap) would be installed on the water side of the levee for up to 400 to 500 feet on each side of the intake structure. Specific information on construction of the levee improvements is provided in section II B 2, below.

3. Conveyance Pipeline

The new conveyance pipeline would cross Victoria Island and Old River to tie into CCWD's existing Old River distribution system, as described below.

a. *Buried Pipeline Across Victoria Island*

The new conveyance pipeline would traverse Victoria Island buried within a trench from the new intake and pump facility on Victoria Canal to the Old River levee. The pipeline would transect Victoria Island diagonally and would be approximately 12,000 to 14,000 feet long. The pipeline would be sized to accommodate a flow rate of up to 250 cfs. The pipe diameter would be approximately 6 feet. Pipeline features such as air release, control valves, cathodic protection test stations, and access hatches would be installed in vaults or on pads above ground along the pipeline route.

The proposed pipeline routing may affect existing irrigation and drainage ditches that are used to irrigate existing fields and divert irrigation/storm water drainage from the fields (for discharge to Old River or Victoria Canal). Any ditches that potentially could be affected by the pipeline routing would be siphoned under, rerouted, crossed over, or replaced. The selected method for ditch crossings would be developed based on discussions with the landowner and considerations of both farming operations and construction costs. Nearly all effects on drainages would be temporary, as the ditches would be re-contoured to their pre-project dimensions where possible.

b. *Buried Pipeline Under Old River*

The conveyance pipeline would be tunneled under Old River at an elevation determined to avoid unconsolidated soils and provide for sufficient protection of the pipeline, estimated to be at least 50 feet below ground surface elevation.

c. *Pipeline Connection to the Old River Distribution System*

A new pipeline, approximately 50 to 100 feet long, would connect the pipeline from the Old River crossing to CCWD's existing Old River delivery pipeline within the existing setback levee. The pipeline would be installed using one of the trench construction methods described below in section II B 3.

d. *Easements*

CCWD would acquire land and/or easements as needed for construction and long-term access to the project sites. On Victoria Island, CCWD would purchase or obtain a permanent easement up to 70 feet wide for the pipeline alignment. For the duration of project construction, a total construction easement (including the width of the permanent easement) of approximately 250 feet would also be required. Land and/or easements would also be required for the intake site and the levee crossings.

Additional temporary construction easements of approximately 10 acres would also be required for construction staging areas. Additional temporary construction easements of approximately 25 to 40 acres for site access would be required on Victoria Island (*e.g.*, range includes on-island road access and potential levee road access).

B. Project Construction

1. Intake Structure

a. *Foundation Preparation*

Soil densification may be required beneath the intake and levee to reduce the liquefaction potential of the soil and to improve its lateral strength during seismic events. Preloading of the soils beneath the levee may also be required to reduce long-term settlement of the levee.

b. *In-Water Construction Activities*

In-water construction activities for installation of the intake and fish screen would be conducted either from a barge or from the top of the levee road. Most of the construction activities would be conducted in a dewatered cofferdam and would be isolated from Victoria Canal. As part of the construction of the new intake structure, a sheet pile cofferdam would be installed in Victoria Canal to isolate the work area from the canal water and provide a means to conduct construction work in a dewatered environment. Following installation of the cofferdam, the water in the cofferdam enclosure would be treated (as necessary) and discharged back to Victoria Canal, and the remaining intake construction work would be conducted in a dewatered environment.

If material needs to be removed for bed preparation at the cofferdam site, this excavated material would be contained within a designated containment area or areas on the land side of the levee. An earthen dike or siltation fences would enclose the containment area(s). Retention of the excavated materials would promote settling of the suspended sediments. Any excess water (desilted supernatant) would be returned back into Victoria Canal or Old River.

To provide additional depth for the fish screen, excavation may be required in Victoria Canal in the immediate vicinity of the intake, in an area up to 50,000 square feet, to depths one to two feet below the existing channel bottom. The need for excavation would be determined during final design based on the results of field data. Excavated materials would be transferred to the designated containment or disposal areas on the land side of the levee.

2. Levee Improvements

Construction of levee improvements would occur in two phases. First, an earthen setback levee would be constructed on the landward side of the existing levee (see Figures 3 and 4, Appendix A for proposed levee modifications). The setback levee would be integrated with the existing levee to provide continuity of the land/water barrier. Construction activities for the new intake would be initiated along the existing levee edge after the setback levee is completed. All new construction for the setback levee would incorporate modern techniques for soil compaction.

The new levee configuration would consist of additional earthen fill placed approximately 1,000 to 1,200 feet longitudinally and 250 to 300 feet laterally on the land side of the existing levee. Sheet piles would also be longitudinally placed approximately 320 feet upstream and downstream of the new intake, and would be integrated into the new setback levee to serve as a seepage barrier. Slope protection in the form of riprap would be installed on the water side of the existing levee for a distance of approximately 400 to 500 feet both upstream and downstream of the new intake. The new fill behind the existing levee would be constructed to maintain continuity of the existing road system along the existing levee crest. The elevation along the top of the new embankment fill would match the existing levee top elevation. Erosion control measures such as hydro seeding would be used on the landward side of the new setback levee.

See "Borrow Areas" below regarding the source of fill material for the proposed levee improvements.

3. Pipeline Construction

a. *Pipeline Installation on Victoria Island*

The conveyance pipeline will be constructed across Victoria Island using a conventional trench design. Because the conveyance pipeline likely will be installed below the groundwater table, the trench is designed to provide enough earthen cover over the pipe to counter any buoyant forces that may occur. The pipeline will be buried in a trench that would be excavated to maintain a minimum cover of five feet over the pipeline. The as-built surface elevation generally will match the original ground surface elevation.

Dewatering likely will be required for construction of the pipeline across Victoria Island. Discharge of dewatering water could be to land or to Old River. See "Borrow Areas" below regarding the placement of spoils from trenching operations.

b. *Pipeline Crossing Under Old River*

The pipeline would be installed under Old River using standard micro tunneling techniques. A large pit would be excavated on Byron Tract, west of the existing levee. A similar pit would be excavated on Victoria Island. One pit would operate as a launching pit while the other acts as a receiving pit, functioning as a drop shaft for the completed pipeline. The pit dimensions would be approximately 30 feet long by 15 feet wide by 80 feet deep. Once the new pipe is in place, concrete access vaults would be constructed within both the launching and receiving pits, prior to backfilling of the pits. The pipeline would be connected to the Old River Distribution System on Byron Tract using the same method described above for Victoria Island.

c. *Borrow Areas*

Borrow areas are sites where native materials are obtained for required construction activities. Borrow material would be required for both the construction of the setback levee and backfill for the pipeline trench. Approximately 140,000 to 170,000 cubic yards of borrow material would be required to construct the new setback levee. The amount of material needed for pipeline backfill depends on pipeline length, material, and depth of burial. An estimated 120,000 to 170,000 cubic yards of high-quality material would be required for the pipeline backfill. Depending on local soil conditions, this material may be available from the excavation of the pipeline trench itself, or may need to be borrowed from another location to backfill the pipeline. The excavation and backfill of the pipeline trench would result in a net excess of 20,000 to 60,000 cubic yards.

Preliminary soils data confirms that on-site soils are suitable for levee and pipeline backfill. Accordingly, an option for new embankment and trench fill would be to select native material obtained from Victoria Island. Based on preliminary field work, it is expected that select soils for the setback levee could be obtained by on-site shallow excavation (*e.g.*, "land leveling") to depths of approximately 1 to 1.5 feet in an area of up to 135 acres.

If on-site borrow activity is not used, the contractor would obtain borrow material from an off-site borrow location. The contractor typically would select a source of off-site borrow. Potential borrow areas have been identified within 20 miles of the project site.

d. *Construction Access and Staging*

Construction staging areas would be located on both Victoria Island and Byron Tract. Staging areas for construction parking and the temporary stockpiling of excavated soils and storage of construction equipment and materials are expected to occupy approximately 10 acres on Victoria Island. Pipeline materials (*e.g.*, piping, backfill material, and geogrids) would be stored along the pipeline route within the temporary easement. A smaller staging area would be located on Byron Tract.

e. *Construction Workforce, Equipment, and Schedule*

The total construction duration is estimated at 36 months. There would be overlap in the timing of construction of some of the components. Table 2 below, summarizes the duration of the major construction components.

At the construction sites, typical heavy construction equipment that may be used includes excavators, backhoes, bulldozers, scrapers, graders, sheepsfoot or tamping foot rollers, water trucks, a front-end loader, several dump trucks, a drill rig, a pump truck, truck-mounted cranes, pile drivers, pickup trucks, and other miscellaneous equipment.

Table 2. Anticipated duration of major construction components from the EIR/EIS.

Construction Phase	Anticipated Duration
Existing Victoria Canal Levee Improvements	6–8 months
New Victoria Canal Intake Structure/Fish Screen and Pump Station Installation	24 months
New Pipeline Installation	6–18 months
Old River Pipeline Crossing	7–9 months
New Pipeline Connection at the Existing Old River Pump Station	1 month
Total Construction Duration	36 months

It is anticipated that approximately 50 to 75 truck round trips would be required to transport the contractor's equipment to the site. A similar number of round trips would be needed to remove the equipment from the site as the work is completed. About 200 to 300 highway truck trips would be needed to bring the riprap to the site from the quarry of origin. An additional 1,000 to 1,500 trips would be needed to bring aggregate surfacing to the site from the quarry of origin. About 300 to 400 concrete loads, transported by transit mixer truck, are also likely. About 150 trailer truck loads would be required to bring other permanent materials, such as geogrid, fish screens, sheet piles, masonry, piping, structural steel, utility poles, and ancillary equipment, to the site. In addition, about 50 highway truckloads may be needed to carry construction debris and waste dump materials to a suitable landfill. If off-site borrow material is used to provide fill for the setback levee construction, up to an additional 11,500 trips may be needed. This would total about 14,000 total round trips during the construction period of approximately 30 to 36 months, or an average of about 15 round trips per day. The actual round trips per day during construction may range between 8 and 100 to meet specific construction sequencing needs. The construction labor force is estimated to average about 75 to 100 people over the total construction period. Peak staffing could be close to 125 people if major construction components are conducted simultaneously (*e.g.*, if the intake and the conveyance pipeline are constructed at the same time).

Typical construction would occur during daylight hours Monday through Friday. However, the construction contractor may extend the hours and may schedule construction work on weekends if necessary to complete aspects of the work within a given timeframe. An exception to the typical construction timing would be tunneling to install the pipeline under Old River, which would not depend on daylight and may be conducted around the clock.

C. Operations and Maintenance

CCWD currently delivers water using the three Delta intakes based on a goal of delivering water with chloride concentrations of 65 milligrams per liter (mg/l) or better to its untreated- and treated-water customers. With implementation of the proposed action, CCWD would have the flexibility to relocate some of its pumping from the existing Old River intake to the new location during certain periods of the year to obtain better water quality. In general, Old River water quality is best in late spring and early summer. Victoria Canal water quality is better than Old River water quality in late summer and fall.

The proposed action (*i.e.*, Alternative 3, Modified Operations in the EIS/EIR) would relocate a portion of the current Rock Slough pumping as well as some of the Old River pumping to the new intake on Victoria Canal. CCWD would immediately apply to change its permits to allow diversions of up to 320 cfs through the Old River conveyance system rather than in the future, as planned. Combined diversions from the 250 cfs Old River pump station and the proposed 250 cfs alternative intake would be limited to 320 cfs by the capacity of the pipeline connecting the Old River pump station to CCWD's transfer station that routes water either into Los Vaqueros Reservoir or the Contra Costa Canal. CCWD would not increase the average total annual quantity diverted from the Delta. This change would enable CCWD to relocate up to half of the currently unscreened Rock Slough diversions to the screened Old River conveyance system in the near-term. Rock Slough would continue to provide a portion of CCWD's water supply, but would be used less frequently under the proposed action because of the operational flexibility that would be provided by a new screened intake with better water quality. Mallard Slough intake would continue to provide a portion of CCWD's water supply in a manner similar to its current operations.

The pump station for the new intake on Victoria Canal would be operated similarly to the existing Old River pump station. The Old River pump station typically is operated remotely from the Bollman Water Treatment Plant but can be locally operated at the pump station itself. CCWD personnel sequentially start the Old River pumps to initiate diversion from Old River. The number of pumps operating at any given time depends on CCWD's flow requirements and diversion strategy. When the pump station is taken off line, the pumps are turned off and the wet well remains flooded.

Maintenance activities at the proposed new intake and pump station would be similar to maintenance activities currently conducted at the Old River pump station, including pump and equipment inspections and maintenance, water quality monitoring, and fish monitoring activities. Periodic maintenance dredging may also be required at the new intake facility. The existing Old River facility has not required any maintenance dredging to date, but an intake on Victoria Canal could experience different sedimentation conditions. Because the new pump station would be unstaffed, CCWD personnel would monitor the station via telemetry as well as through regular inspections.

Operation and maintenance activities will be necessary to maintain function of the fish screen and the pumping plant for the life of the facility. The fish screen structure will be constructed to permit vehicle access for screen panel removal and maintenance. The fish screen will be operated and maintained to reduce debris and sediment accumulation that will adversely affect the magnitude and uniformity of approach velocities by creating turbulence in front of the screen.

The fish screen will be mechanically cleaned using a traveling rake. The cleaning system will operate continuously to reduce and avoid accumulation of debris so that the screen operates in accordance with the approach velocity design criteria. Each screen panel will be removable to allow for annual pressure washing, cleaning and maintenance, as well as inspections of screen integrity. A portable, high pressure wash water system will be used for the panel cleaning. Screen panels will be removed annually (at a minimum) for inspection, repair, and high pressure washing. Back-up panels would be available on-site to replace screen panels that require maintenance or repair. A floating log-boom will be provided in Victoria Canal to deflect floating debris that may otherwise impinge on the screen, damage screen panels, or damage the traveling rake cleaning system.

The intake structure top elevation would be two feet higher than the 100 year floodwater surface elevation in Victoria Canal. The facility is designed to withstand flood events, with water draining naturally into the canal as flows recede.

D. Proposed Conservation Measures

Conservation measures incorporated into the project design to avoid or minimize impacts to listed species as described in Chapter 5 of the ASIP, include:

1. Minimize Turbidity, Sedimentation, and Water Quality Impacts During Construction

Turbidity will be monitored twice daily during the construction period while any visible plume exists in the surface waters to meet Central Valley Regional Water Quality Control Board (Regional Board) section 401 requirements, CDFG Streambed Alteration permit requirements, and U.S. Army Corps of Engineers (Corps) section 404 permit requirements. Water quality surveys will be conducted during the dredging operations and during installation/removal of the cofferdam to comply with the hazardous materials plan approved by the Regional Board for fish screen projects. To reduce turbidity in Victoria Canal during project-related construction activities, CCWD shall:

- Install a silt curtain to reduce the dissipation of suspended sediments during dredging and cofferdam installation, and

- Install and remove the cofferdam between August 1 and November 30 to avoid impacts to Chinook salmon, steelhead, and delta smelt unless modified by written agreement with NMFS, FWS, and CDFG.

Additionally, the AIP has integrated the following measures for dredging and spoil disposal:

- Monitor construction-related dredging activities, especially for any contaminated sediments and regularly report effects to NMFS. Re-evaluate activities based on monitoring results,

- Employ best engineering and best management practices (BMPs) for all project-related dredging to minimize water-column discharges,

- Consider upland disposal sites as an alternative to open water disposal. Dredged sediments removed during intake construction will be used on-site or disposed at an upland site,

- The discharge of petroleum products or other excavated materials to surface waters is prohibited,

- Project construction activities shall minimize substrate disturbances,

- Project construction activities shall not cause turbidity increases in surface waters as follows:

    Where natural turbidity is between 0 and 5 Nephelometric Turbidity Units (NTUs), increases will not exceed 1 NTU. Where natural turbidity is between 5 and 50 NTUs, increases will not exceed 20 percent. Where natural turbidity is between 50 and 100 NTUs, increase will not exceed 10 NTUs. Where natural turbidity is greater than 100 NTUs, increases will not exceed 10 percent. These limits will be eased during in-water working periods to allow a turbidity increase of 15 NTU over background turbidity as measured in surface waters 300 feet downstream from the working area. In determining compliance with above limits, appropriate averaging periods may be applied provided that beneficial uses would be protected,

- In the event that project construction activities create a visible plume in surface waters, CCWD will initiate monitoring of turbidity levels at the discharge site and 300 feet downstream, taking grab samples for analysis of NTU levels twice per day during the work period while the visible plume persists,

- Project construction activities will not cause settleable matter to exceed 0.1 milliliters per liter in surface waters as measured in surface waters 300 feet downstream from the project

- Project construction activities shall not cause visible oil, grease, or foam in the work area or downstream,

- All areas disturbed by project construction activities shall be protected from washout or erosion,

- CCWD shall notify the Regional Board, CDFG, FWS, and NMFS immediately of any spill of petroleum products, organic material, earthen material or if the above criteria for turbidity, oil/grease, or foam are exceeded,

- CCWD shall prepare a soil erosion control plan and stormwater pollution prevention plan prior to project grading and excavation activities to minimize potential construction-related silt from entering waterways. The plans would include, but would not be limited to the following measures:

    - Use of sedimentation basins and straw bales or other measures to trap sediment and prevent sediment and silt loads to waterways during project construction,

    - Cover graded areas adjacent to levees and in other areas subject to erosion with protective material, such as mulch, and re-seed with adapted native plant species after construction is completed,

    - Incorporate bank stabilization (riprap) into the project design on both the east and west sides of the intake to minimize channel margin erosion of soils into Victoria Canal. To the extent practicable, the aerial extent of riprap will be minimized and small (<8 inch diameter) riprap will be used for levee protection,

- Minimize construction-related surface disturbance of soil and vegetation and restore terrestrial habitats immediately after construction to the extent feasible,

- Place construction-related stockpiled soils where it would not be subject to accelerated erosion,

- Re-vegetate with grasses native to the Delta and placement of erosion control devices, such as crushed rock, as soon as graded area has attained finish grade,

- CCWD shall ensure a certified erosion control specialist or California-registered civil engineer prepare the plans. A project field manager would be responsible for monitoring and compliance. If needed, Regional Board staff would review the plans prior to project construction to verify that BMPs have been incorporated, and

- Effects associated with periodic maintenance dredging in front of the fish screen are not covered in these conservation measures, but would be addressed at such time in the future that maintenance dredging is needed, as recommended by CDFG.

2. Implement Measures to Reduce and/or Avoid Underwater Sound Impacts

Potential adverse impacts and incidental take of Sacramento River winter-run Chinook salmon (SR winter-run Chinook salmon), Central Valley spring-run Chinook salmon (CV spring-run Chinook salmon), Central Valley steelhead (CV steelhead), and North American green sturgeon shall be avoided by installing the sheet pile cofferdam using a vibration hammer that minimizes underwater sound pressure levels to the greatest extent feasible to minimize effects to sensitive fish species. Installation of the cofferdam is expected to occur during the designated in-water work window in the summer and early fall when water temperatures are generally considered unsuitable for salmonids. Chinook salmon and CV steelhead avoid habitats, including Victoria Canal, when seasonal water temperatures increase above 25 °C. Installation of the cofferdam using percussion hammers during the summer and early fall would reduce or avoid potential adverse effects to Chinook salmon and CV steelhead, but not green sturgeon, which rear year-round in the central and south Delta. Should percussion hammers be used, underwater acoustic monitoring will confirm that the sound pressure levels are below levels of concern. If underwater sound pressure levels due to pile driving exceed 180 decibels (dB), several methods can be used to reduce or minimize potential impacts to aquatic species, including:

- Reduce hammer drop height or force
- Use hammer buffers
- Use vibratory hammer
- Work at low tide or at times when flows in Victoria Canal are reduced

Once the cofferdam has been installed and dewatered, pile driving that is interior to the cofferdam would not be expected to result in adverse underwater sound pressure levels that would impact fish. The applicant has indicated that implementation of this measure would minimize otherwise adverse effects related to underwater sound pressure and reduce the risk of incidental take of listed fish species.

3. Develop Hazardous Materials Control and Spill Prevention and Response Plan

CCWD shall prepare and implement a hazardous materials control and spill prevention and response plan prior to start of construction. Measures that would be included in the plan to minimize construction-related effects will include the following:

- Establish a spill prevention and countermeasure plan before the commencement of project construction that includes strict on-site handling rules to keep construction and maintenance materials out of drainages and waterways,

- Prevent project-related raw cement, concrete, or concrete washings; asphalt, paint or other coating material; oil or other petroleum products; or other substances that could be hazardous to aquatic life from contaminating the soil or entering watercourses, including Victoria Canal,

- Clean up all project-related spills immediately according to the spill prevention and countermeasure plan, and notify Regional Board immediately of spills and clean up procedures,

- Locate staging and storage areas for construction equipment, materials, fuels, lubricants, solvents, and other possible contaminants away from watercourses,

- Conduct periodic inspections during the construction period, and

- FWS, NMFS, CDFG, and the Regional Board shall review the plan prior to construction to verify that hazardous material control and spill response measures have been incorporated to the maximum extent possible. FWS, NMFS, and CDFG shall have access to inspect construction activities to ensure compliance.

The implementation of a hazardous materials control and spill prevention and response plan prior to the start of construction should reduce the risk of incidental take of listed fish species related to potential chemical spills during construction.

4. Implement Fish Rescue Plan Inside Cofferdam

Installation of the cofferdam and dewatering of the proposed intake structure site during fish screen construction may result in fish stranding. CCWD will develop and implement a Fish Rescue Plan acceptable to CDFG, FWS, and NMFS (see draft Fish Rescue Plan included as Appendix B). CCWD shall ensure that a qualified fishery biologist with a current CDFG collection permit conducts the fish rescue and relocation efforts behind the cofferdam. The fish rescue effort would be implemented during the dewatering of the area behind the cofferdam and would involve capture and return of those fish to suitable habitat within Victoria Canal. A fisheries biologist shall be present on-site during initial pumping (dewatering) to ensure compliance with the plan.

- CCWD shall monitor the progress of dewatering and allow for the fish rescue to occur prior to completely closing the cofferdam and again when water depths reach approximately 2 feet. FWS, NMFS, and CDFG shall be notified at least 48 hours prior to the start of fish rescue efforts. Information on the species, number, and sizes of fish collected would be recorded during the fish rescue and provided in a letter report to be submitted within 30 days after the fish rescue to FWS, NMFS, and CDFG.

- The Fish Rescue Plan developed as part of the ASIP shall contain methods for minimizing the risk of stress and mortality due to capture and handling of fish removed from the construction site and returned to Victoria Canal.

Implementation of the Fish Rescue Plan would minimize potential adverse effects to listed fish species (if present), associated with fish stranding during dewatering activities related to the construction of the AIP.

5. Compensate for the Permanent Loss of Critical Habitat at Victoria Canal Intake Site

Construction of the proposed intake structure and fish screen in Victoria Canal would result in the modification of shallow-water aquatic habitat estimated as follows (Note that the areas of habitat modifications have been reduced from those estimated in the ASIP due to design improvements based on input from the AFSP Technical Team.):

- 0.3 acre of existing riprap shallow water tidal freshwater emergent habitat along the existing shoreline of the levee would be replaced by 0.3 acre of new riprap habitat immediately in front of the fish screen and along each side of the fish screen along the existing levee,

- 0.3 acre of shallow-water tidal freshwater emergent habitat presumed to be earthen bottom would be replaced by 0.3 acre of new riprap habitat,

- 0.2 acre of shallow-water tidal freshwater emergent habitat presumed to be earthen bottom would be excavated to a depth of 10 to 15 feet deeper than existing, but would retain the same substrate characteristics. The resulting new depth would not constitute shallow-water habitat but would provide habitat complexity in the existing channel, and

- 0.2 acre of existing riprap shallow water tidal freshwater emergent habitat along the existing shoreline of the levee would be replaced by 0.2 acre of modified levee section.

These habitats that are being replaced or modified are considered marginal, low-quality habitats for CV steelhead and Chinook salmon. They are classified as shallow-water tidal freshwater emergent habitat based on physical characteristics that could potentially support emergent vegetation; however, the intake has been sited to avoid existing emergent vegetation to the degree possible. CCWD would mitigate for these existing habitats with high-quality emergent marsh habitat at an approved mitigation/conservation bank. The purchased mitigation habitat would be for emergent marsh habitat that is far superior to the habitat being disturbed in Victoria Canal. The amount of mitigation, determined in consultation with NMFS, FWS, and CDFG is calculated as follows:

- 0.3 acre – no mitigation is necessary as the existing habitat would not be modified in a manner that adversely affects available habitat in Victoria Canal. The existing riprap would be replaced with similarly sized riprap.

- 0.3 acre – a 3:1 mitigation ratio is used because a presumed earthen bottom is being replaced with riprap. Over time, the riprap will quickly silt over and be replaced by a natural earthen bottom in the long-term. CCWD would purchase 0.9 acre of shallow-water emergent marsh habitat at an approved mitigation bank.

- 0.2 acre – a 3:1 mitigation ratio is used because the shallow-water habitat would be replaced with open-water habitat. CCWD would purchase 0.6 acre of shallow-water emergent marsh habitat at an approved mitigation bank.

- 0.2 acre – a 3:1 mitigation ratio is used because the shallow-water habitat would be replaced with a modified levee section. CCWD would purchase 0.6 acre of shallow-water emergent marsh habitat at an approved mitigation bank.

To fully compensate for physical habitat modifications (*i.e.*, critical habitat as defined by NMFS is applicable for CV steelhead only in this area) at the Victoria Canal intake site, CCWD will purchase mitigation credits for a total of 2.1 acres of shallow-water emergent marsh aquatic habitat. With this measure, there is no loss in aquatic habitat associated with the AIP.

CCWD considered several other potential measures for bank stabilization including: (1) incorporating a floodplain terrace or bench, (2) use of smaller rock less than 8 inches in diameter for riprap, (3) covering riprap with soil and planting with willows, and (4) designing bank slopes greater than a 3:1 ratio. These measures are not consistent with the design standards for levees in Reclamation District (RD) 2040 and could compromise levee integrity. Based on input from the RD 2040 engineer these measures were eliminated from further consideration. CCWD did remove the concrete apron, originally proposed as part of the project design, in order to minimize effects on habitat.

Application of the Standard Assessment Methodology (SAM) developed by the Corps for quantifying habitats and fish behavior on modified riprapped banks was not applicable because the site-specific hydraulic characteristics would be substantially changed, and this methodology has not been used to evaluate conditions at fish screens and water intakes in the Delta.

6. Minimize Fish Entrainment and Impingement at the New Victoria Canal Intake

As part of the proposed action, CCWD would install a state-of-the-art positive barrier fish screen that would minimize fish entrainment and impingement at the new Victoria Canal intake. To insure compliance with the ESA, long-term monitoring of operations and maintenance of the fish screen will be conducted. Monitoring at the onset of water diversions through the Victoria Canal intake would include approach velocity measurements immediately after initiation of fish screen operations, with fine-tuning of velocity control baffles or other modifications as necessary, to achieve uniformity of velocities in conformance with fish screen criteria (*i.e.*, 0.2 fps). Long-term velocity tests would be scheduled for 5-year intervals, similar to monitoring requirements at the Old River Fish Screen Facility.

CCWD will monitor the condition of the fish screen on an annual basis for as long as diversions are occurring at Victoria Canal. Visual inspections will be conducted monthly, during periods of operation, to remove accumulated debris and repair screen panels as necessary. NMFS, FWS, and CDFG will have access to the fish screen for underwater inspections following completion of the construction period. The standards for success will be long-term reliable operation of the fish screen, and conformance with fish screen design criteria.

- CCWD will operate the proposed Victoria Canal intake consistent with the existing Los Vaqueros Project Biological Opinion operational restrictions on filling Los Vaqueros Reservoir, and diverting Delta water, and any future changes to that opinion.

- CCWD will incorporate entrainment monitoring for fish eggs, larvae, and juveniles at the Victoria Canal Intake consistent with the on-going fishery monitoring program being conducted at the Old River Fish Facility. Entrainment monitoring will be conducted at least for the first year of operation. Following one year of monitoring, CCWD will issue a performance report within 60 days to NMFS, FWS, and CDFG as a cumulative record of monitoring and communications with the regulatory agencies. Using the results from the one year of monitoring, CCWD will recommend continuation, modification, or discontinuation of the monitoring program. At that time an assessment will be made by NMFS, FWS, and CDFG on whether further sampling is necessary, or should be integrated with the current Old River intake sampling.

Implementation of a positive barrier fish screen, designed to meet lower approach velocities than required for salmonids (*i.e.*, 0.2 fps rather than 0.33 fps), will minimize adverse effects and the risk of incidental takes related to fish losses through entrainment and impingement.

E. Action Area

The action area is defined as all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action (50 CFR §402.02). The immediate action area, for the purposes of this biological opinion, is located along the southern and western portion of Victoria Island, and 1,000 feet upstream and downstream of the proposed site within Victoria Canal (see Appendix, Figure 2a). Additional areas of impact, based on modeling related to changes in the hydrology and water quality characteristics of instream flows, include: CCWD's Old River Intake, Mallard Slough Intake, Rock Slough Intake, those reaches of rivers below state and Federal water supply reservoirs, and in the conveyance channels leading to the state and Federal water diversions facilities in the south Delta. Project related operations and maintenance activities could extend to any affected aquatic areas within the Sacramento-San Joaquin Delta region, especially near CCWD's three water intakes. Small indirect effects of project operations as modeled could extend as far upstream as the CVP and State Water Project (SWP) reservoirs. Therefore, all listed salmonid populations in the Central Valley have the potential to experience the effects of the proposed AIP during their movements in the Delta and mainstems of the Sacramento and San Joaquin Rivers.

III. STATUS OF THE SPECIES AND CRITICAL HABITAT

NMFS recently has completed an updated status review of 16 salmon Evolutionarily Significant Units (ESUs), including Sacramento River winter-run Chinook salmon and Central Valley (CV) spring-run Chinook salmon, and concluded the species' status should remain as previously listed (70 FR 37160). On January 5, 2006, NMFS published a final listing determination for 10 steelhead Distinct Population Segments (DPSs), including CV steelhead (71 FR 834). The new listing determinations became effective on February 6, 2006, and concluded that CV steelhead will remain listed as threatened.

This biological opinion analyzes the effects of the proposed AIP on the following threatened and endangered species and designated critical habitat:

Sacramento River winter-run Chinook salmon ESU (*Oncorhynchus tshawytscha*)
endangered (June 28, 2005, 70 FR 37160)
Sacramento River winter-run Chinook salmon designated critical habitat
(June 16, 1993, 58 FR 33212)
CV spring-run Chinook salmon ESU (*O. tshawytscha*)
threatened (June 28, 2005, 70 FR 37160)
CV spring-run Chinook salmon designated critical habitat
(September 2, 2005, 70 FR 52488)
CV steelhead DPS (*O. mykiss*)
threatened (January 5, 2006, 71 FR 834)
CV steelhead designated critical habitat
(September 2, 2005, 70 FR 52488)
Southern DPS of North American green sturgeon (*Acipenser medirostris*)
threatened (April 7, 2006, 71 FR 17757)

A. Species Life History, Population Dynamics, and Likelihood of Survival and Recovery

1. Sacramento River winter-run Chinook salmon

Sacramento River winter-run Chinook salmon were first listed as threatened in August 1989 (54 FR 32085). Their status was reclassified as endangered in January 1994 (59 FR 440) due to continued decline and increased variability of run sizes since their listing as a threatened species, expected weak returns as a result of two small year classes in 1991 and 1993, and continued threats to the population. In the proposed rule to reclassify the winter-run Chinook salmon as endangered, NMFS recognized that the population had dropped nearly 99 percent between 1966 and 1991, and despite conservation measures to improve habitat conditions, the population continued to decline (57 FR 27416). In June 2004, NMFS proposed to reclassify Sacramento River winter-run Chinook salmon as threatened (69 FR 33102). This determination was based on three main points: (1) harvest and habitat conservation efforts have increased the abundance and productivity of the ESU over the past decade; (2) artificial propagation programs that are part of the ESU, the Captive Broodstock Programs at Livingston Stone National Fish Hatchery (LSNFH) and at the University of California Bodega Marine Laboratory contribute to the ESU's viability; and (3) ecosystem restoration plans underway in Battle Creek should provide the opportunity to establish a second winter-run Chinook salmon population. However, on June 28, 2005, after reviewing the best available scientific and commercial information, NMFS issued its final decision to retain the status of Sacramento River winter-run Chinook salmon as endangered (70 FR 37160). This decision was based on the continued threats to Sacramento River winter-run Chinook salmon and the continued likelihood of this ESU becoming extinct throughout all or a significant portion of its range. A draft recovery plan was published in August 1997 (NMFS 1997a).

Winter-run Chinook salmon historically spawned in the headwaters of the McCloud, Pit, and Little Sacramento Rivers and Hat and Battle Creeks. Construction of Shasta Dam in 1943 and Keswick Dam in 1950 blocked access to all of these waters except Battle Creek, which has been severely impacted by hydroelectric facilities and the Coleman National Fish Hatchery (Moyle *et al.* 1989, NMFS 1997a). The majority of the current winter-run Chinook salmon spawning and rearing habitat exists on the mainstem Sacramento River between Keswick Dam and Red Bluff Diversion Dam (RBDD). Although a small, unknown, number of winter-run Chinook salmon occasionally spawn in Battle and Clear Creeks, the ESU is widely considered to be reduced to a single naturally spawning population in the mainstem Sacramento River below Keswick Dam.

Following the construction of Shasta Dam, the number of winter-run Chinook salmon initially declined but recovered during the 1960s. This initial recovery was followed by a steady decline from 1969 through the late 1980s (FWS 1999).

Adult winter-run Chinook salmon enter San Francisco Bay from November through June (Hallock and Fisher 1985) and migrate past RBDD from mid-December through early August (NMFS 1997a). The majority of the run passes RBDD from January through May, and peaks in mid-March (Hallock and Fisher 1985). Generally, winter-run Chinook salmon spawn from near Keswick dam downstream to Red Bluff, California. The largest concentrations of spawning fish occur in the first five to ten miles below Keswick Dam. Spawning occurs from late April through mid-August with peak activity between May and June. Eggs and pre-emergent fry require water temperatures at or below 56 °F for maximum survival during the spawning and incubation period (FWS 1999). Fry emerge from mid-June through mid-October and move to river margins and tributary streams to rear. Emigration past RBDD may begin in mid-July and typically peaks in September and can continue through March in dry years (Vogel and Marine 1991, NMFS 1997a, FWS 1999). From 1995 to 1999, all winter-run Chinook salmon outmigrating as fry passed RBDD by October, and all outmigrating pre-smolts and smolts passed RBDD by March (Martin *et al.* 2001).

Construction of RBDD in 1966 enabled improved accuracy of population estimates as salmon passed through fish ladders. From 1967 to 2000, winter-run Chinook salmon estimates were extrapolated from adult ladder counts at RBDD. Recent operational changes at RBDD have allowed a majority of the winter-run Chinook salmon population to bypass the ladders and counting facilities, and have increased the error associated with extrapolating the population estimate. In order to reduce the error associated with estimating the run, carcass counts replaced the ladder counts beginning in 2001.

Since 1967, the estimated adult winter-run Chinook salmon population ranged from 186 in 1994 to 117,808 in 1969 (CDFG 2002). The estimate declined from an average of 86,000 adults in 1967-1969 to only 2,000 by 1987-1989, and continued downward to an average 830 fish in 1994-1996. Since then, estimates have increased to an average of 3,136 fish for the period of 1998-2001. Winter-run abundance estimates and cohort replacement rates since 1986 are shown in Table 3. Although the population estimates display broad fluctuation since 1986 (186 in 1994 to 17,205 in 2006), there has been an increasing trend in the average population since 1995, and a generally stable trend in the five-year moving average of cohort replacement rates. The 2006 run was the highest since 1981, when an estimated 20,041 adults passed RBDD.

Table 3. Winter-run Chinook salmon population estimates from RBDD ladder counts, and corresponding cohort replacement rates for years since 1986. Population estimates include both adult and grilse. Source: CDFG 2006, Grand Tab.

Year	Population Estimate	5-Year Moving Average of Population Estimate	Cohort Replacement Rate	5-Year Moving Average of Cohort Replacement Rate
1986	2,596	-	-	-
1987	2,186	-	-	-
1988	2,886	-	-	-
1989	697	-	0.3	-
1990	431	1,759	0.2	-
1991	211	1,282	0.1	-
1992	1,241	1,093	1.8	-
1993	387	593	0.9	0.6
1994	186	491	0.9	0.8
1995	1,297	664	1.1	0.9
1996	1,337	890	3.5	1.6
1997	880	817	4.7	2.2
1998	3,002	1,340	2.3	2.5
1999	3,288	1,961	2.5	2.8
2000	1,352	1,972	1.5	2.9
2001*	8,224	2,809	2.7	2.7
2002	7,464	4,467	2.3	2.3
2003	8,218	5,818	6.0	3.0
2004	7,869	6,625	0.9	2.7
2005	15,839	9,522	2.1	2.8
2006	17,205	11,319	2.0	2.6

* In 2001 estimates changed from RBDD ladder counts to carcass surveys

2. <u>Central Valley Spring-Run Chinook Salmon</u>

NMFS listed the CV spring-run Chinook salmon ESU as threatened on September 16, 1999 (64 FR 50394). In June 2004, NMFS proposed that CV spring-run Chinook salmon remain listed as threatened (69 FR 33102). This proposal was based on the recognition that although CV spring-run Chinook salmon productivity trends are positive, the ESU continues to face risks from having a limited number of remaining metapopulations (*i.e.*, 3 existing populations from an estimated 17 historical populations), a limited geographic distribution, and potential hybridization with Feather River Hatchery (FRH) spring-run Chinook salmon, which until recently were not included in the ESU and are genetically divergent from other metapopulations in Mill, Deer, and Butte Creeks. On June 28, 2005, after reviewing the best available scientific and commercial information, NMFS issued its final decision to retain the status of CV spring-run Chinook salmon as threatened (70 FR 37160). This decision included the FRH spring-run Chinook salmon population as part of the CV spring-run Chinook salmon ESU.

The decision to include the FRH population was based on several factors: (1) FRH spring-run Chinook salmon are no more divergent from the naturally spawning population in the Feather River than would be expected between two closely related populations in the ESU; (2) NMFS believes the early run timing of spring-run Chinook salmon in the Feather River represents the evolutionary legacy of the populations that once spawned above Oroville Dam, and that the extant population in the Feather River may be the only remaining representative of this ESU component; (3) the California Department of Water Resources (CDWR) is planning to construct a weir to create geographic isolation for spring-run Chinook in the Feather River to minimize future hybridization with fall-run Chinook salmon, and to preserve the early run timing phenotype; and (4) the FRH population may play an important role in the recovery of spring-run Chinook salmon populations in the Feather and Yuba Rivers.

Historically, spring-run Chinook salmon were the dominant run in the Sacramento River basin, occupying the middle and upper elevation reaches (1,000 to 6,000 feet) of most streams and rivers with sufficient habitat for over-summering adults (Clark 1929). Clark estimated that there were 6,000 miles of salmon habitat in the Central Valley basin (much of which was high elevation spring-run Chinook salmon habitat) and that by 1928, 80 percent of this habitat had been lost. Yoshiyama *et al.* (1996) determined that, historically, there were approximately 2,000 miles of salmon habitat available prior to dam construction and mining and that only 18 percent of that habitat remains.

Adult CV spring-run Chinook salmon enter the Delta from the Pacific Ocean beginning in January and enter their natal streams from March to July. In Mill Creek, Van Woert (1964) noted that of 18,290 adult CV spring-run Chinook salmon observed from 1953 to 1963, 93.5 percent were counted between April 1 and July 14, and 89.3 percent were counted between April 29 and June 30.

During their upstream migration, adult Chinook salmon require streamflows sufficient to provide olfactory and other orientation cues used to locate their natal streams. Adequate streamflows also are necessary to allow adult passage to upstream holding habitat. The preferred temperature range for upstream migration is 38 °F to 56 °F (Bell 1991, CDFG 1998).

Upon entering freshwater, spring-run Chinook salmon are sexually immature and must hold in cold water for several months to mature. Typically, spring-run Chinook salmon utilize mid- to high-elevation streams that provide appropriate temperatures and sufficient flow, cover, and pool depth to allow over-summering. Spring-run Chinook salmon also may utilize tailwaters below dams if cold-water releases provide suitable habitat conditions. Spawning occurs between

September and October and, depending on water temperature, emergence occurs between November and February.

CV spring-run Chinook salmon emigration is highly variable, some begin outmigrating soon after emergence, whereas others oversummer and emigrate as yearlings with the onset of increased fall storms (CDFG 1998). The emigration period for CV spring-run Chinook salmon extends from November to early May, with up to 69 percent of young-of-the-year (YOY) outmigrants passing through the lower Sacramento River/Delta between mid-November and early January (Snider and Titus 2000). Outmigrants also are known to rear in non-natal tributaries to the Sacramento River and the Delta (CDFG 1998).

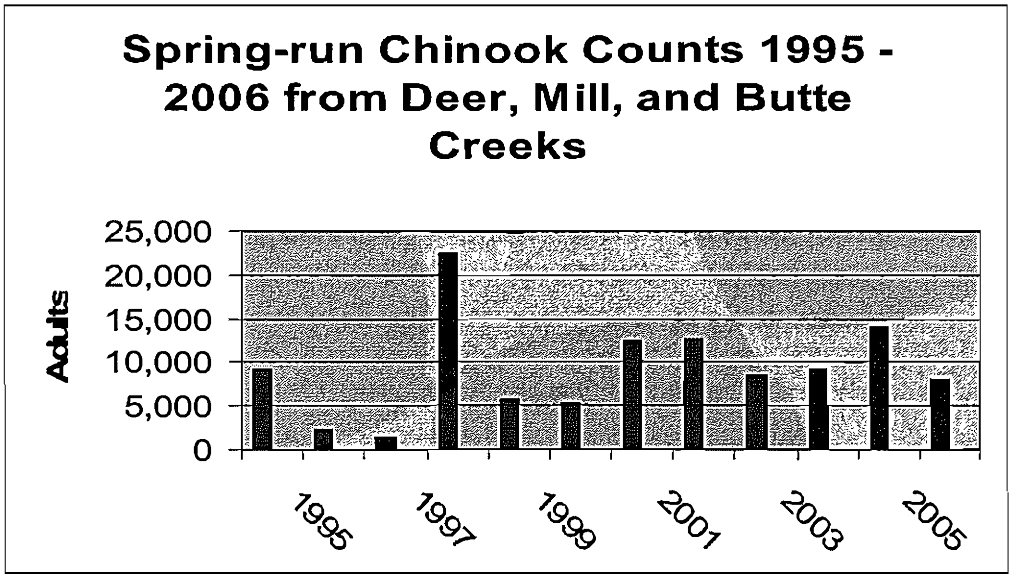
Chinook salmon spend between 1 and 4 years in the ocean before returning to their natal streams to spawn (Myers *et al.* 1998). Fisher (1994) reported that 87 percent of Chinook salmon trapped and examined at RBDD between 1985 and 1991 were 3-year olds.

Spring-run Chinook salmon were once the most abundant run of salmon in the Central Valley (Campbell and Moyle 1992) and were found in both the Sacramento and San Joaquin drainages. More than 500,000 CV spring-run Chinook salmon were caught in the Sacramento-San Joaquin commercial fishery in 1883 alone (Yoshiyama *et al.* 1998). The San Joaquin populations were essentially extirpated by the 1940s, with only small remnants of the run that persisted through the 1950s in the Merced River (Hallock and Van Woert 1959, Yoshiyama *et al.* 1998). Populations in the upper Sacramento, Feather, and Yuba Rivers were eliminated with the construction of major dams during the1950s and 1960s. Naturally spawning populations of CV spring-run Chinook salmon currently are restricted to accessible reaches of the upper Sacramento River, Antelope Creek, Battle Creek, Beegum Creek, Big Chico Creek, Butte Creek, Clear Creek, Deer Creek, Mill Creek, Feather River, and the Yuba River (CDFG 1998).

Since 1969, the CV spring-run Chinook salmon ESU has displayed broad fluctuations in abundance, ranging from 1,403 in 1993 to 25,890 in 1982 (CDFG 2003). The average abundance for the ESU was 12,590 for the period of 1969 to 1979, 13,334 for the period of 1980 to 1990, and 6,554 from 1991 to 2001. Evaluating the abundance of the ESU as a whole, however, complicates trend detection. For example, although the mainstem Sacramento River population appears to have undergone a significant decline, the data are not necessarily comparable because coded wire tag (CWT) information gathered from fall-run Chinook salmon returns since the early 1990s has resulted in adjustments to ladder counts at RBDD that have reduced the overall number of fish that are categorized as CV spring-run Chinook salmon.

Sacramento River tributary populations in Mill, Deer, and Butte Creeks are probably the best trend indicators for the CV spring-run Chinook ESU as a whole. These streams have shown positive escapement trends since 1991. Recent escapements to Butte Creek, including 20,259 in 1998, 9,605 in 2001 and 8,785 in 2002 (CDFG 2002, 2003), represent the greatest proportion of the ESU's abundance. Although recent trends are positive (Figure 1), annual abundance estimates display a high level of fluctuation, and the overall number of CV spring-run Chinook salmon remains well below estimates of historic abundance. Additionally, in 2003, high water temperatures, high fish densities, and an outbreak of Columnaris Disease (*Flexibacter Columnaris*) and Ichthyophthiriasis (*Ichthyophthirius multifiis*) contributed to the pre-spawning mortality of an estimated 11,231 adult spring-run Chinook salmon in Butte Creek. Because the CV spring-run Chinook salmon ESU is confined to relatively few remaining streams; continues to display broad fluctuations in abundance; and a large proportion of the population (*i.e.*, in Butte Creek) faces the risk of high mortality rates, the population is at a moderate to high risk of extinction.

Figure 1. Recent CV spring-run Chinook abundance for 3 independent populations combined.



3. <u>Central Valley Steelhead</u>

NMFS listed CV steelhead as threatened on March 19, 1998 (63 FR 13347). The ESU includes all naturally produced CV steelhead in the Sacramento-San Joaquin River basin. On September 2, 2005, NMFS designated critical habitat for CV steelhead in areas of the central and south Delta including Victoria Canal (70 FR 52488). Based on policy review and shared jurisdiction with FWS over resident forms of *O. mykiss*, NMFS adopted DPS criteria instead of ESUs for steelhead. On January 5, 2006, NMFS issued final determinations on 10 West Coast steelhead populations and concluded that CV steelhead should remain listed as threatened (71 FR 834).

NMFS Pacific Salmonid Biological Review Team (BRT) reviewed the viability and extinction risks of the 10 steelhead DPSs (Good *et al.* 2005). The BRT concluded that the contribution of the resident life-history form is unknown and may not substantially reduce extinction risks. In the final rule two artificial propagation programs were considered to be part of the CV steelhead

DPS; the Coleman National Fish Hatchery, and the FRH steelhead programs.

All steelhead stocks in the Central Valley are considered to be winter-run steelhead (McEwan and Jackson 1996). Steelhead are similar to other Pacific salmon in their life-history requirements. They are born in freshwater, emigrate to the ocean, and return to freshwater to spawn. However, unlike other Pacific salmon, steelhead are capable of spawning more than once before they die.

The majority of the CV steelhead spawning migration occurs from October through February and spawning occurs from December to April in streams with cool, well oxygenated water that is available year-round. Van Woert (1964) and Harvey (1995) observed that in Mill Creek, the CV steelhead migration is continuous, and although there are two peak periods, 60 percent of the run is passed by December 30. Similar bimodal run patterns have also been observed in the Feather River and the American River (Hannon and Deason 2005).

Incubation time is dependent upon water temperature. Eggs incubate for 1.5 to 4 months before emerging. Eggs held between 50 °F and 59 °F hatch within 3 to 4 weeks (Moyle 1976). Fry emerge from redds within about 4 to 6 weeks depending on redd depth, gravel size, siltation, and temperature (Shapovalov and Taft 1954). Newly emerged fry move to shallow stream margins to escape high water velocities and predation (Barnhart 1986). As fry grow larger they move into riffles and pools and establish feeding locations. Juveniles rear in freshwater for one to four years (Meehan and Bjornn 1991) emigrating episodically from natal streams during fall, winter and spring high flows. Steelhead typically spend 2 years in freshwater. Adults spend 1 to 4 years at sea before returning to freshwater to spawn as 4 or 5-year olds (Moyle 1976).

Steelhead historically were well-distributed throughout the Sacramento and San Joaquin Rivers (Busby *et al.* 1996). Steelhead were found from the upper Sacramento and Pit River systems south to the Kings and possibly the Kern River systems and in both east- and west-side Sacramento River tributaries (Yoshiyama *et al.* 1996). The present distribution has been greatly reduced (McEwan and Jackson 1996). The California Advisory Committee on Salmon and Steelhead (1988) reported a reduction of steelhead habitat from 6,000 miles historically to 300 miles. The California Fish and Wildlife Plan (CDFG 1965) estimated there were 40,000 steelhead in the early 1950s. Hallock *et al.* (1961) estimated an average of 20,540 adult steelhead through the 1960s in the Sacramento River, upstream of the Feather River.

Nobriga and Cadrett (2003) compared CWT and untagged (wild) steelhead smolt catch ratios at Chipps Island trawl from 1998-2001 to estimate that about 100,000 to 300,000 steelhead juveniles are produced naturally each year in the Central Valley. In the latest status review of West Coast salmon and steelhead (Good *et al.* 2005), the BRT calculated the following estimates of steelhead juveniles based on midwater trawling data from Chipps Island (Table 4).

Table 4. Estimated natural production of CV steelhead (Good *et al.* 2005).

				Wild female spawners		
Year	**C_w/C_h[a]**	**Hatchery**	**Natural**	**1% ESS**	**5% ESS**	**10% ESS**
1998	0.300	1,120,000	336,000	6,720	1,344	672
1999	0.062	1,510,000	94,000	1,872	374	187
2000	0.083	1,380,000	115,000	2,291	458	229
Average	0.148	1,340,000	181,000	3,628	726	363

[a] C_w/C_h = ratio of unclipped wild to clipped hatchery steelhead
ESS = egg-to-smolt survival

From the calculations in Table 4, the BRT made the following conclusion:

> "It appears that about 100,000-300,000 steelhead juveniles (roughly, smolts) are produced naturally each year in the Central Valley. If we make the fairly generous assumptions (in the sense of generating large estimates of spawners) that average fecundity is 5,000 eggs per female, 1 percent of eggs survive to reach Chipps Island, and 181,000 smolts are produced (the 1998-2000 average), about 3,628 female steelhead spawn naturally in the entire Central Valley. This can be compared with McEwan's (2001) estimate of 1 million to 2 million spawners before 1850, and 40,000 spawners in the 1960s."

Existing wild steelhead stocks in the Central Valley mostly are confined to upper Sacramento River and its tributaries, including Antelope, Deer, and Mill Creeks, and the Yuba River. Populations may exist in Big Chico and Butte Creeks and a few wild steelhead are produced in the American and Feather Rivers (McEwan and Jackson 1996). The only consistent data available on wild steelhead numbers in the San Joaquin River basin come from CDFG mid-water trawling samples collected on the lower San Joaquin River at Mossdale. These data indicate a decline in steelhead numbers in the early 1990s, which have remained low through 2002 (CDFG 2003). Typically, in most years less than 12 steelhead smolts are observed in the Mossdale trawl (CDFG, unpublished data).

Until recently, steelhead were thought to be extirpated from the San Joaquin River system. Recent monitoring has detected small self-sustaining populations of steelhead in the Stanislaus, Mokelumne, Calaveras, and other streams previously thought to be devoid of steelhead (McEwan 2001). On the Stanislaus River, steelhead smolts have been captured in rotary screw traps at Caswell State Park and Oakdale each year since 1995 (Demko *et al.* 2000). After 5 years of operating a fish counting weir on the Stanislaus River only nine adult steelhead have been observed moving upstream, although several large rainbow trout have washed up on the weir in late winter (Cramer 2007). It has been shown that steelhead will spawn with resident *O. mykiss* populations, where naturally occuring steelhead populations are non-existent, creating a polymorphic population that may be necessary for long-term survival (McEwan 2001).

Incidental catches and observations of steelhead juveniles also have occurred on the Tuolumne and Merced Rivers during fall-run Chinook salmon monitoring activities, indicating that steelhead are widespread, if not abundant, throughout accessible streams and rivers in the Central Valley (Good *et al.* 2005).

Reliable estimates of CV steelhead abundance for different basins are not available (McEwan 2001); however, McEwan and Jackson (1996) estimate the total annual run size for the entire Sacramento-San Joaquin system, based on RBDD counts, to be no more than 10,000 adults. Steelhead counts at the RBDD have declined from an average of 11,187 adults for the period of 1967 to 1977, to an average of approximately 2,000 adults through the early 1990s (McEwan and Jackson 1996, McEwan 2001).

Both the BRT (Good *et al.* 2005) and the Artificial Propagation Evaluation Workshop (69 FR 33102) concluded that the CV steelhead DPS presently is "in danger of extinction". CV steelhead have been extirpated from most of their historical range in this region. Habitat concerns in the Central Valley focus on the widespread degradation, destruction, and blockage of freshwater habitat within the region, and water allocation problems. Widespread hatchery steelhead production within this DPS also raises concerns about the potential ecological interactions between introduced stocks and native stocks. Because the CV steelhead population has been fragmented into smaller isolated tributaries without any large source population and the remaining habitat continues to be degraded by water diversions, the population remains at an elevated risk for future population declines.

4. North American Green Sturgeon

The Southern DPS of North American green sturgeon was listed by NMFS as threatened on April 7, 2006 (71 FR 17757). The final rule became effective on July 6, 2006. The southern DPS of North American green sturgeon consists of only one known spawning population in the Sacramento River from Keswick Dam to GCID (Israel *et al.* 2004). Estimates of spawning green sturgeon above RBDD ranged from 30 adults in 2002 to 124 in 2006 (Israel 2006). Assuming 50 percent passage at RBDD (Hueblin 2006), approximately 142 adults may spawn every year and assuming green sturgeon return every five years to spawn there, a maximum of 712 adults may exist in the Southern DPS (Adams, et al. 2006). Critical habitat for the southern DPS of North American green sturgeon has not yet been designated.

a. *General Life History*

North American green sturgeon have morphological characteristics of both cartilaginous fish and bony fish. The fish has some morphological traits similar to sharks, such as a cartilaginous skeleton, heterocercal caudal fin, spiracles, spiral valve intestine, electro-sensory pores on its snout and an enlarged liver. However, like more modern teleosts, it has five gill arches contained within one branchial chamber, covered by one opercular plate and a functional swim bladder for bouyancy control. Adult green sturgeon have a maximum fork length of 2.3 meters and 159 kg body weight (Miller and Lea 1972, Moyle *et al.* 1992). It is believed that green sturgeon can live at least 60 years, based on data from the Klamath River (Emmett *et al.* 1991).

The green sturgeon is the most widely distributed of the *acipenseridae*. They are amphi-Pacific and circumboreal, ranging from the inshore waters of Baja California northwards to the Bering Sea and then southwards to Japan. They have been recorded from at least six different countries: Mexico, United States, Canada, Russia (Sakhalin Island), Japan, and Korea (Emmett *et al.* 1991, Moyle *et al.* 1992). Although widely distributed, they are not very abundant in comparison to the sympatric white sturgeon (*Acipenser transmontanus*).

In North America, spawning populations of green sturgeon currently are found in only three river systems: the Sacramento and Klamath Rivers in California and the Rogue River in southern Oregon. Spawning has only been reported in one Asian river, the Tumin River in eastern Asia. Green sturgeon are known to range from Baja California to the Bering Sea along the North American continental shelf. Data from commercial trawl fisheries and tagging studies indicate that the green sturgeon occupy waters within the 110 meter contour (NMFS 2005a). During the late summer and early fall, subadults and nonspawning adult green sturgeon frequently can be found aggregating in estuaries along the Pacific coast (Emmett *et al.* 1991). Particularly large concentrations occur in the Columbia River estuary, Willapa Bay, and Grays Harbor, with smaller aggregations in San Francisco and San Pablo Bays (Emmett *et al.* 1991, Moyle *et al.* 1992, Beamesderfer *et al.* 2004). Recent acoustical tagging studies on the Rogue River (Erickson *et al.* 2002) have shown that adult green sturgeon will hold for as much as 6 months in deep (> 5m), low gradient reaches or off channel sloughs or coves of the river during summer months when water temperatures were between 15 °C and 23 °C. When ambient temperatures in the river dropped in autumn and early winter (<10 °C) and flows increased, fish moved downstream and into the ocean.

Adult green sturgeon in the Delta are believed to feed primarily upon benthic invertebrates such as clams, mysid and grass shrimp, and amphipods (Radtke 1966). Adult sturgeon caught in Washington state waters were found to have fed on Pacific sand lance (*Ammodytes hexapterus*) and callianassid shrimp (Moyle *et al.* 1992).

Adult green sturgeon are gonochoristic (sex genetically fixed), oviparous, and iteroparous. They are believed to spawn every 3 to 5 years and reach sexual maturity only after several years of growth (10 to 15 years based on sympatric white sturgeon sexual maturity). Younger females may not spawn the first time they undergo oogenesis and subsequently they reabsorb their gametes. Adult female green sturgeon produce between 60,000 and 140,000 eggs, depending on body size, with a mean egg diameter of 4.3 mm (Moyle *et al.* 1992, Van Eenennaam *et al.* 2001). They have the largest egg size of any sturgeon, and the volume of yolk ensures an ample supply of energy for the developing embryo. The eggs themselves are slightly adhesive, much less so than the sympatric white sturgeon, and are more dense than than those of white sturgeon (Kynard *et al.* 2005). Adults begin their upstream spawning migrations into freshwater in late February with spawning occuring between March and July. Peak spawning is believed to occur between

April and June in deep, turbulent, mainstem channels over large cobble and rocky substrates with crevices and interstices. Females broadcast spawn their eggs over this substrate, and the fertilized eggs sink into the interstices of the substrate where they develop further (Kynard *et al.* 2005).

Green sturgeon larvae hatched from fertilized eggs after approximately 169 hours at a water temperature of 15 °C (Van Eenennaam *et al.* 2001, Deng *et al.* 2002), which is similar to the sympatric white sturgeon development rate (176 hours). Studies conducted at the University of California, Davis by Van Eenennaam *et al.* (2005) indicated that an optimum range of water temperature for egg development ranged between 14 °C and 17 °C. Temperatures over 23 °C resulted in 100 percent mortality of fertilized eggs before hatching. Eggs incubated at water temperatures between 17.5 °C and 22 °C resulted in elevated mortalities and an increased occurrence of morphological abnormalities in those eggs that did hatch. At incubation temperatures below 14 °C, hatching mortality also increased significantly, and morphological abnormalities increased slightly, but not statistically so.

Newly hatched green sturgeon are approximately 12.5 to 14.5 mm in length and have a large ovoid yolk sac that supplies nutritional energy until exogenous feeding occurs. The larvae are less developed in their morphology than older juveniles and external morphology resembles a "tadpole" with a continuous fin fold on both the dorsal and ventral sides of the caudal trunk. The eyes are well developed with differentiated lenses and pigmentation.

Olfactory and auditory vesicles are present while the mouth and respiratory structures are only shallow clefts on the head. At 10 days of age, the yolk sac has become greatly reduced in size and the larvae initiates exogenous feeding through a functional mouth. The fin folds have become more developed and formation of fin rays begins to occur in all fin tissues. By 45 days of age, the green sturgeon larvae have completed their metamorphosis, which is characterized by the development of dorsal, lateral, and ventral scutes, elongation of the barbels, rostrum, and caudal peduncle, reabsorption of the caudal and ventral fin folds, and the development of fin rays. The juvenile fish resembles the adult form, including the dark olive coloring, with a dark mid-ventral stripe (Deng *et al.* 2002).

Green sturgeon larvae do not exhibit the initial pelagic swim–up behavior characteristic of other *acipenseridae*. They are strongly oriented to the bottom and exhibit nocturnal activity patterns. After 6 days, the larvae exhibit nocturnal swim-up activity (Deng *et al.* 2002) and nocturnal downstream migrational movements (Kynard *et al.* 2005). Juvenile fish continue to exhibit nocturnal behavior beyond the metamorphosis from larvae to juvenile stages. Kynard *et al.* (2005) laboratory studies indicated that juvenile fish continued to migrate downstream at night for the first 6 months of life. When ambient water temperatures reached 8 °C, downstream migrational behavior diminished and holding behavior increased. This data suggests that 9 to 10 month old fish would hold over in their natal rivers during the ensuing winter following hatching, but at a location downstream of their spawning grounds. The most important food of juvenile green sturgeon caught in the Delta appears to be amphipods such as Corophium and

Neomysis based on fish caught in the spring and summer (Radtke 1966).

Green sturgeon juveniles tested under laboratory conditions had optimal bioenergetic performance (*i.e.*, growth, food conversion, swimming ability) between 15 °C and 19 °C under either full or reduced rations (Mayfield and Cech 2004). This temperature range overlaps the egg incubation temperature range for peak hatching success previously discussed. Ambient water temperature conditions in the Rogue and Klamath River systems range from 4 °C to approximately 24 °C. The Sacramento River has similar temperature profiles, and, like the previous two rivers, is a regulated system with several dams controlling flows on its mainstem (Shasta and Keswick dams), and its tributaries (Whiskeytown, Oroville, Folsom, and Nimbus dams).

Larval and juvenile green sturgeon are subject to predation by both native and introduced fish species. Smallmouth bass (*Micropterus dolmoides*) have been recorded on the Rogue River as preying on juvenile green sturgeon, and prickly sculpin (*Cottus asper*) have been shown to be an effective predator on the larvae of sympatric white sturgeon (Gadomski and Parsley 2005). This latter study also indicated that the lowered turbidity found in tailwater streams and rivers due to dams increased the effectiveness of sculpin predation on sturgeon larvae under laboratory conditions.

b. *Population Trends –Southern population of North American Green Sturgeon*

Known historic and current spawning occurs only in the Sacramento River (Adams *et al.* 2002, 2006; Beamesderfer *et al.* 2004, Heublein *et al.* 2006). Currently, upstream migrations of sturgeon are halted by Keswick and Shasta Dams on the mainstem of the Sacramento River. Although no historical accounts exist for identified green sturgeon spawning occuring above the current dam sites, suitable spawning habitat existed, and based on habitat assessments done for Chinook salmon, the geographic extent of spawning has been reduced due to the impassable barriers constructed on the river.

Spawning on the Feather River is suspected to have occurred in the past due to the continued presence of adult green sturgeon in the river below Oroville Dam. This continued presence of adults below the dam suggests that fish are trying to migrate to upstream spawning areas now blocked by the dam which was constructed in 1968.

Spawning in the San Joaquin River system has not been recorded historically or observed recently, however white sturgeon are routinely caught by poachers as far upstream as Laird County Park, river mile 90.2 (Beamesderfer *et al.* 2004). During the later half of the 1800s impassable barriers were built on these tributaries where the water courses left the foothills and entered the valley floor. Therefore, these low elevation dams have blocked potentially suitable spawning habitats located further upstream for approximately a century. Additional destruction of riparian and stream channel habitat by industrialized gold dredging further disturbed any valley floor habitat that was still available for sturgeon spawning. It is likely that both white and green sturgeon utilized the San Joaquin River basin for spawning prior to the onset of european influence, based on past use of the region by populations of CV spring-run Chinook salmon and CV steelhead. These two populations of salmonids have either been extirpated or greatly diminished in their use of the San Joaquin River basin over the past two centuries.

The size of the population of green sturgeon is difficult to estimate due to a lack of data specific for this fish. However, inferences from the commercial and sport fisheries harvest can be used to estimate population trends over time. Based on the harvest numbers, green sturgeon catch has decreased from a high of 9,065 in 1986 to 512 in 2003 (Adams *et al.* 2006). The greatest decreases in harvest were for commercial gears in the Columbia River, Willapa Bay, and Greys Harbor. The decrease was attributed to changes in the regulatory statutes for sturgeon harvest. Catch rates for the Hoopa and Yurok tribal harvests remained unchanged during this same period and accounted for approximately 59 percent of the total harvest in 2003 (NMFS 2005a). Entrainment numbers at the SWP and CVP pumping facilities in the south Delta have been consistently lower than their levels in the mid-1970s (SWP) and the mid-1980s (CVP). Prior to 1986, the SWP (1968 -2001) averaged 732 green sturgeon salvaged per year, which dropped to 47 per year after 1986. The CVP (1980-2001) showed similar declines in its salvage rate for green sturgeon, 889 per year prior to 1986 and 32 per year after 1986 (Adams *et al.* 2006).

c. *Status –Southern population of North American Green Sturgeon*

The southern population of green sturgeon historically was smaller than the sympatric population of white sturgeon in the San Francisco Bay estuary and its associated tributaries. The population apparently has been declining over the past several decades based on harvest numbers from sport and commercial fisheries and the entrainment rates at the CVP and SWP (Adams *et al.* 2002, 2006). The principle factor for this decline is the reduction of green sturgeon spawning habitat to a limited area below Keswick Dam on the Sacramento River. The construction of impassable barriers, particularly large dams, has greatly reduced the access of green sturgeon to their historical spawning areas. These barriers and their manipulation of the normal hydrograph for the river also have had detrimental effects on the natural life history of green sturgeon. Reduced flows have corresponded with weakened year-class recruitment in the sympatric white sturgeon population and it is believed to have the same effect upon green sturgeon recruitment. Obstruction of natural sediment recruitment below large impoundments potentially has increased predation on larval and juvenile sturgeon due to a reduction in turbidity and loss of larger diameter substrate. In addition to the adverse effects of impassable barriers, numerous agricultural water diversions exist in the Sacramento River and the Delta along the migratory route of larval and juvenile sturgeon. Entrainment or, if equipped with a fish screen, impingement are considered serious threats to sturgeon during their downstream migration. Fish screens have not been designed with criteria that address sturgeon behavior or swimming capabilities. The benthic-oriented sturgeon are also more susceptible to contaminated sediments through dermal contact and through their feeding behavior of ingesting prey along with contaminated sediments. Their long life spans allow them to accumulate high body burdens of contaminants, that potentially will reach concentrations with deleterious physiological effects.

The most recent review of the status of green sturgeon concluded that the Southern DPS is at substantial risk and likely to become an endangered species in the foreseeable future (Adams *et al.* 2006). Threats included vulnerability due to concentration of spawners, smaller population size, lack of population data, growth-limiting temperatures, harvest concerns, loss of habitat, entrainment by water projects, and influence of toxic material and exotic species.

B. Critical Habitat Condition and Function for Species' Conservation

The freshwater habitat of salmon, steelhead, and sturgeon in the Sacramento River, San Joaquin River, and Suisun Marsh watershed drainages varies in function depending on location. Spawning areas are located in accessible, upstream reaches of the Sacramento or San Joaquin Rivers and their watersheds where viable spawning gravels and water quality are found. Spawning habitat condition is strongly affected by water flow and quality, especially temperature, dissolved oxygen (DO), and silt load, all of which can greatly affect the survival of eggs and larvae. High-quality spawning habitat is now inaccessible behind large dams in these watersheds, which limits salmonids to spawning in marginal tailwater habitat below the dams. Despite often intensive management efforts, the existing spawning habitat below dams is highly susceptible to inadequate flows and high temperatures due to competing demands for water, which impairs the habitat function.

Migratory corridors are downstream of the spawning area and include the Delta and Suisun Marsh. These corridors allow the upstream passage of adults and the downstream emigration of juveniles. Migratory habitat conditions are impaired in each of these drainages by the presence of barriers, which can include dams, unscreened or poorly screened diversions, inadequate water flows, and degraded water quality.

Both spawning areas and migratory corridors comprise rearing habitat for juveniles, which feed and grow before and during their outmigration. Non-natal, intermittent tributaries also may be used for juvenile rearing by salmonids, but such use has not been documented for green sturgeon. Rearing habitat condition is strongly affected by habitat complexity, food supply, and presence of predators of juvenile salmonids and sturgeon. Some complex, productive habitats with floodplains remain in the Sacramento and San Joaquin River systems (*e.g.*, the lower Cosumnes River, Sacramento River reaches above Colusa, and the Yolo and Sutter bypasses). However, the channelized, leveed, and rip-rapped river reaches and sloughs that are common in the Delta and Suisun Marsh systems typically have lower habitat complexity, lower abundance of food organisms, and offer little protection from either fish or avian predators.

C. Factors Affecting the Species and Critical Habitat

A number of documents have addressed the history of human activities, present environmental conditions, and factors contributing to the decline of salmon and steelhead species in the Central Valley and Suisun Marsh. For example, NMFS prepared range-wide status reviews for West coast Chinook salmon (Myers *et al.* 1998), steelhead (Busby *et al.* 1996), and green sturgeon (Adams *et al.* 2002, 2006; NMFS 2005a). Also, the NMFS BRT published a final updated status review for West Coast salmon and steelhead in June 2005 (Good *et al.* 2005). Information also is available in Federal Register notices announcing ESA listing proposals and determinations for some of these species and their critical habitat (*e.g.*, 58 FR 33212, 59 FR 440, 62 FR 24588, 62 FR 43937, 63 FR 13347, 64 FR 24049, 64 FR 50394, 65 FR 7764, 70 FR 52488, 71 FR 834, 71 FR 17757). The Final Programmatic EIS/EIR for the CALFED Bay-Delta Program (CALFED 1999), and the Final Programmatic EIS for the CVPIA U.S. Department of Interior (DOI 1999), provide an excellent summary of historical and recent environmental conditions for salmon and steelhead in the Central Valley.

The following general description of the factors affecting Sacramento River winter-run Chinook salmon, CV spring-run Chinook salmon, CV steelhead, green sturgeon and their habitat is based on a summary of these documents.

In general, the human activities that have affected the listed anadromous salmonids and their habitats consist of: (1) dam construction that blocks previously accessible habitat; (2) water development and management activities that affect water quantity, flow timing, quality, and stream function; (3) land use activities such as agriculture, flood control, urban development, mining, road construction, and logging that degrade aquatic and riparian habitat; (4) hatchery operation and practices; (5) harvest activities; and (6) ecosystem restoration actions.

1. Habitat Blockage

Hydropower, flood control, and water supply dams of the CVP, SWP, and other municipal and private entities permanently block or hinder salmonid access to historical spawning and rearing grounds. Clark (1929) estimated that originally there were 6,000 linear miles of salmon habitat in the Central Valley system and that 80 percent of this habitat had been lost by 1928. Yoshiyama *et al.* (1996) calculated that roughly 2,000 linear miles of salmon habitat was actually available before dam construction and mining, and concluded that 82 percent is not accessible today.

In general, large dams on every major tributary to the Sacramento River, San Joaquin River, and the Delta block salmon, and steelhead access to the upper portions of the respective watersheds. On the Sacramento River, Keswick Dam blocks passage to historic spawning and rearing habitat in the upper Sacramento, McCloud, and Pit Rivers. Whiskeytown Dam blocks access to the upper watershed of Clear Creek. Oroville Dam and associated facilities block passage to the upper Feather River watershed. Nimbus Dam blocks access to most of the American River basin. Friant Dam construction in the mid-1940s has been associated with the elimination of spring-run Chinook salmon in the San Joaquin River upstream of the Merced River (DOI 1999). On the Stanislaus River, construction of Goodwin Dam in 1912, Tulloch Dam in 1957, and New Melones Dam in 1979, completely blocked both spring- and fall-run Chinook salmon, as well as CV steelhead (Yoshiyama *et al.* 2001). Similarly, construction of La Grange Dam in 1893 and

New Don Pedro Dam in 1971 blocked upstream access to salmonids on the Tuolumne River. Upstream migration on the Merced River was blocked in 1910 by the construction of Crocker-Huffman Dam and later by New Exchequer Dam and McSwain Dam in 1967. These dams also had the potential to block any spawning populations of green sturgeon in these tributaries.

As a result of the dams, winter-run Chinook salmon, spring-run Chinook salmon, and steelhead populations on these rivers have been confined to lower elevation mainstems that historically only were used for migration. Population abundances have declined in these streams due to decreased quantity and quality of spawning and rearing habitat. Higher temperatures at these lower elevations during late-summer and fall are a major stressor to adults and juvenile salmonids. Green sturgeon populations would be similarly affected by these barriers and alterations to the natural hydrology.

In the Delta, migratory pathways are temporarily blocked by the Delta Cross Channel Gates at Walnut Grove on the Sacramento River, the Head of Old River Barrier on the San Joaquin River, and three agricultural barriers in the south Delta (*i.e.*, Old River near Tracy, Grant Line Canal, and Middle River near Victoria Canal). The Suisun Marsh Salinity Control Gates (SMSCG), located on Montezuma Slough, were installed in 1988, and are operated with gates and flashboards to decrease the salinity levels of managed wetlands in Suisun Marsh. The SMSCG have delayed or blocked passage of adult Chinook salmon migrating upstream (Edwards *et al.* 1996, Tillman *et al.* 1996, CDWR 2002). The effects of the SMSCG on green sturgeon are unknown at this time.

2. <u>Water Development</u>

The diversion and storage of natural flows by dams and diversion structures on Central Valley waterways have depleted streamflows and altered the natural cycles by which juvenile and adult salmonids base their migrations. As much as 60 percent of the natural historical inflow to Central Valley watersheds and the Delta have been diverted for human uses. Depleted flows have contributed to higher temperatures, lower DO levels, and decreased recruitment of gravel and large woody debris (LWD). More uniform flows year-round have resulted in diminished natural channel formation, altered food web processes, and slower regeneration of riparian vegetation. These stable flow patterns have reduced bedload movement (Mount 1995, Ayers 2001), caused spawning gravels to become embedded, and decreased channel widths due to channel incision, all of which has decreased the available spawning and rearing habitat below dams.

Water diversions for irrigated agriculture, municipal and industrial use, and managed wetlands are found throughout the Central Valley. Hundreds of small and medium-size water diversions exist along the Sacramento River, San Joaquin River, and their tributaries. Although efforts have been made in recent years to screen some of these diversions, many remain unscreened. Depending on the size, location, and season of operation, these unscreened diversions entrain and kill many life stages of aquatic species, including juvenile salmonids. For example, as of 1997, 98.5 percent of the 3,356 diversions included in a Central Valley database were either unscreened or screened insufficiently to prevent fish entrainment (Herren and Kawasaki 2001). Most of the 370 water diversions operating in Suisun Marsh are unscreened (USFWS 2003).

Outmigrant juvenile salmonids in the Delta have been subjected to adverse environmental conditions created by water export operations at the CVP/SWP pumps. Specifically, juvenile salmonid survival has been reduced by the following: (1) water diversion from the mainstem Sacramento River into the Central Delta via the Delta Cross Channel; (2) upstream or reverse flows of water in the lower San Joaquin River, Old and Middle Rivers and southern Delta waterways; (3) entrainment at the CVP/SWP export facilities and predation in Clifton Court Forebay; and (4) increased exposure to introduced, non-native predators such as striped bass (*Morone saxatilis*), largemouth bass (*Micropterus salmoides*), smallmouth bass (*Micropterus dolomieui)* and sunfishes (*Centrarchidae* spp.).

3. Land Use Activities

Land use activities continue to have large impacts on salmonid habitat in the Central Valley watershed. Until about 150 years ago, the Sacramento River was bordered by up to 500,000 acres of riparian forest, with bands of vegetation extending outward for 4 or 5 miles (California Resources Agency 1989). By 1979, riparian habitat along the Sacramento River diminished to 11,000 to 12,000 acres, or about 2 percent of historic levels (McGill 1987). The degradation and fragmentation of riparian habitat had resulted mainly from flood control and bank protection projects, together with the conversion of riparian land to agriculture. Removal of snags and driftwood in the Sacramento and San Joaquin River basins has reduced sources of LWD needed to form and maintain stream habitat that salmon depend on in their various life stages.

Increased sedimentation resulting from agricultural and urban practices within the Central Valley is one of the primary causes of salmonid habitat degradation (NMFS 1996). Sedimentation can adversely affect salmonids during all freshwater life stages by: clogging or abrading gill surfaces, adhering to eggs, hampering fry emergence (Phillips and Campbell 1961), burying eggs or alevins, scouring and filling in pools and riffles, reducing primary productivity and photosynthesis activity (Cordone and Kelley 1961), and affecting intergravel permeability and DO levels. Excessive sedimentation over time can cause substrates to become embedded, which reduces successful salmonid spawning and egg and fry survival (Waters 1995).

Land use activities associated with road construction, urban development, logging, mining, agriculture, and recreation have significantly altered fish habitat quantity and quality through the alteration of streambank and channel morphology; alteration of ambient water temperatures; degradation of water quality; elimination of spawning and rearing habitat; fragmentation of available habitats; elimination of downstream recruitment of LWD; and removal of riparian vegetation, resulting in increased streambank erosion (Meehan 1991). Urban stormwater and agricultural runoff may be contaminated with herbicides and pesticides, petroleum products, sediment, *etc.* Agricultural practices in the Central Valley have eliminated large trees and logs and other woody debris that would otherwise be recruited into the stream channel (NMFS 1998). LWD influences stream morphology by affecting channel pattern, position, and geometry, as well as pool formation (Keller and Swanson 1979, Bilby 1984, Robison and Beschta 1990).

Since the 1850s, wetlands reclamation for urban and agricultural development has caused the cumulative loss of 79 and 94 percent of the tidal marsh habitat in the Delta downstream and upstream of Chipps Island, respectively (Conomos *et al.* 1985, Nichols *et al.* 1986, Wright and Phillips 1988, Monroe *et al.* 1992, Goals Project 1999). Prior to 1850, approximately 1400 km^2 of freshwater marsh surrounded the confluence of the Sacramento and San Joaquin Rivers, and another 800 km^2 of saltwater marsh fringed San Francisco Bay's margins. Of the original 2,200 km^2 of tidally influenced marsh, only about 125 km^2 of undiked marsh remains today. In Suisun Marsh, saltwater intrusion and land subsidence gradually has led to the decline of agricultural production. Presently, Suisun Marsh consists largely of tidal sloughs and managed wetlands for duck clubs, which first were established in the 1870s in western Suisun Marsh (Goals Project 1999).

Dredging of river channels to enhance inland maritime trade and to provide raw material for levee construction has significantly and detrimentally altered the natural hydrology and function of the river systems in the Central Valley. Starting in the mid-1800s, the Corps and other private consortiums began straightening river channels and artificially deepening them to enhance shipping commerce. This has led to declines in the natural meandering of river channels and the formation of pool and riffle segments. The deepening of channels beyond their natural depth also has led to a significant alteration in the transport of bedload in the riverine system as well as the local flow velocity in the channel (Mount 1995). The Sacramento Flood Control Project at the turn of the nineteenth century ushered in the start of large scale Corps actions in the Delta and along the rivers of California for reclamation and flood control. The creation of levees and the deep shipping channels reduced the natural tendency of the San Joaquin and Sacramento Rivers to create floodplains along their banks with seasonal inundations during the wet winter season and the spring snow melt periods. These annual inundations provided necessary habitat for rearing and foraging of juvenile native fish that evolved with this flooding process. The armored rip rapped levee banks and active maintenance actions of Reclamation Districts precluded the establishment of ecologically important riparian vegetation, introduction of valuable LWD from these riparian corridors, and the productive intertidal mudflats characteristic of the undisturbed Delta habitat.

Juvenile salmonids are exposed to increased water temperatures in the Delta during the late spring and summer due to the loss of riparian shading, and by thermal inputs from municipal, industrial, and agricultural discharges. Studies by CDWR on water quality in the Delta over the last 30 years show a steady decline in the food sources available for juvenile salmonids and sturgeon and an increase in the clarity of the water due to a reduction in phytoplankton and zooplankton. These conditions have contributed to increased mortality of juvenile Chinook salmon, steelhead, and sturgeon as they move through the Delta.

4. Water Quality

The water quality of the Delta has been negatively impacted over the last 150 years. Increased water temperatures, decreased DO levels, and increased turbidity and contaminant loads have degraded the quality of the aquatic habitat for the rearing and migration of salmonids. The Regional Board, in its 1998 Clean Water Act §303(d) list characterized the Delta as an impaired water body having elevated levels of chlorpyrifos, dichlorodiphenyltrichlor (DDT), diazinon, electrical conductivity, Group A pesticides, mercury, low DO, organic enrichment, and unknown toxicities (Regional Board 1998, 2001).

In general, water degradation or contamination can lead to either acute toxicity, resulting in death when concentrations are sufficiently elevated, or more typically, when concentrations are lower, to chronic or sublethal effects that reduce the physical health of the organism, and lessens its survival over an extended period of time. For listed species, these effects may occur directly to the listed fish or to its prey base, which reduces the forage base available to the listed species.

Sediments can either act as a sink or as a source of contamination depending on hydrological conditions and the type of habitat the sediment occurs in. Sediment provides habitat for many aquatic organisms and is a major repository for many of the more persistent chemicals that are introduced into the surface waters. In the aquatic environment, most anthropogenic chemicals and waste materials including toxic organic and inorganic chemicals eventually accumulate in sediment (Ingersoll 1995).

Direct exposure to contaminated sediments may cause deleterious effects to listed salmonids or the threatened green sturgeon. This may occur if a fish swims through a plume of the re-suspended sediments or rests on contaminated substrate and absorbs the toxic compounds through one of several routes: dermal contact, ingestion, or uptake across the gills. Elevated contaminant levels may be found in localized "hot spots" where discharge occurs or where river currents deposit sediment loads. Sediment contaminant levels can thus be significantly higher than the overlying water column concentration maximums specified by the U.S. Environmental Protection Agency (EPA). However, the more likely route of exposure to salmonids or sturgeon is through the food chain, when the fish feed on organisms that are contaminated with toxic compounds. Prey species become contaminated either by feeding on the detritus associated with the sediments or dwelling in the sediment itself. Therefore, the degree of exposure to the salmonids and green sturgeon depends on their trophic level and the amount of contaminated forage base they consume. Response of salmonids and green sturgeon to contaminated sediments is similar to water borne exposures.

5. Hatchery Operations and Practices

Five hatcheries currently produce Chinook salmon in the Central Valley and four of these also produce CV steelhead. Releasing large numbers of hatchery fish can pose a threat to wild Chinook salmon and CV steelhead stocks through genetic impacts, competition for food and other resources between hatchery and wild fish, predation of hatchery fish on wild fish, and increased fishing pressure on wild stocks as a result of hatchery production (Waples 1991). The genetic impacts of artificial propagation programs in the Central Valley primarily are caused by straying of hatchery fish and the subsequent interbreeding of hatchery fish with wild fish. In the Central Valley, practices such as transferring eggs between hatcheries and trucking smolts to distant sites for release contribute to elevated straying levels (DOI 1999). For example, Nimbus Hatchery on the American River rears Eel River origin steelhead and releases these fish in the Sacramento River basin. One of the recommendations in the Joint Hatchery Review Report (NMFS and CDFG 2001) was to identify and designate new sources of steelhead brood stock to replace the current Eel River origin brood stock.

Hatchery practices as well as spatial and temporal overlaps of habitat use and spawning activity between spring- and fall-run fish have led to the hybridization and homogenization of some subpopulations (CDFG 1998). As early as the 1960s, Slater (1963) observed that early fall- and spring-run Chinook salmon were competing for spawning sites in the Sacramento River below Keswick Dam, and speculated that the two runs may have hybridized. For the last several years zero spring-run Chinook salmon have been observed spawning in the mainstem Sacramento River above RBDD. The FRH spring-run Chinook salmon have been documented as straying throughout the Central Valley for many years (CDFG 1998), and in many cases have been recovered from the spawning grounds of fall-run Chinook salmon, an indication that FRH spring-run Chinook salmon may exhibit fall-run life history characteristics. Although the degree of hybridization has not been comprehensively determined, it is clear that the populations of spring-run Chinook salmon spawning in the Feather River and above RBDD on the Sacramento River contain hybridized fish.

The management of hatcheries, such as Nimbus Hatchery and FRH, can directly impact spring-run Chinook salmon and steelhead populations by overwhelming the natural carrying capacity of the limited habitat available below dams. In the case of the Feather River, significant redd superimposition occurs in-river due to hatchery overproduction and the inability to physically separate spring- and fall-run Chinook salmon adults. This concurrent spawning has led to hybridization between the spring- and fall-run Chinook salmon in the Feather River. At Nimbus Hatchery, operating Folsom Dam to meet temperature requirements for returning hatchery fall-run Chinook salmon often limits the amount of water available for steelhead spawning and rearing the rest of the year.

The increase in Central Valley hatchery production has reversed the composition of the steelhead population, from 88 percent naturally-produced fish in the 1950s (McEwan 2001) to an estimated 23 to 37 percent naturally-produced fish currently (Nobriga and Cadrett 2001). The increase in hatchery steelhead production proportionate to the wild population has reduced the viability of the wild steelhead populations, increased the use of out-of-basin stocks for hatchery production, and increased straying (NMFS and CDFG 2001). Thus, the ability of natural populations to successfully reproduce and continue their genetic integrity likely has been diminished.

The relatively low number of spawners needed to sustain a hatchery population can result in high harvest-to-escapements ratios in waters where fishing regulations are set according to hatchery population. This can lead to over-exploitation and reduction in the size of wild populations existing in the same system as hatchery populations due to incidental bycatch (McEwan 2001).

Hatcheries also can have some positive effects on salmonid populations. Artificial propagation has been shown to be effective in bolstering the numbers of naturally spawning fish in the short term under specific scenarios. Artificial propagation programs can also aid in conserving genetic resources and guarding against catastrophic loss of naturally spawned populations at critically low abundance levels, as was the case with the Sacramento River winter-run Chinook salmon population during the 1990s. However, overall abundance is only one component of a viable salmonid population.

6. <u>Commercial and Sport Harvest</u>

a. *Ocean Harvest*

(1) *Chinook salmon*. Extensive ocean recreational and commercial troll fisheries for Chinook salmon exist along the Central California coast, and an inland recreational fishery exists in the Central Valley for Chinook salmon and steelhead. Ocean harvest of Central Valley Chinook salmon is estimated using an abundance index, called the Central Valley Index (CVI). The CVI is the ratio of Chinook salmon harvested south of Point Arena (where 85 percent of Central Valley Chinook salmon are caught) to escapement. CWT returns indicate that Sacramento River salmon congregate off the California coast between Point Arena and Morro Bay.

Since 1970, the CVI for winter-run Chinook salmon generally has ranged between 0.50 and 0.80. In 1990, when ocean harvest of winter-run Chinook salmon was first evaluated by NMFS and the Pacific Fisheries Management Council (PFMC), the CVI harvest rate was near the highest recorded level at 0.79. NMFS determined in a 1991 biological opinion that continuance of the 1990 ocean harvest rate would not prevent the recovery of winter-run Chinook salmon. Through the early 1990s, the ocean harvest index was below the 1990 level (*i.e.*, 0.71 in 1991 and 1992, 0.72 in 1993, 0.74 in 1994, 0.78 in 1995, and 0.64 in 1996). In 1996 and 1997, NMFS issued a biological opinion which concluded that incidental ocean harvest of winter-run Chinook salmon represented a significant source of mortality to the endangered population, even though ocean harvest was not a key factor leading to the decline of the population. As a result of these opinions, measures were developed and implemented by the PFMC, NMFS, and CDFG to reduce ocean harvest by approximately 50 percent.

Ocean fisheries have affected the age structure of spring-run Chinook salmon through targeting large fish for many years and reducing the numbers of 4- and 5-year-old fish (CDFG 1998). There are limited data on spring-run Chinook salmon ocean harvest rates. An analysis of 6 tagged groups of FRH spring-run Chinook salmon by Cramer and Demko (1997) indicated that harvest rates of 3-year old fish ranged from 18 percent to 22 percent, 4-year old fish ranged from

57 percent to 84 percent, and 5-year old fish ranged from 97 percent to 100 percent. The almost complete removal of 5-year old fish from the population effectively reduces the age structure of the species, which reduces its resiliency to factors that may impact a particular year class (*e.g.*, pre-spawning mortality from lethal instream water temperatures).

(2) *Green sturgeon*. Ocean harvest for green sturgeon occurs primarily along the Oregon and Washington coasts and within their coastal estuaries. A commercial fishery for sturgeon still exists within the Columbia River, where they are caught in gill nets along with the more commercially valuable white sturgeon. Green sturgeons are also caught by recreational fisherman, and it is the primary bottomfish landed in Willapa Bay. Within the San Francisco Bay estuary, green sturgeons are captured by sport fisherman targeting the more desirable white sturgeon, particularly in San Pablo and Suisun Bays (Emmett *et al.* 1991).

b. *Freshwater Sport Harvest*

(1) *Chinook salmon.* Historically in California, almost half of the river sportfishing effort was in the Sacramento-San Joaquin River system, particularly upstream from the city of Sacramento (Emmett *et al.* 1991). Since 1987, the Fish and Game Commission has adopted increasingly stringent regulations to reduce and virtually eliminate the in-river sport fishery for winter-run Chinook salmon. Present regulations include a year-round closure to Chinook salmon fishing between Keswick Dam and the Deschutes Road Bridge and a rolling closure to Chinook salmon fishing on the Sacramento River between the Deschutes River Bridge and the Carquinez Bridge. The rolling closure spans the months that migrating adult winter-run Chinook salmon are ascending the Sacramento River to their spawning grounds. These closures virtually eliminated impacts on winter-run Chinook salmon caused by recreational angling in freshwater.

In 1992, the California Fish and Game Commission adopted gear restrictions (all hooks must be barbless and a maximum of 5.7 cm in length) to minimize hooking injury and mortality of winter-run Chinook salmon caused by trout anglers. That same year, the Commission also adopted regulations which prohibited any salmon from being removed from the water to further reduce the potential for injury and mortality.

In-river recreational fisheries historically have taken spring-run Chinook salmon throughout the species' range. During the summer, holding adult spring-run Chinook salmon are easily targeted by anglers when they congregate in large pools. Poaching also occurs at fish ladders, and other areas where adults congregate; however, the significance of poaching on the adult population is unknown. Specific regulations for the protection of spring-run Chinook salmon in Mill, Deer, Butte and Big Chico Creeks were added to the existing CDFG regulations in 1994. The current regulations, including those developed for winter-run Chinook salmon; provide some level of protection for spring-run fish (CDFG 1998).

(2) *Steelhead*. There is little information on steelhead harvest rates in California. Hallock *et al.* (1961) estimated that harvest rates for Sacramento River steelhead from the 1953-1954 through

1958-1959 seasons ranged from 25.1 percent to 45.6 percent assuming a 20 percent non-return rate of tags. Staley (1975) estimated the harvest rate in the American River during the 1971-1972 and 1973-1974 seasons to be 27 percent. The average annual harvest rate of adult steelhead above RBDD for the 3-year period from 1991-1992 through 1993-1994 was 16 percent (McEwan and Jackson 1996). Since 1998, all hatchery steelhead have been marked with an adipose fin clip allowing anglers to distinguish hatchery and wild steelhead. Current regulations restrict anglers from keeping unmarked steelhead in Central Valley streams (CDFG 2007). Overall, this regulation has increased protection of naturally produced adult steelhead.

(3) ***Green sturgeon.*** Green sturgeon are caught incidentally by sport fisherman targeting the more highly desired white sturgeon within the Delta waterways and in the Sacramento River as far upstream as Hamilton City. As of January 2007, the current fishing regulations allow green sturgeon to be retained by sport fisherman in the San Francisco Bay/Delta waters. Effective March 1, 2007, CDFG will close green sturgeon to take or possession (CDFG 2007). This regulation will afford green sturgeon protection from the sport fishery in California; however, a certain degree of incidental hooking mortality will still exist for those fish caught and released while fishing for white sturgeon.

7. Predation

Accelerated predation also may be a factor in the decline of winter-run Chinook salmon and spring-run Chinook salmon, and to a lesser degree steelhead. Human-induced habitat changes such as alteration of natural flow regimes and installation of bank revetment and structures such as dams, bridges, water diversions, piers, and wharves often provide conditions that both disorient juvenile salmonids and attract predators (Stevens 1961, Decato 1978, Vogel *et al.* 1988, Garcia 1989).

On the mainstem Sacramento River, high rates of predation are known to occur at: RBDD, Anderson Cottonwood Irrigation District's diversion dam, Glenn Colusa Irrigation District's diversion facility, areas where rock revetment has replaced natural riverbank vegetation, and at south Delta water diversion structures (*e.g.*, Clifton Court Forebay; Tracy Fish Facility; Gingras 1997). Predation at RBDD on juvenile winter-run Chinook salmon is believed to be higher than normal due to factors such as water quality and flow dynamics associated with the operation of this structure (Tucker *et al.* 1998). Due to their small size, early emigrating winter-run Chinook salmon may be very susceptible to predation in Lake Red Bluff when the RBDD gates remain closed in summer and early fall (Vogel *et al.* 1988). In passing the dam, juveniles are subject to conditions which greatly disorient them, making them highly susceptible to predation by fish or birds. Sacramento pikeminnow (*Ptychocheilus grandis*) and striped bass congregate below the dam and prey on juvenile salmon in the tail waters (Tucker *et al.* 2003).

FWS found that more predatory fish were found at rock revetment bank protection sites between Chico Landing and Red Bluff than at sites with naturally eroding banks (Michny and Hampton 1984). From October 1976 to November 1993, CDFG conducted 10 mark/recapture studies at the SWP's Clifton Court Forebay to estimate pre-screen losses using hatchery-reared juvenile Chinook salmon. Pre-screen losses ranged from 69 percent to 99 percent. Predation by striped bass is thought to be the primary cause of the loss (Gingras 1997). Similar high pre-screen loss was reported for steelhead smolts in Clifton Court Forebay (CDWR 2005).

Other locations in the Central Valley where predation is of concern include flood bypasses (*i.e.*, Yolo, Sutter, Colusa) in wet years, release sites for fish salvaged at the State and Federal fish facilities, the SMSCG, and various agricultural barriers in the Delta. Predation on salmon by striped bass and pikeminnow at the SWP and CVP salvage release sites in the Delta has been documented (Orsi 1967, Pickard *et al.* 1982); however, accurate predation rates at these sites are difficult to determine. CDFG conducted predation studies from 1987 to 1993 at the SMSCG to determine if the structure attracts and concentrates predators. The dominant predator species at the SMSCG was striped bass, and the remains of juvenile Chinook salmon were identified in their stomach contents (NMFS 1997b).

8. <u>Environmental Variation</u>

Natural changes in the freshwater and marine environments play a major role in salmonid abundance. Recent evidence suggests that marine survival among salmonids fluctuates in response to 20- to 30-year cycles of climatic conditions and ocean productivity (Hare *et al.* 1999, Mantua and Hare 2002). This phenomenon has been referred to as the Pacific Decadal Oscillation. In addition, large-scale climatic regime shifts, such as the El Niño condition, appear to change productivity levels over large expanses of the Pacific Ocean. A further confounding effect is the fluctuation between drought and wet conditions in the basins of the American west. During the first part of the 1990s, much of the Pacific Coast was subject to a series of very dry years, which reduced inflows to watersheds up and down the west coast.

A key factor affecting many West Coast stocks has been a general 30-year decline in ocean productivity. The mechanism whereby stocks are affected is not well understood, partially because the pattern of response to these changing ocean conditions has differed among stocks, presumably due to differences in their ocean timing and distribution. It is presumed that survival in the ocean is driven largely by events occurring between ocean entry and recruitment to a subadult life stage.

Salmon and steelhead are exposed to high rates of natural predation, particularly during freshwater rearing and migration stages. Predation rates on juvenile and adult green sturgeon have not been adequately studied to date. Ocean predation may also contribute to significant natural mortality, although it is not known to what extent. In general, salmonids are prey for pelagic fishes, birds, and marine mammals, including harbor seals, sea lions, and killer whales. There have been recent concerns that the rebound of seal and sea lion populations following their protection under the Marine Mammal Protection Act of 1972 has increased the number of salmonid deaths. Seals have been reported following schools of salmon upstream as far as the City of Sacramento and the Tracy Fish Facility. This may be further exacerbated by the decline of other fisheries stocks (*i.e.,* haddock, pollock, and rockfish) which provided alternative forage resources to marine mammals.

Finally, unusual drought conditions may warrant additional consideration in California. Flows in 2001 were among the lowest flow conditions on record in the Central Valley. The available water in the Sacramento watershed and San Joaquin watershed was 70 percent and 66 percent of normal, according to the Sacramento River Index and the San Joaquin River Index, respectively. Back-to-back drought years could be catastrophic to small single populations of listed salmonids that are dependent upon reservoir releases for their success (*e.g.*, winter-run Chinook salmon). Therefore, reservoir carryover storage (usually referred to as end-of-September storage) is a key element in providing adequate reserves to protect salmon and steelhead during extended drought periods. In order to buffer the effect of drought conditions and over allocation of resources, NMFS in the past has recommended that minimum carryover storage be maintained in Shasta and Folsom reservoirs to help alleviate critical flow and temperature conditions in the fall. Green sturgeon's need for appropriate water temperatures would also benefit from river operations that maintain a suitable temperature profile for this species.

The future effects of global warming are of key interest to salmonid and green sturgeon survival. CDWR (2006) predicts that by 2100 California's snow pack will dwindle, the majority of runoff will shift to more in winter, and sea-level will rise by 2.9 feet. An analysis of a relatively large group of climate models for California projected a central tendency of air temperatures to rise 3°C by 2050 (Dettinger 2005 in CDWR 2006). This will alter river runoff patterns and transform the tributaries that feed the Central Valley from a spring/summer snowmelt dominated system to a winter rain dominated system. In many of the low to middle elevation Central Valley streams summer water temperatures often come close to the upper tolerance limits for salmon and steelhead. Anticipated climate change that raises air temperatures a few degrees Celsius may be enough to raise water temperatures above the tolerance limits of salmon and steelhead, favoring non-native fishes. Without the necessary cold-water pool developed from melting snow pack filling reservoirs in the spring and early summer, late summer and fall temperatures below reservoirs, such as Lake Shasta, could potentially rise above thermal tolerances for juvenile and adult salmonids (*i.e.,* winter-run and spring-run Chinook salmon) that must hold below the dam over the summer and fall periods. Similar, although potentially to a lesser degree, declines in green sturgeon populations are anticipated with reduced cold-water flows. Green sturgeon egg and larval development are optimized at water temperatures that are only slightly higher than those for salmonids. Lethal temperatures are similar to salmonids, although slightly higher.

9. Ecosystem Restoration

a. *CALFED*

Two programs included under CALFED; the Ecosystem Restoration Program (ERP) and the Environmental Water Account (EWA), were created to improve conditions for fish, including listed salmonids, in the Central Valley. Restoration actions implemented by the ERP include the installation of fish screens, modification of barriers to improve fish passage, habitat acquisition, and instream habitat restoration. The majority of these actions address key factors affecting listed salmonids and emphasis has been placed in tributary drainages with high potential for steelhead and spring-run Chinook salmon production. Additional ongoing actions include new efforts to enhance fisheries monitoring and directly support salmonid production through hatchery releases. Recent habitat restoration initiatives sponsored and funded primarily by the ERP Program have resulted in plans to restore ecological function to 9,543 acres of shallow-water tidal and marsh habitats within the Delta. Restoration of these areas primarily involves flooding lands previously used for agriculture, thereby creating additional rearing habitat for juvenile salmonids. Similar habitat restoration is imminent adjacent to Suisun Marsh (*i.e.*, at the confluence of Montezuma Slough and the Sacramento River) as part of the Montezuma Wetlands project, which is intended to provide for commercial disposal of material dredged from San Francisco Bay in conjunction with tidal wetland restoration.

The EWA is designed to provide water at critical times to meet ESA requirements and incidental take limits without water supply impacts to other users. In early 2001, the EWA released 290 thousand acre feet (TAF) of water from San Luis Reservoir at key times to offset reductions in south Delta pumping implemented to protect winter-run Chinook salmon, delta smelt, and splittail. However, the benefit derived by this action to winter-run Chinook salmon in terms of number of fish saved was very small. The anticipated benefits to other Delta fisheries from the use of the EWA water are much higher than those benefits ascribed to listed salmonids by the EWA release.

b. *Central Valley Project Improvement Act*

The CVPIA, implemented in 1992, requires that fish and wildlife get equal consideration with other demands for water allocations derived from the CVP. From this act arose several programs that have benefited listed salmonids: the AFSP, Anadromous Fish Restoration Program (AFRP), and the Water Acquisition Program (WAP). The AFRP is engaged in monitoring, education, and restoration projects geared toward recovery of all anadromous fish species residing in the Central Valley. Restoration projects funded through the AFRP include fish passage, fish screening, riparian easement and land acquisition, development of watershed planning groups, instream and riparian habitat improvement, and gravel replenishment. The AFSP combines Federal funding with State and private funds in order to fund construction of fish screens on water diversions mainly in the Central Valley. The AFSP also provides technical assistance in the review of fish screen design and criteria. The goal of the WAP is to acquire water supplies to meet the habitat restoration and enhancement goals of the CVPIA and to improve the DOI's ability to meet regulatory water quality requirements. The WAP has been used successfully to improve fish habitat for CV spring-run Chinook salmon and CV steelhead by maintaining or increasing instream flows in Butte Creek, Mill Creek, and the San Joaquin River at critical times.

c. *Iron Mountain Mine Remediation*

EPA's Iron Mountain Mine remediation involves the removal of toxic metals in acidic mine drainage from the Spring Creek Watershed with a state-of-the-art lime neutralization plant. Contaminant loading into the Sacramento River from Iron Mountain Mine has shown measurable reductions since the early 1990s (see Appendix J, BOR 2004). Decreasing the heavy metal contaminants that enter the Sacramento River should increase the survival of salmonid eggs and juveniles. However, during periods of heavy rainfall upstream of the Iron Mountain Mine, BOR substantially increases Sacramento River flows in order to dilute heavy metal contaminants being spilled from the Spring Creek debris dam. This rapid change in flows can cause juvenile salmonids to become stranded or isolated in side channels below Keswick Dam.

d. *State Water Project Delta Pumping Plant Fish Protection Agreement (Four-Pumps Agreement)*

The Four Pumps Agreement Program has approved about $49 million for projects that benefit salmon and steelhead production in the Sacramento-San Joaquin basins and Delta since the agreement inception in 1986. Four Pumps projects that benefit CV spring-run Chinook salmon and CV steelhead include water exchange programs on Mill and Deer Creeks; enhanced law enforcement efforts from San Francisco Bay upstream to the Sacramento and San Joaquin Rivers and their tributaries; design and construction of fish screens and ladders on Butte Creek; and screening of diversions in Suisun Marsh and San Joaquin tributaries. Predator habitat isolation and removal, and spawning habitat enhancement projects on the San Joaquin tributaries benefit steelhead (see Chapter 15, BOR 2004).

The Spring-run Salmon Increased Protection project provides overtime wages for CDFG wardens to focus on reducing illegal take and illegal water diversions on upper Sacramento River tributaries and adult holding areas, where the fish are vulnerable to poaching. This project covers Mill, Deer, Antelope, Butte, Big Chico, Cottonwood, and Battle Creeks, and has been in effect since 1996. Through the Delta-Bay Enhanced Enforcement Program, initiated in 1994, a team of 10 wardens focus their enforcement efforts on salmon, steelhead, and other species of concern from the San Francisco Bay Estuary upstream into the Sacramento and San Joaquin River basins. These two enhanced enforcement programs have had significant, but unquantified benefits to spring-run Chinook salmon attributed by CDFG (see Chapter 15, BOR 2004).

10. <u>Non-native Invasive Species</u>

As currently seen in the San Francisco estuary, non-native invasive species (NIS) can alter the natural food webs that existed prior to their introduction. Perhaps the most significant example is illustrated by the Asiatic freshwater clams *Corbicula fluminea* and *Potamocorbula amurensis*. The arrival of these clams in the estuary disrupted the normal benthic community structure and depressed phytoplankton levels in the estuary due to the highly efficient filter feeding of the introduced clams (Cohen and Moyle 2004). The decline in the levels of phytoplankton reduces the population levels of zooplankton that feed upon them, and hence reduces the forage base available to salmonids transiting the Delta and San Francisco estuary. This lack of forage base can adversely impact the health and physiological condition of these salmonids as they emigrate through the Delta region to the Pacific Ocean.

Attempts to control the NIS also can adversely impact the health and well-being of salmonids within the affected water systems. For example, the control programs for the invasive water hyacinth and *Egeria densa* plants in the Delta must balance the toxicity of the herbicides applied to control the plants to the probability of exposure to listed salmonids during herbicide application. In addition, the control of the nuisance plants have certain physical parameters that must be accounted for in the treatment protocols, particularly the decrease in DO resulting from the decomposing vegetable matter left by plants that have died.

11. Summary

For Sacramento River winter-run Chinook salmon, CV spring-run Chinook salmon, and CV steelhead, the construction of high dams for hydropower, flood control, and water supply resulted in the loss of vast amounts of upstream habitat (*i.e.*, approximately 80 percent, or a minimum linear estimate of over 1,000 stream miles), and often resulted in precipitous declines in affected salmonid populations. For example, the completion of Friant Dam in 1947 has been linked with the extirpation of CV spring-run Chinook salmon in the San Joaquin River upstream of the Merced River within just a few years. The reduced populations that remain below Central Valley dams are forced to spawn in lower elevation tailwater habitats of the mainstem rivers and tributaries that previously were not used for this purpose. This habitat is entirely dependent on managing reservoir releases to maintain cool water temperatures suitable for spawning, and/or rearing of salmonids. This requirement has been difficult to achieve in all water year types and for all life stages of affected salmonid species. CV steelhead, in particular, seem to require the qualities of small tributary habitat similar to what they historically used for spawning; habitat that is largely unavailable to them under the current water management scenario. All salmonid species considered in this consultation have been adversely affected by the production of hatchery fish associated with the mitigation for the habitat lost to dam construction (*e.g.*, from genetic impacts, increased competition, exposure to novel diseases, *etc.*).

Land use activities such as road construction, urban development, logging, mining, agriculture, and recreation are pervasive and have significantly altered fish habitat quantity and quality for Chinook salmon and steelhead through alteration of streambank and channel morphology; alteration of ambient water temperatures; degradation of water quality; elimination of spawning and rearing habitat; fragmentation of available habitats; elimination of downstream recruitment of LWD; and removal of riparian vegetation resulting in increased streambank erosion. Human-induced habitat changes, such as: alteration of natural flow regimes; installation of bank revetment (riprap); and building structures such as dams, bridges, water diversions, piers, and wharves, often provide conditions that both disorient juvenile salmonids and attract predators. Harvest activities, declining ocean productivity, and drought conditions provide added stressors to listed salmonid populations. In contrast, various ecosystem restoration activities (*e.g.*, CVPIA and ERP) have contributed to improved conditions for listed salmonids (*e.g.*, fish screens and gravel augmentation). However, the benefits to listed salmonids from the ERP and EWA have been smaller than anticipated.

Similar to the listed salmonids, the Southern DPS of North American green sturgeon have been negatively impacted by hydroelectric and water storage operations in the Central Valley which ultimately affect the hydrology and accesibility of Central Valley rivers and streams to anadromous fish. Anthropogenic manipulations of the aquatic habitat, such as dredging, bank stabilization, and waste-water discharges have also degraded the quality of the Central Valley's waterways for green sturgeon.

IV. ENVIRONMENTAL BASELINE

A. Presence of Listed Salmonids in the Action Area

Based on fish monitoring studies (CDWR 2004/2005, 2005/2006), Sacramento River winter-run Chinook salmon, CV spring-run Chinook salmon, and CV steelhead juveniles and smolts from the Sacramento River watershed enter into the central Delta system depending on river flows and SWP and CVP pumping rates. Fish from the Sacramento River can access the interior of the Delta via the Mokelumne River (*i.e.*, when Delta Cross Channel Gates are open) and Georgiana Slough channels from the north. Three Mile Slough, and the mouth of the San Joaquin River near Antioch and Sherman Island provide access from the west to the interior of the Delta. CV steelhead emigrating downstream in the San Joaquin River system have a high potential to move through the action area due to the flow split at the Head of Old River and the timing of their emigration in relation to the installation of a rock barrier at the Head of Old River.

B. Presence of Green Sturgeon in the Action Area

Although the Sacramento River watershed is the identified migration route and spawning area for green sturgeon, both adult and juvenile green sturgeon are known to occur within the lower reaches of the San Joaquin River and into the interior of the Delta. Juveniles have been captured in the vicinity of Santa Clara Shoals, Brannan Island State Recreational Area, and in the channels of the south Delta (Moyle *et al.* 1992, Beamesderfer *et al.* 2004). Green sturgeon have also been recovered year-round at both the SWP and CVP Fish Salvage Facilities on Old River approximately three miles from the proposed intake site on Victoria Canal, indicating that they must have transited through one of the many channels of the south Delta to reach that location.

Both adult and juvenile green sturgeon may use the Delta as a migratory, resting, or rearing habitat. Occurrence in the Delta could be in any month, as juveniles may reside there year-round during their first few years of growth. Adults are likely to be present in the winter and early spring as they move through the Delta towards their spawning grounds in the upper Sacramento

River watershed. Following spawning, the fish will pass through the Delta again on their way back to the ocean, but the duration and timing of this event is not well understood in the Sacramento River system. Those green sturgeons that make spawning runs up the Sacramento River may experience slight changes in the hydrology of the river due to the proposed project, as indicated by the CALSIM modeling. Likewise, larval and juvenile sturgeon would also experience the effects of the proposed operations through the slight changes in the hydrology of the Sacramento River.

C. Status of the Species and Critical Habitat in the Action Area

The immediate action area lies within designated critical habitat of the CV steelhead. The indirect action area (applies to areas upstream of the Delta) lies within designated critical habitat for Sacramento River winter-run Chinook salmon, CV spring-run Chinook salmon, and CV steelhead. The action area is within a reach of the Delta that is confined by levees, protected by rock riprap, and lined with sparse amounts of Shaded Riverine Aquatic (SRA) cover. The essential habitat elements in the action area are the water, substrate, and SRA cover.

1. Status of the Species Within the Action Area

The action area functions as a migratory corridor for adult Sacramento River winter-run Chinook salmon, CV spring-run Chinook salmon, and CV steelhead and provides migration and rearing habitat for juveniles of these species. A small proportion of all Federally listed Central Valley salmonids are expected to utilize aquatic habitat within the action area. The action area functions as the primary rearing area for juvenile green sturgeon and may at times be used for a migratory corridor for adults.

a. *Sacramento River Winter-run Chinook Salmon*

Sacramento River winter-run Chinook salmon currently spawn only in the Sacramento River below Keswick Dam, and are composed of a single breeding population (Good 2005; section III, *Status of the Species and Critical Habitat*). The entire population of adults and juveniles migrate through the lower Sacramento River and a small portion of these are misguided by reverse flows (caused by the SWP and CVP export pumps) into the action area.

The critical habitat designation identifies those physical and biological features of the habitat that are essential to the conservation of the species and that may require special management consideration and protection. Within the Sacramento River this includes the river water, river bottom (including those areas and associated gravel used by winter-run Chinook salmon as spawning substrate), and adjacent riparian zone used by fry and juveniles for rearing. In the areas west of Chipps Island, including San Francisco Bay to the Golden Gate Bridge, this designation includes the estuarine water column, essential foraging habitat, and food resources utilized by winter-run Chinook salmon as part of their juvenile outmigration or adult spawning migrations. As governed by the critical habitat definition for winter-run Chinook salmon, critical habitat does not occur at the project location, however critical habitat is found within the action area as defined by the effects of the computer simulation results performed by the applicant's consultant.

The migration timing of listed salmon and steelhead in the action area can be approximated by assessing studies that examine run timing in the Sacramento River (*e.g.*, Hallock *et al.* 1957, Van Woert 1958, Vogel and Marine 1991, Snider and Titus 2000). Adults enter San Francisco Bay from November through June (Van Woert 1958), and migrate up the Sacramento River from December through early August (Vogel and Marine 1991). Juvenile Chinook salmon emigrate through the action area from late fall to spring. Snider and Titus (2000) observed that juvenile salmon emigrate through the lower Sacramento River, at Knights Landing, in three phases. The first phase is the initiation of emigration that is strongly linked to initial Sacramento River flow increases between mid-November and early January. Approximately 78 percent of winter-run Chinook salmon emigrate during this phase. The second phase is characterized by sustained high Sacramento River flows between early January and early March, and the third phase typically occurs one week after the release of fall-run Chinook salmon from the Coleman National Fish Hatchery. Juveniles start to enter the Delta between November and December and usually spend 3 to 5 months rearing to smolt size. The peak in salvage at the State and Federal Fish Facilities usually occurs in March when juvenile winter-run Chinook salmon begin to leave the Delta. The age structure of emigrating juveniles is dominated by YOY fry, but also may contain some yearlings.

b. *Central Valley Spring-run Chinook Salmon*

CV spring-run Chinook salmon populations currently spawn in the Sacramento River below Keswick Dam, the low-flow channel of the Feather River, and in Sacramento River tributaries including Clear, Antelope, Mill, Deer, and Butte Creeks (CDFG 1998). The entire population of migrating adults and emigrating juveniles must pass through the action area. Critical habitat was designated for spring-run Chinook salmon in the Central Valley on September 2, 2005 (70 FR 52488). Critical habitat does not include the hydrologic unit in which the project is located (San Joaquin Delta), however critical habitat is found within the action area as defined by the effects of the computer simulation results performed by the applicant's consultant.

Adult CV spring-run Chinook salmon enter the mainstem Sacramento River in February and March, and continue to their upstream migration into June and July (CDFG 1998). In the Sacramento River, juveniles may begin migrating downstream almost immediately following emergence from the gravel with most emigration occurring from December through March (Moyle *et al.* 1989, Vogel and Marine 1991). Snider and Titus (2000) observed that up to 69 percent of CV spring-run Chinook salmon emigrate during the first migration phase between November and early January. The remainder of the CV spring-run Chinook salmon emigrate during subsequent phases that extend into early June. The age structure of emigrating juveniles is comprised of YOY and yearlings. The exact composition of the age structure is not known, although populations from Mill and Deer Creek primarily emigrate as yearlings. In the Delta, peak spring-run juvenile emigration is difficult to determine due to overlap in the length-size criteria with juvenile fall-run Chinook salmon. However, yearlings usually start to enter the Delta in the fall following the first significant rainfall event. YOY spring-run Chinook usually enter the Delta during the spring. A few wild YOY from Butte Creek have been observed in March in the Sacramento Trawl and at the Delta Fish Facilities, however, spring-run Chinook usually make up less than one percent of the juvenile Chinook salmon observed in the Delta fish salvage estimates (CDWR annual salvage reports 2004, 2005, 2006).

c. *Central Valley Steelhead*

Critical habitat was designated for Central Valley steelhead on September 2, 2005 (70 FR 52488). Critical habitat includes the stream channels to the ordinary high water line within designated stream reaches such as those of the American, Feather, and Yuba Rivers, and Deer, Mill, Battle, Antelope, and Clear Creeks in the Sacramento River basin; the Calaveras, Mokelumne, Stanislaus, and Tuolumne Rivers in the San Joaquin River basin; and, the Sacramento and San Joaquin Rivers and Delta. The project site is located within the San Joaquin Delta, which is included within the critical habitat designation for CV steelhead.

CV steelhead populations currently spawn in tributaries to the Sacramento and San Joaquin Rivers. The proportion of CV steelhead in this DPS that migrate through the action area is unknown. However, because of the relatively large amount of suitable habitat in the Sacramento River relative to the San Joaquin River, it is likely that small numbers would be present in the action area (*i.e.*, most steelhead smolts would tend to stay in the Sacramento River rather than migrate into the south Delta). A portion of those fish headed for the SWP/CVP pumps would pass through the action area. Although the number varies from year to year, on average less than 3,000 juveniles (*i.e.*, incidental take limit) a year are salvaged at the SWP/CVP Fish Facilities. Since there are three possible routes for steelhead to reach the Delta pumps (*i.e.*, Victoria Canal, Old River, and Grant Line Canal), one can assume that at most one third of the salvage at the Delta pumps must pass through the action area, or roughly 1,000 steelhead/year). Juvenile steelhead can emigrate through the action area from December through June. Snider and Titus (2000) observed that juvenile steelhead emigration primarily occurs between November and June. Salvage of unclipped steelhead from 1981 through 2002 showed that juveniles are present in the action area in every month except September. The majority of juvenile steelhead emigrate as yearlings from 200 to 250 mm in length. Adult CV steelhead may be present in the action area from July through May, with the peak occurring between August and October (Bailey 1954, Hallock *et al.* 1957).

d. *North American Green Sturgeon*

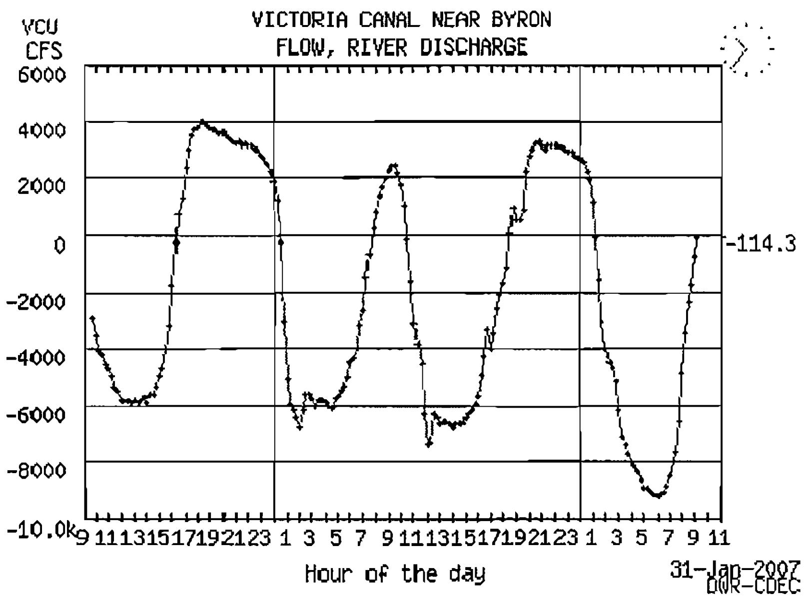
Although the Sacramento River watershed is the identified migration route and spawning area for green sturgeon, both adult and juvenile green sturgeon are known to occur within the lower reaches of the San Joaquin River and into the interior of the Delta. Juveniles have been captured in the vicinity of Santa Clara Shoals, Brannan Island State Recreational Area, and in the channels of the south Delta (Moyle *et al.* 1992, Beamesderfer *et al.* 2004). Green sturgeon also have been recovered at both the SWP and CVP pumping facilities on Old River near Tracy, indicating that they must have transited through one of the many channels of the south Delta to reach that location. Salvage estimates at the SWP/CVP pumping facilities vary dramatically, but have trended downward in recent years from a high of 1,400 juveniles in 1983 to a low of less than 50 in 2005 (CDFG annual salvage reports 2005).

Both adult and juvenile green sturgeon may use the Delta as a migratory, resting, or rearing habitat. Occurrence in the Delta can occur in any month, as juveniles may reside there during their first few years of growth. Adults are likely to be present in the winter and early spring as they move through the Delta towards their spawning grounds in the upper Sacramento River watershed. Following spawning, the fish will pass through the Delta again on their way back to the ocean, but the duration and timing of this event is not well understood in the Sacramento River system.

D. Factors Affecting the Species and Critical Habitat in the Action Area

The dominant features controlling the habitat within the action area are tidal cycles and the influence of the CVP/SWP pumping plants located approximately 3 miles from the proposed intake site. In all but extremely wet years the direction of flow is reversed southward due to the magnitude of diversions (*i.e.*, Clifton Court Forebay takes in up to 10,000 cfs daily on the high tide while average flows in Victoria Canal range from 4,000 cfs to - 8,000 cfs). Therefore, fish that enter the central Delta are drawn southward by reverse flows toward the CVP/SWP pumps. These are the fish that are most likely to come in contact with the proposed project. In addition, the over-arching effect of tides means fish have a tendency to move back and forth within Victoria Canal (Figure 2). In a single 24-hour period there can be up to 4 periods of slack tide when no flow would be moving past the proposed intake site. When water is moving velocities are typically less than 1 f/s.

Figure 2. Tidal flow in Victoria Canal from California Data Exchange Center (CDEC 2007).



Riprapped rock levees represent 100 percent of the current bank habitat in the action area. Levee construction and bank protection have affected salmonid habitat availability and the processes that develop and maintain preferred habitat by reducing floodplain connectivity, changing riverbank substrate size, and decreasing riparian habitat and SRA cover. Revetted embankments result in loss of sinuosity and braiding and reduce the amount of aquatic habitat.

The use of rock armoring in the action area limits recruitment of LWD because the relatively smooth and homogenous surface facilitates the downstream transportation of instream debris, and greatly reduces, if not eliminates, the retention of LWD once it enters Victoria Canal. Riprapping creates a relatively clean, smooth surface which diminishes the ability of LWD to become securely snagged and anchored by sediment. LWD tends to become only temporarily snagged along riprap, and generally moves downstream with subsequent high flows. Habitat value and ecological function are thus greatly reduced, because wood needs to remain in place to generate maximum values to fish and wildlife (USFWS 2000). Juvenile salmonids likely are being impacted by reduction, fragmentation, and general lack of connectedness of remaining nearshore refuge areas. Impacts to these refuge areas reduce the amount of high value habitat available for juvenile salmonids to rear and grow, increasing susceptibility to predation in the open water.

Habitat within the action area primarily is used as juvenile rearing habitat and as a migration corridor for adults and juveniles. The condition and function of this habitat has been severely impaired through several factors discussed in the *Status of the Species and Habitat* section of this biological opinion, including agricultural water development and land use practices, predation, and habitat fragmentation. The result has been the reduction in quantity and quality of essential habitat elements that are required by juveniles to survive and grow, such as water contamination and loss of shallow-water rearing and refugia habitat. In spite of the degraded condition, the importance of the area to juvenile salmonids and green sturgeon is high because it is used for extended periods of time by a large number of juveniles. However, due to the currently degraded condition, the function of the habitat is low. Because of the location of the action area (*i.e.*, southern Delta), only a small proportion of each salmonid population utilizes the action area as a migratory corridor or for rearing in any given year, reducing the conservation value of the habitat for the survival and recovery of Sacramento River winter-run Chinook salmon, CV spring-run Chinook salmon, CV steelhead and North American green sturgeon.

V. EFFECTS OF THE ACTION

This section discusses the direct and indirect effects of the construction and operation of the proposed AIP on Sacramento River winter-run Chinook salmon, CV spring-run Chinook salmon, CV steelhead, designated critical habitat for these salmonid species and Southern DPS of North American green sturgeon that are expected to result from the proposed action. Cumulative effects (*i.e.*, effects of future State, local, or private actions on endangered and threatened species or critical habitat) are discussed separately.

A. Approach to the Assessment

Pursuant to section 7(a)(2) of the ESA (16 U.S.C. §1536), Federal agencies are directed to ensure that their activities are not likely to jeopardize the continued existence of any listed species or result in the destruction or adverse modification of critical habitat. This biological opinion assesses the effects of the construction, and operations and maintenance of CCWD'S proposed AIP on endangered Sacramento River winter-run Chinook salmon, threatened CV spring-run Chinook salmon, threatened CV steelhead, and their designated critical habitat, and threatened green sturgeon. Impacts related to replacement of nearshore aquatic habitat with the fish screen structure also will be assessed. The proposed project is likely to cause adverse short-term effects to listed species and critical habitat during construction, and provide long-term protection from entrainment. The AIP includes integrated design features to avoid and minimize many potential on-site construction impacts. The project also includes off-site conservation measures to compensate for unavoidable loss or modification of critical habitat.

In the *Description of the Proposed Action* section of this biological opinion, NMFS provided an overview of the action. In the *Status of the Species* and *Environmental Baseline* sections of this biological opinion, NMFS provided an overview of the threatened and endangered species and critical habitat that are likely to be adversely affected by the activity under consultation.

Regulations that implement section 7(b)(2) of the ESA require biological opinions to evaluate the direct and indirect effects of Federal actions and actions that are interrelated with or interdependent to the Federal action to determine if it would be reasonable to expect them to appreciably reduce listed species' likelihood of surviving and recovering in the wild by reducing their reproduction, numbers, or distribution (16 U.S.C. §1536; 50 CFR 402.02). Section 7 of the ESA and its implementing regulations also require biological opinions to determine if Federal actions would destroy or adversely modify critical habitat (16 U.S.C. §1536).

This biological opinion does not rely on the regulatory definition of "destruction or adverse modification" of critical habitat at 50 CFR 402.02. Instead, we have relied upon the statutory provisions of the ESA to complete the following analysis with respect to critical habitat. NMFS will evaluate destruction or adverse modification of critical habitat by determining if the action reduces the value of critical habitat for the conservation of the species.

NMFS generally approaches "jeopardy" analyses in a series of steps. First, we evaluate the available evidence to identify the direct and indirect physical, chemical, and biotic effects of proposed actions on individual members of listed species or aspects of the species' environment (these effects include direct, physical harm or injury to individual members of a species; modifications to important elements of the species' environment - such as reducing a species' prey base, enhancing populations of predators, altering its spawning substrate, altering its ambient temperature regimes; or adding something novel to a species' environment - such as introducing exotic competitors or a detrimental sound). Once we have identified the effects of an action, we evaluate the available evidence to identify a species' probable response (including behavioral responses) to those effects to determine if those effects could reasonably be expected to reduce a species' reproduction, numbers, or distribution (*e.g.,* by changing birth, death, immigration, or emigration rates; increasing the age at which individuals reach sexual maturity; decreasing the age at which individuals stop reproducing; among others). We then use the evidence available to determine if these reductions, if there are any, could reasonably be expected to appreciably reduce a species' likelihood of surviving and recovering in the wild.

To evaluate the effects of the proposed action, NMFS examined proposed construction activities, operations and maintenance activities, habitat loss, and conservation measures, to identify likely impacts to listed anadromous salmonids within the action area based on the best available information.

1. Information Available for the Assessment

To conduct the assessment, NMFS examined evidence from a variety of sources. Detailed background information on the status of these species and critical habitat has been published in a number of documents including peer reviewed scientific journals, primary reference materials, governmental and non-governmental reports, scientific meetings, as well as the supporting information supplied with the action's environmental documents.

The primary information used in this assessment includes fishery information previously described in the *Status of the Species* and *Environmental Baseline* sections of this biological opinion, studies and accounts of the impacts of water diversions, previous biological opinions on in-river construction activities, and documents prepared in support of the proposed action, including the ASIP and EIS/EIR (CCWD and BOR 2006a, 2006b).

2. Assumptions Underlying This Assessment

In the absence of definitive data or conclusive evidence, NMFS must make a logical series of assumptions to overcome the limits of the available information. These assumptions will be made using sound, scientific reasoning that can be logically derived from the available information. The progression of the reasoning will be stated for each assumption, and supporting evidence cited.

The applicant and their consultants have made extensive use of computer simulation programs CALSIM II, Delta Simulation Model (DSM2), and the CCWD Solver Model in their analysis of the project's effects on hydrology and water quality. These monthly time-step models are based on a past 72-year hydrologic period which may not represent current climate change trends. CALSIM II uses a comparative analysis between baseline conditions and the AIP for current level of demand and future level of demand (year 2020) to assess changes in potential net entrainment and impingement losses. Modeling output evaluated for the fisheries analysis included:

- Water diversion export operations at the CVP, SWP, Rock Slough, Old River, Mallard Slough, and the proposed AIP,
- Hydrologic conditions in the Delta,
- River flows into the Delta (*i.e.*, Sacramento, Mokelumne, Calavaras, and San Joaquin River above and below the Delta),
- Export/Inflow ratio, and
- Location of X2 (*i.e.*, defined as the two-parts-per-thousand salinity isohaline).

NMFS understands that these models currently are the best available tools for hydrology modeling in the Central Valley, but also recognizes that these models have certain drawbacks and inadequacies in representing hydrological effects on listed salmonids. In particular, the fine temporal and spatial scales frequently needed to make informed decisions on the impacts of projects upon listed fish are not readily available from the computer simulations. The degree of resolution provided by these planning tools in their current configuration represents a homogenized averaging of values. This smoothing of data points starts with the 30-day time step in the CALSIM II modeling approach and is propagated through the DSM2 model where it serves as the delta inflow data point for the subsequent DSM2 calculations for the current month's simulation run. Flow data for Delta channels assumes that the flow value is the same across the entire cross section of the channel (one dimensional) and that water quality constituents, as represented by the electrical conductivity (EC) parameter, behave in the same manner as the salts that compose the EC parameter.

B. Assessment

The assessment will consider the nature, duration, and extent of the proposed action relative to the migration timing, behavior, and habitat requirements of Federally listed anadromous fish. This assessment will consider construction impacts, operations and maintenance impacts, and impacts of habitat modification and loss associated with replacement of nearshore aquatic habitat with the fish screen structure and placement of riprap. The assessment does not consider effects upstream from releasing water to meet CCWD's demands because: (1) upsteam effects have already been analyzed and addressed in the NMFS 2004 biological opinion concerning long-term CVP and SWP Operations, Criteria and Plan (OCAP), and (2) CCWD's total diversions from the Delta are not proposed to increase.

1. Construction Impacts

Potential construction-related impacts include exposure of juvenile and adult salmon, steelhead, and sturgeon to noise and high sound pressure levels and increased turbidity during cofferdam installation and removal, entrainment behind the cofferdam, injury or death during fish rescue and relocation, and permanent loss of nearshore riverine habitat to the fish screen structure. Construction activities that occur behind the cofferdam are not likely to adversely affect salmon, steelhead, and sturgeon because they will be isolated from Victoria Canal, and stabilized prior to cofferdam removal. In water activities (*i.e.*, dredging) also are not likely to adversely affect salmon and steelhead because they will occur at a time of year that avoids peak migration periods.

a. *Cofferdam Installation and Removal*

Installation of sheet pile and beams during construction of the cofferdam will be performed using a vibratory hammer pile driver if feasible. The bottom substrate is expected to be soft, based on results of similar substrate conditions encountered during installation of the cofferdam during construction of the CCWD'S Old River Intake and fish screen, which is located within a few miles of the project. Pile driving will last up to 60 days and will be on an intermittent and short duration basis (*i.e.*, hours or days). If percussion pile driving is used, it will produce underwater sound pressure levels that may cause temporary disturbance within Victoria Canal and affect salmon, steelhead, and sturgeon behavior and physiology through disruption of migration, feeding behavior, and potential increased exposure of juveniles to predation by forcing them from nearshore refugia.

The effect pile driving has on fish depends upon the pressure, measured in decibels (dB), of a sound or compression wave. Rassmusen (1967) found that immediate mortality of juvenile salmonids may occur at sound pressure levels exceeding 204 dB. Sustained sound pressures (four hours) in excess of 180 dB damaged the hair cells in the inner ear of cichlids (Hastings *et al.* 1996). Feist *et al.* (1992) found that pile driving in Puget Sound created sound within the range of salmonid hearing that could be detected at least 600 meters away. Abundance of juvenile salmon near pile-driving rigs was reduced on days when the rigs were operating compared to non-operating days. McKinley and Patrick (1986) found that salmon smolts exposed to pulsed sound (similar to pile driving) demonstrated a startle or avoidance response, and Anderson (1990) observed a startle response in salmon smolts at the beginning of a pile-driving episode but found that after a few poundings of the pilings fish were no longer startled. This suggests that pile driving or associated activity (*e.g.*, human movement, work boat operation, *etc.*) can cause avoidance of habitat in the immediate vicinity of the project site, but that fish also may become acclimated to the noise. If fish move into an area of higher predator concentration (*e.g.*, deeper water), they may experience increased susceptibility to predation and decreased survival. Fish that become acclimated may be exposed to additional project-related impacts. NMFS does not have any data available to determine the hearing sensitivities of green sturgeon, and thus will use the values for salmonids in its analysis of effects.

In order to measure sound levels, NMFS uses two methods. The Peak Sound Pressure Level (SPL) which is the maximum excursion of pressure within the sound. This typically occurs during one strike and varies depending on the substrate, equipment, and type of pile used. The SPL measurement will determine whether the swim bladder and ear are subjected to extreme mechanical stress and injury. As a result of recent ESA consultations and new research, the accumulation of sound energy has been determined to be very important. Therefore, the Sound Exposure Level (SEL) is the metric that NMFS now uses to define sound accumulation lasting for one second. However, it does not indicate the total exposure over a series of strikes. Pile driving that occurs every several seconds does not allow for recovery time and will accumulate. To calculate accumulated SELs, NMFS multiplies the SEL (in dB) by 10*log (# of strikes). Thus we can calculate how many strikes it takes to reach the injury threshold (in salmonids 187 dB for juveniles, and 190 dB for adults). Table 5 shows the distance from pile driving that fish are likely to be exposed to injury given 100 strikes. Sheet pile driving could injure fish within a 100 meter radius of the construction site (Table 5).

Table 5. Calculated accumulated SELs at 100 strikes for various types of piles

Pile Type	Single Strike SEL (dB)	Accumulated SEL (dB)	Injury Radius (meters)
12 inch dia. timber	157	177	< 10
12 inch dia. steel	155	175	< 10
24 inch dia. concrete	165	185	< 10
20 inch dia. steel	175	195	34
24 inch dia. steel	178	198	54
30 inch dia. steel	180	200	74
Sheet pile	182	202	100
66 inc dia. steel	190	210	341
102 inch dia. steel	198	218	1166

Based on information from scientific literature, NMFS believes that the accumulated SEL from percussion pile driving will exceed 180 dB and may result in lethal effects to listed fish species. Data derived from concrete piles driven at the Concord Naval Weapons Depot in Suisun Bay indicated pile driving SELs exceeded 170 to 180 dB 10 meters from the pile at a depth of 3 meters. A report by Burgess and Blackwell (2003) indicated that vibratory installation of a sheet pile wall in an upland location generated sound levels of approximately 140 dB at a distance of 200 feet in the adjacent waterway, indicating that the noise was coupled through the soil to the water column.

At the City of Sacramento Water Treatment Plant Fish Screen Project, engineering analysis anticipated that the use of a smaller pile-driving hammer would generate sound pressure levels of 95 to 120 dB. Actual levels were not monitored. Because of the similarities in channel depth, substrate size, and the expected use of a vibratory hammer in the proposed project, maximum sound levels or SELs should be below the 180 dB threshold known to cause internal tissue damage to fish. However, the levels may be high enough to affect adult and juvenile salmonids by startling fish and causing avoidance of habitats within 600 meters of the noise source. This is a conservative estimate based on observations in Puget Sound and does not take into account specific on-site variables such as channel flow and bank morphology that may reduce the actual distance. At the proposed intake site a mid-channel tule berm or island separates Victoria Canal into two canals and would tend to buffer the SEL for fish in the North Canal.

NMFS anticipates that pile driving will be detectable to salmonids up to 600 meters from the source, and that the sounds generated will harass juvenile salmon, steelhead, and sturgeon by causing injury from temporary disruption of normal behaviors such as feeding, sheltering, and migrating that may contribute to reduced or negative growth. Disruption of these behaviors also may lead to increased predation if fish become disoriented or concentrated in areas with high predator densities. Injury or death could occur within 10 meters of the location where the larger structural piles will be driven based on use of 24 inch diameter concrete piles as described (Table 4), however, the driving of these types of piles will occur "in the dry" more than 10 meters behind the cofferdam, and would therefore not be expected to kill or injure listed fish.

Pile driving effects should be small and short-term in nature because pile driving will occur only during the day, enabling unhindered fish passage at night during peak migration times. Additionally, given the proposed limited and intermittent use of vibratory hammers (*i.e.*, expected to be hours or days) the magnitude of potential adverse effects is expected to be low. If percussion hammers are used, construction work periods will avoid peak migration periods when juvenile salmonids are expected to be present. Therefore, only a small number of individuals in each of the listed ESU/DPS should be affected.

b. *Stranding and Fish Rescue*

Juvenile salmonids may become stranded behind the cofferdam during construction. Cofferdam construction that occurs between August 1 and November 30 would avoid migration periods of adult and juvenile winter- and spring-run Chinook salmon. Some juvenile and adult steelhead could be present during this period, based on salvage data at the CVP/SWP Fish Facilities (BOR 2004), but the numbers are expected to be very low since water temperatures at that time of year are above the preferred level. Adult salmon, steelhead, and sturgeon are strong swimmers, and are likely to avoid construction-related disturbance during sheet pile driving, and avoid being entrained or stranded. Juvenile salmon and steelhead also demonstrate a startle or avoidance response to noise (Anderson 1990). However, some juveniles may follow the contours of the shoreline into the area behind the cofferdam, where they may become stranded during dewatering. We anticipate that stranding in the cofferdam will be low due to work windows that avoid peak migration periods for adult and juvenile salmonids. Sturgeon should avoid the cofferdam since they are known to prefer deeper, mid-channel areas.

As the water level behind the cofferdam is drawn down to allow construction of the fish screen in the dry, salmon, steelhead, and sturgeon if present will be rescued (*i.e.*, netted) and returned to Victoria Canal according to the Fish Rescue Program guidelines (Attachment F, ASIP). Two fish rescue events are anticipated, one prior to closing the cofferdam and again when water depths are approximately two feet. All portable pumps would be equipped with fish screens using a 1.75 mm mesh. The remaining water will be seined or dip-netted to remove any fish. Standard fish handling techniques will be used. Although salmonids recover well from capture, handling, and short relocations, there may be incidental injury and death to individuals during the rescue. We expect that the rescue program will not capture and release every entrained juvenile. Results of a similar fish rescue operation behind the cofferdam installed during construction of a fish screen showed that no salmonids were stranded, and fewer than 10 fish total were collected in the fish rescue. Since construction methods and schedules for the proposed AIP are similar to past construction of cofferdams at City of Sacramento, American River, and Wilkins Slough fish screens, and a similar fish rescue program will be applied when the cofferdams are closed, the loss of sturgeon and salmonids due to stranding is expected to be low to non-existent.

c. *Exposure to Increased Turbidity, Sedimentation and Contaminants*

Cofferdam installation, dredging, and site preparation will result in increased short-term, localized turbidity and suspended sediment concentrations within Victoria Canal. Exposure to increased turbidity and suspended sediment may affect Sacramento River winter-run Chinook salmon, CV spring-run Chinook salmon, CV steelhead, and green sturgeon through disruption of normal feeding and migration behavior, and exposure of juveniles to increased predation by forcing them from shallow water refugia into the open water of the river channel. The period of increased turbidity will be limited to pre-project dredging and installation of the cofferdam, which will require up to 60 days. Increased turbidity and suspended sediments will occur intermittently during construction of the cofferdam.

Numerous studies show that suspended sediment and turbidity levels moderately elevated above natural background values can result in non-lethal detrimental effects to salmonids. Suspended sediment affects salmonids by decreasing reproductive success, reducing feeding success and growth, causing avoidance of preferred rearing habitats, and disrupting migration cues (Bash *et al.* 2001). Sigler *et al.* (1984) in Bjornn and Reiser (1991), found that prolonged turbidity between 25 and 50 NTUs reduced growth of juvenile coho salmon and steelhead. MacDonald *et al.* (1991) found that the ability of salmon to find and capture food is impaired at turbidities from 25 to 70 NTUs. Bisson and Bilby (1982) reported that juvenile coho salmon avoid turbidities exceeding 70 NTUs. Increased sediment delivery can also fill interstitial substrate spaces and reduce cover for juvenile fish (Platts *et al.* 1979) and abundance and availability of aquatic invertebrates for food (Bjornn and Reiser 1991). We expect turbidity to affect Chinook salmon and steelhead in much the same way that it affects other salmonids, because of similar physiological and life history requirements between species.

Newcombe and Jensen (1996) believe that impacts on fish populations exposed to episodes of high suspended sediment may vary depending on the circumstance of the event. They also believe that wild fish may be less susceptible to direct and indirect effects of localized suspended sediment and turbidity increases because they are free to move elsewhere in the system and avoid sediment related effects. They emphasize that the severity of effects on salmonids depends not only on sediment concentration, but also on duration of exposure and the sensitivity of the affected life stage.

Suspended sediment from construction activities would increase turbidity at the project site and could continue 1,000 feet upstream and downstream of the new intake site. Although Chinook salmon and steelhead are highly migratory and capable of moving freely throughout the action area, an increase in turbidity may injure juvenile salmonids by temporarily disrupting normal behaviors that are essential to growth and survival such as feeding, sheltering, and migrating. Injury is caused when disrupting these behaviors increases the likelihood that individual fish will face increased competition for food and space, and experience reduced growth rates or possibly weight loss.

The ASIP concludes that the construction of the proposed intake and fish screen are expected to suspend sediment and turbidity at levels below what is reported in the literature as causing adverse effects (*e.g.*, 25 to 70 NTUs). The conservation measures proposed (*i.e.*, Regional Board requirements) are designed to keep turbidity within 10 to 20 percent of the natural turbidity in Victoria Canal. In either case, suspended sediment concentrations are not expected to exceed the Regional Board standard of 260 mg/l, which is well below levels measured in NTUs that cause sublethal physiological effects to salmonids.

Project-related turbidity increases may affect the sheltering ability of some juvenile salmon and steelhead and may cause injury or death by increasing their susceptibility to predation. The extent of these effects is expected to be small for several reasons. First, the highest turbidity levels will occur at the end of the seasonal juvenile migration period and should affect only a small portion of each population. Second, the overall duration of the effect will be temporary, lasting approximately 60 days. Additionally, based on observations during similar construction activities, turbidity plumes are not expected to extend across Victoria Canal (*i.e.*, 500 feet in width), but rather the plumes are expected to extend downstream from the site along the western side of the canal, affecting only a portion of the fish within the action area. Turbidity plumes may be as wide as 100 feet, and extend downstream for up to 1,000 feet. Once construction stops, water quality is expected to return to background levels within hours. Adherence to erosion control measures and BMPs such as use of silt fences, straw bales and straw wattles will minimize the amount of project-related sediment and minimize the potential for post-construction turbidity changes.

As a result of the limited timing and distribution of any sediment plumes generated during construction, salmon and steelhead will have the opportunity to avoid the plume during their upstream or downstream migration. Therefore turbidity-related effects that prevent successful upstream and downstream migration are not anticipated. Using white sturgeon as a surrogate, studies have shown that individuals do not disperse during in-channel dredging and exhibit a high degree of site fidelity (U.S. Geological Survey 2004). Green sturgeon may be attracted to sediment plumes during construction looking for food. However, given the spatial and temporal extent of the disturbance, turbidity and sediments are not expected to adversely effect green sturgeon since a daytime disturbance that occurs in shallow water will have minimal short-term effects on individuals that are likely to be located nearby in deeper water. White sturgeon typically moved to shallower water at night (USGS 2004).

Fuel spills or use of toxic compounds during project construction could release toxic contaminants into Victoria Canal and could injure or kill salmon, steelhead, and sturgeon. Specific contaminant effects to green sturgeon are unknown, however studies on similar surrogate species, Atlantic sturgeon (*Acipenser oxyrhynchus*) and Shortnose Sturgeon (*Acipenser brevirostrum*), found that sturgeon tend to be more sensitive than salmonids in tests for contaminants (Dwyer *et al.*, 2005). Therefore, we will assume that contaminant levels that may effect salmonids will also be likely to effect green sturgeon. NMFS expects that adherence to a Hazardous Materials Control Plan (as described in the conservation measures) and BMPs that dictate the use, containment, and cleanup of contaminants will minimize the risk of introducing such products to the waterway because the prevention and contingency measures will require frequent equipment checks to prevent leaks, will keep stockpiled materials away from the water, and will require that absorbent booms are kept on-site to prevent petroleum products from entering the river in the event of a spill or leak. If the Hazardous Materials Control Plan and BMPs are successfully implemented, NMFS does not expect fuel spills or toxic compounds to cause injury or death to individual fish.

d. *Pipeline Construction*

The proposed pipeline for the AIP will cross Victoria Island and be routed under Old River to connect to CCWD's existing Old River Facility. The pipeline will be constructed by tunneling up to 50 feet under Old River, approximately 1 acre of land near the crossing will be affected during construction on the dry-side of the levee. No freshwater marsh or aquatic habitat will be disturbed and the entire area will be restored to pre-construction conditions. The depth of the tunneling (*i.e.*, 50 feet) under Old River should minimize any chance that accidental frac-outs will leak drilling material into the channel. As above, adherence to a Hazardous Materials Control Plan and BMPs that dictate the use, containment, and cleanup of contaminants will minimize the risk of introducing such products to the waterway because the prevention and contingency measures will require frequent equipment checks to prevent leaks. Therefore, no adverse impacts to listed fish species are anticipated from pipeline construction.

2. Operations and Maintenance Impacts

Operations and maintenance activities will be performed to maintain the design criteria of the proposed water intake and fish screen. Operations and maintenance of the fish screen will reduce fish entrainment at the pumping facilities, but also may cause limited adverse effects to fish exposed to the structure and maintenance operations. The facility will not increase water diversions from the Delta and will, therefore, not affect baseline instream flows (see *Assumptions Underlying this Assessment*). The proposed fish screen project will result in a change in the seasonal distribution of diversions between CCWD's Old River, and Rock Slough Intake Facilities. The maximum combined diversions of the existing Old River intake and the proposed Victoria Canal will not exceed 320 cfs. CCWD does not expect overall annual water consumption to increase due to the proposed project, because CCWD is not increasing its CVP contract water or water rights out of the Delta. The new intake on Victoria Island will change CCWD's integrated operations by shifting some pumping from Old River and/or Rock Slough intake to the new intake during periods when water quality is better in Victoria Canal.

Fish exposure to screens and associated features may affect some individuals through direct physical injury or by altering swimming behavior and causing an increased vulnerability to predation. Site-specific flow data collected from the canal and modeling results confirm that the ambient sweeping velocity in the canal exceeds 0.4 fps greater than 70 percent of the time (*i.e.*, flows in the canal exceed 800 cfs greater than 70 percent of the time). The exposure time at a sweeping velocity of 0.4 fps is approximately 6.5 minutes (CCWD fish screen design specs). The anticipated exposure time of 6.5 minutes, and the approach and sweeping velocities at the screen have the potential for fish to be injured or killed along the surface of the screen. Therefore, the size of the fish screen has been increased by 7-10 percent to minimize potential impingement of fish as recommended by the AFSP technical team. The fish screen also has been designed to have a smooth exterior surface and upstream and downstream transition areas that reduce or eliminate areas where juvenile salmonids are concentrated or disoriented to reduce the risk of predation, as well as to reduce or eliminate structural locations offering cover for predatory fish.

Factors that could affect screen performance are debris and sediment accumulation in front of the fish screen structure. Debris and sediment accumulations could result in increased approach velocities and loss of hydraulic uniformity at the screen face. Several operation and maintenance elements have been incorporated in the facility to avoid or minimize this occurrence. The automated traveling rake cleaning system will be used when the facility is operating to remove debris from the face of the fish screen. Pressure washing will be used to clean individual screen panels and periodic maintenance dredging, if necessary, will remove additional accumulations of sediment in Victoria Canal. A floating log boom will be provided in Victoria Canal to deflect floating debris that may otherwise impinge on the screen, damage screen panels, or damage the traveling rake cleaning system. Continuous monitoring of screen condition and performance will insure that the screen is operating to criteria. The long-term use of the automated rake cleaning system, pressure washing, periodic dredging, and maintenance and replacement of fish screen parts is expected to keep the fish screen operating within criteria for the life of the project. Maintenance actions such as dredging and screen replacement will be infrequent (*e.g.*, periodic maintenance dredging at the existing Old River facility has not been required in 10 years of operation) and occur when pumping is non-operational. Maintenance actions, therefore, are not expected to have significant effects or result in appreciable injury or death of individuals.

3. Habitat Impacts

Construction of the new intake and fish screen permanently will alter existing habitat through the use of riprap on the banks and deepening of the shallow water habitat in front of the proposed intake. The amount and type of habitat is described in the *Project Description*. CCWD would mitigate for 0.7 acre of low quality shallow-water habitat by purchasing 2.1 acres (at a 3:1 mitigation ratio) of high quality, freshwater emergent marsh habitat in an approved mitigation/conservation bank. The amount of habitat modified is relatively small, compared to the size of the ESU and designated critical habitat in the Delta. Construction of the fish screen will exclude fish from 100 to 200 feet of shoreline, but since the fish screen will be near the bank, minimal surface area (0.2 acre) of aquatic habitat will be lost. In addition, the location of the fish screen has been designed to create more uniform cross flow in front of the screen, reducing the risk of eddies or irregular hydraulics near the intake that could be detrimental to fish. The change in habitat quality and availability associated with replacing existing riprap will be short-term (see turbidity and sediment disturbances already discussed) and minimal since it would silt over in time. Modification of the habitat in front of the fish screen by deepening the channel to a depth of 10 to 15 feet will be a permanent loss of 0.2 acre of shallow water tidal habitat, but may provide some benefit to green sturgeon by diversifying the channel morphology and providing shelter. Large numbers of juvenile green sturgeon have been observed in association with deep holes behind diversion structures like the radial arm gates at Clifton Court Forebay (CDFG 2002, as cited in Beamesderfer 2004) approximately 3 miles from the proposed intake site.

Anadromous fish are present seasonally in the action area. The surrounding habitat is characterized as a wide shallow tidal channel confined by levees, stabilized with riprap, and having a mid-channel tule island extended the length of Victoria Canal, with no floodplains and sparse riparian vegetation. Because of these habitat conditions, the action area does not provide favorable rearing conditions for salmon or steelhead, and primarily functions as a migration corridor. The area is not used as spawning habitat by salmonids or green sturgeon. Due to the degraded condition of the already modified habitat (*i.e.*, riprap levees) throughout the action area, the impacts of habitat loss on juvenile growth are expected to be small. The function of the action area as a migratory corridor will not be impaired by the loss of habitat behind the fish screen.

The replacement of 15,000 square feet of existing riprap (*i.e.*, 400 to 500 feet on each side of the fish screen structure or 0.3 acre) will maintain predator habitat availability and predation rates throughout the action area. Predation studies indicate that juvenile salmon and steelhead may be exposed to increased susceptibility to predation by native and introduced fish species along riprapped banks (Peters *et al.* 1998, FWS 2000). Predatory fish in the central and south Delta have a broad tolerance of environmental conditions and are well distributed throughout the action area (*i.e.*, making up the majority of fish sampled). Potential predator species include Sacramento pikeminnow, striped bass, largemouth bass, smallmouth bass, and several sunfish species. Recent radio-tagging studies have shown low rates of juvenile Chinook survival in Georgiana Slough and the south Delta attributed to predation (Brandes and McLain 2001, Vogel 2004). Studies on the Sacramento River (Michny and Deibel 1986, Michny 1989) and in several other western states (Peters *et al.* 1998, Tiffan *et al.* 2002) have shown lower salmonid rearing densities and higher predator densities along armored banks. The COE (2004) model also assumes that mortality is highest for juvenile salmonids along armored banks because they provide predator access, and lowest along natural banks with gravel and cobble sized materials because they exclude predators. Although predation is expected to increase with the additional application of riprap, the habitat modification will not be substantial, and any increase in the predation rate should be relatively small (relative to the baseline) since the banks are already rocked. The application of 15,000 square feet (0.3 acre) of additional rock underwater is not expected to affect the overall suitability of nearshore habitat for rearing and migration.

The proposed action would continue to contribute cumulatively to the negative factors affecting pelagic fish species by maintaining the preferred habitat of introduced organisms (*i.e.*, riprap), diverting water from the Delta containing food sources (zooplankton) necessary for survival, and by contributing to changes in the hydrologic conditions (*i.e.*, reverse flows) that confuse migratory fish. In addition, the proposed AIP would contribute incrementally to the cumulative adverse impacts to the quality and quantity of critical habitat available within the Delta for CV steelhead, Sacramento River winter-run Chinook salmon and CV spring-run Chinook salmon. The purchase of mitigation credits in a shallow water emergent marsh may not provide the same migratory function as the habitat along Victoria Canal, but may provide better rearing habitat quality, which is lacking in Victoria Canal.

a. *Hydraulic Changes to Habitat*

The presence of a water intake on Victoria Canal would contribute to localized changes in hydraulic conditions (*e.g.*, water velocities, water depths, and water circulation periods), and the availability of cover habitat utilized by salmon, steelhead, and green sturgeon. Changes in local flow patterns may affect sediment deposition, thereby effecting benthic macroinvertebrates (*i.e.*, food source for listed fish). Changes in local water velocities are not expected to be significant or represent a barrier to either adult or juvenile fish movement due to the proposed intake structure being set back from the existing bank and not extending into Victoria Canal.

Continued operation of the new 250 cfs intake will remove approximately 3-10 percent of the flow down Victoria Canal throughout each diversion season. Flows average about negative 3,500 cfs during August, and range from negative 1,000 cfs to negative100 cfs in April (CCWD and BOR 2006b). Flows that are more negative indicate a larger volume of water moving in the reverse direction (*i.e.*, upstream, towards the CVP/SWP pumps) then flows that are less negative (*i.e.*, -1000 cfs is a larger volume of reverse flows than -100 cfs). Water surface elevation is strongly influenced by tidal changes and can vary by more than five feet during one tidal cycle. Tidal range is about 3.5 feet in Victoria Canal (CDEC 2007).

A reduction in flows of this magnitude would not be significant or have an effect on fish behavior given the much larger tidal variation in flows. Also, there would be no net difference in flows from the baseline conditions, since this amount of water currently is diverted at CCWD's Old River Facility. Changes in flow and water depth may attract predatory fish to the intake structure and may change the distribution of these individuals within Victoria Canal, but are not expected to increase the overall abundance of predatory fish in the action area.

The proposed action would reduce diversions from Rock Slough, where loss of listed salmonids occurs from CCWD's unscreened diversion and predation within the 4-mile-long Contra Costa Canal leading to the pumping plant. Therefore, shifting the unscreened diversions at the Rock Slough intake over to the newly screened diversion in Victoria Canal would have a net beneficial effect on salmon and steelhead (ASIP Table 4.1-3).

Effects on key Delta hydraulic indicators were modeled using a 72-year period of record (CALSIM II) to project the existing, future, and cumulative conditions for the proposed project. These hydrologic indicators are typically used as State Water Quality Control Board standards (*i.e.*, Decision 1641) to control the export of water diversions from the Delta and include: Total Delta Outflow, Total Delta Inflow, Sacramento River Inflow (measured at Rio Vista), San Joaquin River Inflows (measured at Mossdale), the Export-to-Inflow Ratio, and the location of X2 (*i.e.*, defined as the location in the Delta where the 2-part-per-thousand salinity isohaline is established). The proposed project resulted in a less than one percent chance that in any month these hydraulic indicators changed. A change of one percent or less is well within the error of the models.

The proposed AIP would shift the location and timing of a portion of CCWD's diversions from the Old River and Rock Slough intakes to Victoria Canal. Total diversions from CCWD's three intakes are small, approximately 135 TAF, when compared to overall tidal flows in the Delta, and combined CVP/SWP exports which total 6 million acre feet (MAF). Changes in total monthly diversion rates (all intakes) compared to the existing and future condition amounted to 500 acre feet and 300 acre feet, respectively (CCWD and BOR 2006b, EIS/EIR Table 4.2-4). Total CCWD diversions would decrease from December through July, when juvenile salmonids are present, and increase from August through November, when juvenile salmonids are absent. Therefore, future changes in location and timing of CCWD diversions are not expected to affect overall Delta hydraulic conditions as indicated by modeling results.

4. Fish Screen Losses at CCWD Intakes

Construction of the proposed new fish screen on Victoria Canal would result in a limited amount of incidental take associated with the long-term operation of the fish screens. Typically, the performance of a positive barrier fish screen, such as the one proposed, is expected to reduce entrainment and impingement of fish by 95 percent or more when compared to an unscreened diversion. As designed, the proposed screen will exceed the criteria for juvenile salmonids by being protective of delta smelt, a fish with inferior swimming capabilities compared to juvenile salmonids. When taken as a whole, the integrated operation of CCWD's intakes would experience a net reduction in incidental take, due to operating the proposed Victoria Canal intake (Table 6). Increased take associated with the proposed action on Victoria Canal would be offset by decreased take at Rock Slough and Old River. Table 6 is meant to show the proposed action will decrease the overall loss of listed fish due to CCWD's combined diversions. Reduction in take is due to the shifting of diversions away from the unscreened Rock Slough intake and a shift in timing of some CCWD diversions from spring to fall (when listed fish are less vulnerable to entrainment). Historically, peak periods for CVP/SWP salvage of juvenile salmon and steelhead occur in the spring from February through May (CDFG 2005, in CCWD and BOR 2006a).

Table 6. Index of Estimated Annual Average Net Entrainment/Impingement Losses for the Proposed Action (future conditions) Compared to the No-Action Alternative (Hanson 2005, in CCWD and BOR 2006a, Table 4.1-3).

Taxa (Juveniles)	*Rock Slough*	*Old River*	*Victoria Canal (proposed)*	*Overall Net Change*
steelhead	-12	-5	4	-13
Chinook salmon	-207	-77	56	-227
delta smelt	-88	-60	26	-121
larval delta smelt	-250	-1,990	1,032	-1,208
splittail	-1,256	-164	152	-1,268
striped bass	-11,559	-1,394	1,519	-11,434

Note: Negative values under Rock Slough and Old River denote less entrainment/impingement under future conditions than existing conditions based on historic fish densities. Positive values under Victoria Canal denote estimated entrainment into the new diversion.

Previous fish monitoring conducted at CCWD's Old River Fish Screen Facility can be used to compare the expected performance of the proposed screen on Victoria Island because it is similar in size, design, and location. Modeled entrainment in Table 6 is significantly higher than actual observations of entrainment at Old River because modeled numbers are derived from average monthly densities per thousand acre feet of water at CVP over a 73 year historic period of record (1922 through 1994). Since 1998, sampling behind the fish screen with a large sieve net, no salmon or sturgeon were observed, and only one delta smelt was caught (Morinaka 2000). The results of fish sampling demonstrate that the low approach velocities designed for the proposed fish screen at Victoria Island would allow juvenile fish to escape entrainment.

NMFS does not expect juvenile green sturgeon to be entrained at the proposed new fish screen because of their larger size than salmonids in the Delta (*i.e.*, fish screens are designed to protect smaller size fish). Based on CVP/SWP historical salvage from 1981 to 2006, green sturgeon lengths averaged 330 mm with a range of 136 to 774 mm. The screen size opening of 1.75 mm would prevent any green sturgeon from becoming entrained. Recent experiments by Swanson, Young, and Cech (2004) exposed juvenile Chinook salmon and green sturgeon to a simulated fish screen in a large annular flume. The incidence of impingement was very low (< 1 percent) for experimental fish. Therefore, NMFS anticipates that losses due to entrainment and impingement will be minimal. Overall, the proposed AIP is likely to result in a net benefit to listed fish species (Table 6) through the reduction in entrainment and impingement at CCWD's three other diversions.

VI. CUMULATIVE EFFECTS

Cumulative effects include the effects of future State, tribal, local, or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA.

Non-Federal actions that may affect the action area include ongoing agricultural activities and increased urbanization. Agricultural practices in the Delta may adversely affect riparian and wetland habitats through upland modifications of the watershed that lead to increased sediments and contaminants or reductions in water flow in channels flowing through the Delta. Unscreened agricultural diversions throughout the Delta entrain fish, including juvenile salmonids. Grazing activities from dairy and cattle operations can degrade or reduce suitable critical habitat for listed salmonids by increasing erosion and sedimentation as well as introducing nitrogen, ammonia, and other nutrients into the watershed, which then flow into the receiving waters of the Delta. Stormwater and irrigation discharges related to both agricultural and urban activities contain numerous pesticides, herbicides and other contaminants that may adversely affect salmonid reproductive success and survival rates (Dubrovsky *et al.* 1998, 2000; Daughton 2003).

The Delta and East Bay regions, which include portions of Contra Costa, Alameda, Sacramento, San Joaquin, Solano, Stanislaus, and Yolo counties, are expected to increase in population by nearly 3 million people by the year 2020 (California Commercial, Industrial, and Residential Real Estate Services Directory 2002). Increases in urbanization and housing developments can impact habitat by altering watershed characteristics, and changing both water use and stormwater runoff patterns. The general plans for the cities of Stockton, Brentwood, Lathrop, Tracy, Manteca, and their surrounding communities anticipate rapid growth for several decades to come. The anticipated growth will occur along both the I-5 and US-99 transit corridors in the east and Highway 205/120 in the south and west. Increased growth will place additional burdens on resource allocations, including natural gas, electricity, and water, as well as on infrastructure such as wastewater sanitation plants, roads and highways, and public utilities. Some of these actions will not require Federal permits, and thus will not undergo review through the section 7 consultation process.

Greater urbanization in and around the Delta will lead to increased recreational boat operation, resulting in more levee erosion from wave action, contamination from the operation of engines, and abandonment of vessels. Commercial vessel traffic is expected to increase with the redevelopment plans of the Port of Stockton. Increased commercial and recreational traffic in the Delta is also anticipated to further the rapid spread of non-native invasive plants and animals (*e.g.*, Asiatic clams, Japanese gobies, Chinese mitten crab, and water hyacinth) that compete with native species for food and space. These physical effects are expected to adversely affect aquatic organisms, including listed salmonids and green sturgeon resulting in lower survival rates in the Delta.

The combined effects of continued land subsidence, sea level rise, increasing seismic risk to levees, and maintaining a homogeneous freshwater environment make the current management of the Delta unsustainable for agencies relying on Delta waters (Lund *et al.* 2007). Evidence from fishery monitoring conducted by CDFG, CDWR, FWS, and others has shown a dramatic decline in indices of abundance for a variety of pelagic fish species such as: delta smelt, longfin smelt (*Spirinchus thaleichthys)*, striped bass, and threadfin shad (*Dorosoma petenense)* that reside in the Delta. The recent pelagic organism decline (POD) has heightened the concern regarding the overall health and condition of these resident and migratory fish, as well as the zooplankton and phytoplankton that make up the basis for the food web and habitat conditions within the Delta. The four primary factors that have been implicated in the POD are: (1) changes in the food web resulting from the introduction of exotic plants and organisms, (2) fish losses associated with greater winter-time diversions from the CVP/SWP export pumps, (3) changes in the timing of hydraulic conditions in the Delta associated with increased export pumping since 1995, and (4) chronic and acute toxicity effects from discharges of contaminants, including pesticides and herbicides associated with land use within the Central Valley (Armour *et al.* 2005, in CCWD and BOR 2006b). Therefore, the likelihood of these issues worsening in the future is considered high.

The effects of climate change are likely to occur within the next 30 years as described in *Status of Species and Critical Habitat.* The corresponding change in fish populations and their habitats could vary considerably. A rise in air temperatures of only a few degrees could have far reaching negative impacts on small populations of listed salmonids and green sturgeon that are entirely dependent on cold-water releases from large storage reservoirs like those found within the Central Valley. Although there is some uncertainty, most models predict average sea levels will rise between 0.3 and 2.9 feet by the year 2100, which is likely to affect Delta water surface elevations and salinity levels (CDWR 2006). Salt water intrusion into the central and south Delta would shift the diversion of water to spring and winter months when water quality is better, negating some of the beneficial effects of the proposed action. Slightly higher Delta water surface elevations or lower summer/fall flows over the next 100 years are expected to have little effect on the proposed project or on fish populations (CCWD and BOR 2006b). However, climate warming is expected to reduce the amount of habitat available to Central Valley salmonids that reside in freshwater during the summer (*i.e.*, CV steelhead, CV spring-run Chinook salmon, Sacramento River winter-run Chinook salmon and green sturgeon), since artificial barriers restrict the movement of fish to higher elevations (Lindley *et al.* 2007).

VII. INTEGRATION AND SYNTHESIS

A. Effects on Listed Species

NMFS finds that the proposed action will affect Sacramento River winter-run Chinook salmon, CV spring-run Chinook salmon, CV steelhead, and green sturgeon through construction-related impacts, operations, and habitat modification and loss at the project site. Because the proposed project incorporates a suite of impact avoidance and minimization measures, the potential adverse effects of the proposed project are anticipated to be small, limited, or short-term in nature.

Construction-related impacts are limited to cofferdam installation, cofferdam dewatering, and implementation of the fish rescue plan. Cofferdam installation will cause temporary increases in underwater sound pressure and turbidity levels, and may injure or kill juveniles by causing physical trauma or causing increased susceptibility to predation. Cofferdam installation will occur between August 1 and November 30, and the new intake/fish screen will take approximately 24 months to complete. Construction activities would be limited to daylight hours except for the tunneling under Old River, which could occur 24 hours a day. The cofferdam dewatering may isolate and strand juvenile Chinook salmon, green sturgeon and steelhead. Individuals may be entrained into pumps and killed as water is drawn down prior to the fish rescue. The fish rescue may injure or kill fish during capture, transport, and relocation to Victoria Canal. The dewatering and fish rescue are expected to be a one-time occurrence, lasting only 1 to 2 days.

Juveniles are more likely to be affected by the construction activities because of their small size, reliance on nearshore aquatic habitat, and vulnerability to factors that affect their growth and distribution. Adults should not be injured because their larger size, preference for deep water, and crepuscular migratory behavior should enable them to avoid construction-related impacts. Although juveniles exhibit crepuscular behavior, because of their use of near-shore aquatic habitats, they are more susceptible to impacts from daytime construction activities. Construction impacts following the 120-day cofferdam installation period should be small to negligible because most work will be performed "in the dry" behind cofferdams, and other in-channel work will avoid peak juvenile outmigration and adult upstream migration periods.

Turbidity-related injury and predation will be minimized by implementing the proposed conservation measures such as implementation of BMPs, Erosion Control, and adherence to Regional Board standards. Adherence to BMPs is expected to prevent fuel spills and the release of other toxic compounds from causing injury or death to individuals. The fish rescue plan will minimize the mortality of fish that are entrained or stranded within the cofferdam.

Long-term operations and maintenance actions will occur for the lifespan of the project. Conservation measures and integrated design features are expected to minimize or avoid adverse operations and maintenance effects by maintaining the fish screen to NMFS criteria, repairing or replacing damaged parts, and avoiding peak migration periods during maintenance activities. Near-screen conditions are expected to be favorable for survival and because NMFS and CDFG fish screen criteria will be met under a large range of tidal conditions and pumping conditions. Therefore, injury and death rates for operations and maintenance activities should be low.

Maintenance actions such as dredging and screen replacement will be infrequent or occur during periods of non-operation. As an example, CCWD's existing Old River Intake Facility located close by, has not required any maintenance dredging in 10 years of operations. The proposed intake on Victoria Canal may have different sediment conditions, but NMFS expects dredging will be as infrequent as the Old River Facility, and occur only as needed. Maintenance actions, therefore, are not expected to have significant effects or result in appreciable injury or death of individuals.

The addition of a new fish screen on Victoria Canal is expected to provide long-term net benefits to listed fish species by allowing a greater volume of CCWD's current diversions to pass through screened facilities, thus reducing losses at CCWD's unscreened Rock Slough Intake (Table 6).

Overall, NMFS expects that the construction and operation of the proposed AIP will have some minor, short-term effects, but in the long term, given the integrated operation of CCWD's other intakes, the AIP incrementally will reduce juvenile Chinook salmon, steelhead, and green sturgeon entrainment, injury, and mortality from the current baseline condition.

B. Impacts of the Proposed Action on ESU Survival and Recovery

The adverse effects to Sacramento River winter-run Chinook salmon, CV spring-run Chinook salmon, CV steelhead, and green sturgeon within the action area are not expected to affect the overall survival and recovery of the ESUs. This is largely due to the fact that construction impacts will be temporary, confined to individuals present in the local area, and will be minimized through the implementation of the proposed conservation measures including the purchase of 2.1 acres of shallow water emergent marsh habitat. Construction-related impacts will not impede adult fish from reaching upstream spawning and holding habitat, or juvenile fish from migrating to downstream rearing areas. The number of individuals actually injured or killed is expected to be small compared to the sizes of the respective salmonid and sturgeon populations; therefore, adverse population-level impacts are not anticipated.

The viable salmonid population criteria developed by McElhaney *et al.* (2000) uses four measures of population viability (*i.e.*, abundance, productivity, diversity, and spatial structure) to determine the health of a salmonid ESU. Population viability can be assessed by using two approaches described by Lindley *et al.* (2007); (a) the representation and redundancy rule, and (b) specific sources of threats. The goal of both of these approaches is to spread risk and maximize the future potential for adaptation. The proposed project is not expected to alter the life history or genetic diversity that contribute to the viability of salmonid ESUs. The addition of a new fish screen would not qualify as a specific threat (*e.g.*, a toxic spill, volcanic eruption, wildfire, or drought) that could extirpate a population. Although habitat diversity would be slightly altered, abundance would be increased as shown in the modeled entrainments effects. The impacts of the proposed action are not expected to occur at the scale where any one of these measures would impact listed salmonids at the population level.

The long-term operation of the proposed fish screen will reduce entrainment and related mortality of juvenile Chinook salmon, CV steelhead, and green sturgeon through reduced use of CCWD's unscreened diversion. Since construction impacts are expected to be temporary and avoid peak migration periods, and the integrated operation of CCWD's other diversions will reduce entrainment and increase juvenile survival in the south Delta, the proposed action is not expected to appreciably reduce the likelihood of survival and recovery of Sacramento River winter-run Chinook salmon, CV spring-run Chinook salmon, CV steelhead, and the Southern DPS of North American green sturgeon within the action area.

C. Impacts of the Proposed Action on Critical Habitat

Impacts to the designated critical habitat of CV steelhead include the replacement of 0.3 acre of existing riprap, the change in water depth of 0.2 acre of shallow water tidal habitat, addition of 0.3 acre of new riprap underwater on either side of the fish screen, and replacement of 0.2 acre of existing riprap with modified levee section. A total of 1.0 acre of modified critical habitat at the Victoria Canal intake site will be fully compensated for with 2.1 acres of shallow water emergent marsh habitat to be purchased and preserved by CCWD. The proposed fish screen will result in a permanent loss of approximately 100 to 200 linear feet of existing nearshore aquatic habitat along the Victoria Canal levee. Habitat elements, or primary constituent elements (PCEs), within the action area (*e.g.*, LWD, SRA cover, shoreline habitat complexity, refugia, and water quality) currently are degraded, fragmented, and do not contribute beneficially to the conservation value of critical habitat. However, NMFS (2005b) in their final assessment of critical habitat for CV steelhead rated the action area (*i.e.*, San Joaquin Delta) as having a high conservation value (ranked 10 out of a possible 18), mainly due to its importance as a migratory corridor. Although the proposed action will maintain these degraded and fragmented habitat conditions, the proposed habitat modifications and loss are relatively small and will result in habitat conditions that are similar to existing site conditions. The action area is expected to continue to function primarily as a migration corridor for listed salmonids and as a rearing area for juvenile green sturgeon. Therefore, we do not expect project-related impacts to result in a reduction in the conservation value of critical habitat for CV steelhead.

Impacts to the designated critical habitat for Sacramento River winter-run Chinook salmon and CV spring-run Chinook salmon are expected to be less than significant based on the CALSIM II modeling performed for potential impacts on CVP and SWP water supply. Impacts to water supply would correspond to impacts to designated critical habitat, since changes in reservoir storage alter flows and water temperatures downstream of project dams. Most of the changes are very small relative to the size of the reservoirs, resulted in less than 1 percent increase or decrease in total reservoir storage. For perspective, storage changes in Shasta Reservoir ranged from 0.7 to 16.5 TAF, while evaporative losses were 94 TAF. The changes caused by the proposed project under future conditions are not large enough to result in operational changes downstream or impact water deliveries, see ASIP Table 4.2-15 (CCWD and BOR 2006).

Project impacts to the cold water pool in Shasta Reservoir were analyzed by looking at exceedences to the 1.9 MAF end of September storage criteria (*i.e.*, temperature criteria required for winter-run Chinook salmon spawning and incubation in the upper Sacramento River). Out of the 73 year period of record from 1922 through 1993, the number of exceedences was the same in the base case as in the future conditions. Under future conditions, the proposed action increased storage slightly in 8 years and decreased storage slightly in 5 years. Therefore, we do not expect project-related impacts to result in a reduction in the conservation value of critical habitat for Sacramento River winter-run Chinook salmon or CV spring-run Chinook salmon.

Critical habitat for green sturgeon has not yet been designated; however, given that most of the PCEs of critical habitat for salmonids within the project site will return to pre-project conditions within two years, NMFS does not expect the function or value of the habitat as a whole will be impaired given the total habitat available.

VIII. CONCLUSION

After reviewing the best available scientific and commercial information, the current status of the listed species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is NMFS' biological opinion that the Alternative Intake Project, as proposed, is not likely to jeopardize the continued existence of Sacramento River winter-run Chinook salmon, CV spring-run Chinook salmon, CV steelhead, or the Southern DPS of North American green sturgeon, and is not likely to destroy or adversely modify designated critical habitat for CV steelhead, Sacramento River winter-run Chinook salmon or CV spring-run Chinook salmon.

IX. INCIDENTAL TAKE STATEMENT

Section 9 of the ESA and Federal regulation pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by NMFS as an act which kills or injures fish or wildlife. Such an act may include significant habitat modification or degradation where it actually kills or injures fish or wildlife by significantly impairing essential behavioral patterns, including breeding, spawning, rearing, migrating, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not the purpose of the agency action is not considered to be prohibited taking under the ESA provided that such taking is in compliance with the terms and conditions of this incidental take statement.

The listing of the Southern DPS of North American green sturgeon became effective on July 7, 2006, and some or all of the ESA section 9(a) prohibitions against take will become effective upon the future issuance of protective regulations under section 4(d). Because there are no section 9(a) prohibitions at this time, the incidental take statement, as it pertains to the Southern DPS of North American green sturgeon does not become effective until the issuance of a final 4(d) regulation.

The measures described below are non-discretionary, and must be undertaken by BOR and CCWD, so that they become binding conditions of any grant or permit, as appropriate, for the exemption in section 7(o)(2) to apply. BOR has a continuing duty to regulate the activity covered by this incidental take statement. If BOR: (1) fails to assume and implement the terms and conditions, or (2) fails to require the contractors to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, BOR or CCWD must report the progress of the action and its impact on the species to NMFS, as specified below in this incidental take statement (50 CFR §402.14(i)(3)).

A. Amount or Extent of Take

NMFS anticipates incidental take of Sacramento River winter-run Chinook salmon, CV spring-run Chinook salmon, CV steelhead, and green sturgeon through construction-related impacts, operations and maintenance impacts, habitat modification and loss of habitat at the project site. Specifically, it is anticipated that construction-related take will be in the form of harm, harassment, or death from physical injury or predation related to increased underwater sound pressure levels and turbidity, entrainment within the cofferdam, stranding, and physical injury or death from cofferdam installation, dewatering, and fish rescue efforts. Long-term operations-related take in the form of injury and death are anticipated from physical injury of individuals that contact the screen face multiple times, and continued exposure to project features such as riprap that contributes to predation of juveniles. NMFS does not anticipate take of adult salmonids or green sturgeon.

NMFS cannot, using the best available information, quantify the anticipated incidental take of individual Sacramento River winter Chinook salmon, CV spring-run Chinook salmon, CV steelhead, and green sturgeon because of the variability and uncertainty associated with the population size of each species, annual variations in the timing of migration, and uncertainties regarding individual habitat use of the project area. For example loss of Sacramento River winter-run Chinook salmon at the nearby CVP/SWP pumps varies from 3,000 to 20,000 juveniles per year depending on the water year type, population size, pumping practices and hydrology.

Because we are unable to determine specific numbers of listed species anticipated to be taken by the implementation of the proposed project, NMFS is designating ecological surrogates, or specific, measurable elements of the proposed project that are expected to affect the habitat and ecology of the listed fish and result in the take of those fish. These ecological surrogates will be used to describe the extent of take anticipated to be caused by the proposed project, and to monitor the level of take that is occurring during construction and operation of the facility. The most appropriate ecological surrogates for representing the extent of take caused by the AIP are: (1) construction time-lines and duration, (2) the level of underwater sound exposure generated by pile driving activities, (3) increases in turbidity caused by construction activities, (4) the mortality rate of fish salvaged during the rescue operations, (5) the extent of habitat loss or modification resulting from the project, and (6) the rate of water diversion realized by the operation of the facility.

The following parameters associated with these ecological surrogates are expected to be met and/or maintained to keep the level of incidental take from project activities within the anticipated range:

1. Pile driving will occur between August 1 and November 30 during construction of the cofferdam. Take in the form of injury and death from pile driving is not expected to occur for more than a total of 120 days or more than 10 meters from the sound source. Sound exposure levels are not expected to exceed 180 dB. Any exceedence of these parameters would result in an exceedence of the anticipated take levels.

2. Take in the form of injury and death from predation is expected from turbidity level increases that would exceed the Regional Board standards listed in the *Description of the Proposed Action* section, between August 1 and November 30 of the first construction year, extending 305 meters upstream and downstream of the intake site. Any exceedence of these parameters would result in an exceedence of the anticipated take levels.

3. Take in the form of capture, injury and death is expected from the fish rescue that will occur within enclosed cofferdams between August 1 and November 30 of the first

construction year. Death from fish rescue efforts is not expected to exceed 10 percent of fish captured. Any exceedence of these parameters would result in an exceedence of the anticipated take levels.

4. NMFS estimates that construction and operation of the fish screen will result in the permanent loss of up to 200 linear feet and 1.0 acre of existing nearshore aquatic habitat (*i.e.*, 0.5 acre of shallow water habitat and 0.5 acre of replaced riprap). Any exceedence of these parameters would result in an exceedence of the anticipated take levels.

5. Operations-related take is expected in the form of injury and death of juveniles from exposure to the fish screen and associated in-river project features resulting from a diversion of up to 250 cfs of water from Victoria Canal. Any exceedence of these diversion rates would result in an exceedence of the anticipated take levels.

Anticipated incidental take may be exceeded if these ecological surrogates exceed the criteria described above, or if the project's conservation measures are not implemented as described in the ASIP for the proposed AIP (CCWD and BOR 2006a).

B. Effect of the Take

NMFS has determined that the above level of take is not likely to jeopardize Sacramento River winter-run Chinook salmon, CV spring-run Chinook salmon, CV steelhead, or green sturgeon. The effect of this action will consist of individual fish behavior modifications, loss of habitat value, and potential injury or death of juvenile Sacramento River winter-run Chinook salmon, CV spring-run Chinook salmon, CV steelhead, and green sturgeon. Based on fish salvage data at the CVP/SWP Delta export pumps, only a small fraction of listed salmonid populations would be exposed to the project during construction. For example, incidental take at the CVP/SWP for juvenile winter-run Chinook salmon rarely exceeds one percent of the juvenile production estimate (JPE) entering the Delta. In 2006, an estimated 3.8 million juvenile winter-run Chinook salmon entered the Delta based on the number of adults spawned in the previous year (NMFS 2006). The incidental take for the CVP/SWP is 2 percent of the JPE entering the Delta, or in 2006, 76,626 juveniles. The actual estimated loss for 2006, based on fish salvaged at the CVP/SWP facilities, was 2,601 or 0.067 percent of the JPE. A fraction of that estimated loss at the CVP/SWP facilities would be assumed to be exposed to the AIP intake site in most years, since Victoria Canal is one of three pathways fish can travel through to reach the CVP/SWP fish salvage facilities (*i.e.*, flows are always towards the CVP/SWP Delta pumps except in very wet years). The same analysis would apply for CV steelhead and CV spring-run Chinook salmon. In addition, fish monitoring at CCWD's Rock Slough intake has shown that fewer than 4 juvenile CV steelhead and CV spring-run Chinook salmon enter the unscreened diversion in most years (Tenera 2005).

For green sturgeon, population estimates are not known, however, the latest life-history model (Beamesderfer 2006, in press) indicates that 25 percent of the total population may be represented by juveniles in the size category (*i.e.*, 1-3 year freshwater rearing stage observed in the CVP/SWP fish salvage) found in the Delta. The model suggests that an additional 30 to 60 percent mortality would need to be applied to the first 3 years in freshwater for significant reductions in reproductive potential to occur (*i.e.*, 20 to 50 percent eggs per recruit). Elasticity modeling indicates that a dramatic increase in the survival of YOY sturgeon or annual egg production is required to compensate for relatively low levels of fishing mortality that occur presently (Heppell 2006). Since only indirect effects to individual fish behavior, loss of habitat value, and potential injury are expected to occur from construction-related impacts in a small portion of the Delta where a few individuals occur, NMFS has determined that this level of take is not likely to jeopardize the Southern DPS of North American green sturgeon.

C. Reasonable and Prudent Measures

NMFS has determined that the following reasonable and prudent measures are necessary and appropriate to minimize the incidental take of listed anadromous salmonids. They must be implemented as binding conditions for the exemption in ESA section 7(o)(2) to apply. BOR and CCWD have the continuing duty to regulate the activities covered in this incidental take statement. If CCWD fails to adhere to the terms and conditions of the incidental take statement, or fails to retain the oversight of its contractor(s) to ensure compliance with these terms and conditions, the protective coverage of section 7(o)(2) may lapse.

NMFS has determined that the following reasonable and prudent measures are necessary and appropriate to minimize take of Sacramento River winter-run Chinook salmon, CV spring-run Chinook salmon, CV steelhead and Southern DPS of North American green sturgeon resulting from implementation of the action. These reasonable and prudent measures would also minimize adverse effects to critical habitat for CV steelhead.

1. BOR and CCWD shall take measures to avoid, minimize, and monitor injury and mortality from project construction, operations, and maintenance upon listed salmonids, green sturgeon and minimize impacts to critical habitat.

2. BOR and CCWD shall take measures to maintain, monitor, and adaptively manage all conservation measures described in the ASIP to ensure their effectiveness throughout the duration of the project.

3. BOR and CCWD shall take measures to minimize the effect of habitat modifications at the project site.

D. Terms and Conditions

1. BOR and CCWD shall take measures to avoid, minimize, and monitor injury and

mortality from project construction, operations, and maintenance upon listed salmonids, green sturgeon and minimize impacts to critical habitat.

a. CCWD shall require its contractors to use low-flow pumps with screened intakes during cofferdam dewatering activities.

b. CCWD shall require its contractors to conduct the Fish Rescue Plan consistent with NMFS Electrofishing Guidelines if applicable (NMFS 2000).

c. Prior to the new intake becoming operational, CCWD shall allow inspections of the intake structure and fish screen by NMFS engineers. Review of the final screen design, 60 percent build out, and final build out will be done in cooperation with NMFS engineers, or the CVPIA Anadromous Fish Screen Program.

d. NMFS staff, including dive team personnel, shall be granted access to the site for inspection and measurements of fish screen performance with a minimum of 72-hours advance notice to CCWD.

e. The fish screen shall be maintained to NMFS operating criteria as long as the diversion is in use. Should the fish screen be damaged or in need of repair, such that the protection of juvenile fish is compromised or screen criteria can not be met, CCWD shall curtail or cease pumping through the damaged or removed screen section and notify NMFS immediately, but no later than 48 hours after the incident.

2. BOR and CCWD shall take measures to maintain, monitor, and adaptively manage all conservation measures described in the ASIP to ensure their effectiveness.

a. BOR or CCWD shall provide a project summary and compliance report to NMFS within 90 days of initiation of diversions from Victoria Canal. This report shall describe construction dates, implementation of project conservation measures, compliance monitoring, and compliance with the terms and conditions of this biological opinion; observed or other known effects on listed fish species, if any; and any occurrences of incidental take of Sacramento River winter-run Chinook salmon, CV spring-run Chinook salmon, CV steelhead, or green sturgeon.

b. CCWD shall provide a detailed fish screen operations and maintenance plan within 1 year of completion of the initiation of diversions from Victoria Canal. This plan shall conform to the guidelines developed for CVPIA AFSP projects (see Appendix B).

c. BOR or CCWD shall notify NMFS at least 48 hours prior to closing the cofferdam and again when water depths reach approximately 2 feet. NMFS must be notified immediately by Fax within 48 hours of any listed salmonids or green sturgeon found injured or dead. If incidental take is observed, at a minimum the following information should be reported: date, time, location of dead or injured fish, cause of death, and the name of the person finding the fish.

d. In the event that a percussion hammer is required to install the cofferdam, acoustic monitoring shall be performed using standard protocols and procedures by a qualified acoustics measurement firm over a 2-day period. If underwater acoustic measurements demonstrate that sound pressure levels are consistently below 180 dB, no further monitoring will be required. Should underwater sound pressure levels exceed 180 dB, CCWD shall require the contractor to take measures to reduce the sound pressure level after coordination with NMFS. Monitoring over a second 2-day period would be required to confirm that sound pressure levels are consistently below 180 dB once appropriate measures have been implemented. A qualified acoustics measurement firm would measure underwater sound pressure levels at a minimum of 10 and 100 m from the cofferdam over a 2-day period while pilings are being driven within the cofferdam.

3. BOR and CCWD shall take measures to minimize the effect of habitat modifications at the project site.

   a. To mitigate for the loss of 1.0 acre of shallow water habitat, CCWD shall acquire, conserve, fund and manage at least 2.1 acres of shallow water habitat at a mitigation bank or other location approved by DFG, USFWS and NMFS. If 2.1 acres cannot be acquired prior to project impacts, CCWD shall provide DFG, prior to project impacts, the following:

      (1) an Irrevocable Letter of Credit or other form of Security approved by DFG, USFWS, and NMFS in the amount of $73,500 ($35,000/acre), to cover the costs of land acquisition, land conservation, and land management planning. The Security shall allow DFG to draw on the principal sum if DFG, at its sole discretion, determines that CCWD has failed to acquire the required 2.1 acres of shallow water habitat within 1 year of project impacts;

      (2) payment in the form of a check in the amount of $10,500 ($5000/acre) for use as principal for a permanent capital endowment. Interest from this amount shall be available for the operation, management and protection of the mitigation lands, including reasonable administrative overhead, biological monitoring, improvements to carrying capacity, law enforcement measures, and any other action designed to protect or improve the habitat values of the mitigation lands. The endowment principal shall not be drawn upon unless

such withdrawal is deemed necessary by DFG to ensure the continued viability of the species on the mitigation lands.

(3) The 2.1 acres shall be conserved through fee title transfer or a conservation easement acceptable to DFG, USFWS and NMFS. A management plan acceptable to DFG, USFWS, and NMFS is required for the mitigation site. The management plan shall be developed prior to acquisition of mitigation land and shall include, but not be limited to; description of the habitat, habitat enhancements to site, monitoring and management of invasive aquatic plant species, maintaining shallow water habitat depth criteria, success criteria and adaptive management if not met.

b. If maintenance dredging is necessary in order to keep the fish screen working as designed, maintenance dredging shall be conducted between July 1 and October 30, to reduce potential take of juvenile green sturgeon, Chinook salmon, and steelhead. Emergency dredging can be performed outside of the designated work window with written approval by NMFS and other permitting agencies.

Reports and notifications required by these terms and conditions shall be submitted to:

Supervisor
Sacramento Area Office
National Marine Fisheries Service
650 Capitol Mall, Suite 8-300
Sacramento California 95814-4706
FAX: (916) 930-3629
Phone: (916) 930-3600

X. CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the ESA directs Federal agencies to utilize their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of endangered and threatened species. These conservation recommendations include discretionary measures that BOR or CCWD can implement to avoid or minimize adverse effects of a proposed action on a listed species or critical habitat or regarding the development of information. NMFS provides the following conservation recommendations that would avoid or reduce adverse impacts to listed salmonids:

1. Measures should be taken to evaluate and minimize injury and mortality at other diversion points in the Delta that are owned and operated by the CCWD. BOR should integrate the operation of CCWD's diversion into its modeling and project description for OCAP.

2. CCWD should continue to monitor entrainment at the unscreened Rock Slough Intake, and coordinate with BOR on projects to reduce predation within the Contra Costa Canal leading up to Pumping Plant #1.

3. BOR should conduct or fund studies at the Tracy Fish Facility to help quantify fish losses associated with water diversions (*i.e.*, green sturgeon and CV steelhead mortality), and prioritize fish screen projects for future funding.

4. BOR should continue to work cooperatively with other State and Federal agencies, private landowners, governments, and local watershed groups to identify opportunities for cooperative analysis and funding to support salmonid habitat restoration projects within the southern Delta.

To be kept informed of actions minimizing or avoiding adverse effects, or benefitting listed species or their habitats, NMFS requests notification of the implementation of any conservation recommendations.

XI. REINITIATION OF CONSULTATION

This concludes formal consultation on the proposed AIP. Reinitiation of formal consultation is required if: (1) the amount or extent of taking specified in any incidental take statement is exceeded; (2) new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered; (3) the action, including the avoidance, minimization, and compensation measures listed in the *Description of the Proposed Action* section is subsequently modified in a manner that causes an effect to the listed species that was not considered in the biological opinion; or (4) a new species is listed or critical habitat is designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, formal consultation shall be reinitiated immediately.

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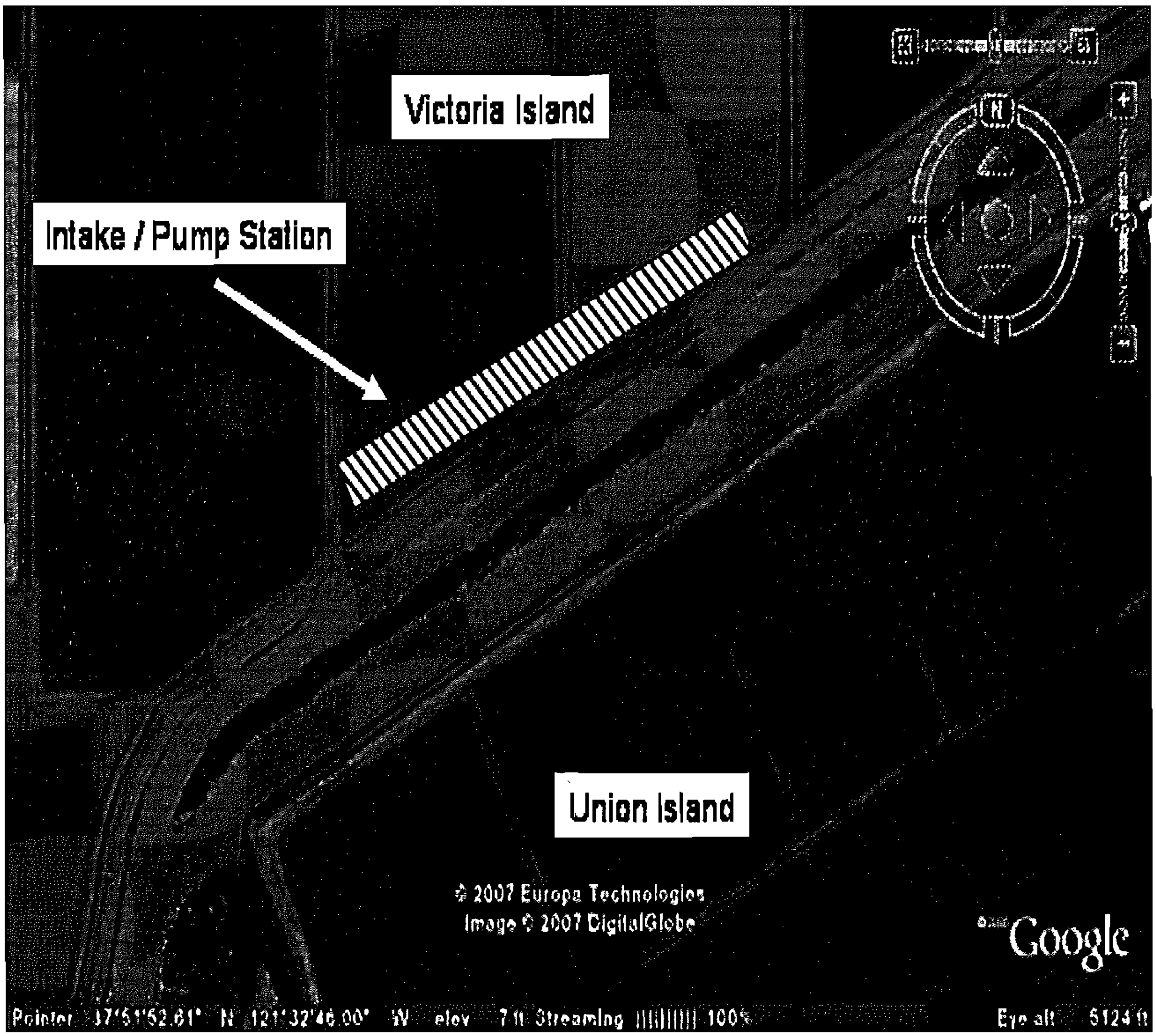
Appendix A.

Figure 2a. Aerial view of CCWD's Alternative Intake site.



Figures 3 and 4. Alternative Intake Project Fish Screen Design and Potential Impact Area.

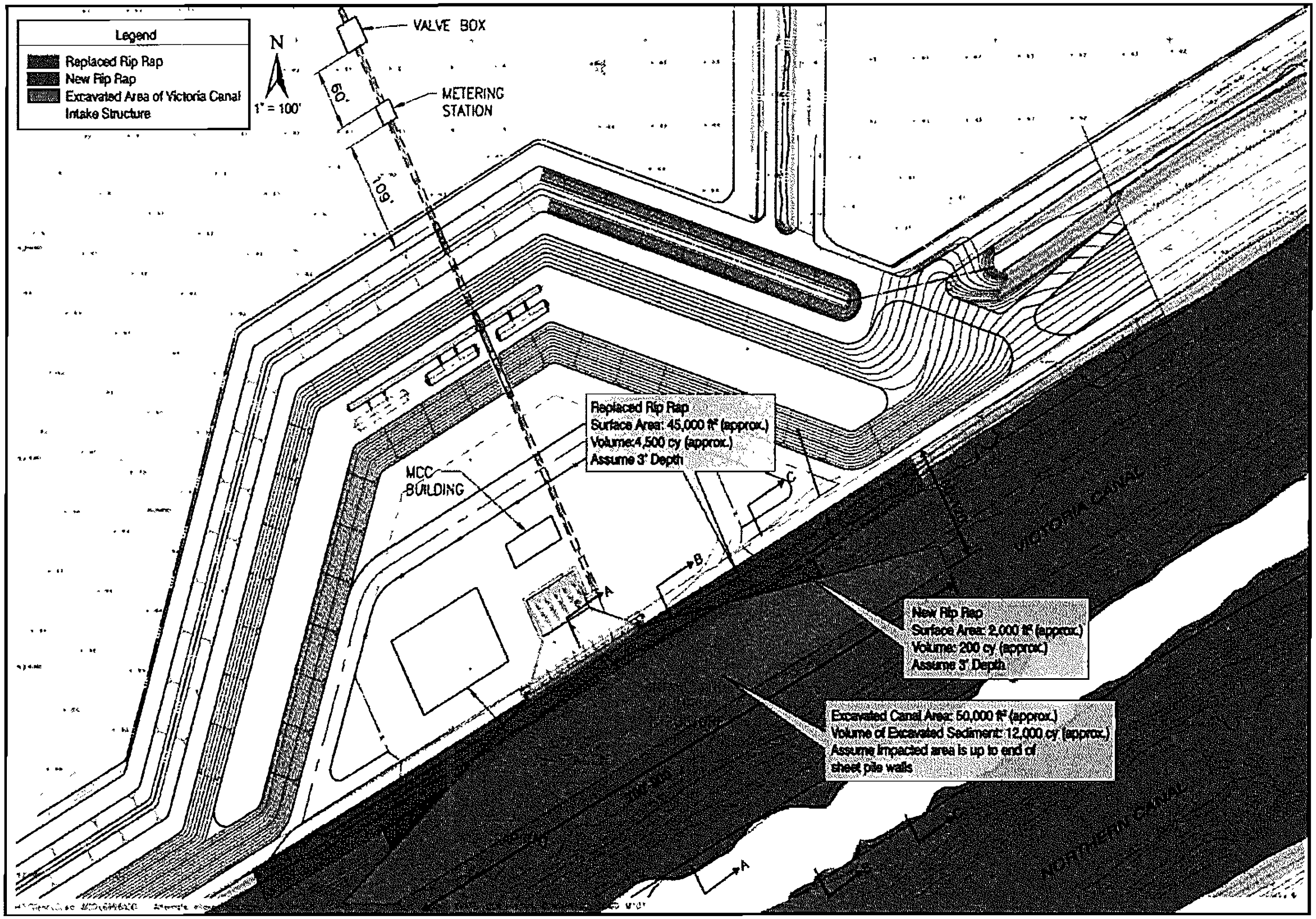


Figure 3
POTENTIAL IMPACTED AREA
VICTORIA CANAL INTAKE: ORIGINAL INTAKE LOCATION
ALTERNATIVE INTAKE PROJECT
CONTRA COSTA WATER DISTRICT

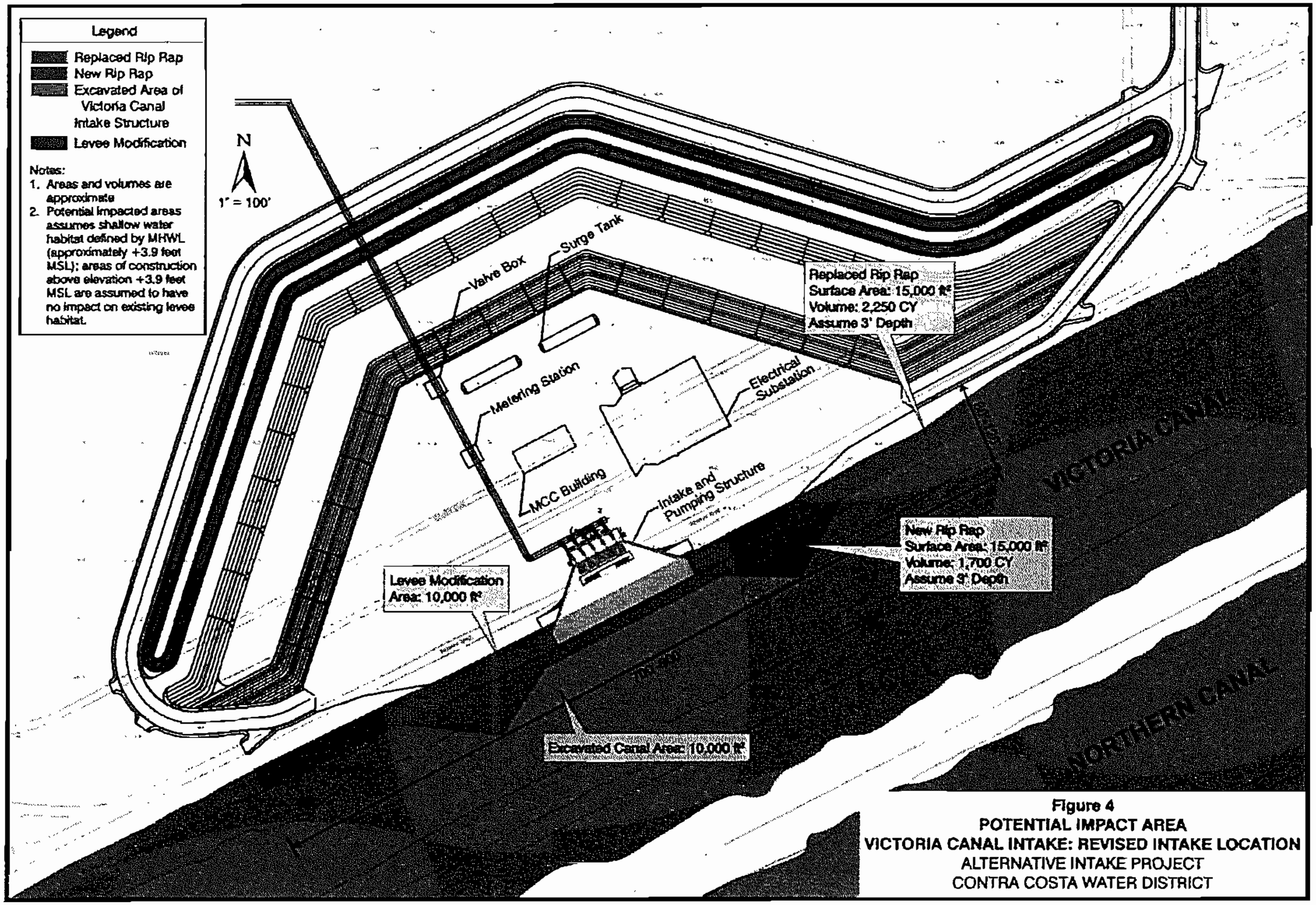


Figure 4
POTENTIAL IMPACT AREA
VICTORIA CANAL INTAKE: REVISED INTAKE LOCATION
ALTERNATIVE INTAKE PROJECT
CONTRA COSTA WATER DISTRICT

Appendix B.

Alternative Intake Project Fish Rescue Plan
Source: ASIP Attachment F (CCWD and BOR 2006a)

Approach

Contra Costa Water District (CCWD) proposes to construct the Alternative Intake Project, which includes a water intake and positive barrier fish screen on Victoria Canal. Construction of the intake structure and positive barrier fish screen would require installing a cofferdam and dewatering the area within the cofferdam. Fish inhabiting Victoria Canal would potentially be trapped within the cofferdam and lost as a result of dewatering. To minimize and/or avoid these losses, a Fish Rescue Plan shall be implemented to reduce harm, harassment, and mortality from cofferdam construction and dewatering operations associated with in-water construction activities on listed fish species.

This plan has been developed in conjunction with informal consultations between CCWD and the National Marine Fisheries Service (NMFS), U.S. Fish and Wildlife Service (USFWS), and the California Department of Fish and Game (DFG), and is intended to serve as a reasonable and prudent measure to minimize take of listed fish species. The plan is based on those consultations and the fish rescue plan successfully implemented by the City of Sacramento (2001), as recommended by the fisheries agencies. The Alternative Intake Project Fish Rescue Plan may be modified and/or updated pending the issuance of a Biological Opinion and/or during the formal consultation with the fisheries agencies.

Although all fish species trapped by the cofferdam would be rescued and returned back into Victoria Canal, the primary emphasis of this effort focuses on protecting listed and special-status fish species inhabiting Victoria Canal. Special-status fish species potentially inhabiting Victoria Canal are identified below.

Endangered Fish
Winter-run Chinook salmon

Threatened Fish
Delta smelt
Central Valley steelhead
Central Valley Spring-run Chinook salmon
North American green sturgeon

Special-Status Fish Species of Concern

Central Valley fall/late-fall run Chinook salmon
Longfin smelt
River lamprey
Hardhead
Sacramento splittail

Methods

This Fish Rescue Plan is comprised of several phases. The intake and fish screen are to be installed in Victoria Canal within a depth of approximately 10-15 feet of water. The in water construction area is to first be isolated from the canal with a cofferdam (*e.g.*, sheet pile or other barrier) to reduce flows into the area. Before completely closing the cofferdam, the interior area will be swept with a net to herd any fish out of the cofferdam area and remove fish from within the water inside of the cofferdam. During this phase, the cofferdam will remain open at the bottom (see Exhibit I). After the area has been swept through several times to catch or chase out any fish within the cofferdam, the cofferdam will be completely closed and portable pumps would be used to dewater the area enclosed by the cofferdam. The intake on the portable pumps would be equipped with a fish screen constructed using 1.75 mm screen mesh and <0.2 ft/sec calculated average approach velocity. The dewatering pumps would be used to reduce water depths within the cofferdam to a depth of approximately 1.5 to 2 feet to facilitate fish rescue.

The fish rescue team, comprised of a qualified fishery biologist with a valid Scientific Collection Permit from DFG for the fish rescue and field technicians, would then capture fish using a 114-inch beach seine and/or handheld dip nets. Fish collection efforts would continue within the area until multiple pass collections deplete the fish population. Immediately after collection, fish would be placed in aerated 5-gallon buckets and/or coolers filled with Delta water, identified to species and counted, and transported to a location outside of the cofferdam for immediate release back into Victoria Canal.

Installation of the cofferdam would occur within the seasonal work window for in water construction from August 1 through November 30, or any other work window agreed to between CCWD, NMFS, USFWS, and DFG. Once the cofferdam has been installed and the fish rescue competed, construction would continue throughout the year without the risk of adversely affecting fish inhabiting Victoria Canal.

Controls to Prevent Mortality

Specific efforts would be made to reduce collection and handling stress, minimize the time that fish are held in buckets, and minimize handling stress during processing and at release. Chemical additives may be used in the holding buckets to reduce potential bacterial infection.

All captured fish will be handled pursuant to the standard NMFS protocols under the Endangered Species Act (ESA) and presented in City of Sacramento (200 1). Standard protocol for the fish rescue operation follow that no employee is to remove any fish, either dead or alive, from the site for personal use. In addition, all efforts to reduce the time that live fish are out of the water should be maximized so as to reduce the chances of incidental take during the fish rescue. All fish are to be promptly returned to the water with the exception of any Chinook salmon, steelhead, or delta smelt mortality.

Up to 50 each of captured Chinook salmon, steelhead, and delta smelt and up to 30 each of other captured special-status species (*i.e.*, green sturgeon, longfin smelt, river lamprey, hardhead, and Sacramento splittail) will be measured. The use of anesthetics during the handling of these species will help reduce any potential mortality. Dip nets or buckets will be used to remove fish from the beach seine and transferred to buckets or coolers for release.

Fish Identification

In the event that a fish cannot be positively identified, even after consulting on-site reference materials, the fish will be bagged, labeled, and brought to the office for positive identification. Bagged fish, excluding as much water as is possible from the bag, would be kept as cold as possible, and if not identified on the same day, would be put into a freezer box. Large quantities of fish exceeding 30 individuals for all species other than salmon, steelhead, and delta smelt would be "plus counted." Salmon, steelhead, and delta smelt would be plus counted once the number of fish exceeds 50.

Species name, length data, and proper identification information will be recorded onto data sheets and parallel the labeling on each individual fish. Time, date, location, fork length, and gear type will be recorded onto the field sheet, along with any other pertinent observations of the fish.

Dead Fish Handling Procedures

During the fish rescue, there is the potential for some fish mortality despite the precautions taken to rescue all fish. If any special-status species suffer mortality, the individuals should be preserved via freezing or placing in a container with 10% formalin solution. Information on time and exact location of any incidental take, the method of take, length of time from death to preservation, water temperature, and any other relevant information should be recorded in writing. For any incidental take of delta smelt, the written documentation of the incidental take, along with the specimen(s), should then be delivered to the USFWS Law Enforcement Division via the USFWS's Sacramento Fish & Wildlife Office (attn: Chief, Endangered Species), or alternative delivery arrangements made. For any incidental take of Chinook salmon meeting the size-at-date length criteria and identified as either a winter-run or spring-run Chinook salmon, or for any incidental take of steelhead, the specimen will be placed in a cooler with ice and held for pickup by NMFS. The NMFS Sacramento office will he notified via telephone in the event that take of a protected salmonid occurs during the fish rescue. A follow-up written notification to NMFS shall include the date and location of the carcass or injured fish specimen, a color photograph, a description of the cause of injury or death, and name and affiliation of the person who collected this specimen. All materials would follow procedure, should any incidental take of species occur, and would be kept at the construction area in the trailer located on-site.

Reporting

After completing the fish rescue, a brief documentation report will be prepared. The report will include information on the personnel conducting the fish rescue, methods used, numbers of each species collected and relocated, length information for non-listed species, and an estimate of the survival of fish immediately after release. Photographs showing the site and rescue operation will be included. Any incidental take of a special status species will be documented. The report will he provided by CCWD to NMFS, USFWS, and DFG within 30 days of completing the fish rescue.

References

City of Sacramento. 2001. Sacramento River Water Treatment Plant Intake Structure Fish Screen Replacement Project. Fish Rescue/Salvage Plan, Species Photographs and Handling Protocols. Sacramento, CA.

Enclosure 2

MAGNUSON-STEVENS FISHERY CONSERVATION AND MANAGEMENT ACT

ESSENTIAL FISH HABITAT CONSERVATION RECOMMENDATIONS

Agency:	U.S. Bureau of Reclamation Mid-Pacific Region
Activity:	Contra Costa Water District Alternative Intake Project
Consultation Conducted By:	NOAA's National Marine Fisheries Service

I. IDENTIFICATION OF ESSENTIAL FISH HABITAT

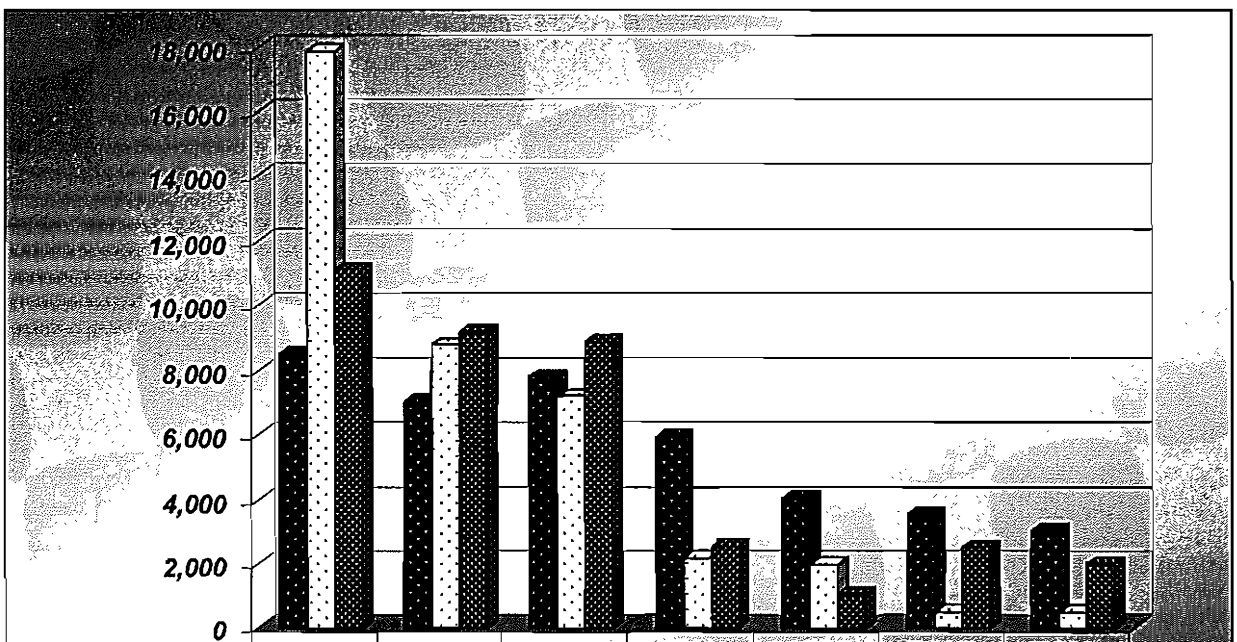
This document represents NOAA's National Marine Fisheries Service's (NMFS) Essential Fish Habitat (EFH) consultation based on our review of information provided by the U.S. Bureau of Reclamation (BOR) and Contra Costa Water District (CCWD) on the proposed Alternative Intake Project (AIP) in San Joaquin and Contra Costa County, California. The Magnuson-Stevens Fishery Conservation Act (MSA) as amended (U.S.C 180 et seq.) requires that EFH be identified and described in Federal fishery management plans. Federal action agencies must consult with NMFS on activities which they fund, permit, or carry out that may adversely affect EFH. NMFS is required to provide EFH conservation and enhancement recommendations to the Federal action agencies.

EFH is defined as those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity. For the purpose of interpreting the definition of EFH, "waters" includes aquatic areas and their associated physical, chemical, and biological properties that are used by fish, and may include areas historically used by fish where appropriate; "substrate" includes sediment, hard bottom, structures underlying the waters, and associated biological communities; "necessary" means habitat required to support a sustainable fishery and a healthy ecosystem; and "spawning, breeding, feeding, or growth to maturity" covers all habitat types used by a species throughout its life cycle. The proposed project site is within the region identified as EFH for Pacific salmon in Amendment 14 of the Pacific Coast Salmon Fishery Management Plan and for starry flounder (*Platichthys stellatus*) and English sole (*Parophrys vetulus*) in Amendment 11 to the Pacific Coast Groundfish Fishery Management Plan.

The Pacific Fishery Management Council (PFMC) has identified and described EFH, Adverse Impacts, and Recommended Conservation Measures for salmon in Amendment 14 to the Pacific Coast Salmon Fishery Management Plan (PFMC 1999). The geographic extent of freshwater EFH for Pacific salmon in California includes waters currently or historically accessible to salmon within the Central Valley ecosystem as described in Myers *et al.* (1998), and includes not only the watersheds of the Sacramento and San Joaquin River basins but also the San Joaquin Delta (Delta) hydrologic unit (*i.e.*, number 18040003), Suisun Bay hydrologic unit (18050001) and the Lower Sacramento hydrologic unit (18020109). Sacramento River winter-run Chinook salmon (*Oncorhynchus tshawytscha*), Central Valley spring-run Chinook salmon (*O. tshawytscha*), and Central Valley fall-/late fall-run Chinook salmon (*O. tshawytscha*) are species managed under the Pacific Coast Salmon Fishery Management Plan that occur in the these basins as well as the Delta, Suisun Bay, and Lower Sacramento units.

Historically, the San Joaquin River and its principal tributaries; the Merced, Tuolumne, and Stanislaus Rivers once supported large spring and fall runs of Chinook salmon (Reynolds *et al.* 1993). The spring run, formerly the most abundant salmon in the San Joaquin system, were extirpated in 1942 due to construction of Friant Dam. The fall run, which make up the largest proportion of juvenile Chinook salmon in the south Delta (based on salvage at the CVP/SWP pumps), have been reduced to small remnant populations in the San Joaquin tributaries. Recent estimates of fall run spawning in the San Joaquin basin show a sharp decline in abundance since 2001 (Figure 1).

Figure 1. Trends in San Joaquin Basin fall-run Chinook salmon estimated in-river escapement (CDFG 2006).



	2000	2001	2002	2003	2004	[2005]	[2006]
Stanislaus	8,498	7,033	7,787	5,902	4,015	3,500	3,022
Tuolumne	17,873	8,782	7,173	2,163	1,984	500	500
Merced	11,130	9,181	8,866	2,530	1,050	2,500	2,000

Factors limiting salmon populations in the Delta include: reduced flows from the San Joaquin River due to dams, periodic reversed flows due to high water exports (drawing juveniles into the CVP/SWP diversion pumps), loss of fish into numerous unscreened agricultural diversions, predation by introduced species, and reduction in the quality and quantity of rearing habitat due to channelization, pollution, riprapping, *etc.* (Dettman *et al.* 1987, California Advisory Committee on Salmon and Steelhead Trout 1988, Kondolf *et al.* 1996). Factors affecting salmon populations in Suisun Bay include heavy industrialization within its watershed and discharge of wastewater effluents into the bay. Loss of vital wetland habitat along the fringes of the bay reduce rearing habitat and diminish the functional processes that wetlands provide for the bay ecosystem.

A. Life History and Habitat Requirements

1. Pacific Salmon

General life history information for Central Valley Chinook salmon is summarized below. Information on Sacramento River winter-run and Central Valley spring-run Chinook salmon life histories is summarized in the preceding biological opinion for the proposed project (Enclosure 1). Further detailed information on Chinook salmon Evolutionarily Significant Units (ESU) are available in the NMFS status review of Chinook salmon from Washington, Idaho, Oregon, and California (Myers *et al.* 1998), and the NMFS proposed rule for listing several ESU of Chinook salmon (63 FR 11482).

Adult Central Valley fall-run Chinook salmon enter the Sacramento and San Joaquin Rivers from July through December and spawn from October through December while adult Central Valley late fall-run Chinook salmon enter the Sacramento and San Joaquin Rivers from October to April and spawn from January to April. Chinook salmon spawning generally occurs in clean loose gravel in swift, relatively shallow riffles or along the edges of fast runs (NMFS 1998).

Egg incubation occurs from October through March (Reynolds *et al.* 1993). Shortly after emergence from their gravel nests, most fry disperse downstream towards the Delta and into the San Francisco Bay and its estuarine waters (Kjelson *et al.* 1982). The remaining fry hide in the gravel or station in calm, shallow waters with bank cover such as tree roots, logs, and submerged or overhead vegetation. These juveniles feed and grow from January through mid-May, and emigrate to the Delta and estuary from mid-March through mid-June (Lister and Genoe 1970). As they grow, the juveniles associate with coarser substrates along the stream margin or farther from shore (Healey 1991). Along the emigration route, submerged and overhead cover in the form of rocks, aquatic and riparian vegetation, logs, and undercut banks provide habitat for food organisms, shade, and protect juveniles and smolts from predation. These smolts generally spend a very short time in the Delta and estuary before entry into the ocean. Whether entering the Delta or estuary as fry or juveniles, Central Valley fall-run Chinook salmon depend on passage through the Delta for access to the ocean.

2. Starry Flounder

The starry flounder is a flatfish found throughout the eastern Pacific Ocean, from the Santa Ynez River in California to the Bering and Chukchi Seas in Alaska, and eastwards to Bathurst inlet in Arctic Canada. Adults are found in marine waters to a depth of 375 meters. Spawning takes place during the fall and winter months in marine to polyhaline waters. The adults spawn in shallow coastal waters near river mouths and sloughs, and the juveniles are found almost exclusively in estuaries. The juveniles often migrate up freshwater rivers, but are estuarine dependent. Eggs are broadcast spawned and the buoyant eggs drift with wind and tidal currents. Juveniles gradually settle to the bottom after undergoing metamorphosis from a pelagic larva to a demersal juvenile by the end of April. Juveniles feed mainly on small crustaceans, barnacle larvae, cladocerans, clams and dipteran larvae. Juveniles are extremely dependent on the condition of the estuary for their health. Polluted estuaries and wetlands decrease the survival rate for juvenile starry flounder. Juvenile starry flounder also have a tendency to accumulate many of the anthropogenic contaminants found in the environment.

3. English Sole

The English sole is a flatfish found from Mexico to Alaska. It is the most abundant flatfish in Puget Sound, Washington and is abundant in the San Francisco Bay estuary system. Adults are found in nearshore environments. English sole generally spawn during late fall to early spring at depths of 50 to 70 meters over soft mud bottoms. Eggs are initially buoyant, and then begin to sink just prior to hatching. Incubation may last only a couple of days to a week depending on temperature. Newly hatched larvae are bilaterally symmetrical and float near the surface. Wind and tidal currents carry the larvae into bays and estuaries where the larvae undergo metamorphosis into the demersal juvenile. The young depend heavily on the intertidal areas, estuaries, and shallow near-shore waters for food and shelter. Juvenile English sole primarily feed on small crustaceans (*i.e.* copepods and amphipods) and on polychaete worms in these rearing areas. Polluted estuaries and wetlands decrease the survival rate for juvenile English soles. The juveniles also have a tendency to accumulate many of the contaminants found in their environment and this exposure manifests itself as tumors, sores, and reproductive failures.

II. PROPOSED ACTION

The proposed action is described in detail in the *Description of the Proposed Action* section of the preceding biological opinion (Enclosure 1). The following is a brief summary of the proposed action.

The BOR and CCWD propose to construct and operate a new municipal water intake and fish screen, on the southeast end of Victoria Island (west side of Victoria Canal), near State Highway 4 and Clifton Court Forebay. The proposed fish screen project is identified in the California Bay-Delta Program (CALFED) Ecosystem Restoration Program's Draft Stage 1 Implementation Plan as a project that will result in progress towards meeting water quality goals for the Delta. The new pumping plant and fish screen will have a diversion rate of 250 cfs, and will be constructed to meet all California Department of Fish and Game, U.S. Fish and Wildlife Service, and NMFS fish screen criteria. The combined diversion rate for CCWD will not change. The proposed action includes construction of new facilities, modifying operations of existing facilities, operations and maintenance, conservation measures, and monitoring.

In addition to the fish screen and pumping facilities, a new pipeline is proposed to cross Victoria Island and go under Old River to connect to CCWD's existing Old River Pumping Facility. Project elements on the inside of Victoria Island and Byron Tract will have no effect on Chinook salmon, starry flounder or English sole, and will not be considered further in this assessment.

III. EFFECTS OF THE PROPOSED ACTION

The effects of the proposed action on salmonid habitat (*i.e.,* for winter-run and spring-run Chinook salmon) are described at length in Section V (*Effects of the Action*) of the preceding biological opinion, and generally are expected to apply to Pacific salmon EFH. Both the starry flounder and the English sole will spend more time as juveniles rearing in the action area than the Chinook salmon smolts and will therefore be exposed to the effects of the action over longer periods of time. A summary of the effects of the proposed action on Central Valley fall-/late fall-run Chinook salmon, Starry flounder, and English sole are discussed below.

Adverse effects to Chinook salmon habitat will result from construction-related impacts, operations and maintenance impacts, and long-term impacts related to the modification and loss of aquatic and riparian habitat at the project site. Primary construction-related impacts include turbidity and suspended sediment created during cofferdam installation and dredging. Habitat impacts include the permanent loss of approximately 0.4 acre of shallow-water tidal freshwater emergent habitat in front of the fish screen and along each side, and modification of approximately 0.3 acre of shallow-water tidal freshwater emergent habitat to a depth of 10 to 15 feet. An additional 0.3 acre of shallow water habitat presumed to be earthen bottom will be replaced by riprap. These actions will cause an immediate reduction in habitat availability, and nearshore habitat complexity and suitability.

In-channel construction activities such as dredging and cofferdam installation will cause temporary increases in suspended sediment and turbidity. Turbidity will be minimized by implementing the proposed conservation measures such as implementation of best management practices (BMPs) and adherence to Regional Water Quality Control Board water quality standards. Fuel spills or use of toxic compounds during project construction could release toxic contaminants into Victoria Canal and could injure or kill listed fish species. Adherence to BMPs that dictate the use, containment, and cleanup of contaminants will minimize the risk of introducing such products to the waterway because the prevention and contingency measures will require frequent equipment checks to prevent leaks, will keep stockpiled materials away from the water, and will require that absorbent booms are kept on-site to prevent petroleum products from entering the river in the event of a spill or leak.

Operation and maintenance actions will be conducted annually to ensure the performance of the fish screen. Most construction-related impacts are expected to occur during the summer when Chinook salmon are not expected to be present, or behind the fish screen structure, where impacts will not extend into areas of occupied fish habitat.

Starry flounder and English sole are typically only found incidentally in Victoria Canal. Given the decreasing salinity gradient from the Rock Slough intake to the proposed AIP on Victoria Canal, it is highly likely that reduced diversions from Rock Slough and increased diversions from the Victoria Canal intake would be slightly beneficial to these species as their densities would be greater near the Rock Slough intake compared to the proposed Victoria Canal intake.

Entrainment of early life stages of Starry flounder and English sole could occur at the proposed Victoria Canal intake. However, CCWD operates its intakes conjunctively, and the overall net effect is expected to be a reduction in entrainment and impingement (Table 6) losses for all species under future operating conditions.

IV. CONCLUSION

Based on the best available information, NMFS believes that the proposed AIP may adversely affect EFH for Pacific salmon and groundfish during construction and long-term operations due to impingement, loss of eggs and larvae, entrainment of food organisms, and alterations in the hydrology of the Delta.

V. EFH CONSERVATION RECOMMENDATIONS

Considering that the habitat requirements of Central Valley fall-/late fall-run Chinook salmon within the action area are similar to the Federally listed species addressed in the preceding biological opinion (Enclosure 1), NMFS recommends that Terms and Conditions 1 through 3, as well as the conservation recommendations described in the preceding biological opinion prepared for the Sacramento River winter-run Chinook salmon, Central Valley spring-run Chinook salmon, Central Valley steelhead, and the Southern Distinct Population Segment of North American green sturgeon, be adopted as EFH conservation recommendations. In addition, NMFS anticipates that implementing the conservation measures listed below would benefit EFH for groundfish by minimizing disturbances, sedimentation, and pollutants to waterways.

(1) Bank Stabilization

The installation of riprap or other streambank stabilization devices can reduce or eliminate the development of side channels, functioning riparian and floodplain areas and off channel sloughs. In order to minimize these impacts, BOR and CCWD should:

- Use vegetative methods of bank erosion control whenever feasible. Hard bank protection should be a last resort when all other options have been explored and deemed unacceptable, and

- Minimize alterations or disturbance of the bank and existing riparian vegetation.

(2) Construction Impacts

Activities associated with construction (*e.g.*, new buildings, utility installation, road improvements, and storm water discharge) can significantly alter the land surface, soil, vegetation, and hydrology and subsequently adversely impact EFH through habitat loss or modification. In order to minimize these impacts, BOR and CCWD should:

- Plan development sites to minimize clearing and grading,

- Use Best Management Practices in building as well as road construction and maintenance operations such as avoiding ground disturbing activities during the wet season, minimizing the time disturbed lands are left exposed, using erosion prevention and sediment control methods, minimizing vegetation disturbance, maintaining buffers of vegetation around wetlands, streams and drainage ways, and avoid building activities in areas of steep slopes with highly erodible soils. Use methods such as sediment ponds, silt curtains, or other facilities designed to slow water runoff and trap sediment and nutrients, and

- Where feasible, reduce impervious surfaces.

(3) Wastewater/Pollutant Discharges

Water quality essential to Pacific salmon and groundfish can be altered when pollutants are introduced through surface runoff, through direct discharges of pollutants into the water, when sediments are re-suspended (*e.g.*, from dredging), and when flow is altered. Indirect sources of water pollution in EFH includes run-off from streets, yards, and construction sites. In order to minimize these impacts, BOR and CCWD should:

- Monitor water quality discharge following National Pollution Discharge Elimination System requirements from all discharge points,

- Implement all mitigation and conservation measures specified in the proposed AIP Environmental Impact Statement/Environmental Impact Report to minimize pollutant discharges, and

- Establish and update, as necessary, pollution prevention plans, erosion control plans, spill control practices, and spill control equipment for the handling and transport of toxic substances in salmon and groundfish EFH (*e.g.*, oil and fuel, organic solvents, raw cement residue, sanitary wastes, *etc.*). Consider bonds or other damage compensation mechanisms to cover clean-up, restoration, and mitigation costs.

VI. STATUTORY REQUIREMENTS

Section 305 (b)4(B) of the MSA requires that the Federal lead agency provide NMFS with a detailed written response within 30 days, and 10 days in advance of any action, to the EFH conservation recommendations, including a description of measures adopted by the lead agency for avoiding, minimizing, or mitigating the impact of the project on EFH (50 CFR §600.920(k)). In the case of a response that is inconsistent with our recommendations, BOR must explain its reasons for not following the recommendations, including the scientific justification for any disagreement with NMFS over the anticipated effects of the proposed action and the measures needed to avoid, minimize, or mitigate such effects.

VI. LITERATURE CITED

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Appendix C

Floodplain and Wetland Environmental Review

C.1 Floodplain and Wetland Environmental Review

The Western Area Power Administration (Western) is proposing to extend its existing Tracy-Los Vaqueros 69-kilovolt (kV) transmission line to provide an electric transmission line and interconnection (Proposed Action) to Contra Costa Water District's (CCWD's) Alternative Intake Project (AIP) located in the Sacramento-San Joaquin Delta, within San Joaquin and Contra Costa Counties, California. Under the Proposed Action, Western would install and maintain power poles and construct an approximately 3.6-mile long transmission line within a 50-foot-wide right-of-way (ROW) corridor to provide electric service to the AIP power substation for operating AIP project facilities, including the new pump station on Victoria Canal, while minimizing costs and environmental effects.

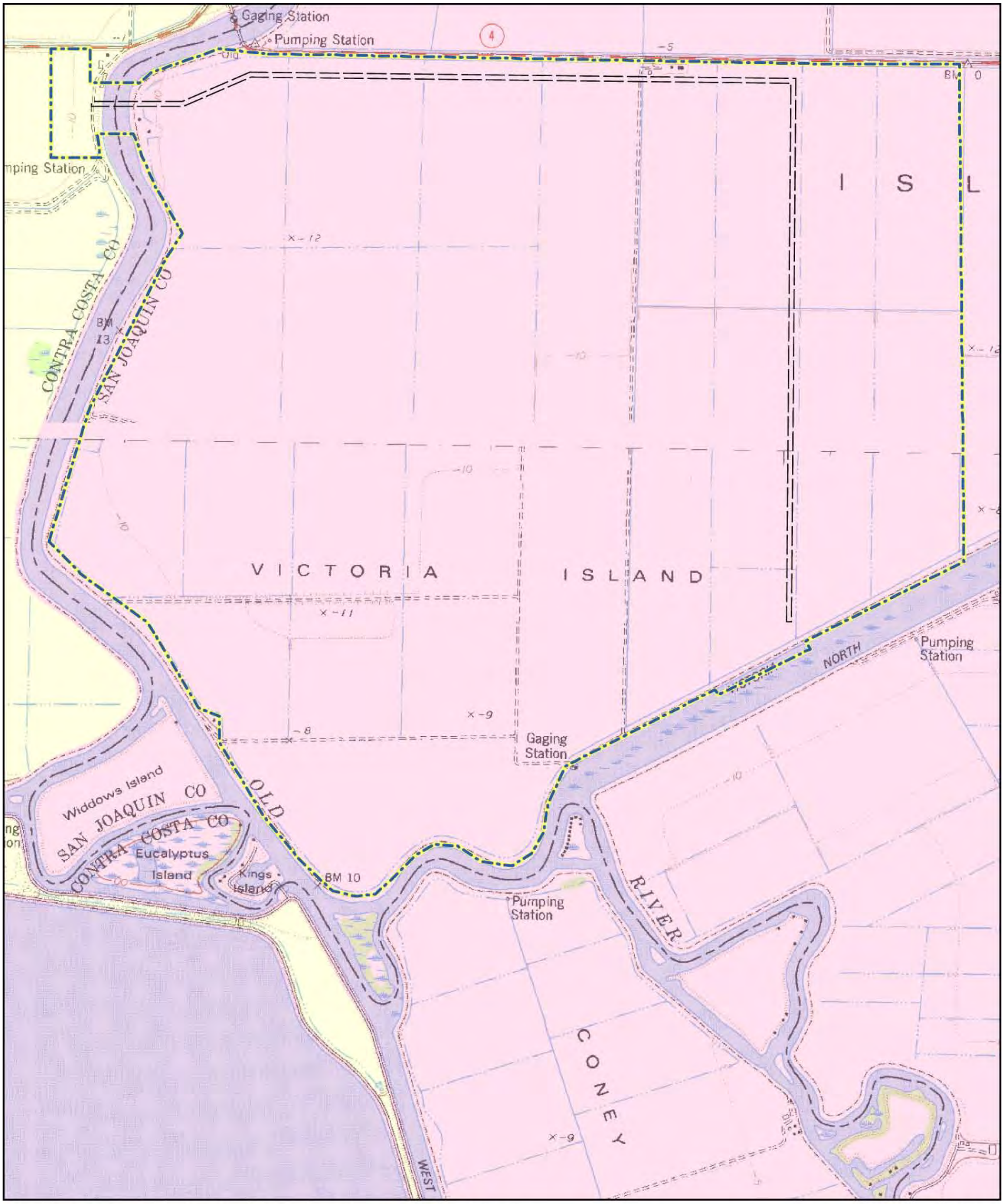
The Proposed Action would make the AIP a new point of delivery on Western's system for delivery of project power for pumping CCWD's Central Valley Project (CVP) water supply for the U.S. Department of the Interior, Bureau of Reclamation (Reclamation), and also for delivery of power from third party providers under Western's Open Access Transmission Tariff for pumping of non-CVP water. This arrangement would be similar to CCWD's other intake facilities with Reclamation and Western and would offset some of the existing power usage by CCWD at Old River Pump Station. The AIP would be a new point of delivery for project power. Western would be responsible for constructing, operating, and maintaining the Proposed Action.

The U.S. Department of Energy's Floodplain and Wetland Environmental Review Requirements (10 CFR 1022) direct agencies to determine whether a Proposed Action would be located within a floodplain/wetland and, if it is, to perform the Proposed Action in a manner that avoids or minimizes potential harm to or within the affected floodplain/wetland. Disturbances within a floodplain can have potential adverse effects including increased potential for flood damage to structures placed within the floodplain, increased flooding due to displacement of water from the normal floodplain by road construction activities, and reduced ability of the floodplain to store excess water.

Under the Proposed Action, the new transmission line would span Old River to Victoria Island and parallel State Route (SR) 4 until turning south to connect with CCWD's proposed intake and pump station on Victoria Canal. The transmission line would be installed along existing access roads. Victoria Island is below sea level and surrounded by levees. Reclamation District (RD) 2040 maintains the levee system on Victoria Island.

Victoria Island is within the 100-year floodplain as designated by the Federal Emergency Management Agency (FEMA) and, therefore, the entire Western transmission line ROW on Victoria Island would be within the 100-year floodplain (Exhibit C-1) except for where the proposed transmission line would be located on top of levees at the Old River crossing and at the new pump station.

C Floodplain and Wetland Environmental Review



Floodplains within Project Area for the Proposed Action

Exhibit C-1

100 Year Flood Zone | 500 Year Flood Zone | Project Area | Area of Potential Effects (50-foot ROW)

0 | 2,000 | 4,000 Feet

Source: FEMA Flood Zone Designations, 2006; USGS DRG

The Proposed Action is needed to enable CCWD to deliver power to the AIP project components. Under the No-Action Alternative, the AIP could not be operated to meet its purpose and need. However, due to its nature and scale, the Proposed Action would have virtually no effect on the floodplain on Victoria Island. The minor changes caused by the transmission line poles would have an insignificant effect on floodwater flow and on the ability of the floodplain to store water. Victoria Island is nearly level, encircled by levees, and ranges in elevation from approximately 9 to 14 feet below sea level. A 100-year flood, such as one caused by a levee breach, would be anticipated to inundate the entire island and would not be significantly affected by the presence of additional power poles. The Proposed Action would have essentially no effect on the floodplain, flood hazards, or floodplain management.

Under the Proposed Action, Western would incorporate conservation measures that address potential environmental effects including measures that address water quality and resource issues related to installing and maintaining transmission facilities within a floodplain/wetland:

- Prepare and implement a Storm Water Pollution Prevention Plan (SWPPP) that minimizes the potential contamination of surface waters, and complies with Regional Water Quality Control Board (RWQCB) requirements to protect water quality; and

- Minimize potential fill of jurisdictional waters of the United States and loss of sensitive habitat, and compensate for unavoidable impacts.

Installation and maintenance of the transmission line within the 50-foot-wide ROW corridor would not be expected to influence flow of water during any 100-year flood event.

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Appendix D

Correspondence with the State Historic Preservation Officer (SHPO)

United States Department of the Interior

BUREAU OF RECLAMATION
Mid-Pacific Regional Office
2800 Cottage Way
Sacramento, California 95825-1898

IN REPLY
REFER TO

FEB 15 2007

MP-153
ENV-3.00

CERTIFIED – RETURN RECEIPT REQUESTED

Mr. Milford Wayne Donaldson
State Historic Preservation Officer
Office of Historic Preservation
P.O. Box 942896
Sacramento, California 94296-0001

Subject: Section 106 Compliance for the Contra Costa Water District Alternative Intake Project, Central Valley Project, Delta Division, Contra County Canal, California (Tracking #06-SCAO-230)

Dear Mr. Donaldson:

The Contra Costa Water District (CCWD) is proposing to relocate some of CCWD's diversions to obtain better water quality during certain times of the year. CCWD's existing intakes are all located in the western Delta, where water quality can be diminished due to seasonal sea water intrusion into the Delta. An intake in the central Delta would increase CCWD's flexibility to access better quality source water, and improve CCWD's ability to maintain Federal and State drinking water standards. This action requires Reclamation to agree to a change in point of diversion of Central Valley Project (CVP) water and requires CCWD, and Reclamation to petition the California State Water Resources Control Board (SWRCB) for necessary water right changes regarding that point of diversion. CCWD and Reclamation each hold water rights and must petition the SWRCB separately for permit modifications. The change in diversion of CVP water and associated construction activities constitutes an undertaking subject to Section 106 of the National Historic Preservation Act (NHPA) (16U.S.C.470f). Reclamation is consulting with your office pursuant to the 36 CFR Part 800 regulations implementing Section 106 of the NHPA.

The project area is located in the Public Land Survey System Wetlands Land Grant within the Woodward Island and Clifton Court Forebay 7.5 minute USGS quadrangles. CCWD proposes to construct and operate a new screened water intake, and pump station located along the lower third of Victoria Canal on Victoria Island. The Area of Potential Effect (APE) encompasses the construction of the intake pipeline connection to the existing CCWD Old River conveyance system, a new power line and power pole alignment, and the adjacent areas used for access, construction staging, and borrow sites.

150

CCWD contracted with EDAW to conduct an archeological study of the proposed project. This report, *Cultural Resources Inventory and Evaluation Report for the Contra Costa Water District Alternative Intake Project, Contra Costa and San Joaquin Counties California*, is enclosed to document the efforts to identify historic properties within the APE pursuant to 36 CFR Part 800. Three cultural resources were identified within the APE: an obsidian biface fragment, a trash scatter, at the Victoria Canal. The isolated biface fragment was located in a plowed field just north of the Victoria North Canal. The trash scatter, located immediately south of the obsidian biface, consists of structure foundations and a thin scatter of fragmentary bottle glass, ceramics, lumber, brick, and concrete dating between the early and middle 1900s. The Victoria Canal was a byproduct of initial cross-levee construction between 1894 and1897 and served as a local water source and transportation route.

These resources were evaluated for their eligibility for inclusion in the National Register of Historic Places (NRHP) in compliance with 36 CFR Part 800 and 36 CFR Part 60.4. The isolated obsidian biface fragment does not possess integrity of location, association, or design and has no potential to contribute to the prehistory of the region. The fragmentary debris associated with historic trash scatter has no identifying characteristics beyond those indicating the relative time of their disposal. While a 1916 USGS quadrangle map shows several structures in the vicinity of the trash scatter, recent construction and refuse dumping activities have disturbed the integrity of the site to where it is impossible to determine any historic associations. The general location, setting, and design of the Victoria Canal remains relatively unchanged since its construction; however, the canal and associated levee have been continuously dredged and improved since the 1890s up to present day. The Victoria Canal lacks the integrity of materials and workmanship that make it eligible for listing on the NRHP. Due to the history of agricultural operations and reoccurring construction that has impacted the integrity of the cultural resources identified in the APE, Reclamation concludes that none of the sites are eligible for inclusion in the NRHP. Therefore, there will be no historic properties affected by project implementation as defined by 36 CFR Part 800.4(d)(1).

Native American consultation was conducted by the contractor to comply with the California Environmental Quality Act. The contractor notified the Native American Heritage Commission and subsequently sent letters to the Ohlone Tribe requesting information concerning Native American land use and values in the project area. One response was received, but was not relevant to the project. This consultation effort demonstrated that there are no identifiable Native American issues within the project area. Given the absence of Federally recognized Indian Tribes and the overall lack of response, Reclamation determined that additional Tribal consultation was unnecessary.

Based on the above findings and the information documented in the enclosed material, Reclamation concludes, that no historic properties will be affected by the CCWD Alternative Intake Project pursuant to 36 CFR Part 800.4(d)(1). Reclamation asks that your staff consider the enclosed report and requests your concurrence with our identification efforts, determinations of eligibility, and finding of effects.

Please contact Amy Barnes at 916-978-5047, or by email at abarnes@mp.usbr.gov, if you have questions or comments regarding this project.

Sincerely,

sgd Michael Nepstad

Michael Nepstad
Deputy Regional Environmental Officer

Enclosures

Deis, Richard and Brian Ludwig
2006 *Cultural Resources Inventory and Evaluation Report for the Contra Costa Water District Alternative Intake Project, Contra Costa and San Joaquin Counties, California*. EDAW, Sacramento, California.

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STATE OF CALIFORNIA – THE RESOURCES AGENCY ARNOLD SCHWARZENEGGER, *Governor*

OFFICE OF HISTORIC PRESERVATION
DEPARTMENT OF PARKS AND RECREATION
P.O. BOX 942896
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March 22, 2007

In Reply Refer To: BUR070220A

Michael Nepstad
Deputy Regional Environmental Officer
United States Department of the Interior
Bureau of Reclamation
Mid-Pacific Regional Office
2800 Cottage Way
Sacramento, CA 95825-1898

Re: Contra Costa Water District (CCWD) Alternative Intake Project, Central Valley Project (CVP), Delta Division, Contra Costa Canal, Contra Costa County, California.

Dear Mr. Nepstad:

Thank you for consulting with me regarding the above noted undertaking. Pursuant to 36 CFR Part 800 (as amended 8-05-04) regulations implementing Section 106 of the National Historic Preservation Act, the Bureau of Reclamation (BUR) is the lead Federal agency for this undertaking and is seeking my comments on the effects that the proposed project will have on historic properties. The undertaking is the proposed relocation of some of CCWD's water diversion facilities to obtain improved water quality. The CCWD proposes to construct and operate a new screened water intake and pump station located along the lower third of the Victoria Canal on Victoria Island.

The BUR has identified the project Area of Potential Effects (APE) to include the construction area of the new intake, the pipeline connecting it to the existing CCWD Old River conveyance system, a new power line and power pole alignment, and areas required for access, staging, and material borrow. I concur that this APE is appropriate pursuant to 36 CFR Parts 800.4(a)(1) and 800.16(d). In addition to your letter of February 20, 2007, you have submitted the following document to support your efforts to identify and evaluate historic properties in the APE:

- *Cultural Resources Inventory and Evaluation Report for the Contra Costa Water District Alternative Intake Project, Contra Costa and San Joaquin Counties, California* (EDAW, February 2007).

After reviewing your letter and supporting documentation, I concur that the Victoria Island Isolate Biface is not a historic property for the purposes of Section 106 and that the Victoria Island Historic Artifact Scatter is not eligible for the National Register of Historic Places. While I am generally satisfied that the information provided in your submittal constitutes a reasonable and good faith effort by the BUR to identify historic properties in the APE, I do not believe that you have yet completed your responsibility pursuant to 36 CFR Part 800.4(c) as regards your efforts to apply the criteria (36 CFR Part 63) for eligibility of the Victoria Canal for the National Register of Historic Places. I find that the historic context provided for the Victoria Canal has not been sufficiently explored or documented regarding the agricultural and engineering history of the Victoria Canal, and more generally, Victoria Island and the South Delta. Additionally, I am unconvinced by your position that periodic maintenance, such as channel dredging and levee repairs, has modified the Victoria Canal to such an extent that it lacks sufficient integrity to convey the era, setting, and circumstances under which it was designed and constructed. The lack of integrity of the original construction materials is, I believe, symptomatic of the entire Delta, an artificial landform in which the principal construction materials (earth, sand, and rock) have to be continually augmented in order to maintain the dependability of the levee and island system, and the channels periodically dredged to maintain capacity and facilitate navigation. It would also be supportive if the BUR would explore the presence/absence of similar hydraulic features in the South Delta to illuminate whether or not the Victoria Canal possesses any distinctiveness of construction or design.

I will be pleased to continue this consultation following the submittal by the BUR of additional documentation addressing the issues that I have identified above. Thank you for seeking my comments and for considering historic properties in planning your project. If you require further information, please contact William Soule, Associate State Archeologist, at phone 916-654-4614 or email wsoule@parks.ca.gov.

Sincerely,

Susan K Stratton for

Milford Wayne Donaldson, FAIA
State Historic Preservation Officer

United States Department of the Interior

BUREAU OF RECLAMATION
Mid-Pacific Regional Office
2800 Cottage Way
Sacramento, California 95825-1898

IN REPLY
REFER TO:

MP-153
ENV-3.00

JUL 10 2007

CERTIFIED – RETURN RECEIPT REQUESTED

Mr. Milford Wayne Donaldson
Attn: Mr. William Soule
State Historic Preservation Officer
Office of Historic Preservation
P.O. Box 942896
Sacramento, California 94296-0001

Subject: National Historic Preservation Act, Continuation of Section 106 Compliance for the Contra Costa Water District Alternative Intake Project, Central Valley Project, Delta Division, Contra Costa Canal, Contra Costa County, California (BUR070220A; Reclamation #06-SCAO-230)

Dear Mr. Donaldson:

The Bureau of Reclamation is continuing consultation under Section 106 of the National Historic Preservation Act (NHPA) for relocating a diversion at Victoria Island and seeks your concurrence with a finding of no historic properties affected (Figure 1). Contra Costa Water District (CCWD) proposes to construct and operate a new, screened water intake and pump station located along the lower third of Victoria Canal on Victoria Island. Reclamation initially consulted with your office regarding this project on February 15, 2007. On March 22, 2007, your office concurred with Reclamation's delineation of the Area of Potential Effects (APE), identification efforts, and determination that the Victoria Island Isolate Biface and the Victoria Island Historic Artifact Scatter were not eligible for listing on the National Register of Historic Places (NRHP) (BUR070220A). Your office also requested elaboration of the historic context for the Victoria Canal relative to the agricultural and engineering history of the Victoria Canal, Victoria Island, and the South Delta. These letters are enclosed for your convenience. The enclosed report, *Cultural Resources Inventory and Evaluation Report for the Contra Costa Water District Alternative Intake Project, Contra Costa and San Joaquin Counties, California*, by Dies and Ludwig (2007) has been revised to include additional information regarding the Victoria Canal in the context of its importance to agricultural development in the South Delta and on Victoria Island.

The Victoria Canal is an unlined structure stretching approximately 5.2 miles between Middle River and Old River in the San Joaquin Valley. The canal was a by-product of initial cross-levee construction between 1894 and 1897 and served as a local water source and transportation route. Like numerous other canals in the Delta, the Victoria Canal and associated levees have been continuously dredged and improved since the 1890s to present day.

Reclamation has determined that the Victoria Canal is not eligible for listing on the NRHP. The Victoria Canal and its levees are not associated with events significant to the broad patterns of our history and are not eligible for inclusion on the National Register under Criterion A. The development and construction of canal and levee systems through the Delta had a significant impact on the economic development of

153AB

agricultural production and commerce and the social dynamics of small-scale farming in the Delta. The Victoria Canal and levee system was built to drain lands for agricultural use; however, due to the limited scope of these features, its relatively small length and size compared to other similar features, was not central to the historic patterns of agricultural development in the Delta. The impact of the Victoria Canal and its levees are localized and does not illustrate the magnitude of the larger regional pattern of land reclamation.

While the Victoria Canal was constructed by local parties, T.H. Williams and the Old River Land and Reclamation Company, Victoria Canal and its associated levees are not directly associated with significant individuals responsible for reclamation in the Delta and therefore, are not eligible under Criteria B. The Victoria Canal and its levees do not possess unique characteristics of design and engineering. In comparison to other similar structures in the South Delta, Victoria Canal is a typical example of a common type of levee construction for draining swamp lands. In the late 19th century, canals in the South Delta were typically cut by machinery leaving a V-shaped cross section, like that displayed by the Victoria Canal. Dredged earth was deposited on either side of the channel, creating the levees. Canals and associated levees of this type are ubiquitous throughout the Delta as previously flooded lands were gradually reclaimed for agriculture. Like many other canals, there is no record of design or "as built" drawings for the canal or levees. Thus, the canal is not eligible under Criteria C. The Victoria Canal and levees have little potential to yield information that could contribute to the history of agriculture in the Delta and therefore, are not eligible under Criteria D. Additional details can be found in the enclosed report by Dies and Ludwig (2007).

Based on the above findings and the information documented in the enclosed report, Reclamation concludes that no historic properties will be affected by the CCWD Alternative Intake Project pursuant to 36 CFR Part 800.4(d)(1). Reclamation invites your comments on our efforts to identify historic properties. We also request your concurrence with our determination that the Victoria Canal is not eligible for listing on the NRHP and that no historic properties will be affected by CCWD relocating a diversion at Victoria Island. Please contact Archeologist Amy Barnes at 916-978-5047 or abarnes@mp.usbr.gov if you have questions.

Sincerely,

Susan M. Fry
Regional Environmental Officer

Enclosures (maintain in MP-153)

Deis, Richard and Brian Ludwig
2007 *Cultural Resources Inventory and Evaluation Report for the Contra Costa Water District Alternative Intake Project, Contra Costa and San Joaquin Counties, California,* EDAW, Sacramento, California

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STATE OF CALIFORNIA – THE RESOURCES AGENCY

ARNOLD SCHWARZENEGGER, *Governor*

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BUREAU OF RECLAMATION
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AUG 14 2007

CODE	ACTION	SURNAME & DATE

EA 8/14

Welch 8/14/07

August 9, 2007

In Reply Refer To: BUR070220A

Michael Nepstad
Deputy Regional Environmental Officer
United States Department of the Interior
Bureau of Reclamation
Mid-Pacific Regional Office
2800 Cottage Way
Sacramento, CA 95825-1898

Re: Continued Consultation Regarding the Contra Costa Water District (CCWD) Alternative Intake Project, Central Valley Project (CVP), Delta Division, Contra Costa Canal, Contra Costa County, California (Reclamation # 06-SCAO-230).

Dear Mr. Nepstad:

Thank you for continuing consultation with me concerning the above noted undertaking. Pursuant to 36 CFR Part 800 (as amended 8-05-04) regulations implementing Section 106 of the National Historic Preservation Act, the Bureau of Reclamation (BUR) is the lead Federal agency for this undertaking and is seeking my comments on the effects that the proposed project will have on historic properties. The undertaking is the proposed relocation of some of CCWD's water diversion facilities for purposes of obtaining improved water quality. The CCWD proposes to construct and operate a new screened water intake and pump station located along the lower third of the Victoria Canal on Victoria Island.

Previously in this consultation I concurred that your determination of an Area of Potential Effects (APE) was appropriate, that the Victoria Island Historic Artifact Scatter archeological site was not eligible for the National Register of Historic Places (NRHP), and that the Victoria Island Isolate Biface was not an historic property for Section 106 purposes. At that time I stated that I could not concur with your determination that the Victoria Canal was not eligible for the NRHP, and I requested, in my letter of March 22, 2007, that you provide additional historic context for the Victoria Canal and present additional documentation regarding the design, integrity, and possible uniqueness of this hydraulic engineering feature.

At this time, you have responded to my request with your letter of July 10, 2007, and the following supporting documentation:

Classification	[illegible]
Project	214
Control No.	07064497
Folder I.D.	[illegible]
Date Input & Initials	8-14-07

• *Cultural Resources Inventory and Evaluation Report for the Contra Costa Water District Alternative Intake Project, Contra Costa and San Joaquin Counties, California* (EDAW: February 2007, Revised June 2007).

Based on my review of the additional historic context and analysis contained in your letter and supporting documentation, I can now concur that your historic property identification efforts have been completed pursuant to 36 CFR Part 800.4, and that the Victoria Canal is not eligible for the National Register of Historic Places. Therefore, I have no objection to your proposed finding of No Historic Properties Affected.

Be advised that under certain circumstances, such as unanticipated discovery or a change in project description, the BUR may have additional future responsibilities for this undertaking under 36 CFR Part 800. Thank you for seeking my comments and for considering historic properties in planning your project. If you require further information, please contact William Soule, Associate State Archeologist, at phone 916-654-4614 or email wsoule@parks.ca.gov.

Sincerely,

Susan K Stratton for

Milford Wayne Donaldson, FAIA
State Historic Preservation Officer

Department of Energy
Western Area Power Administration
Sierra Nevada Customer Service Region
114 Parkshore Drive
Folsom, California 95630-4710
NOV 30 2007

Mr. Milford Wayne Donaldson
State Historic Preservation Officer
Attn: Mr. William Soule
Office of Historic Preservation
Department of Parks and Recreation
P.O. Box 942896
Sacramento, CA 94296-0001

Dear Mr. Donaldson:

The Western Area Power Administration (Western), Sierra Nevada Region, has received a request from the Contra Costa Water District (CCWD) for an interconnection to Western's transmission system to serve the electric load for CCWD's proposed Alternate Intake Project (AIP) to be located in San Joaquin and Contra Costa Counties. Western is proposing to extend its existing Tracy-Los Vaqueros (TCY-LVQ) 69 kilovolt (kV) single-circuit transmission line (undertaking) on Byron Tract in Contra Costa County to provide an interconnection with a new proposed substation being constructed by CCWD.

At this time we consult with you pursuant to Section 106 of the National Historic Preservation Act regarding Western's proposed TCY-LVQ 69-kV transmission line extension and interconnection. Pursuant to §800.5(b) of 36 CFR Part 800 (as amended 2004), Western has determined that no historic properties will be adversely affected by the proposed undertaking. Pursuant to 800.3(g) of 36 CFR Part 800, Western believes that an expedited review is appropriate for this determination.

Background
CCWD is proposing AIP to relocate some of CCWD's diversions to obtain better source water quality in order to protect and improve the quality of water delivered to its customers. The U.S. Department of the Interior, Bureau of Reclamation (Reclamation) is assisting CCWD in this action in a manner and to the extent consistent with a long-term renewal contract for Central Valley Project water service between Reclamation and CCWD. CCWD and Reclamation prepared and finalized an Environmental Impact Statement/Environmental Impact Report for the AIP in 2006. Western is preparing a separate Environmental Assessment specifically to analyze potential environmental effects from the construction of the proposed transmission line and interconnection. As lead Federal agency, Reclamation consulted with you between February and August, 2007 regarding potential effects AIP may have on historic properties. Enclosure 1 provides you with copies of the consultation correspondence between you and Reclamation.

A cultural resource inventory and evaluation report (cover enclosure 2) and other supporting documentation were provided to you by Reclamation for the AIP. Enclosure 1 details the description of the AIP undertaking. Consultation between you and Reclamation for the AIP included the direct area of potential effects (APE) for a proposed new power line and power pole alignment. At the time of the AIP consultation, it had not been determined whether Western or a local power company would provide the electrical power for CCWD's proposed substation. Since that time, Western has committed to provide the power source for AIP resulting in Western's proposed TCY-LVQ 69-kV transmission line extension and interconnection undertaking. The APE for Western's proposed transmission line corridor remains the same as discussed during consultations with Reclamation. The construction of Western's proposed transmission line, interconnection to CCWD's new substation, and any associated construction activities will not change or alter the direct APE as determined between you and Reclamation during consultation for AIP (enclosure 1). Based on your review of Reclamation's cultural and historical documentation and a National Register of Historic Places (NRHP) evaluation of the Victoria Canal, which was determined not eligible for the NRHP, you concurred pursuant to 36 CFR Part 800.4 with Reclamation's proposed finding of No Historic Properties Affected for the AIP undertaking. Western, therefore, has determined that the construction of the proposed transmission line and interconnection is included in this determination.

The determination of No Historic Properties Affected for the AIP included an evaluation of potential historic properties in both the direct and indirect APE. One historic property exists within the indirect APE for the AIP which was defined as any historic properties within 1/2 mile of the AIP direct APE. This property is the bridge on State Route 4 spanning Old River, commonly called Old River Bridge (Bridge # 29-45). The bridge is listed on the California Register of Historical Resources and is considered eligible for NRHP. Potential visual effects resulting from the introduction of a new transmission line in the view shed of the historic bridge were not evaluated during initial consultation for AIP. Western, therefore, is consulting regarding potential indirect effects to the historic bridge as described above. The existing TCY-LVQ 69-kV line was constructed in 1995 and does not meet any of the NRHP eligibility criteria.

Description of Western's Proposed 69-Kilovolt Transmission Line and Interconnection Undertaking

The proposed undertaking would extend Western's existing TCY-LVQ 69-kV transmission line near CCWD's existing Old River Pump Station on Byron Tract in Contra Costa County to a new proposed CCWD substation at the new Victoria Canal Intake (as describe for AIP) (enclosure 3). The transmission line right-of-way (ROW) would be directly adjacent to, or in the footprint of, existing dirt access roads and would be approximately 19,000- feet long and 50-feet wide. A portion of the ROW alignment will be adjacent to SR 4 heading in an easterly direction. The proposed transmission line would provide power for CCWD proposed substation and other AIP components.

The proposed transmission line extension would be an overhead 69-kV single-circuit line supported on wood poles. The poles would be approximately 70 to 90-feet tall with a 3 to 4-foot diameter base. The poles would be embedded in the ground to approximately 12 to 15-feet deep. Approximately 18 to 20 poles per mile would be used to support the 69-kV transmission line. Approximately 60 to 70 poles would be required guy wires would be necessary for pole support at some locations. Steel lattice tower structures up to approximately 110-feet tall would be required on each side of the Old River crossing to satisfy minimum conductor clearances from the water surface. The proposed transmission line would connect from the existing TCY-LVQ 69-kV transmission line where it currently terminates at Western's existing TCY-LVQ substation next to Old River and Highway 4 (enclosure 4). Construction staging areas of approximately 5 acres or less would be located on each side of the Old River crossing. One to three additional staging areas of less than 1 acre would be located along the proposed transmission line ROW on Victoria Island.

State Route 4 Old River Bridge (Bridge No. 29-45)

The Old River Bridge (Bridge No. 29-45) was constructed in 1915 by Tibbetts Pacific Company and was evaluated as part of the Caltrans statewide bridge inventory in the mid-1980s. The bridge was determined to be eligible for listing in the NRHP at the State level of significance in 1985. According to the Truss Bridge Rating Sheet, the bridge is one of the oldest unmodified swing bridges in the State, and is significant under NRHP Criterion A (as a key link on an important highway) and under Criterion C as a distinctive example of this particular bridge type (enclosure 5). The evaluation of the bridge did not specify information on the integrity of the structure and its setting, feeling, and association, which are relevant topics when addressing indirect effects on historic properties.

The historically significant bridge on SR 4 is just north of the proposed alignment of the overhead 69-kV transmission line (enclosure 3). Recent photographs of the bridge taken in 2005 and 2007, document existing conditions near the bridge (enclosure 6). The enclosed photographs show the truss bridge and the general setting of this historic property. The photographs also demonstrate that overhead transmission lines already exist within the purview of the bridge. In addition, housing development in Discovery Bay west of Old River Bridge has also altered the original setting of the area (enclosure 3). However, even with these modern intrusions, Bridge No. 29-45 still conveys the important historical associations of its origins as a linkage on SR 4 under Criterion A. While the proposed undertaking would create an additional visual intrusion to the setting of this structure, this indirect impact would not adversely affect the historic values of the bridge. The proposed undertaking would involve a new overhead transmission line to the south of the bridge, but this line would be installed on smaller wooden poles that are more characteristic of the general region. The significant value of Bridge No. 29-45 under Criterion C as an early and distinctive, unmodified swing-truss bridge is inherent in the design, materials, and workmanship of the structure itself, and would be unaltered by the proposed project.

Given the previous alterations to the visual setting in the form of the large overhead transmission line towers as depicted in enclosure 6, the proposed undertaking would not introduce any new visual elements that do not already exist in the immediate area, and therefore, would not adversely effect the significant values of Bridge 29-45 under NRHP Criteria A and C.

Effects Determination

Based on the information and documentation provided in this consultation, Western has determined, pursuant to §800.5(b) of 36 CFR Part 800, that the proposed extension of Western's TCY-LVQ 69-kV transmission line and the interconnection into CCWD new substation would not adversely effect the Old River Bridge. We request your concurrence with our determination. Pursuant to 800.3(g) of 36 CFR Part 800, Western believes that an expedited review is appropriate for this determination. Please respond within 30 days of receipt of this letter. If you have any questions, please contact Ms. Cherie Johnston-Waldear at 916-353-4035, or email at waldear@wapa.gov. Your continued assistance and cooperation are appreciated.

Sincerely,

Stephen Tuggle
Natural Resources Manager

6 Enclosures

cc:

Mr. Patrick Welch
Bureau of Reclamation
2800 Cottage Way
MP-152
Sacramento, California 95825-1898

Ms. Rachel Martin
Project Engineer
Contra Costa Water District
P.O. Box H20
Concord, California, 94524-2099

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December 14, 2007

In Reply Refer To: WAPA071204A

Stephen C. Tuggle
Natural Resources Manager
Western Area Power Administration
Sierra Nevada Customer Service Region
114 Parkshore Drive
Folsom, California 95630-4710

Re: Proposed Extension of Western Area Power Authority TCY-LVQ 69-kV Transmission Line from the Contra Costa Water District (CCWD) Old River Pump Station on Byron Tract in Contra Costa County to a New Proposed CCWD Substation on the New Victoria Canal Intake in San Joaquin County, California.

Dear Mr. Tuggle:

Thank you for seeking consultation with me, regarding the above noted project, pursuant to 36 CFR Part 800 (as amended 8-05-04) regulations implementing Section 106 of the National Historic Preservation Act. The Department of Energy, Western Area Power Administration (WAPA) is the lead federal agency for the subject undertaking, the proposed Extension of the TCY-LVQ 69-kV Transmission Line, and has identified this project as an undertaking pursuant to the National Historic Preservation Act (NHPA). As noted in your letter, this proposed power transmission line was included within the area of potential effects in an earlier consultation by the Bureau of Reclamation (SHPO file BUR07220A). That consultation (SHPO letters of March 22, 2007 and August 9. 2007) was for the relocation of the CCWD pumping station from its present location in Contra Costa County on the Old River on Byron Tract to the proposed new pumping station in San Joaquin County on the Victoria Canal on Victoria Island.

The consultation for that undertaking did include the APE for the physical footprint of the proposed power line, but did not, as you have noted, include a visual APE regarding possible effects to architectural historic properties. You are now consulting directly for the construction of this transmission line, the physical dimensions of which had not been determined by the BUR, as an entity responsible for its construction and operation had not yet been identified as of the dates of that consultation. In determining an appropriate APE and identifying historic properties in compliance with 36 CFR Part 800, WAPA has determined that one historic property has been determined eligible for the National Register of Historic Places is located within the viewshed (visual APE) of the proposed power transmission line. That property is the Old River Bridge (Bridge No. 29-0045), a steel truss structure with a center pivot swing that crosses the Old River Channel at a location just north of the site where the proposed transmission line will cross the Old River channel. The Old River Bridge was determined eligible for the NRHP under criteria A and C by SHPO consensus in 1985.

After reviewing your letter and attachments, and revisiting the earlier BUR consultation for the CCWD project, I find that with the current level of supporting documentation, I am unable to concur, at this time, with your proposed finding of No Adverse Effect. I would like to be able to review more data regarding the effect of this undertaking on the viewshed of the Old River Bridge. In specific, I require a more detailed description of the proposed transmission line (including the number of poles and their distance from the Old River Bridge) and photographs and plans of examples of this type of power transmission line with similar poles and lattice towers. If possible, a computer overlay (simulation) of the projected appearance of the transmission line on photograph(s) of the Old River Bridge would be ideal.

I will be available to continue this consultation following receipt and review of the additional information as requested above. Thank you for seeking my comments and for considering historic properties in planning your project. If you require further information, please contact William Soule, Associate State Archeologist, at phone 916-654-4614 or email wsoule@parks.ca.gov and David Byrd, State Historian, at phone 916-653-9019 or email dbyrd@parks.ca.gov.

Sincerely,

Susan K Stratton for

Milford Wayne Donaldson, FAIA
State Historic Preservation Officer

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October 01, 2008 In Reply Refer To: WAPA071204A

Stephen C. Tuggle, Natural Resources Manager
Western Area Power Administration
Sierra Nevada Customer Service Region
114 Parkshore Drive
Folsom, California 95630-4710

Re: Proposed Extension of Western Area Power Authority TCY-LVQ 69-kV Transmission Line from the Contra Costa Water District (CCWD) Old River Pump Station on Byron Tract in Contra Costa County to a New Proposed CCWD Substation on the New Victoria Canal Intake in San Joaquin County, California.

Dear Mr. Tuggle:

Thank you for continuing consultation with me, regarding the above noted project, pursuant to 36 CFR Part 800 (as amended 8-05-04) regulations implementing Section 106 of the National Historic Preservation Act. The Department of Energy, Western Area Power Administration (WAPA) is the lead federal agency for the subject undertaking, the proposed Extension of the TCY-LVQ 69-kV Transmission Line, and has identified this project as an undertaking pursuant to the National Historic Preservation Act (NHPA). Previously in this consultation I requested that you submit additional documentation regarding the physical dimensions and description of the power poles that are proposed for this project within the viewshed of the Old River Bridge (Bridge No. 29-0045), a National Register of Historic Places (NRHP) eligible historic property.

At this time you have responded to my request with additional project description, photographs of the types of power poles to be installed, photographs of the Old River Bridge and the existing power lines (wood poles) and steel-lattice tower transmission lines already present within the viewshed, and aerial photographs and engineering designs of the proposed undertaking. After reviewing your additional supporting documentation I agree that the viewshed of the Old River Bridge will not be adversely affected by this undertaking. Accordingly, I now concur that your determination of a finding of No Adverse Effect for this undertaking is appropriate pursuant to 36 CFR Part 800.5(b).

Be advised that under certain circumstances, such as unanticipated discovery or a change in project description, the Western Area Power Administration may have additional future responsibilities for this undertaking under 36 CFR Part 800. Thank you for seeking my comments and for considering historic properties in planning your project. If you require further information, please contact William Soule, Associate State Archeologist, at phone 916-654-4614 or email wsoule@parks.ca.gov.

Sincerely,

Susan K Stratton for

Milford Wayne Donaldson, FAIA
State Historic Preservation Officer

Appendix E

Comments and Responses

Public Comments

STATE OF CALIFORNIA
ARNOLD SCHWARZENEGGER, *Governor*

CALIFORNIA STATE LANDS COMMISSION
100 Howe Avenue, Suite 100-South
Sacramento, CA 95825-8202

PAUL D. THAYER, *Executive Officer*
(916) 574-1800 FAX (916) 574-1810
Relay Service From TDD Phone 1-800-735-2929
from Voice Phone 1-800-735-2922

Contact Phone: **(916) 574-1900**
Contact FAX: **(916) 574-1885**

October 23, 2008

File Ref: SCH# 2008092092

Cherie Johnston-Waldear
Western Area Power Administration
114 Parkshore Drive
P.O. Box 942836
Folsom, CA 95630

Subject: Draft Environmental Assessment for the Western Area Power Administration Alternative Intake Project Transmission Line Interconnection.

Dear Ms. Johnston-Waldear:

The California State Lands Commission (CSLC) staff has reviewed the Draft Environmental Assessment for the Western Area Power Administration Alternative Intake Project Transmission Line Interconnection (project). For this project, the CSLC is both a trustee agency and a responsible agency under the California Environmental Quality Act (CEQA).

By way of background, the State of California acquired sovereign ownership of all tidelands and submerged lands and beds of navigable waterways upon its admission to the United States in 1850. The State holds these lands for the benefit of all people of the State for statewide Public Trust purposes, which include waterborne commerce, navigation, fisheries, water-related recreation, habitat preservation and open space. The boundaries of these State-owned lands generally are based upon the last naturally occurring location of the ordinary high or low water marks prior to artificial influences which may have altered or modified the river or shoreline characteristics. On tidal waterways, the State's sovereign fee ownership extends landward to the ordinary high water mark as it last naturally existed. On navigable non-tidal waterways, the State holds fee ownership of the bed landward to the ordinary low water mark and a Public Trust easement landward to the ordinary high water mark, as they last naturally existed. Such boundaries may not be readily apparent from present day site inspections. The State's sovereign interests are under the leasing jurisdiction of the CSLC.

This is to advise that the locations within the Sacramento-San Joaquin Delta (Delta) where the proposed power line crosses Old River will encroach onto state sovereign lands waterward of the ordinary high water mark in the bed of the river.

A lease will be required for the use of sovereign lands for any portion of the project(s) located waterward of the ordinary high water mark in the established historical channels of the rivers within the boundaries of the project.

Based on a review of the Draft EA, the CSLC recommends that the following be included as a part of the final document.

- Disclose all construction and project-related greenhouse gas emissions information consistent with the California Global Warming Solutions Act (AB 32 2006). The project site is located within Contra Costa County and within the San Francisco Bay Air Basin (SFBAB) and San Joaquin Valley Air Basin (SJVAB), which are both State and Federal attainment areas. It is recommended that the extent of the impacts be evaluated by a preferred air modeling program under the jurisdiction of the Bay Area Air Quality Management District (BAAQMD) and the San Joaquin Valley Air Pollution Control District (SJVAPCD). This would include a determination of the greenhouse gases that will be emitted as a result of construction, a determination of the significance of these impacts, and mitigation measures to reduce impacts. There are several modeling programs utilized by the BAAQMD and SJVAPCD that evaluate the amount of emissions created during the various construction phases, and help predict and determine mitigation for the project.

- An evaluation of the noise impacts on fish from construction activities in the water, construction on the levees, and construction of land-side supporting structures for the proposed power lines should be included in the Draft EA.

As a responsible and trustee agency, the CSLC will need to rely on this document for the issuance of a lease, and therefore, we hope that you consider our comments prior to adoption of the final EA and subsequent Finding of No Significant Impact (FONSI). For the EA and FONSI to be considered for CEQA compliance, both documents must be broadly circulated through the California State Clearinghouse for no less than 30-days. If you have any questions involving the lease and sovereign lands portion of the project, please contact Mary Hays, Public Land Manager at (916) 574-1812 or by email at haysm@slc.ca.gov. If you have questions on the environmental review, please contact Christopher Huitt at (916) 574-1938 or by e-mail at huittc@slc.ca.gov.

Sincerely,

Gail Newton, Chief
Division of Environmental Planning
and Management

cc: Office of Planning and Research
M. Hays, CSLC
C. Huitt, CSLC

STATE OF CALIFORNIA—THE RESOURCES AGENCY ARNOLD SCHWARZENEGGER, *Governor*

DELTA PROTECTION COMMISSION
14215 RIVER ROAD
P.O. BOX 530
WALNUT GROVE, CA 95690
Phone (916) 776-2290
FAX (916) 776-2293
E-Mail: dpc@citlink.net Home Page: www.delta.ca.gov

RECEIVED
OCT 24 2008
STATE CLEARING HOUSE

Clear
10-22-08
late

October 22, 2008

State Clearinghouse
PO Box 3044
Sacramento, CA 95812-3044

Dear Project Manager:

SUBJECT: Alternative Intake Project, Transmission Line, and Interconnection
SCH # 2008092092

The staff of the Delta Protection Commission (Commission) has reviewed the subject document dated September 23, 2008. From the information provided, staff has determined that the proposed project is located within the Primary Zone of the Legal Delta. Actions for approval or denial of projects in the Primary and Secondary Zones are subject to possible appeal to the Commission. Processing of the proposal should take into consideration consistency with the Commission's Land Use and Management Plan for the Primary and Secondary Zones of the Delta (Management Plan).

The Delta Protection Act (Act) was enacted in 1992 in recognition of the increasing threats to the resources of the Primary and Secondary Zones of the Delta from urban and suburban encroachment having the potential to impact agriculture, wildlife habitat, and recreation uses. Pursuant to the Act, the Management Plan was completed and adopted by the Commission in 1995. For your information and reference, both the Act and the Management Plan are available from the Commission's website, www.delta.ca.gov.

The Management Plan sets out findings, policies, and recommendations resulting from background studies in the areas of environment, utilities and infrastructure, land use, agriculture, water, recreation and access, levees, and marine patrol/boater education/ safety programs. As mandated by the Act, the policies of the Management Plan are incorporated in the General Plans of local entities having jurisdiction within the Primary and Secondary Zones, including Contra Costa and San Joaquin Counties.

The policies and findings from the Management Plan that are applicable to this project include but are not limited to:

Utilities and Infrastructure:

- Policy 1: Impacts associated with construction of transmission lines and utilities can be mitigated by locating new construction in existing utility or transportation corridors, or along property lines, and by minimizing construction impacts. Before new transmission lines are constructed, the utility should determine if an existing line has available capacity. To minimize impacts on agricultural practices, utility lines shall follow edges of fields. Pipelines in utility corridors or existing rights-of-way shall be buried to avoid adverse impacts to terrestrial wildlife. Pipelines crossing agricultural areas shall be buried deep enough to avoid conflicts with normal agricultural or construction activities. Utilities shall be designed and constructed to minimize any detrimental effect on levee integrity or maintenance.

- Finding 1: The flat, largely unpopulated Delta is a valuable site for regional utility corridors, such as transmission lines and pipelines.
- Finding 2: High voltage transmission lines have disrupted wildlife use patterns and resulted in the loss of birds due to collision with those lines.

Thank you for the opportunity to review and comment on this document. Please contact me at (916) 776-2290 if you have any questions regarding the Commission or the comments provided herein.

Sincerely,

Linda Fiack

Linda Fiack
Executive Director

STATE OF CALIFORNIA—BUSINESS, TRANSPORTATION AND HOUSING AGENCY ARNOLD SCHWARZENEGGER, Governor

DEPARTMENT OF TRANSPORTATION
P.O. BOX 2048 STOCKTON, CA 95201
(1976 E. CHARTER WAY/1976 E. DR. MARTIN
LUTHER KING JR. BLVD. 95205)
TTY: California Relay Service (800) 735-2929
PHONE (209) 941-1921
FAX (209) 948-7194

Flex your power!
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September 29, 2008

Clear
10-22-08
e

RECEIVED
SEP. 29 2008
STATE CLEARING HOUSE

10-SJ-Various
SCH#2008092092
Alternative Intake
Project

Cherie Johnston-Waldear
Western Area Power
114 Parkshore Drive
Folsom, CA 95630
Dear Ms. Johnston-Waldear

The California Department of Transportation (Department) appreciates the opportunity to have reviewed the 60kv Transmission Line Extension Project.

The Department has no comments at this time.

If you have any questions or would like to discuss our comments in more detail, please contact Kathy Selsor at (209) 948-7190 (e-mail: kathy_selsor@dot.ca.gov) or me at (209) 941-1921.

Sincerely,

Kathy Selsor for

TOM DUMAS, Chief
Office of Intermodal Planning

c: SMorgan CA Office of Planning and Research bc: TDumas IGR

DEPARTMENT OF TRANSPORTATION
111 GRAND AVENUE
P. O. BOX 23660
OAKLAND, CA 94623-0660
PHONE (510) 622-5491
FAX (510) 286-5559
TTY 711

Flex your power!
Be energy efficient!

October 7, 2008

CC004014
CC-4-48.39
SCH#2008092092

Ms. Cherie Johnston-Waldear
Sierra Nevada Regional Office
Western Area Power Administration
114 Parkshore Drive
Folsom, CA 95630

Dear Ms. Johnston-Waldear:

Alternate Intake Project Transmission Line and Interconnection – Environmental Assessment

Thank you for including the California Department of Transportation (Department) in the environmental review process for the Alternate Intake Project Transmission Line and Interconnection. We have reviewed the Environmental Assessment and offer the following comments:

As lead agency, the Western Area Power Administration is responsible for all project mitigation, including any needed improvements to State highways. The project's fair share contribution, financing, scheduling, and implementation responsibilities as well as lead agency monitoring should be fully discussed for all proposed mitigation measures and the project's traffic mitigation fees should be specifically identified in the Environmental Assessment.

Any required roadway improvements should be completed prior to issuance of project occupancy permits. An encroachment permit is required when the project involves work in the State's right of way (ROW). The Department will not issue an encroachment permit until our concerns are adequately addressed. Therefore, we strongly recommend that the lead agency ensure resolution of the Department's CEQA concerns prior to submittal of the encroachment permit application; see the end of this letter for more information regarding the encroachment permit process.

Cultural Resources

For construction activities proposed within the State ROW, the Department requires documented results of a current archaeological record search from the Northwest Information Center (NIC) of the California Historical Resources Information System before an encroachment permit can be issued. Current record searches must be no more than five years old.

The Department requires the records search, and if warranted, a cultural resource study by a qualified, professional archaeologist, to ensure compliance with NEPA (if there is federal action on the project), CEQA, Section 5024.5 of the California Public Resources Code (for state-owned historic resources) and Volume 2 of the Department's Environmental Handbook (Caltrans Standard Environmental Reference (SER), available at http://www.dot.ca.gov/hq/env/index.htm).

Work subject to these requirements includes, but is not limited to: lane widening, channelization, auxiliary lanes, and/or modification of existing features such as slopes, drainage features, curbs, sidewalks and driveways within or adjacent to State ROW.

Traffic

The Department is primarily concerned with impacts to the State Highway System. There will be additional traffic on State Route (SR) 4 in Byron during construction of the transmission line. The Western Area Power Administration should address the construction on SR 4 in terms of specific traffic impacts, time of construction, detours, pavement replacement and traffic control.

Permits

Transportation Permits

Project work that requires movement of oversized or excessive load vehicles on State roadways requires a transportation permit that is issued by the Department. To apply, a completed transportation permit application with the determined specific route(s) for the shipper to follow from origin to destination must be submitted to the address below.

Office of Transportation Permits
California DOT Headquarters
P.O. Box 942874
Sacramento, CA 94274-0001

See the following website link for more information: http://www.dot.ca.gov/hq/traffops/permits/.

Encroachment Permits
Additionally, any work or traffic control within the State's ROW requires an encroachment permit that is issued by the Department. Traffic-related mitigation measures will be incorporated into the construction plans during the encroachment permit process. See the following website link for more information:
http://www.dot.ca.gov/hq/traffops/developserv/permits/

To apply for an encroachment permit, submit a completed encroachment permit application, environmental documentation, and five (5) sets of plans which clearly indicate State ROW to the address at the top of this letterhead, marked ATTN: Michael Condie, Mail Stop #5E.

Should you have any questions regarding this letter, please contact Lisa Courington of my staff at (510) 286-5505 or via email at lisa.ann.courington@dot.ca.gov.

Sincerely,

Lisa Carboni

LISA CARBONI
District Branch Chief
Local Development - Intergovernmental Review

c: State Clearinghouse

Responses to Public Comments

Department of Energy
Western Area Power Administration
Sierra Nevada Customer Service Region
114 Parkshore Drive
Folsom, California 95630-4710

NOV - 4 2008

Ms. Gail Newton, Chief
Division of Environmental Planning
California State Lands Commission
100 Howe Avenue
Suite 100-South
Sacramento, CA 95825-8202

Subject: Alternative Intake Project – Transmission Line and Interconnection – Draft Environmental Assessment

Dear Ms. Newton:

Thank you for your letter dated October 23, 2008, commenting on the Draft Environmental Assessment (EA) for the Alternative Intake Project (AIP) Transmission Line and Interconnection.

The Western Area Power Administration (Western) has reviewed your letter and concludes that the issues you raise have been addressed in their entirety in the environmental impact report/environmental impact statement (EIR/EIS) prepared by the Contra Costa Water District (CCWD) and the U.S. Department of the Interior, Bureau of Reclamation (Reclamation) for AIP. CCWD/Reclamation's EIR/EIS was prepared in compliance with the California Environmental Quality Act (CEQA) and the National Environmental Policy Act (NEPA) to evaluate the environmental effects of the entire AIP. The State Clearinghouse number for the EIR/EIS is Number 2005012101. The CCWD Board certified the EIR on November 15, 2006. Western's draft EA uses much of the information contained in CCWD/Reclamation's EIR/EIS, but is focused solely on the potential environmental effects associated with the proposed transmission line and interconnection.

Western's powerline construction was included in the EIR/EIS, and CCWD has taken the lead with for all permitting requirements for the AIP, including the transmission line and interconnection portion of the project.

In a letter dated April 4, 2005, CSLC provided comments on the draft AIP EIR/EIS (enclosed) to CCWD. Although the AIP is located on State-owned sovereign lands, as identified in your October 23, 2008 letter to Western, CSLC concluded that the AIP is subject to Section 6327 of the State Public Resources Code, and therefore, CCWD would not need to obtain a lease from CSLC provided CCWD obtained the appropriate permits from the local reclamation district, State Reclamation Board, the U.S. Army Corps of Engineers (USACE), or the Department of Water Resources.

Western understands that CCWD has obtained the appropriate permits from USACE and others for AIP. Please contact Ms. Cherie Johnston-Waldear at (916) 353-4035 or waldear@wapa.gov if you have further questions.

Sincerely,

Cherie Johnston-Waldear
for

Stephen Tuggle
Natural Resources Manager

2 Enclosures

cc:
Mr. Scott Weddle
Contra Costa Water District
PO Box H2O
Concord, CA 94524

Department of Energy
Western Area Power Administration
Sierra Nevada Customer Service Region
114 Parkshore Drive
Folsom, California 95630-4710

NOV - 6 2008

Ms. Linda Fiack, Executive Director
Delta Protection Commission
14215 River Road
P.O. Box 530
Walnut Grove, CA 95690

Subject: Alternative Intake Project – Transmission Line and Interconnection – Draft Environmental Assessment

Dear Ms. Fiack:

Thank you for your letter dated October 22, 2008, commenting on the Draft Environmental Assessment (EA) for the Alternative Intake Project (AIP) Transmission Line and Interconnection.

The Western Area Power Administration (Western) has reviewed your letter in its entirety and concludes that the policy and findings you stipulate in your comment letter (enclosed) have been addressed in the environmental impact report/environmental impact statement (EIR/EIS) prepared by the Contra Costa Water District (CCWD) and the U.S. Department of the Interior, Bureau of Reclamation (Reclamation) for AIP. CCWD/Reclamation's EIR/EIS was prepared in compliance with the California Environmental Quality Act (CEQA) and the National Environmental Policy Act (NEPA) to evaluate the environmental effects of the entire AIP. The State Clearinghouse number for the EIR/EIS is Number 2005012101. Western's draft EA uses much of the information contained in CCWD/Reclamation's EIR/EIS, but is focused solely on the potential environmental effects associated with the proposed transmission line and interconnection.

As part of the CCWD/Reclamation EIR/EIS review process, CCWD considered the Delta Protection Commission's (Commission's) Management Plan, as well as many other sources of information, in its design and development of the AIP, including the transmission line and interconnection.

With respect to the Commission's Management Plan, Utilities and Infrastructure, Policy 1, CCWD has, to the degree feasible, located the proposed transmission line in existing utility or transportation corridors, minimizing construction impacts, and minimizing adverse affects to agricultural operations on Victoria Island. The transmission line route follows existing agricultural access roads to minimize impacts on agricultural practices. The "Finding 1" statement is noted. The "Finding 2" statement regarding the effects of high voltage transmission lines was addressed in both the EIR/EIS prepared by CCWD and Reclamation for AIP, as well as in Western's Environmental Assessment. Western and CCWD have adopted conservation measures which include following Avian Protection Plan guidelines for power lines to minimize adverse effects on birds. The U.S. Fish and Wildlife Service issued a Biological Opinion that explicitly considered Western's Transmission Line and Interconnection, and CCWD is following the terms in that Biological Opinion.

We believe that both Western and CCWD have addressed all of the concerns expressed in your letter. Please contact Ms. Cherie Johnston-Waldear at (916) 353-4035 or waldear@wapa.gov if you have further questions.

Sincerely,

ORIGINAL SIGNED BY
Cherie Johnston-Waldear
FOR

Stephen Tuggle
Natural Resources Manager

Enclosure

cc:
Mr. Scott Weddle
CCWD
PO Box H20
Concord, CA 94524

bcc:
N1400
N1416
N1400 Read File (w/enclosure)

N1416:C.Waldear:X4035:AW:11/6/08
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Department of Energy
Western Area Power Administration
Sierra Nevada Customer Service Region
114 Parkshore Drive
Folsom, California 95630-4710

NOV - 4 2008

Ms. Lisa Carboni, District Branch Chief
Local Development – Intergovernmental Review
California Department of Transportation
111 Grand Avenue
P.O. Box 23660
Oakland, CA 94623-0660

Subject: Alternative Intake Project – Transmission Line and Interconnection – Draft Environmental Assessment

Dear Ms. Carboni:

Thank you for your letter dated October 7, 2008, commenting on the Draft Environmental Assessment (EA) for the Alternative Intake Project (AIP) Transmission Line and Interconnection.

The Western Area Power Administration (Western) has reviewed your letter and concludes that the issues you raise have been addressed in their entirety in the environmental impact report/environmental impact statement (EIR/EIS) prepared by the Contra Costa Water District (CCWD) and the U.S. Department of the Interior, Bureau of Reclamation (Reclamation) for AIP. CCWD/Reclamation's EIR/EIS was prepared in compliance with the California Environmental Quality Act (CEQA) and the National Environmental Policy Act (NEPA) to evaluate the environmental effects of the entire AIP. The State Clearinghouse number for the EIR/EIS is Number 2005012101. The CCWD Board certified the EIR on November 15, 2006. Western's draft EA uses much of the information contained in CCWD/Reclamation's EIR/EIS, but is focused solely on the potential environmental effects associated with the proposed transmission line and interconnection.

The AIP EIR/EIS satisfies CEQA and addresses the specific concerns you raise related to cultural resources, traffic, transportation permits, and encroachment permits. Western's powerline construction was included in the EIR/EIS, and CCWD has taken the lead with Caltrans on permitting the AIP, including the transmission line and interconnection portion of the project. CCWD received Caltrans Permit Number 10-07-N-RC-0882 covering improvements to the existing access road, including transmission line construction. The permit was received January 11, 2008 and the permitted work was completed in July 2008.

Western understands that CCWD has obtained the appropriate Caltrans permits and both agencies look forward to working with your staff. Please contact Ms. Cherie Johnston-Waldear at (916) 353-4035 or waldear@wapa.gov if you have further questions.

Sincerely,

Cherie Johnston-Waldear
for

Stephen Tuggle
Natural Resources Manage

Enclosure

cc:
Mr. Scott Weddle
Contra Costa Water District
PO Box H2O
Concord, CA 94524