Yuba City Feather River Fish Screen Action Specific Implementation Plan

U.S. Department of the Interior
Bureau of Reclamation

City of Yuba City

November 2009

Mission Statements

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The mission of the Bureau of Reclamation is to manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interest of the American public.

Yuba City Feather River Fish Screen Action Specific Implementation Plan

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Acronyms and Abbreviations

ASIP	Action Specific Implementation Plan
BA	biological assessment
BCNH	black-crowned night-heron rookeries
BMPs	best management practices
BO	biological opinion
CALFED	CALFED Bay-Delta Program
Caltrans	California Department of Transportation
CBDA	California Bay-Delta Authority
CEQA	California Environmental Quality Act
CESA	California Endangered Species Act
CFR	Code of Federal Regulations
CISS	Cast-in-Steel-Shell
City	City of Yuba City
CNDDB	California Natural Diversity Database
COHA	Cooper's hawk
Conservation Agreement	The Conservation Agreement Regarding the CALFED Bay-Delta Program Multi-Species Conservation Strategy
CVPIA	Central Valley Project Improvement Act
CWA	Clean Water Act
dB	decibels
DCCO	double-crested cormorant rookeries
DFG	California Department of Fish and Game
DOI	U.S. Department of the Interior
DPS	Distinct Population Segment
DWR	Department of Water Resources
EA/IS	environmental assessment/initial study
EFH	essential fish habitat
EIS/EIR	environmental impact statement/environmental impact report
ESA	Endangered Species Act
ESU	Evolutionarily Significant Unit
fps	feet per second

FR	Federal Register
FRCS	Central Valley fall-run Chinook salmon
GBHE	great blue heron rookeries
General Dewatering Permit	General Order for Dewatering and Other Low Threat Discharges to Surface Waters
GPS	global positioning system
GREG	great egret rookeries
GS	green sturgeon
Guidelines	Guidelines for Developing Post-Construction Evaluation & Assessment Plans, and Operations & Maintenance Plans
HCP	Habitat Conservation Plan
HFC	high flow channel
LFC	low flow channel
LLPS	low-lift pump station
LWD	large woody debris
MBTA	Migratory Bird Treaty Act
mg/L	milligrams per liter
mgd	million gallons per day
Mm	millimeter
MSA	Magnuson-Stevens Fishery Conservation and Management Act
MSCS	Multi-Species Conservation Strategy
msl	above mean sea level
NCCP	Natural Community Conservation Plan
NCCPA	Natural Community Conservation Planning Act
NEPA	National Environmental Policy Act
NOAA Fisheries	National Marine Fisheries Service
NOI	notice of intent
OHWM	ordinary high-water mark
PPMP	pollution prevention and monitoring program
Project	Yuba City Feather River Intake Screen
psi	pounds per square inch
Reclamation	U.S. Department of the Interior, Bureau of Reclamation
RM	River Mile
ROD	Record of Decision
RWQCB	Regional Water Quality Control Board
SEL	sound exposure level
SH	steelhead
SNEG	snowy egret rookeries

SPCCP	Spill Prevention Control and Countermeasure Plan
SPT	Sacramento splittail
SR	State Route
SRA	shaded riverine aquatic
SRCS	Central Valley spring-run Chinook salmon
State Water Board	State Water Resources Control Board
SWHA	Swainson's Hawk
SWP	State Water Project
SWPPP	stormwater pollution prevention plan
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VELB	valley elderberry longhorn beetle
WEPT	western pond turtle
WRCS	Sacramento winter-run Chinook salmon
WTKI	white-tailed kite
WTP	Water Treatment Plant
YCWD	Yuba County Water District

Chapter 1
Introduction

1.1 Purpose of ASIP

The Yuba City Feather River Fish Screen (Project) Action Specific Implementation Plan (ASIP) serves as the biological assessment (BA) for compliance with Section 7 of the federal Endangered Species Act (ESA), and also serves as the mitigation plan to support a Section 2081 permit application for compliance with the California Endangered Species Act (CESA). This ASIP is consistent with the Multi-Species Conservation Strategy (MSCS) (CALFED Bay-Delta Program 2000a), and with the requirements of the programmatic CALFED Bay-Delta Program (CALFED) compliance documents and agreements for the ESA and CESA.

The purpose of this ASIP is to provide the U.S. Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NOAA Fisheries) with the information necessary to enter into consultation on the Project for federally listed species. Another purpose of this ASIP is to provide the California Department of Fish and Game (DFG) with the information necessary to issue a permit and/or consistency determination to comply with CESA.

This ASIP provides the USFWS and NOAA Fisheries with the information needed to:

- Determine the likelihood for the project to jeopardize the continued existence of a federally listed species by affecting survival, growth, reproduction, or migration (e.g., spawning and rearing habitat area, migration habitat conditions, food availability, entrainment) or result in the destruction or adverse modification of critical habitat;
- Issue incidental take authorizations under Section 7 of the ESA for the two species covered under the *U.S. Fish and Wildlife Service Programmatic Biological Opinion on the CALFED Bay-Delta Program* (CALFED Bay-Delta Program 2000b) that could be affected by the project; and
- Issue incidental take authorizations under Section 7 of the ESA for the four species covered under the *National Marine Fisheries Service CALFED Bay-Delta Program Programmatic Biological Opinion* (CALFED Bay-Delta Program 2000b) that could be affected by the project.

This ASIP provides DFG with the information needed to:

- Determine whether impacts on the state-listed species would be fully mitigated following implementation of the project and its related environmental commitments;
- If needed, issue incidental take authorization under Section 2081(b) of the California Fish and Game Code for those species that are state-listed but not federally listed;
- Issue a consistency determination under Section 2080.1 of the California Fish and Game Code for those species that are both federally and state-listed, based on the Biological Opinions (BOs) that USFWS and NOAA Fisheries will issue through the Section 7 consultations on this ASIP.

The ASIP also provides information and conservation measures necessary to address impacts of the project on species managed under the Magnuson-Stevens Fishery Conservation and Management Act (MSA) and essential fish habitat (EFH), as described below under Essential Fish Habitat.

U.S. Department of the Interior, Bureau of Reclamation (Reclamation) and the City of Yuba City are the lead agencies under the National Environmental Policy Act (NEPA) and the California Environmental Quality Act (CEQA), respectively, and are also the project proponents for the proposed action. Reclamation jointly administers the Anadromous Fish Screen Program with USFWS, and one of Reclamation's administrative duties is to serve as the federal lead agency for compliance with the ESA. The City of Yuba City provides water to its residents (as further described in Chapter 2 under Project Purpose and Need) using the existing unscreened diversion, which will be replaced by the proposed project.

1.1.1 Relationship to CALFED Program and CALFED Documents

The following five documents establish the CALFED Program's compliance with the ESA, CESA, and Natural Community Conservation Planning Act (NCCPA):

- MSCS,
- USFWS Programmatic BO,
- NOAA Fisheries Programmatic BO,
- Programmatic Natural Communities Conservation Plan (NCCP) Determination, and
- Conservation Agreement Regarding the CALFED Bay-Delta Program MSCS (Conservation Agreement).

1.1.1.1 MSCS

The MSCS is a technical appendix to the Programmatic Environmental Impact Statement/Environmental Impact Report (EIS/EIR) that explains how the CALFED Program will meet the requirements of the ESA, CESA, and the NCCPA. The MSCS was used only to provide guidance for developing mitigation for the impacts of the project on ASIP-covered species and NCCP communities. The MSCS conservation measures include measures to avoid, minimize, and compensate for the potential impacts of the CALFED Program project actions. A compensation conservation measure is a type of mitigation measure that compensates for effects on affected resource value or replaces an affected resource value (e.g., avoidance and minimization measures).

Mitigation measures presented in the ASIP are consistent with the following programmatic conservation measures in the MSCS:

- ASIP contents necessary to meet the requirements of the Programmatic BOs and NCCP Determination, and
- Conservation measures to avoid, minimize, and compensate for impacts on ASIP-covered species and NCCP communities.

The project Environmental Assessment/Initial Study (EA/IS) and ASIP stand alone and each include an analysis of the impacts of the project and avoidance, minimization, and compensation measures to mitigate those impacts. Specific conservation measures for affected ASIP-covered species are listed in the appropriate resource sections in this chapter.

USFWS Programmatic BO

The USFWS Programmatic BO covers nine ESA-listed, proposed, and candidate species that were evaluated in the MSCS.

NOAA Fisheries Programmatic BO

The NOAA Fisheries Programmatic BO covers four ESA-listed, proposed, and candidate species that were evaluated in the MSCS.

Programmatic NCCP Determination

The Programmatic NCCP Determination covers 79 species, including 35 species covered under the Programmatic BOs that were evaluated in the MSCS.

The Conservation Agreement

The Conservation Agreement is an agreement entered into by the CALFED agencies that ensures that the MSCS will be implemented in a way consistent with the statutory authority of each signatory agency. Included in the Conservation Agreement is a commitment that a CALFED project proponent and the lead agencies (if different from the project proponent) will prepare an ASIP if the project could affect species covered under the Programmatic BOs or NCCP Determination.

1.2 ASIP Process

The MSCS and other program-level documents require that CALFED project proponents and lead agencies (if different from the project proponent) coordinate preparation of ASIPs with the USFWS, NOAA Fisheries, and DFG. This coordination initiates informal consultation under Section 7 of the ESA. The purpose of this coordination is to ensure that the ASIP incorporates appropriate conservation measures consistent with requirements of the MSCS.

To facilitate coordinating preparation of the ASIP, the lead agencies for the Project established an Interagency ASIP team composed of representatives from the City of Yuba City, Reclamation, USFWS, NOAA Fisheries, and DFG. An objective of the lead agencies in establishing the ASIP team was to identify and address USFWS, NOAA Fisheries, and DFG requirements for successfully compensating for project impacts early in the process and, thus, avoid the likelihood that additional measures would be required as terms and conditions of the Project BOs, DFG-issued take authorizations per the California Fish and Game Code, and NCCP Determination. The City of Yuba City and Reclamation were responsible for preparing the ASIP. USFWS, NOAA Fisheries, and DFG were primarily responsible for:

- providing input on project design to avoid or minimize impacts;
- providing information relevant to conducting the assessment of impacts on ASIP-covered species;
- reviewing and providing input to proposed impact assessment methods;
- reviewing results of the impact assessment;
- reviewing and providing input on proposed conservation measures to avoid, minimize, and compensate for impacts on ASIP-covered species and NCCP communities; and
- reviewing ASIP sections for consistency with the Programmatic BOs and NCCP Determination.

Coordination of ASIP preparation within the ASIP team included meetings and informal communications throughout the ASIP preparation process.

1.3 Terminology

Key terms used in this ASIP are defined below.

- *Programmatic BOs* refers to both the USFWS Programmatic BO and the NOAA Fisheries Programmatic BO for the 2000 CALFED Bay Delta Program (Record of Decision [ROD] and MSCS).
- *ASIP-covered species* refers to the species covered under the Programmatic BOs and the state-listed species that could be affected by the proposed project (Table 1-1).
- *ASIP-covered natural communities* refers to the natural communities that provide habitat to listed species that could be affected by the proposed project's implementation (includes both natural habitats and fish groups) (Table 1-2).
- *Action area* is defined by the ESA Section 7 as all areas to be affected directly or indirectly by the federal action and not merely the immediate area involved in the action (50 Code of Federal Regulations [CFR] 402.02). This analysis is not limited to the "footprint" of the action nor is it limited by the Federal agency's authority.
- *Study area* is the area covered by the U.S. Geological Survey (USGS) quadrangles that were surveyed as part of the California Natural Diversity Database (CNDDB) search. The applicable quadrangle for this project is the Yuba City 7.5-minute quadrangle. The study area corresponds to the ESA Section 7 term "action area."
- *Project area* is the area within the footprint of the proposed fish screen, the construction and staging areas, and adjacent areas that may be directly affected by the project. The project area is the geographic extent of the analysis of impacts that could be associated with the proposed project. It is the area in which construction- and operation-related activities will be implemented and within which ASIP-covered species and natural communities could be affected by the proposed project.

1.4 ASIP-Covered Species

Table 1-1 identifies species covered under the Programmatic BOs and the state-listed species that could be affected by the proposed project. Table 1-2 identifies the natural communities that provide habitat to listed species that could be affected by the proposed project's implementation (includes both natural habitats and fish groups). Table 1-3 identifies species proposed for evaluation in the Yuba City Feather River Intake Screen Project ASIP.

Table 1-1. Species Assessed in the Yuba City Feather River Intake Screen ASIP

ASIP-Covered Species	MSCS Species Goals[a]	ASIP Coverage—Agency Responsibility[b]		
		USFWS	NOAA Fisheries	DFG
Birds				
Black-crowned night heron (rookery)	m			X
Cooper's hawk	m			X
Great blue heron (rookery)	m			X
Great egret (rookery)	m			X
Snowy egret (rookery)	m			X
Swainson's hawk	r			X
White-tailed kite	m			X
Reptiles				
Western pond turtle	m			X
Fish				
Central Valley steelhead ESU	R		X	
Central Valley spring-run Chinook salmon ESU (essential fish habitat)	R		X	X
Central Valley fall-/late fall–run Chinook salmon ESU (essential fish habitat)	R		X	
Sacramento River winter-run Chinook salmon	R		X	
Green sturgeon	R		X	
Splittail	R			X
Hardhead	m			X
River lamprey				X
Invertebrates				
Valley elderberry longhorn beetle	R	X		

DFG = California Department of Fish and Game.
ESU = evolutionarily significant unit.
MSCS = Multi-Species Conservation Strategy.
NOAA Fisheries = National Oceanic and Atmospheric Administration Marine Fisheries Service.
USFWS = U.S. Fish and Wildlife Service.

[a] Species Goals:
R = Recover. Recover species' populations within the MSCS focus area to levels that ensure the species' long-term survival in nature.
r = Contribute to recovery. Implement some of the actions deemed necessary to recover species' populations within the MSCS focus area.
m = Maintain. Ensure that any adverse effects on the species that could be associated with implementation of CALFED Bay-Delta Program actions will be fully offset through implementation of actions beneficial to the species.

[b] The determination of agency responsibility for the ASIP is based on the programmatic coverage determination for each species.

Table 1-2. Summary of Adverse Impacts and ASIP Conservation Measures for Natural Communities

Natural Community	MSCS Habitat Goal	Impact	ASIP Conservation Measure	Yuba City Feather River Intake Screen EIS/EIR Mitigation Measures Associated with ASIP Conservation Measures
Natural Habitats				
Valley riverine aquatic	Avoid, minimize, and compensate for loss	Filling or disturbance of valley riverine aquatic habitat as a result of LLPS construction	Conservation Measure VRAQ1—Implement Mitigation Measure VRAQ1	Mitigation Measure VRAQ1—Avoid and Minimize Disturbance of Valley Riverine Aquatic Habitat
			Conservation Measure VRAQ2—Implement Mitigation Measure VRAQ2	Mitigation Measure VRAQ2—Compensate for Loss of Valley Riverine Aquatic (Open Water) Habitat
			Conservation Measure VRAQ3—Implement Mitigation Measure VRAQ3	Mitigation Measure VRAQ3—Compensate for Loss of Valley Riverine Aquatic (SRA) Habitat
Valley/foothill riparian	Avoid, minimize, and compensate for loss	Loss of woody riparian communities as a result of LLPS construction	Conservation Measure VFRC1—Implement Mitigation Measure VFRC1	Mitigation Measure VFRC1—Avoid and Minimize Disturbance of Riparian Habitat
			Conservation Measure VFRC2—Implement Mitigation Measure VFRC2	Mitigation Measure VFRC2—Compensate for Temporary and Permanent Loss of Riparian Habitat
Upland Cropland	Avoid, minimize, and compensate for loss	Loss of upland cropland as a result of LLPS construction	Conservation Measure UPCR—Implement Mitigation Measure UPCR1	Mitigation Measure UPCR1—Avoid and Minimize Disturbance of Upland Cropland Habitat
Fish Species Group				
Anadromous fish species[1]		Refer to impacts on valley riverine aquatic and valley/foothill riparian	Refer to conservation measures for valley riverine aquatic and valley/foothill riparian	Refer to conservation measures for valley riverine aquatic and valley/foothill riparian

Notes:

[1] Anadromous fish species include Sacramento River winter-run Chinook salmon, Central Valley fall-/late fall–run Chinook salmon, Central Valley spring-run Chinook salmon, Central Valley steelhead, and green sturgeon.

Table 1-3. Species Proposed for Evaluation in the Yuba City Feather River Intake Screen Project ASIP

Species Name	MSCS Species Goals[a]	Status[b]			Further Evaluated in ASIP?	Explanation for Inclusion or Exclusion from Further Evaluation in This ASIP
		Federal	State	Other		
Mammals						
Ringtail (Miner's cat)	m	–	FP	–	No	No suitable denning habitat in project area.
Birds						
American peregrine falcon	m	D	E/FP	–	No	Species may occur in study area during migration or winter but will not be affected by project.
Bald eagle	m	D	E/FP	–	No	Species may occur in study area during migration or winter but will not be affected by project.
Bank swallow	r	–	T	–	No	Three CNDDB-recorded occurrences in the study area. Species may forage in study area during nesting season and migration but no suitable nesting habitat occurs within the project footprint.
Black-crowned night-heron (rookery)	m	–	–	SC	Yes	Species expected to forage and roost in study area. Suitable rookery sites present in study area. No CNDDB-recorded occurrences in study area.
California yellow warbler	r	–	SSC	–	No	Suitable breeding habitat is present in areas adjacent to study area but no impacts are expected to occur to suitable breeding habitat. No CNDDB-recorded occurrences in study area.
Cooper's hawk	m	–	–	–	Yes	Suitable habitat present in study area. No CNDDB-recorded occurrences in study area.
Double-crested cormorant (rookery)	m	–	–	–	Yes	No CNDDB-recorded occurrences in study area. Species known to forage in study area. Suitable rookery sites present in study areaNo CNDDB-recorded occurrences in study area.
Great blue heron (rookery)	m	–	–	SC	Yes	Species expected to forage and roost in study area. Suitable rookery sites present in study area. No CNDDB-recorded occurrences in study area.
Great egret (rookery)	m	–	–	SC	Yes	Species expected to forage and roost in study area. Suitable rookery sites present in study area. No CNDDB-recorded occurrences in study area.
Loggerhead shrike		–	SSC	–	No	Suitable nesting habitat present in study area but not expected to be adversely affected by actions in affected areas. No CNDDB-recorded occurrences in study area.

Species Name	MSCS Species Goals[a]	Status[b]			Further Evaluated in ASIP?	Explanation for Inclusion or Exclusion from Further Evaluation in This ASIP
		Federal	State	Other		
Northern harrier	m	–	SSC	–	No	Species expected to nest and forage in of study area. No suitable nesting habitat in project area. No CNDDB-recorded occurrences in study area.
Osprey	m	–	–	–	No	Species known to nest and forage in vicinity of study area. No suitable nesting habitat will be affected by the project. No CNDDB-recorded occurrences in study area.
Snowy egret (rookery)	m	–	–	SC	Yes	Species expected to forage and roost in study area. Suitable rookery sites present in study area. No CNDDB-recorded occurrences in study area.
Swainson's hawk	r	–	T	–	Yes	One CNDDB-occurrence in the study area. Suitable nesting habitat present in study area; no suitable foraging habitat in the project footprint.
Tricolored blackbird	m	–	SSC	SC	No	Three occurrences in the study area but no suitable nesting habitat present in vicinity of project footprint. No suitable nesting habitat will be affected by the project.
Western yellow-billed cuckoo	r	C	E	–	No	Two CNDDB-occurrences in the study area. No suitable nesting or foraging habitat in the project footprint or in the vicinity of the project.
White-tailed (black shouldered) kite	m	–	FP	–	Yes	No CNDDB-recorded occurrences in study area. Species expected to occur in study area.
Yellow-breasted chat	m	–	SSC	–	No	Suitable habitat present in vicinity of study area. No suitable nesting habitat will be affected by the project.
Reptiles						
Giant garter snake	r	T	T	–	No	No suitable habitat present in study area.
Western pond turtle	m	–	SSC	SC	Yes	No CNDDB-recorded occurrences in study area. Species known to occur in the Feather River adjacent to the project area.
Amphibians						
California red-legged frog	m	T	SSC	–	No	Outside species' known range.
California red-legged frog critical habitat (proposed 2008)					No	Study area is not within areas proposed as critical habitat.
California tiger salamander	m	T	PE,SSC	–	No	No suitable habitat present in study area.

Species Name	MSCS Species Goals[a]	Status[b]			Further Evaluated in ASIP?	Explanation for Inclusion or Exclusion from Further Evaluation in This ASIP
		Federal	State	Other		
California tiger salamander critical habitat					No	Study area is not within areas designated as critical habitat.
Fish						
Central Valley fall-/late fall–run Chinook salmon ESU	R	SC	SSC	–	Yes	Species known to occur in study area during migration.
Central Valley spring-run Chinook salmon ESU	R	T	T	–	Yes	Species known to occur in study area during migration.
Central Valley spring-run Chinook salmon ESU critical habitat					Yes	Study area is within areas designated as critical habitat.
Central Valley steelhead ESU	R	T	–	–	Yes	Species known to occur in study area during migration.
Central Valley steelhead ESU critical habitat					Yes	Study area is within areas designated as critical habitat.
Delta smelt	R	T	T	–	No	Outside species' known range.
Delta smelt critical habitat					No	Study area is not within areas designated as critical habitat.
Green sturgeon	R	T	SSC	–	Yes	Suitable habitat present in study area.
Hardhead	m	–	SSC	–	Yes	Suitable habitat present in study area.
River lamprey		–	SSC	–	Yes	Suitable habitat present in study area.
Sacramento River winter-run Chinook salmon ESU	R	E	E	–	Yes	Although outside species' known range, species could potentially use study area for non-natal rearing.
Sacramento River winter-run Chinook salmon critical habitat					No	Study area is not within areas designated as critical habitat.
Sacramento splittail	R	–	SSC	–	Yes	Suitable habitat present in study area.
Invertebrates						
California linderiella		–	–	–	No	No suitable habitat in study area.
Conservancy fairy shrimp	m	E	–	–	No	No suitable habitat in study area.
Valley elderberry longhorn beetle	R	T	–	–	Yes	Within species' known range. Suitable habitat present in study area.
Valley elderberry longhorn beetle critical habitat					No	Study area is not within areas designated as critical habitat.
Vernal pool fairy shrimp	m	T	–	–	No	No suitable habitat in study area.
Vernal pool tadpole shrimp		E	–	–	No	No suitable habitat in study area.

Notes:

MSCS = multi-species conservation strategy.
ESU = evolutionary significant unit.
CNDDB = California Natural Diversity Database.

[a] Species Goals:

R = Recover. Recover species' populations within the MSCS focus area to levels that ensure the species' long-term survival in nature.
r = Contribute to recovery. Implement some of the actions deemed necessary to recover species' populations within the MSCS focus area.
m = Maintain. Ensure that any adverse effects on the species that could be associated with implementation of CALFED actions will be fully offset through implementation of actions beneficial to the species.

[b] Status:

Federal

E = Listed as endangered under the federal Endangered Species Act (ESA).
T = Listed as threatened under ESA.
C = Candidate for listing under ESA.
SC = Federal species of concern.
D = Species delisted.

State

E = Listed as endangered under the California Endangered Species Act (CESA).
T = Listed as threatened under CESA.
PE = Proposed for listing as endangered under CESA.
R = Listed as rare under California Native Plant Protection Act.
SSC = California species of special concern.
FP = Fully protected under the California Fish and Game Code.

Other

SC = Other species of concern identified by CALFED.

1.5 Critical Habitat

Critical habitat was designated for Central Valley steelhead and Central Valley spring-run Chinook salmon Evolutionarily Significant Unit (ESU) by NOAA Fisheries (65 FR 7764, February 16, 2000) and includes the Feather River from the confluence of the Yuba River upstream to Oroville Dam. Critical habitat for green sturgeon has not been designated. EFH is included in the Feather River for fall-/late fall–run and spring-run Chinook salmon.

1.6 Essential Fish Habitat

This ASIP provides information and conservation measures necessary to address impacts of the project's implementation on MSA-managed species and their EFH. Section 305(b)(2)-(4) of the MSA requires federal action agencies (e.g., Reclamation) to consult with NOAA Fisheries on any action authorized, funded, or undertaken that may adversely affect EFH. Species for which EFH is assessed in this ASIP are identified in Table 1-1 and include Sacramento River winter-run Chinook salmon and Central Valley fall-/late fall–run and spring-run Chinook salmon.

For this project, the EFH assessment is integrated into this ASIP, and the EFH consultation process will be integrated into the NOAA Fisheries BO for the project. NOAA Fisheries will provide EFH conservation recommendations for any action that would adversely affect EFH.

EFH is the aquatic habitat (water and substrate) necessary for fish to spawn, breed, feed, or grow to maturity that would allow a level of production needed to support a long-term, sustainable commercial fishery and contribute to a healthy ecosystem (National Marine Fisheries Service 1998). Consultation with NOAA Fisheries is required for potential effects on all runs of Chinook salmon because of their commercial value.

Fish in the project area that are covered under the EFH assessment are Sacramento River winter-run Chinook salmon, Central Valley spring-run Chinook salmon, and Central Valley fall-/late fall–run Chinook salmon. Important components of EFH for spawning, rearing, and migration include adequate:

- substrate composition;
- water quality;
- water quantity, depth, and velocity;
- channel gradient and stability;
- food;

- cover and habitat complexity;
- space;
- access and passage; and
- habitat connectivity.

1.7 NCCP Communities

The MSCS term "NCCP community" refers to both habitats and fish groups. The MSCS identified 20 natural communities: 18 habitats and two ecologically-based fish groups. The natural communities that are present in the project area and that could be affected by the proposed project implementation were identified from review of aerial photographs and field investigations. The vegetation mapping data were then classified based on the list of communities in the Programmatic NCCP Determination (California Department of Fish and Game 2000a).

Three of the 20 natural communities that were identified in the MSCS are present in the project area:

- Valley Riverine Aquatic,
- Valley/Foothill Riparian,
- Seasonally Flooded Agriculture Land

Table 1-2 lists the natural communities identified in the MSCS that are present in the project area and identifies the MSCS goals for each of the communities. In addition, this table correlates each of the natural habitats to the habitat subtypes that are likely to be affected by project implementation and that are assessed in this ASIP. Both of the ecologically based fish groups identified in the MSCS (i.e., anadromous fish species and estuarine fish species) are present in the project area. All of the fish species covered under this ASIP are included in one of these fish groups.

Chapter 2
Description of Proposed Action

2.1 Introduction

Reclamation and the City of Yuba City (the City) have agreed to jointly replace the City's unscreened intake structure with a screened intake structure to address the needs of the aquatic environment as well as regional water supply needs. The new intake structure facility on the Feather River would meet the DFG and NOAA Fisheries anadromous fish screen criteria and accommodate existing and future water supply needs.

2.2 Purpose and Need for the Project

The City currently provides water to a population of approximately 60,000. The primary source of water is from the Feather River, where the City currently operates an unscreened intake structure. The diverted water is conveyed through the intake structure and the associated low-lift pump station (LLPS) to the Yuba City Water Treatment Plant (WTP) system for treatment prior to distribution to customers.

The City's need for surface water has increased recently and will continue to increase in the future as groundwater use decreases due to groundwater quality issues. Some portions of the City's service area that historically relied on groundwater supplies have already been connected to the City's surface water system. The City intends to make high quality treated surface water available throughout its service area. Additionally, the City is growing through development according to its General Plan and is forecasting an annual growth in demand for its surface water supply from three percent to ten percent (0.7 to 2.4 million gallons per day [mgd]) (City of Yuba City 2004). As a result of these factors, the City needs a surface water supply of 48 mgd. The current intake structure can accommodate 48 mgd; however, the current pumping capacity of the low-lift pump station is 40 mgd.

The proposed project has two primary purposes:

1. Replace the City's existing unscreened intake structure on the Feather River with a new intake structure facility on the Feather River that meets the DFG and NOAA Fisheries anadromous fish screen criteria.

2. Construct a new intake structure facility, including upgrades to the LLPS, with 48 mgd capacity to accommodate the ongoing conversion from groundwater supplies to surface water supplies and planned growth consistent with the City's General Plan.

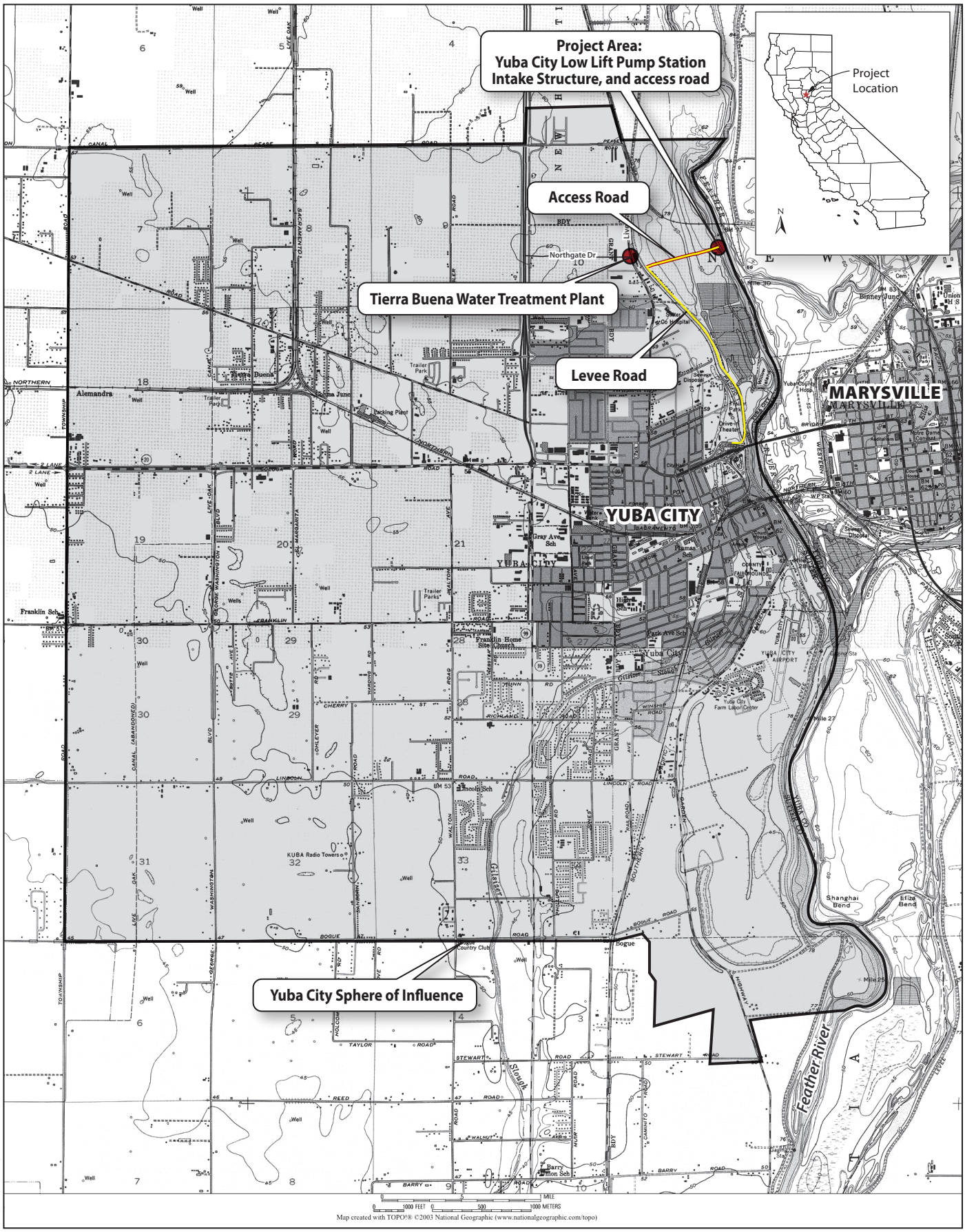
Reclamation is funding a portion of this project through its Anadromous Fish Screen Program. As a result, Reclamation is the federal lead agency under NEPA. Reclamation's role is consistent with the Central Valley Project Improvement Act (CVPIA), Section 3406(b)(21), which authorized the U.S. Department of the Interior (DOI) to *"assist the State of California in efforts to develop and implement measures to avoid losses of juvenile anadromous fish resulting from unscreened or inadequately screened diversions on the Sacramento and San Joaquin Rivers, their tributaries, the Sacramento–San Joaquin Delta, and the Suisun Marsh.*" This applies to the Feather River, which is tributary to the Sacramento River.

2.3 Action Area

The project area is the area within the footprint of the proposed fish screen and associated staging area and access road. The project area boundary is located within the floodplain and bank of the Feather River in Sutter County (Figure 2-1 and 2-2). The project area extends along the west bank of the river near River Mile (RM) 28, east of Yuba City. The overall construction area includes approximately 100 feet of riverbank and extends about 35 feet into the Feather River channel (Figure 2-3). Figure 2-4 shows the overall site plan of the intake location. Figure 2-5 shows a cross section of the intake structure and facility.

The action area for this project includes all areas affected directly or indirectly by project construction and operation, including areas outside the immediate construction area. With in-river construction projects, the action area is defined downstream by any area that may be affected by elevated turbidity or sediment deposition. It is typical to define this area to the confluence of the river with another water body that would act to dilute any suspended sediment to immeasurable levels. For projects with pile-driving that may increase underwater noise, the action area can be defined both upstream and downstream from the pile-driving activity as the area where the generated noise may have physical or behavioral effects on a listed species.

For purposes of this assessment, the action area encompasses the Feather River channel from approximately 2500 feet upstream of the construction site to the confluence with the Sacramento River. This area represents the extent of anticipated aquatic effects (e.g., noise from pile driving and increases in suspended sediment and turbidity during construction, and potential changes in river flow and temperature during project operation).



06813.06 Yuba City Tiera Buena/ EA-1S/ (09-09) SS

ICF Jones & Stokes
an ICF International Company

Figure 2-1
Project Area and Regional Vicinity

06813.06 Yuba City Tiera Buena/ EA-IS/ (09-09) SS

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Figure 2-2
Project Access Route

06813.06 Yuba City Tiera Buena/ EA-IS/ (10-09) SS

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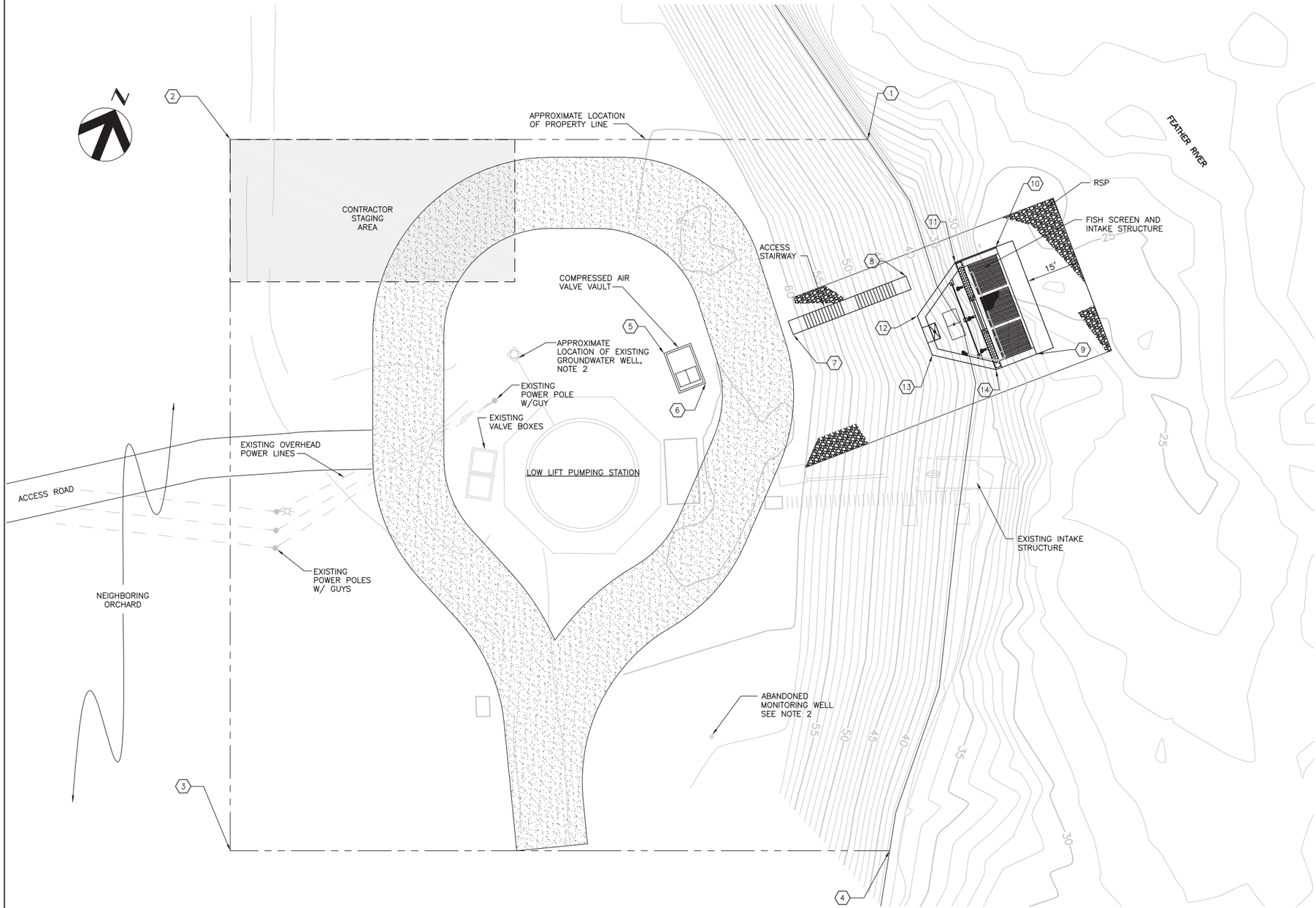
Figure 2-3
Limit of Construction Activity



OVERALL SITE PLAN

NOT TO SCALE

Source: HDR.

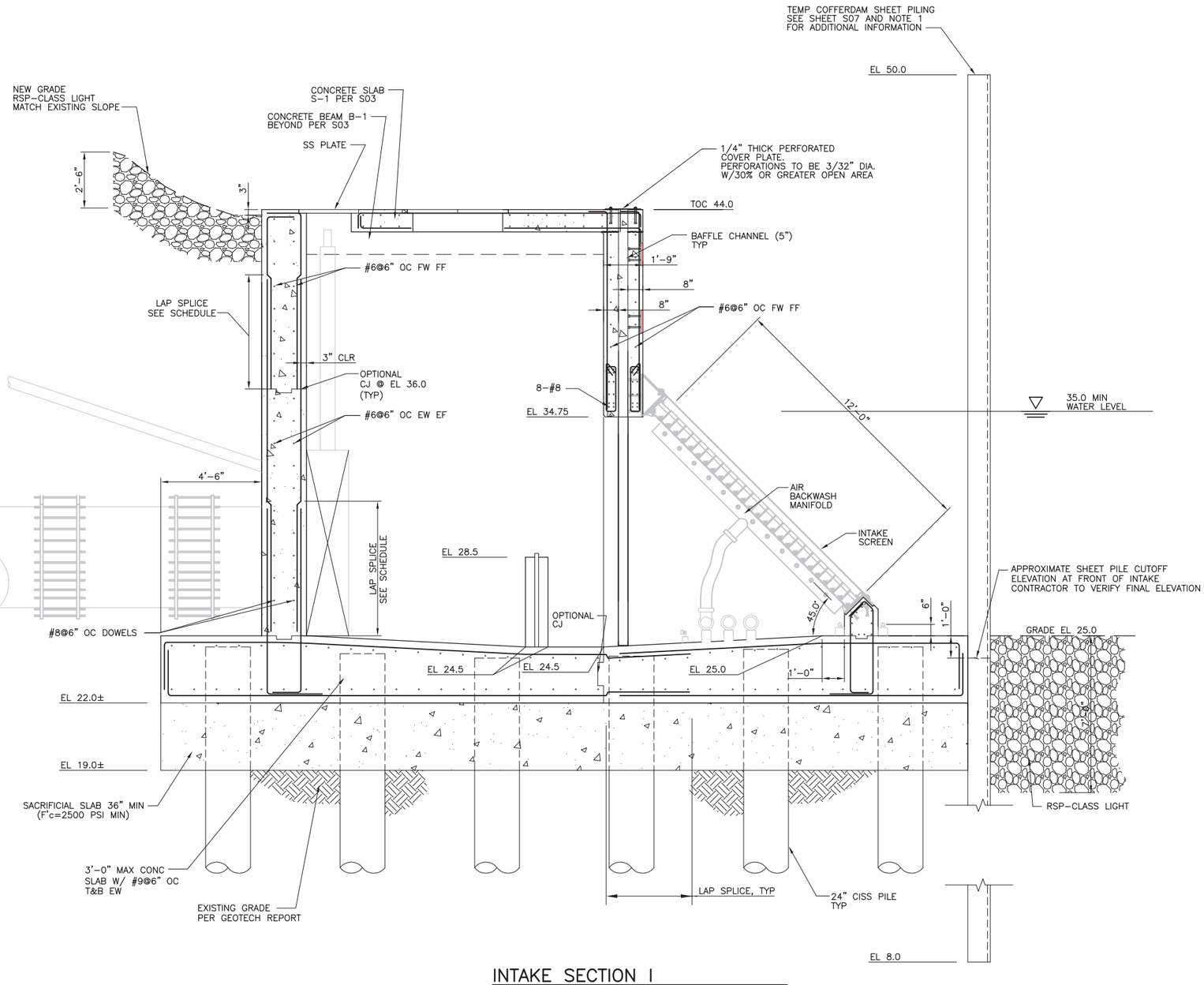
NOTES:

1. BENCHMARK:
   N: 2184786.5
   E: 6670264.1
   THE BENCH MARK USED FOR THIS PROJECT IS THE CLOSEST CONTROL POINT FROM THE MARCH 2005 KSN AERIAL SURVEY. IT IS BETWEEN THE RIVER AND THE LEVEE APPROXIMATELY 1230 FEET EAST OF THE PROJECT SITE.
2. CONTRACTOR IS RESPONSIBLE FOR PROTECTION OF MONITORING WELL AND GROUNDWATER WELL.
3. CITY WILL SURVEY AND STAKE PROPERTY PRIOR TO CONSTRUCTION. CONTRACTOR IS RESPONSIBLE FOR ON SITE SECURITY.
4. CONTRACTOR IS RESPONSIBLE FOR SEPARATING STAGING AREA AND CONSTRUCTION AREA. THE ACCESS ROADWAY WILL BE THE FINAL PART OF CONSTRUCTION AT WHICH POINT THE STAGING AREA CAN BE REDUCED.
5. CONTRACTOR IS RESPONSIBLE FOR DUST CONTROL PER SPECIFICATIONS.
6. ACCESS TO SITE WILL BE VIA 10TH STREET BRIDGE, SUTTER STREET, VON GELDERN WAY, SUMNER STREET SOUTH OF THE SITE, AND JUST NORTH OF HIGHWAY 20. SUMNER STREET LEADS TO A DIRT LEVEE ROAD WHICH PROVIDES DIRECT ACCESS TO THE SITE LOCATION. ACCESS ROUTE WILL BE SHOWN AT MANDATORY PRE–BID MEETING PER SPECS.

Pt.	NORTHING	EASTING
1	2185183.3	6671598.5
2	2185117.2	6671431.8
3	2184931.3	6671505.4
4	2184999.6	6671677.8
5	2185106.3	6671567.4
6	2185102.8	6671581.4
7	2185124.6	6671599.2
8	2185151.5	6671622.6
9	2185144.7	6671664.9
10	2185168.5	6671643.1
11	2185160.2	6671634.1
12	2185142.4	6671629.8
13	2185133.7	6671637.7
14	2185136.4	6671655.9

ICF Jones & Stokes
an ICF International Company

Figure 2-4
Overall Site Plan



INTAKE SECTION I

NOT TO SCALE

NOTES:

1. CONTRACTOR IS RESPONSIBLE FOR SHEET PILING EXTENT DESIGN. ELEVATION INDICATED IS FOR BIDDING PURPOSES ONLY.
2. REFER TO THE GEOTECHNICAL STUDY PREPARED BY AGS, INC. (JOB# KD0801), JUNE 2005 FOR SOIL INFORMATION AND DESIGN.

Source: HDR

06813.06 (11/08)

ICF Jones & Stokes
an ICF International Company

Figure 2-5
Intake Cross-Section

2.4 Project Construction Activities

The project would enhance fish passage conditions for salmonids in the Feather River consistent with the DFG and NOAA Fisheries anadromous fish screen criteria and achieve the identified water delivery needs of the City.

The design capacity of the proposed intake structure system is 48 mgd. This water would be used to meet municipal and industrial demands in the City's sphere of influence.

The project consists of the following components:

- A 48 mgd–capacity intake facility (screened intake structure) on the Feather River just upstream of the current unscreened intake;
- A 54-inch underground pipeline from the new intake structure to the LLPS;
- Removal of the existing traveling screen inside the existing LLPS structure;
- Improvements to the existing LLPS to support auxiliary equipment (i.e., air receivers and control panels for the air burst cleaning system, manifold piping) for the new fish screen and updated facade to protect equipment from the elements and vandalism;
- Removal of the existing unscreened intake; and
- Improvements to the existing road to enable access during winter months and storm events.

The construction staging area would be located immediately northwest of the LLPS, and would occupy approximately 0.07 acre (Figure 2-4).

2.4.1 Intake Structure

The intake structure would be located on the west bank of the Feather River, approximately 60 feet upstream from the current intake, on property owned by the City (Figure 2-3). Approximately 0.05 acre of the intake structure would be constructed on pilings and foundation material placed in the Feather River. An additional 0.12 acre of riprap erosion protection would be placed on the river bottom around the intake facility to protect against scour and erosion. The riprap would be 2.5 feet thick and would extend approximately 35 feet into the river from the ordinary high water mark (OHWM). Riprap would also extend approximately 25 feet upstream and 20 feet downstream beyond the intake facility. The intake structure is designed to accommodate the pumping of up to 48 mgd of water from the Feather River.

Access to the intake structure would be via concrete steps installed from the top of the river bank (elevation 60 feet) to the Intake Structure (elevation 41 feet).

2.4.1.1 Fish Screen

The intake structure would include a fish exclusionary system designed to meet the applicable screening requirements of the DFG and NOAA Fisheries. The species of concern in this reach of the Feather River include anadromous salmonids and green sturgeon. Protection of these species was included in the design of the fish screen.

A 1.75-millimeter (mm) fish screen with maximum approach velocity of 0.33 feet per second (fps) is included in the intake structure. The fish screen system includes an automated screen cleaning system. The fish screens are located flush on the face of the structure between approximately elevations 26 and 34 (above mean sea level [msl]). The fish screens are installed from the top of the structure through guide slots for screen bays. Solid panels are installed in the guide slots above the fish screens to the top of the structure.

A screen cleaning mechanism would be installed to allow continuous cleaning of the fish screens for regulatory and operational needs (Figure 2-5). An air burst cleaning system is proposed. This system includes air compressors, air receivers, and control panels. The air compressors would be located at the WTP site. The air receivers and control panels would be located in the existing LLPS pump room. The air compressor proposed is a 28 horsepower rotary screw compressor rated for 53 standard cubic feet per minute at 125 pounds per square inch (psi). A 1,500 gallon, 200 psi rated, air receiver is recommended.

Intake Structure Construction Methods

Cofferdam

The first step of constructing the intake structure would involve installation of a sheet pile cofferdam on the waterside of the riverbank along the outermost edge of the intake structure footprint. It is estimated that the construction of the cofferdam would take up to two weeks. Thirty seven sheet piles would be installed with both a vibratory and an impact hammer. Based on conservative estimates, it is expected that the majority (70%) of the sheet pile installation would be done with a vibratory hammer, but approximately 30% of the installation would require an impact hammer. Once completed, the cofferdam would be dewatered prior to the installation of intake structure foundation. It is estimated that 21 of the 37 sheet piles would be installed in the wetted river channel; the remainder would be driven on dry land. The sheet piling would extend to the top of the sloped soil bank.

A dewatering plan for the cofferdam area is being developed by the project engineers and may include pumping the water into the City's treatment system, discharging it to upland areas, or treating it on site to remove sediments and discharging it back into the river. The dewatering plan would comply with Clean Water Act (CWA) Section 401 and other applicable permit conditions. Fish salvage would occur during the cofferdam dewatering, as discussed in Appendix A.

The sheet pile training and support walls would support the fill on the riverbank that allows traffic to access the new structure. The front (river side) of sheet pile would be installed both upstream and downstream of the intake structure and would extend the overall length where the sand layer is hydraulically cut off from the river along the levee. Secondary rows of sheet piles would be included behind the front wall to serve as support walls for the deadmean anchor rods from the front wall. The excavations required to install this system would occur at the secondary support wall to allow the anchor rods to be attached to the support wall at the correct elevation. Excavation may also be required behind the lower secondary wall to accommodate the excavations in front of that wall. Granular backfill would be brought up to the lower anchor elevation, the deadmean anchor rods would be installed, and the backfill would progress upward.

Foundation

The proposed foundation for the intake structure is a pile foundation. Piers would be constructed by driving a total of sixteen 24-inch diameter cast-in-steel-shell (CISS) piles. Ten piles would be driven within the dewatered, in-channel section of the cofferdam and the remaining six piles would be driven within the bank section of the cofferdam. These piers would extend beneath the structure down into a hard clay layer. A tremie seal would be placed within the cofferdam, beneath the structure, and at the top of the piers. The bottom of this seal would be founded on the sand layer beneath the structure, but above the stiff to hard clays. After the piers are installed, the contractor would improve the sand layer inside the cofferdam to reduce liquefaction potential by jet grouting the entire area within the cofferdam above the clays and under the structure.

During design, a soil boring was taken from the riverbank adjacent to the proposed fish screen structure site. Based on the soil found, it is anticipated that each pile installation should take less than one hour (from the time the pile is placed at the specific location). Each CISS pile would be driven 30 feet below grade with an impact hammer. Approximately 50 to 75 blows per pile would be required for installation, and two piles will be installed per day. It would require approximately two weeks to drive all piles.

A 54-inch diameter, 112-foot long pipeline would be constructed from the intake structure to the LLPS. The pipe would be constructed of fabricated steel pipe (cement lined and cement mortar coated) and would be buried no more than 25 feet underground, beginning at the intake structure with an elevation of approximately 26 feet above msl and ending at the LLPS at an elevation of approximately 55 feet above msl. The alignment for the pipeline would be excavated from the bank of the river using an extended-arm excavator.

With the new fish screen, the existing traveling screen located inside the LLPS structure would no longer be needed. To make room for the new fish screen's air receiver, the existing traveling screen would be removed. The opening in the LLPS pump room, where the screen penetrated, would be sealed.

Once the intake is nearly complete, portions of the sheet piling would be removed to allow water to pass into the LLPS wet well sump.

After the new intake is connected to the LLPS, the existing unscreened intake piping would be removed from service. To minimize disruption to the river, the existing piping extending from the LLPS wet well sump to the Feather River would be abandoned-in-place. At the river end, the existing bar racks would be removed, wooden planks would be installed to cover the pipe opening, and the entire pipe would be tremied (filled with concrete underwater via pipe) full of concrete (starting from the wet well end) to plug the pipe. The wooden planks would be removed after the concrete fill has set.

2.4.2 Access Road

The proposed improvements to the access road west of the intake structure include changing the width of the road from 30 feet to 20 feet, and adding compacted aggregate base, geotextile filter fabric and additional culverts to facilitate drainage during high flow periods. This road would provide the only access to the LLPS and intake structure during construction and operation of the intake.

Construction equipment would include an excavator, backhoe, dump truck, and compactor. Flat bed trucks would be used to deliver 12-inch and 36-inch culverts, geotextile fabric and other equipment and supplies to the project site.

2.4.3 Access to Project Site

During construction, access to the project site would be via 10th Street Bridge (State Route 20 [SR 20]), south of the project site. Construction vehicles would exit SR 20 onto Sumner Street and then proceed on the levee road to the existing access road west of the intake and LLPS (Figure 2-2).

2.4.4 Construction Schedule

Construction is currently anticipated to begin in 2010 and would require approximately 12 to 15 months to complete, depending on river flow, weather conditions, and the time of year when the project is initiated. The in-river work would take place between July 1 and October 31. Depending on weather conditions and time of year, construction would run 5 days per week (Monday through Friday), approximately 10 hours per day. For example, anticipated hours during the summer would be from 6 a.m. to 4 p.m. Following are the key steps and their estimated duration:

- Complete proposed improvements to the access road—2 weeks (June 17–June 30);
- Prepare the site and install sheet piles to form cofferdam—2 weeks (July 1–July 15);

- Excavate cofferdam, install dewatering system, and cast sacrificial concrete slab inside cofferdam—2 weeks (July 15–July 30);
- Construct fish screen structure, install rip-rap, and construct pipeline to LLPS—to be completed by October 31;
- Cut and remove sheet piling from front of structure—to be completed by October 1;
- Install air compressor, air receiver, and controls for fish screen cleaning system. Test system and make functional—to be completed by November 15;
- Install and start-up temporary pumping system—March 1;
- Shut down existing LLPS and make modifications to pipes—March 1–April 15; and
- Remove remaining sheet piling—July 1–July 30.

2.5 Operation and Maintenance Activities

2.5.1 Operations

The City would continue to deliver its Feather River water via the LLPS. The City would continue to divert water from the Feather River as allowed for by right, as provided for in permits issued by the State Water Resources Control Board (State Water Board).

The City's base summer water supply is provided through a contract with Yuba County Water District (YCWD). Under this contract YCWD provides up to 4,500 acre-feet of water to Yuba City. Additionally, the City has a water supply contract for State Water Project (SWP) water with the DWR. This contract entitles the City to divert up to 9,600 acre-feet per year. Diversions would occur year-round, subject to the provisions of permits issued by the State Water Board. The City anticipates securing additional water entitlements up to the proposed intake's 48 mgd capacity. This ASIP discloses the potential effects of diverting up to 48 mgd at the new screened intake facility. However, depending on the specific details of new entitlements the City may obtain, additional environmental analysis and compliance may be necessary to disclose the effects of accessing those entitlements.

2.5.1.1 Intake Facility

The new intake structure facility and pipeline would allow the delivery of up to 48 mgd of water and would be capable of diverting water under all river hydraulic conditions. The screen face would be oriented parallel to the river flow and would extend into the river section to allow adequate water depth at the screen (2.4-foot minimum). The orientation would also allow suitable sweeping

flows across the screens, reduce the overall screen length needs, and reduce maintenance requirements.

Project Start-Up

Following construction, the intake structure and other project facilities would be operated in a start-up mode to facilitate testing of the equipment (e.g., air compressor and pipelines) and confirmation that the project is operational.

Sediment Management

Because the intake facility would be used under a wide range of river-flow conditions, there is potential for grit and sediment to enter the intake facility and pipelines. A sediment management system is necessary to minimize the deposition of suspended sediments in the system. Collecting sediment as it settles and immediately returning it to the river is considered the most practical and effective method of managing sediment deposition within the intake structure.

Sediment may be deposited in the forebay of the intake. Such deposits would need to be removed to keep the forebay clear and to keep approach velocities at the fish screen relatively uniform along all parts of the screen.

At most times, the diversion would be less than 2% of the total river flow. At times the diverted water would contain an appreciable amount of suspended sediment, reflecting the background turbidity in the river. To prevent sediment from entering the transmission pipeline where it could settle out and create an operator and maintenance problem, the intake would include a forebay structure designed to allow some sediment to settle out prior to the water entering the transmission system. The forebay settling structure is expected to capture relatively coarse sediments (sand totaling about one-third of the sediment passing through the fish screens).

The sediment that settles out in the forebay would be continuously removed by a gravity collection system that would move the settled sediment to sediment pumps that would return the sediment to the Feather River just downstream of the fish screens. The return flow depth would be at the same depth range as the fish screens, the depth at which the material was originally diverted.

No additional material would be introduced, and thus all returned sediment would be material suspended in the Feather River flow that would otherwise be part of the prevailing sediment load. The suspended sediment is only temporarily retained within the intake structure. The project is expected to create a suspended plume of sediment below the diversion structure that would quickly dissipate as material is diluted by river flow.

2.6 Environmental Commitments

The following measures have been adopted as part of the Proposed Action and would be incorporated into the construction and/or operations and maintenance specifications to address project-related impacts on environmental resources. Inclusion in the specifications will ensure their implementation.

2.6.1 Avoidance and Minimization

Avoidance and minimization measures are those project actions that will be implemented to avoid and minimize project-related impacts on ASIP-covered species and natural communities. These measures may include, but are not limited to, preconstruction surveys, avoiding occupied habitats, restricting the timing of in-channel activities, minimizing impacts on natural communities, installing protective fencing, and providing an on-site biological monitoring. Following are the proposed avoidance and minimization measures for covered species and natural communities.

2.6.1.1 Terrestrial Resources

Environmental Commitment BIO-1: Preconstruction Surveying and Avoidance of Sensitive Species and Habitat

Valley Elderberry Longhorn Beetle

To reduce potential impacts to elderberry shrubs and valley elderberry longhorn beetle (VELB), all elderberry shrub clusters within the riparian corridor in the vicinity of the proposed project will be surveyed by a qualified biologist and flagged to provide protection from construction activities. The City will also require that the construction contractor educate all contractors and workers at the site regarding the significance of the elderberry shrubs, the need to avoid damaging shrubs, and the possible penalties involved should the shrubs be impacted.

VELB mitigation also includes daily monitoring and weekly reporting during construction activities along the Feather River. As discussed under Conservation Measures to protect Air Quality, the City will also develop and implement a fugitive dust control plan and implement other best management practices (BMPs) and techniques to minimize dust measures in the construction area.

Bald Eagle, Swainson's Hawk, White-Tailed Kite, Loggerhead Shrike, and Tricolored Blackbird

Surveys for Bald Eagle, Swainson's hawk, and White-Tailed Kite nests will be conducted in all suitable nesting habitat within a one-half mile radius of the project area. Surveys for loggerhead shrike nests and tricolored blackbird colonies will be conducted in all suitable nesting habitat within 200 feet of the

project area. These surveys will take place one week prior to the start of construction activities. Should any nesting sites for Bald Eagle, Swainson's hawk, and White-Tailed Kite be found within a one-half mile radius, or loggerhead shrike or tricolored blackbird nests/colonies be found within a 200 feet radius of the project area during the survey, DFG will be contacted regarding the appropriate actions to be taken (in accordance with DFG standards). Trees containing active nests (i.e., a nest currently in use) will be marked for avoidance until after the young birds have fully fledged. Open agricultural fields, grasslands, and alfalfa fields in adjacent areas identified as potential Swainson's hawk foraging habitat should be avoided.

2.6.1.2 Aquatic Resources

Environmental Commitment BIO-2: Minimize Entrainment of Juvenile Fish

The City's plans for the proposed project include a fish screen that would be designed to meet DFG (2000b) and NOAA Fisheries (1996; 1997a) requirements of 1.75 mm slot size and 0.33 fps approach velocity to conform to salmonid fry criteria.

Environmental Commitment BIO-3: Implement Construction Period Limits

In-channel construction, including riverbank and channel bed construction below the ordinary high-water mark (OHWM), will be limited to the summer low-precipitation period (July 1 to October 31) to reduce the likelihood of adverse effects on fish spawning, rearing, and migration. Project construction in the channel will also be subject to the following constraints:

Construction requiring channel dewatering, or work in the channel bed will not start before July 1. Upstream passage for fish will be provided through or around the construction site at all times. A cofferdam will be installed in the river to divert streamflow around the construction area of the new fish screen. Limiting in-channel construction to the July 1 to October 31 period would avoid the primary juvenile salmonid rearing and emigration period and the spawning and early rearing periods of other special-status species.

Environmental Commitment BIO-4: Employ Noise-Reduction Measures to Minimize Noise Impacts on Special-Status Fish Species

Potential injury and mortality associated with pile driving will be avoided or minimized by implementing the following noise-reduction measures:

- In-channel construction, including riverbank and channel bed construction below the OHWM, will be limited to the summer low-flow period (July 1–October 31) to reduce the likelihood of adverse effects on juvenile salmonids.
- A cofferdam will be installed around the in-channel construction area, which would be dewatered before additional pile driving and/or construction activities. Once the outer sheet piling is completed, fish would not have access to the construction site, and underwater sounds produced by pile driving would be attenuated.
- The number and size of piles will be limited to the minimum necessary to meet the engineering and design requirements of the project.
- The smallest pile driver and minimum force necessary will be used to complete the work.
- Vibratory hammers will be used whenever feasible.

Environmental Commitment BIO-5: Avoid Stranding Impacts to Fish in Dewatered Areas

A qualified fish biologist shall be on site during the installation of cofferdams and during the cofferdam dewatering process to remove any trapped salmonids and other fish from the cofferdam. The fish will be relocated to suitable habitat upstream of the work area. Protocols for the capture, handling, and release of fish would be developed in cooperation with NOAA Fisheries, DFG, and the City. Fish biologists will contact NOAA Fisheries and DFG immediately if any steelhead, Chinook salmon, or green sturgeon are found dead or injured.

Environmental Commitment BIO-6: Evaluate Performance of New Fish Screen

The City shall evaluate the performance of the newly constructed fish screen to ensure that the fish screen and pumping plant are operated and maintained in accordance with acceptable fish screen performance criteria. The following steps shall be followed prior to full operation of the facility to ensure proper operation.

- A draft hydraulic plan will be submitted to NOAA Fisheries before completion of the project. The plan shall outline in detail a proposed methodology for monitoring the performance of the fish screen to ensure the protection of juvenile salmonids, as outlined in the Guidelines for Developing Post-Construction Evaluation & Assessment Plans, and Operations & Maintenance Plans (Guidelines).
- A draft operations and maintenance plan shall be developed and submitted to NOAA Fisheries before operations of the pumping plant are initiated. The plan shall act as a manual for operating and maintaining the pumping plant and fish screen in accordance with the Guidelines.

- An operations and maintenance log shall be maintained by the City on a daily basis. The log shall be made available for inspection by NOAA Fisheries personnel with 24 hours notice given to the City.
- The City shall curtail diversion to the greatest extent possible when any portion of the fish screen structure is damaged or removed for maintenance or repair, which would allow unscreened fish to pass.

2.6.1.3 Water Quality

Environmental Commitment HWQ-1: Prepare a Stormwater Pollution Prevention Plan

To address potential water quality impacts during construction, the City or its contractor will prepare a stormwater pollution prevention plan (SWPPP) acceptable to the RWQCB. The construction contractor hired by the City will be responsible for implementing the BMPs identified in the plan as well as daily monitoring and weekly reporting on the effectiveness of the measures. To minimize the mobilization of sediment to adjacent water bodies, the following BMPs will be included in the SWPPP, to be included in the construction specifications and project performance specifications, based on standard City measures and standard dust-reduction measures. The following erosion and sediment control BMPs are examples that may be included in the SWPPP:

- Cover or apply nontoxic soil stabilizers to inactive construction areas (previously graded areas inactive for 10 days or more) that could contribute sediment to waterways.
- Enclose and cover exposed stockpiles of dirt or other loose, granular construction materials that could contribute sediment to waterways.
- Control and contain soil and filter runoff from disturbed areas. This will be done by using berms, silt fencing, straw bales or wattles, plastic sheeting or geofabric, silt/sediment traps and catch basins, silt fencing, sand bag dikes, temporary vegetation or other groundcover, or other means necessary to prevent the escape of sediment from the disturbed area.
- Ensure that no earth or organic material shall be deposited or placed where it may be directly carried into a stream, marsh, slough, lagoon, or body of standing water.

Final selection of BMPs will be subject to review by the City. The City will verify that a notice of intent (NOI) and a SWPPP have been filed before allowing construction to begin. The City or its agent shall perform routine inspections of the construction area to verify that the BMPs specified in the SWPPP are properly implemented and maintained. The City will notify Contractors immediately if there is a noncompliance issue and will require compliance.

Environmental Commitment HWQ-2: Obtain General Dewatering Permit and Follow Dewatering Provisions

Dewatering of the project area in the Feather River would likely require a General Dewatering Permit issued by the Regional Water Quality Control Board (RWQCB). The RWQCB has also adopted a General Order for Dewatering and Other Low Threat Discharges to Surface Waters (General Dewatering Permit). To obtain coverage, the City will submit a NOI and a Pollution Prevention and Monitoring Program (PPMP). The PPMP must include a description of the discharge location, discharge characteristics, primary pollutants, receiving water, treatment systems, spill prevention plans, and other measures necessary to comply with discharge limits. A representative sampling and analysis program will be prepared as part of the PPMP and implemented by the applicant, along with record keeping and quarterly reporting requirements during dewatering activities.

2.6.1.4 Hazardous Materials

Environmental Commitment HAZ-1: Prepare a Spill Prevention and Control and Countermeasure Plan

The City will minimize the potential for hazardous materials release into the proposed project area by preparing or requiring the construction contractor to prepare a spill prevention/containment plan (SPCCP) prior to the start of construction. The SPCCP will require approval from the State Water Board prior to implementation of the proposed project, and will require trained staff familiar with implementation of the plan requirements in case of a spill. With the implementation of the plan, the City would anticipate a less than significant impact from the accidental release of hazardous materials. Additionally, the SPCCP will require gas powered generators to be located a minimum of 100 feet from water sources to minimize the potential for spills into the Feather River. The SPCCP will be completed before any construction activities begin and the City will review and approve the SPCCP before onset of construction activities. The City will routinely inspect the construction area to verify the measures specified in the SPCCP are properly implemented and maintained. The City will notify its Contractors immediately if there is a noncompliance issue and will require compliance.

The federal reportable spill quantity for petroleum products, as defined in 40 CFR 110, is any oil spill that:

- violates applicable water quality standards,
- causes a film or sheen on, or discoloration of, the water surface or adjoining shoreline, or
- causes a sludge or emulsion to be deposited beneath the surface of the water or adjoining shorelines.

If a spill is reportable, the Contractor's superintendent will notify the City, and the City will take action to contact the appropriate safety and cleanup crews to ensure the SPCCP is followed.

A written description of reportable releases must be submitted to the RWQCB. This submittal must contain a description of the release, including the type of material and an estimate of the amount spilled, the date of the release, an explanation of why the spill occurred, and a description of the steps taken to prevent and control future releases. The releases shall be documented on a spill report form.

If an appreciable spill has occurred and results determine that project activities have adversely affected surface water or groundwater quality, a detailed analysis shall be performed to identify the likely cause of contamination, and recommendations shall be made for reducing or eliminating the source or mechanisms of contamination. Based on this analysis, the City and its Contractors will select and implement measures to control contamination, with a performance standard that surface and/or groundwater quality must be returned to baseline conditions. These measures will be subject to approval by the City.

Implementation of measures to avoid or minimize the effects of increased sediment input would also avoid and minimize increased input of pollutants associated with sediments (e.g., mercury) and the potential for subsequent effects on biological and human resources.

2.6.1.5 Environmental Training

Environmental Commitment ENV-1: Conduct an Environmental Training Program for Project Personnel

The City will inform field management and construction personnel of the need to avoid and protect resources. Communication efforts will occur at preconstruction meetings so that construction personnel are aware of their responsibilities and the importance of compliance.

Construction personnel will be educated on the types of sensitive resources located in the project area and the measures required to avoid impacts on these resources. They will attend an environmental training program before groundbreaking activities associated with the proposed project are initiated. Materials covered in the training program will include environmental rules and regulations for the proposed project and requirements for limiting activities to the construction right-of-way/footprint and avoiding demarcated sensitive resources areas.

Training seminars will be held to educate construction supervisors and managers on:

- the need for resource avoidance and protection,

- construction drawing format and interpretation,
- staking methods to protect resources,
- the construction process,
- roles and responsibilities,
- project management structure and contacts,
- environmental commitments, and
- emergency procedures.

2.7 Monitoring

The Yuba City Feather River Intake Screen project requires several types of monitoring related to ASIP conservation measures. The City and Reclamation are responsible for implementing the project's ASIP monitoring plan described below. The primary purposes of this monitoring are to:

- Identify the occurrences of ASIP-covered species and ASIP-covered species habitat under preproject conditions;
- Ensure that ASIP-covered species are not affected by construction;
- Document the implementation and effectiveness of ASIP conservation measures; and
- Collect data needed to support development and implementation of more effective ASIP conservation measures.

Monitoring implementation and effectiveness of conservation measures is required as part of the environmental commitments. Monitoring assesses consistency with the terms and conditions of the project's permits. The types of compliance monitoring are described in the following sections.

2.7.1 Preconstruction Surveys

Preconstruction surveys would be conducted before implementation of ASIP-covered activities and project conservation measures that have footprint impacts. The City and Reclamation would l be responsible for implementing conservation measures related to performing preconstruction surveys in and adjacent to the footprint of covered activities and project conservation measures to determine whether covered species are, or could be, present and affected. The purpose of preconstruction surveys is to avoid or minimize construction-related impacts on covered species. All preconstruction monitoring would be conducted by qualified biologists.

Survey results would be used to determine site-specific project conservation measures that would need to be implemented to avoid, minimize, and mitigate

impacts on ASIP-covered species and natural communities. For example, preconstruction surveys for Swainson's hawk (i.e., Mitigation Measure SWHA1-Conduct Preconstruction Surveys to Locate Swainson's Hawk Nest Sites) would be used to determine whether nesting or roosting Swainson's hawks occur in or adjacent to the project footprint. If they are present, the other mitigation measures relate to Swainson's hawk (i.e., Mitigation Measure SWHA2-Minimize Construction Related Disturbances within ½-Mile of Active Nest Sites; Mitigation Measure SWHA3-Avoid Removal of Occupied Nest Sites; Mitigation Measure SWHA4-Replace Lost Foraging and Nesting Habitat) would l be implemented. If Swainson's hawk nests are not observed during preconstruction surveys, the additional conservation measures listed above would not need to be implemented.

Preconstruction survey methods, including survey timing, for each covered species are described in Chapter 5. Additional detailed preconstruction survey protocol would be developed, as appropriate, through coordination with the USFWS, NOAA Fisheries, and DFG.

2.7.2 Construction Monitoring

Construction monitoring would be conducted to monitor implementation of ASIP-covered activities and project conservation measures that have footprint impacts and to ensure that the applicable avoidance and minimization conservation measures identified in this ASIP, and during preconstruction surveys, are implemented. Construction monitoring would be required if results of preconstruction surveys indicate that covered species could be affected by covered activities or implementation of project conservation measures.

The implementation of ASIP-covered activities and project environmental commitments would be monitored to ensure that measures required to avoid and minimize impacts on covered species are appropriately implemented. Construction monitoring of natural communities is not proposed under this ASIP.

All construction monitoring would be conducted by qualified biologists. These construction monitors would document and ensure that the responsible entity implements the required avoidance and minimization measures (e.g., protection fencing is installed around sensitive habitats to be protected).

2.7.3 Performance Monitoring

Performance monitoring would be conducted for habitat created specifically for ASIP-covered species (e.g., riparian habitat), to confirm development of intended ecological functions and values. Information collected through performance monitoring would be used to determine whether changed circumstances exist and the need for implementing remedial measures. In addition, performance monitoring would provide information that may help improve enhancement, creation, and restoration techniques.

Performance indicators are the variables that would be quantitatively measured over time to determine whether enhanced, created, or restored habitats have successfully met the project's biological goals and objectives. Success criteria established for each performance indicator are the minimum requirements needed to achieve biological goals and objectives. Achieving the success criteria indicates that the mitigation measures have successfully replaced the functions and values of the natural communities affected by covered activities. Remedial measures must be implemented if the success criteria are not achieved within the performance period indicated for each applicable conservation measure.

Performance monitoring would be conducted by qualified biologists and ecologists. Detailed monitoring protocol will be developed through coordination with the USFWS, NOAA Fisheries, and DFG.

2.8 Reporting

The City would prepare quarterly monitoring reports. The quarterly monitoring reports summarize the previous quarter's monitoring results and would be completed 4 weeks following the end of the quarter. Reports would be submitted to the California Bay-Delta Authority (CBDA) and the resource agencies.

Monitoring reports would include:

- A description of ASIP-covered activities implemented during the reporting period;
- A description of habitat protection, enhancement, and restoration conservation measures implemented during the reporting period;
- A year-to-date summary of impacts of ASIP-covered activities and conservation measures on covered species and natural communities
- A description of avoidance, minimization, and mitigation conservation measures implemented to address impacts of ASIP-covered activities and conservation measures;
- A description of performance monitoring undertaken during the reporting period, an analysis of monitoring results, and a description of remedial actions undertaken during the reporting period;
- An assessment of the efficacy of the monitoring program and recommended changes to the program, based on interpretation of monitoring results and research findings;
- An assessment of the efficacy of habitat enhancement and restoration methods in achieving performance objectives and recommended changes to improve the efficacy of enhancement and restoration methods;
- An assessment of the appropriateness of performance indicators and objectives, based on results of performance monitoring, and recommended changes to performance indicators and objectives; and

- Recommendations for modifying and improving the efficacy of conservation measures.

2.9 Integrating Monitoring Results into the CALFED Monitoring Program

Monitoring of project conservation measures would be developed through coordination with the City, Reclamation, USFWS, NOAA Fisheries, and DFG. Monitoring results would be reported back to the CBDA for tracking compliance of CALFED projects with the ESA, CESA, and NCCPA. Monitoring results would also provide information to improve habitat restoration and protection methods for other CALFED projects.

Chapter 3

Approach to Impact Assessment and Development of Conservation Measures to Avoid, Minimize, and Compensate for Impacts

3.1 Baseline for Endangered Species Act Consultation

The environmental baseline is defined as the existing pre-project environmental conditions that are used to assess effects of the proposed project on covered species, habitats, and communities in this ASIP. Existing conditions include the status of the species, habitats, and associated environmental conditions. The environmental baseline under Section 7 of the ESA includes "the past and present impacts of all Federal, State, or private actions and other human activities in the action area, the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal or early Section 7 consultation, and the impact of State or private actions which are contemporaneous with the consultation in process."

Under baseline conditions for ESA consultation, the existing intake would remain unscreened and the City would continue to divert water consistent with its current needs and permit conditions.

Impacts from construction and operation of the proposed project are not likely to result in take of endangered species. However, temporary impacts could result during construction and consultation is required under Section 7 of the ESA. Placement of a new fish screen on the City's intake structure would actually help to protect listed salmonids in the area.

Construction activities associated with temporary cofferdam construction may result in the removal, disturbance, modification, or replacement of channel bottom and channel bank substrates. Although construction activities are unlikely to remove or disturb substantial aquatic and riparian vegetation, reestablishment of vegetation will be prevented in the construction footprint. Organisms on the channel bottom and bank may be removed or crushed during grading and placement of riprap. Local noise, physical movement, and vibration may cause temporary movement of individuals or permanent loss of nestlings from adjacent habitat.

During cofferdam construction, petroleum products associated with construction equipment may be spilled, and sediment may become suspended. These contaminants may adversely affect organisms in the channel, causing mortality from acute toxicity and suffocation of fish eggs and sessile organisms.

3.2 Impact Mechanisms

Impact mechanisms, or effects, are those actions affecting biological resources in the project study area. Impact mechanisms can be direct, indirect, or cumulative. Direct and indirect impacts on ASIP-covered species and natural communities are assessed in Chapters 4 and 5. Cumulative impacts are assessed in Chapter 6.

Direct impacts (effects) are caused by project actions and occur at the time of the action. Direct effects for the project include ground-disturbing activities, channel- and channel bed–disturbing activities associated with intake and fish screen construction. Rip-rap of the shoreline and construction of the temporary coffer dam have the potential to affect habitat for ASIP-covered species and natural communities. Direct impacts are considered temporary (impacts that last less than 1 year).

Indirect impacts (effects), as defined by the USFWS, are "those that are caused by the proposed action and are later in time, but are still reasonably certain to occur" (50 CFR 402.02). Indirect effects are caused by project actions but occur later in time and are reasonably certain to occur.

Project effects are also defined as short-term or long-term. *Short-term effects*, which are related primarily to construction activities (e.g., pile driving), may last several hours to several weeks. *Long-term effects* may last months or years and generally involve physical alteration of the project site or downstream habitat conditions through construction and operation of project facilities.

Cumulative impacts (effects), as defined by the USFWS, "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." (U.S. Fish and Wildlife Service and National Marine Fisheries Service 1998.)

The following chapters describe the impact mechanisms and affected environmental conditions for the project elements, including construction of the screened intake and operation of the fish screen. The changes in environmental conditions described here are the basis for the assessment of impacts on NCCP communities and ASIP-covered species, which are described in Chapters 4 and 5.

The assessment of impacts considers the occurrence and potential occurrence of species relative to the magnitude, timing, frequency, and duration of project

activities, including construction and operation of the intake in the Feather River. The assessment links project actions to changes in environmental correlates, where environmental correlates are environmental conditions or suites of environmental conditions that individually or synergistically affect the survival, growth, fecundity, or movement of an ASIP-covered species.

The methods used to assess project-related impacts on NCCP communities and ASIP-covered species are described in Chapters 4 and 5.

Chapter 4

Natural Community Assessment and Conservation Measures

4.1 Introduction

ASIP-covered NCCP communities in the project area include valley riverine aquatic, valley/foothill riparian, and upland cropland. These communities have been designated as land cover types that occur in the project area. This chapter describes the status of each ASIP-covered NCCP community, the impacts of the project on each NCCP community, and the conservation measures that will be implemented to avoid, minimize, and compensate for each impact. In addition, this chapter describes the extent, function, values, and special-status species associated with each NCCP community that could be affected by the project.

ASIP conservation measures were derived from the MSCS conservation measures (CALFED Bay-Delta Program 2000). The ASIP conservation measures are consistent with the MSCS programmatic conservation measures for NCCP communities. This chapter also describes the expected outcome of implementing the project and conservation measures and how the CALFED Program has contributed to the conservation of each ASIP-covered NCCP community.

4.1.1 Definition of Study Area and Project Area

As described in Section 1.3, Terminology, *study area* refers to the area covered by the USGS 7.5-minute quadrangle (Yuba City) that was surveyed as part of the CNDDB search and includes those areas in which the City performed vegetation mapping and wildlife and botanical surveys.

Project area refers to the area within the footprint of the proposed fish screen and associated staging areas and haul roads. The project area is located within the floodplain and bank of the Feather River in Sutter County (Figures 2-1 through 2-4). The project area extends along the west bank of the river near RM 28, east of Yuba City. The overall construction area includes approximately 100 feet of riverbank and extends about 35 feet into the Feather River channel.

The *action area* would also include the segment of the river affected by noise and movement of materials or sediment downstream during construction and

operation. For purposes of this assessment, the action area encompasses the Feather River channel from approximately 2,500 feet upstream of the construction site to the confluence with the Sacramento River. This area represents the extent of anticipated aquatic effects (e.g., noise from pile driving and increases in suspended sediment and turbidity during construction, and potential changes in river flow and temperature during project operation).

Access to the construction area would be along an existing unpaved road that runs east/west through an orchard to the LLPS. Use of the existing access road would not affect aquatic resources or other native vegetation.

4.1.2 Natural Community Surveys

Reconnaissance level surveys were performed by Jones & Stokes biologists in Spring 2007. NCCP communities were mapped within, and in the vicinity of, the project area. NCCP communities were mapped directly onto aerial photographs of the area and acreages were calculated using GIS software.

4.2 Relationship to the CALFED Programmatic EIS/EIR

As described in Chapter 1, the following five documents establish the CALFED Program's compliance with the ESA, CESA, and the NCCPA:

- MSCS,
- USFWS Programmatic BO,
- NOAA Fisheries Programmatic BO,
- Programmatic NCCP Determination, and
- Conservation Agreement.

The MSCS is a technical appendix to the Programmatic EIS/EIR that explains how the CALFED Program will meet the requirements of the ESA, CESA, and the NCCPA. The MSCS was used to provide guidance for developing mitigation for the impacts of the project on ASIP-covered species and NCCP communities. The project EA and ASIP each stand alone and include an independently developed analysis of the impacts of the project and avoidance, minimization, and compensation measures to mitigate those impacts.

The MSCS conservation measures include measures to avoid, minimize, and compensate for the impacts of the CALFED Program project actions. A compensation conservation measure is a type of mitigation measure that replaces an affected resource value (e.g., restoring NCCP communities affected by a project action).

Mitigation measures presented in this ASIP are consistent with the following programmatic conservation measures in the MSCS:

- ASIP contents necessary to meet the requirements of the Programmatic BOs and NCCP Determination and
- Conservation measures to avoid, minimize, and compensate for impacts on ASIP-covered species and NCCP communities.

Specific conservation measures for affected NCCP communities are listed in the appropriate resource sections in this chapter.

4.3 ASIP-Covered NCCP Communities

The following sections provide an assessment of project impacts on ASIP-covered NCCP communities and identify conservation measures for these communities. The assessment of project impacts for each community includes:

- the current status of the communities in the study area,
- a description of the direct and indirect impacts of the project on the communities,
- conservation measures for each community,
- a description of the objectives to fulfill the conservation measures for each community, and
- a description of the expected outcome of implementing the project and conservation measures for the communities.

4.3.1 Valley Riverine Aquatic

4.3.1.1 Status in the Study Area

Valley riverine aquatic habitat, as defined by the CALFED Bay-Delta Program, includes:

> "the water column of flowing streams and rivers in low-gradient channel reaches below an elevation of approximately 300 feet that are not tidally influenced. This includes associated SRA…Valley riverine aquatic habitat includes portions of the ERP riparian and riverine aquatic habitat."

Valley riverine aquatic habitat in the project area consists of the Feather River and associated shaded riverine aquatic (SRA) habitat. Approximately 0.10 acre of valley riverine aquatic habitat occurs in the project area. Valley riverine aquatic habitat is considered jurisdictional waters of the United States under Section 404 of the CWA.

Valley riverine aquatic habitat in the project area provides habitat for anadromous and other fish species and western pond turtle. The river also provides foraging habitat for numerous other fish and wildlife species. The associated overhead cover SRA habitat (i.e., riparian habitat) is described under Section 4.3.2, Valley/Foothill Riparian.

4.3.1.2 Project Impacts

Permanent and temporary disturbance of valley riverine aquatic habitat would occur during construction of the project. Permanent impacts include the permanent loss of open water because of the construction of permanent structures in the river. A total of 0.05 acre would be permanently affected by the project. Temporary impacts include the placement of coffer dams or sheet piles and dewatering during the construction period. A total of 0.10 acre would be temporarily affected by the project. An area up to 891 meters upstream and downstream of aquatic habitat would be affected by noise from pile driving and areas downstream by increases in suspended sediment and turbidity during construction and operation.

The project would also result in the permanent loss of approximately 50 linear feet of SRA overhead cover habitat due to the removal of riparian vegetation in the project area.

4.3.1.3 Mitigation Measures

The following mitigation measures have been developed to avoid, minimize, and compensate for impacts on valley riverine aquatic habitat.

Mitigation Measure VRAQ1—Avoid and Minimize Disturbance of Valley Riverine Aquatic Habitat

To the extent possible, the City will avoid and minimize impacts on the valley riverine aquatic habitat by minimizing the size of the in-water work areas, minimizing the removal or pruning of riparian vegetation, and by implementing the environmental commitments listed in Chapter 2.

Mitigation Measure VRAQ2—Compensate for Loss of Valley Riverine Aquatic (Open Water) Habitat

The City will compensate for the permanent loss of up to 0.05 acre of valley riverine aquatic habitat caused by construction of the project at a ratio of 2 acres for each acre affected, for a total of up to 0.1 acres. The City will purchase the valley riverine aquatic habitat as mitigation credits from an approved mitigation bank in the project vicinity or compensate on site.

Mitigation Measure VRAQ3—Compensate for Loss of Valley Riverine Aquatic (Overhead SRA) Habitat

The City will compensate for the permanent loss of up to 50 linear feet of riparian habitat that provides overhead SRA cover habitat at a ratio of 2 linear feet for each linear foot affected, for a total of up to 100 linear feet. The City will purchase the valley riverine aquatic habitat as mitigation credits from an approved mitigation bank in the project vicinity or compensate on site.

This mitigation is consistent with the following MSCS conservation measures for valley riverine aquatic habitat (CALFED Bay-Delta Program 2000a)

4.3.1.4 ASIP Conservation Measures

ASIP conservation measures for valley riverine aquatic habitat are discussed below.

Conservation Measure VRAQ-1—Implement Mitigation Measure VRAQ1

Implementation of this conservation measure is consistent with the following MSCS programmatic conservation measure for valley riverine aquatic habitat (CALFED Bay-Delta Program 2000).

Avoid or minimize disturbance to existing shaded riverine aquatic overhead cover.

Conservation Measure VRAQ-2—Implement Mitigation Measure VRAQ2

Implementation of this conservation measure is consistent with the following MSCS programmatic conservation measure for valley riverine aquatic habitat (CALFED Bay-Delta Program 2000).

Avoid or minimize disturbance to existing shaded riverine aquatic overhead cover.

Restore or enhance 1–3 times the linear footage of affected shaded riverine aquatic overhead cover near where the impacts occurred.

Conservation Measure VRAQ-3—Implement Mitigation Measure VRAQ3

Implementation of this conservation measure is consistent with the following MSCS programmatic conservation measure for valley riverine aquatic habitat (CALFED Bay-Delta Program 2000).

Restore or enhance 1–3 times the linear footage of affected shaded riverine aquatic overhead cover near where the impacts occurred.

Implementation of Conservation Measures VRAQ-1, VRAQ-2, and VRAQ-3 will fully mitigate impacts of the project on valley riverine aquatic habitat, and no additional conservation measures are required.

4.3.1.5 Expected Outcomes

Implementation of ASIP Conservation Measures VRAQ-1, VRAQ-2, and VRAQ-3 achieves the ASIP goal of avoidance, minimization, and compensation for adverse impacts of project actions on valley riverine aquatic communities. Implementation of these conservation measures will help ensure that the existing functions and values of valley riverine aquatic habitat in the project area are maintained.

4.3.2 Valley/Foothill Riparian Community

4.3.2.1 Status in the Study Area

The NCCP valley/foothill riparian community in the study area consists of riparian woodland and riparian scrub. Valley/foothill riparian communities are assumed to be nonjurisdictional (i.e., not regulated under Section 404 of the CWA). Riparian habitat has been designated by DFG as a habitat of special concern in California because of its limited abundance and high value to wildlife.

Riparian habitat in the study area occurs on the banks and floodplain of the Feather River. The section of river bank within the project footprint is lined with a layer of existing rock revetment. Approximately 0.05 acre of riparian habitat occurs on the river bank in the LLPS project area. This riparian habitat is comprised of a mature cottonwood tree and riparian scrub vegetation along the riverbank.

Riparian habitat also occurs on adjacent sections of the river bank. Riparian vegetation includes Fremont's cottonwood (*Populus fremontii*), Gooding's willow (*Salix gooddingii*), valley oak (*Quercus lobata*), and box elder (*Acer negundo*). Elderberry shrubs occur within the riparian habitat.

Overstory trees may be used for nesting and roosting by numerous raptors and also provide suitable habitat for other birds, such as herons, egrets, and numerous songbirds. Riparian habitat provides important nesting and foraging cover for resident, migratory, and wintering songbirds. In addition, riparian vegetation provides habitat for several species of mammals. Riparian habitat also provides SRA overhead and instream cover.

4.3.2.2 Project Impacts

Permanent and temporary disturbance of valley foothill riparian habitat would occur during construction of the project. Permanent impacts include the removal of approximately 0.05 acre of riparian vegetation from the river bank in the project area.

As described under Section 4.4.1, Valley Riverine Aquatic Community, the project would also result in the permanent loss of approximately 50 linear feet of SRA overhead cover habitat due to the removal of riparian vegetation in the project area.

4.3.2.3 Mitigation Measures

The mitigation measures to avoid, minimize, and compensate for potential impacts on riparian habitat are described below.

Mitigation Measure VFRC1—Avoid and Minimize Disturbance of Riparian Habitat

To the extent possible, the City will avoid and minimize impacts on riparian habitat. The City will include the following measures in the project construction conditions to minimize indirect impacts on riparian habitat and on special-status plants that may occur in this community.

- The City will provide a biologist/environmental monitor who will be responsible for monitoring implementation of the conditions in the state and federal permits (CWA Section 401, 402, and 404; ESA Section 7; Fish and Game Code Section 1601; Fish and Game Code Section 2080; project plans [SWPPP]).
- The biologist/environmental monitor will determine the location of environmentally sensitive areas in and adjacent to the project area based on mapping of existing land cover types and special-status plant species. To avoid construction-phase disturbance to sensitive habitats immediately adjacent to the project area, the monitor will identify the boundaries of sensitive habitats and add a 50-foot buffer, where feasible, using orange construction fencing. The fencing will be mapped on the project designs. Erosion-control fencing will also be placed at the edges of construction

where the construction activities are upslope of wetlands and channels to prevent washing of sediments offsite. The ESA and erosion-control fencing will be installed before any construction activities begin and will be maintained throughout the construction period.

- The biologist/environmental monitor will ensure the avoidance of all sensitive habitat areas during construction operations.
- The City will provide a worker environmental training program for all construction personnel prior to the start of construction activities. The program will educate workers about special-status species and riparian habitats present on and adjacent to the site and also about the regulations and penalties for unmitigated impacts on these sensitive biological resources.
- Where feasible, construction will avoid removal of woody vegetation by trimming vegetation to approximately 1 foot above ground level.
- Following construction, the construction contractor will remove all trash and construction debris and implement a revegetation plan for temporarily disturbed vegetation in the construction zones. The elements that should be included in the revegetation of these sites are described in Mitigation Measure VFCR-2.

Mitigation Measure VFRC2—Compensate for Temporary and Permanent Loss of Riparian Habitats

The City will compensate for the permanent loss of up to 0.05 acre of riparian habitat associated with LLPS construction. The City will purchase the valley foothill riparian habitat as mitigation credits from an approved mitigation bank in the project vicinity or restore or enhance in-kind riparian habitat at a ratio of 2 acres for each acre affected. Revegetation will be planned and implemented prior to the removal of existing riparian vegetation.

4.3.2.4 ASIP Conservation Measures

The ASIP conservation measures for riparian habitat are discussed below.

Conservation Measure VFRC-1—Implement Mitigation Measure VFRC1

Implementation of this conservation measure is consistent with the following MSCS programmatic conservation measure for riparian habitat (CALFED Bay-Delta Program 2000a).

- Avoid or minimize disturbance to existing habitat.

Conservation Measure VFRC-2—Implement Mitigation Measure VFRC2

Implementation of this conservation measure is consistent with the following MSCS programmatic conservation measures for riparian habitat (CALFED Bay-Delta Program 2000a).

- Restore or enhance 2–5 acres of additional in-kind habitat for every acre of affected habitat near where impacts are incurred before implementing actions that could result in the loss or degradation of habitat.
- To the extent practicable, include project design features that allow for on-site reestablishment and long-term maintenance of riparian vegetation following project construction.

Implementation of Conservation Measures VFRC-1 and VFRC-2 will fully mitigate impacts of the project on riparian habitat. No additional conservation measures are required.

4.3.2.5 Expected Outcomes

Implementation of the ASIP Conservation Measures VFRC-1 and VFRC-2 achieves the ASIP goal to avoid, minimize, and compensate for adverse impacts of project actions on riparian habitat. Implementation of these conservation measures will help ensure that the existing functions and values of riparian habitat in the project area are maintained.

4.3.3 Upland Cropland

4.3.3.1 Status in the Project Area

Upland cropland habitat is made up of agricultural lands that are not seasonally flooded. Upland cropland in the study area consists of a walnut orchard on the west side of the project area.

No special-status plant species are known to occur in upland cropland habitat because of the soil disturbance inherent in the agricultural practices. Special-status wildlife species, such as raptors, and other common wildlife species may forage in the orchard.

4.3.3.2 Project Impacts

Upland cropland could be temporarily affected by project staging and storage areas. No permanent loss of upland cropland is anticipated.

4.3.3.3 Mitigation Measures

Upland cropland habitat is not a sensitive natural community and does not provide critical habitat for special-status species; therefore, there are no compensation requirements for the permanent or temporary loss of upland cropland habitat. The City will design and construct the project to minimize impacts to upland cropland and will provide monetary compensation to the land owner which may be used to restore upland cropland.

Mitigation Measure UPCR1—Avoid and Minimize Disturbance of Upland Cropland Habitat

To the extent possible, the City will avoid and minimize impacts on upland cropland habitat.

4.3.3.4 ASIP Conservation Measures

ASIP conservation measures for upland cropland habitat are discussed below.

Conservation Measure UPCR-1—Implement Mitigation Measure UPCR1

Implementation of this conservation measure is consistent with the following MSCS programmatic conservation measure for upland cropland habitat (CALFED Bay-Delta Program 2000a).

- Avoid or minimize disturbance to existing habitat.

4.3.3.5 Expected Outcomes

Implementation of the ASIP Conservation Measures UPCR-1 and UPCR-2 achieves the ASIP goal to avoid, minimize, and compensate for adverse impacts of project actions on upland cropland habitat. Implementation of these conservation measures will help ensure that the existing functions and values of upland cropland habitat in the project area are maintained.

Chapter 5

Assessment of Project Impacts on ASIP-Covered Species and Conservation Measures

5.1 Introduction

This chapter describes the current status of each ASIP-covered species and the impacts of the project on these species and identifies measures that would be implemented to avoid, minimize, and compensate for each impact.

This assessment considers the occurrence or potential occurrence of special-status species and habitat in the action area; the extent, timing, and duration of project activities; and the magnitude of habitat or biological effects. This assessment focuses on key species, life stages, and habitats considered most likely to be affected by the proposed action based on their known presence in the action area and their sensitivity to project effects. Unless otherwise stated, the conclusions and proposed minimization, avoidance, and compensation measures are assumed to be generally applicable to other special-status species.

Potential effects were assessed by comparing pre-project habitat conditions with habitat conditions under the proposed action (based on the project description and predicted changes in key habitat variables). Where information is insufficient to quantitatively predict the magnitude of effects on key species and habitat attributes, potential effects were characterized in a qualitative manner based on professional judgment and application of general knowledge regarding the species life history, biology, and ecology.

The assessment of project impacts for each species includes a description of the:

- current status of the species in the study area,
- direct and indirect impacts of the project on the species,
- conservation measures for each species,
- objectives to fulfill the conservation measures for each species, and
- expected outcome of implementing the project and conservation measures for the species.

The ASIP-covered species are grouped into three sections by agency responsibility for the covered species. These sections are:

- U.S. Fish and Wildlife Service–Covered Species,
- National Marine Fisheries Service–Covered Species, and
- California Department of Fish and Game–Covered Species.

Each species conservation measure is assigned a unique five-character alphanumeric code that will assist with monitoring the ASIP implementation. The four-letter portion of the code designates the ASIP-covered species, and the numeral portion of the code designates the conservation measure number for the species.

As described in Chapter 3, direct impacts for the project include ground-disturbing activities and channel- and channel bed–disturbing activities associated with construction of the screened intake structure. Indirect impacts are defined as "those that are caused by the proposed action and are later in time, but are still reasonably certain to occur" (50 CFR 402.02). Most of the impacts associated with the implementation of project components and mitigation measures are considered to be direct impacts.

5.1.1 Definition of the Study Area and Project Area

As described in Section 1.3, Terminology, *study area* refers to the area covered by the USGS 7.5-minute quadrangle (Yuba City) that was surveyed as part of the CNDDB search and includes those areas in which the City performed vegetation mapping and wildlife and botanical surveys (Figure 2-1).

Project area refers to the area within the footprint of the proposed fish screen and associated staging areas and access road. The project area is located within the floodplain and bank of the Feather River in Sutter County. The project area extends along the west bank of the river near RM 28, east of Yuba City. The overall construction area includes approximately 100 feet of riverbank and extends about 35 feet into the Feather River channel.

The *action area* would also include the segment of the river affected by noise and movement of materials or sediment downstream during construction and operation. For purposes of this assessment, the action area encompasses the Feather River channel from approximately 2,500 feet upstream of the construction site to the confluence with the Sacramento River. This area represents the extent of anticipated aquatic effects (e.g., noise from pile driving and increases in suspended sediment and turbidity during construction, and potential changes in river flow and temperature during project operation)

Access to the construction area would be along an existing unpaved road that runs west through an orchard to the LLPS. Use of the existing access road would not affect aquatic resources or native vegetation.

5.2 Relationship to the CALFED Programmatic EIS/EIR

As described in Chapter 1, the following five documents establish the CALFED Program's compliance with the ESA, CESA, and NCCPA:

- MSCS,
- USFWS Programmatic BO,
- NOAA Fisheries Programmatic BO,
- Programmatic NCCP Determination, and
- Conservation Agreement.

The MSCS is a technical appendix to the Programmatic EIS/EIR that explains how the CALFED Program will meet the requirements of the ESA, CESA, and the NCCPA. The MSCS was used only to provide guidance for developing mitigation for the impacts of the project on ASIP-covered species and NCCP communities. The project EA/IS and ASIP stand alone and each include an independently developed analysis of the impacts of the project and avoidance, minimization, and compensation measures to mitigate those impacts.

The MSCS conservation measures include measures to avoid, minimize, and compensate for the potential impacts of the CALFED Program project actions. A compensation conservation measure is a type of mitigation measure that compensates for effects on affected resource value or replaces an affected resource value (e.g., avoidance and minimization measures).

Mitigation measures presented in the ASIP are consistent with the following programmatic conservation measures in the MSCS:

- ASIP contents necessary to meet the requirements of the Programmatic BOs and NCCP Determination, and
- Conservation measures to avoid, minimize, and compensate for impacts on ASIP-covered species and NCCP communities.

Specific conservation measures for affected ASIP-covered species are listed in the appropriate resource sections in this chapter.

5.3 U.S. Fish and Wildlife Service–Covered Species

5.3.1 Valley Elderberry Longhorn Beetle

5.3.1.1 Status in the Project Area

Elderberry shrubs are the host plant of the federally listed as threatened VELB. Current information on the beetle indicates that it is found only with its host plant, the elderberry. Adult VELB feed on foliage and are active from early March to early June. The beetles mate in May, and females then lay eggs on living elderberry shrubs. Larvae bore through the stems of the shrubs to create an opening in the stem, where they then pupate. After metamorphosing into adults, the beetles chew a circular exit hole and emerge (Barr 1991). Elderberry shrubs in California's Central Valley are commonly associated with riparian habitat but also occur in oak woodlands, savannas, and disturbed areas.

There are no CNDDB occurrences of VELB in the study area (California Natural Diversity Database 2007). However, numerous elderberry shrubs are located in the vicinity of the project. Elderberry shrubs occur in scattered locations along the banks of the Feather River. The nearest shrubs are less than 100 feet from the LLPS, but 20 feet outside the footprint for proposed project activities.

The project was assumed to have a direct adverse impact on VELB if project activities could result in the removal or disturbance of elderberry shrubs or if construction and activities would occur within the recommended 100-foot buffer zone (U.S. Fish and Wildlife Service 1999d).

Complete avoidance of adult beetles and elderberry shrubs is assumed when a 100-foot buffer is established and maintained around elderberry shrubs that have stems of 1 inch or greater in diameter (U.S. Fish and Wildlife Service 1999d). When work occurs within the 100-foot buffer zone, a minimum setback of 20 feet from the drip line of each shrub is required. However, because of the location and dimensions of the proposed work areas, a minimum 100-foot buffer is not feasible in all areas. However, no activities would occur within the 20-foot setback area. The City and Reclamation will maximize the buffer width around elderberry shrubs on a site-by-site basis and will consult with the USFWS on the buffer widths before commencing construction activities.

5.3.1.2 Project Impacts

Project implementation was assumed to have an adverse impact on VELB if project activities could result in the removal or disturbance of elderberry shrubs. It is assumed that all elderberry shrubs in the project areas provide habitat and may be occupied by VELB.

No elderberry shrubs were observed in the construction area. However several shrubs occur in adjacent uplands and there are 13 shrubs within 100 feet of the project area. The City will attempt to perform construction operations without affecting elderberry shrubs and to maintain a 100-foot buffer zone, where feasible, around all elderberry shrubs, to the greatest extent possible.

Additionally, the project may result in take of VELB if elderberry shrubs have become established at the LLPS since the time of the last survey. Regardless, no shrubs would be directly affected by the construction activity. Mitigation Measures VELB-1 and VELB-2 would minimize and avoid impacts to those shrubs and inhabitant VELB that are between 20 and 100 feet from the construction area.

5.3.1.3 Mitigation Measures

Implementation of project components and mitigation measures that include the restoration of affected habitats could result in a low, unquantifiable level of take of VELB. The following mitigation measures have been developed to avoid, minimize, and compensate for impacts of implementing project components and mitigation-related activities on VELB.

Mitigation Measure VELB1—Perform a Preconstruction and Postconstruction Survey for Elderberry Shrubs

Before the start of construction- and restoration-related activities, a qualified biologist will perform an elderberry shrub survey to ensure that any elderberry shrubs that occur in the vicinity of project components are identified. The biologist will field stake the locations of elderberry shrubs and shrub clusters, if present, before construction begins (Mitigation Measure VELB2).

The surveys will be performed according to the USFWS VELB conservation guidelines (U.S. Fish and Wildlife Service 1999). During the preconstruction and postconstruction surveys, the following information will be recorded for each shrub or shrub cluster

- number of stems greater than 1 inch in diameter at ground level—tallied according to stem size class;
- presence of VELB exit holes in elderberry shrubs with stems greater than 1 inch diameter at ground level; and
- whether or not the shrub is in a riparian area.

The location of each elderberry shrub will be mapped using global positioning system (GPS), and a site map will be prepared identifying the location and size of each shrub and shrub cluster. The City will use this site map to determine vehicle and equipment access routes and work areas. Following completion of construction activities, the City will perform a postconstruction evaluation of the

elderberry shrubs to determine whether any shrubs were damaged by construction activities. If damage occurs to elderberry shrubs, the City will consult with the USFWS on appropriate mitigation.

Mitigation Measure VELB2—Avoid and Minimize Impacts on Elderberry Shrubs

The City will attempt to perform construction operations without affecting elderberry shrubs and to maintain a 100-foot buffer zone around all elderberry shrubs, to the greatest extent possible. Avoidance and minimization efforts will be performed according to the USFWS VELB conservation guidelines (U.S. Fish and Wildlife Service 1999). If elderberry shrubs with one or more stems measuring 1 inch or greater in diameter at ground level or plants with visible evidence of exit holes are located within or adjacent to proposed construction or staging areas, the City and Reclamation will implement the following actions.

- Install exclusion fencing around each elderberry shrub and shrub cluster.
- Avoid disturbance to VELB by establishing and maintaining, to the maximum extent feasible, a 100-foot buffer around elderberry plants identified as suitable habitat. However, as described above, there are 13 shrubs known to be within the 100-foot buffer. These shrubs are located along the levee to the south of the LLPS. The nature and extent of the ground-disturbing activities is not expected to result in disturbance of these shrubs or any VELB. The City and Reclamation will implement the conservation measures as described in the VELB conservation guidelines and will promptly restore any disturbed areas.
- Fence and flag all buffer areas and place signs every 50 feet along the edge of the avoidance area, as described in the VELB conservation guidelines (U.S. Fish and Wildlife Service 1999d).
- All construction personnel will receive USFWS-approved environmental awareness training prior to undertaking work at construction sites. The construction contractor will educate all construction personnel at the site regarding the identification and significance of the elderberry shrubs, the need to avoid damaging shrubs, and the possible penalties involved should the shrubs be impacted.

5.3.1.4 ASIP Conservation Measures

ASIP conservation measures for the VELB are described below.

Conservation Measure VELB-1—Implement Mitigation Measure VELB1

Implementation of this conservation measure is consistent with the following MSCS programmatic conservation measure for VELB.

- Before implementing actions that could result in the loss or degradation of occupied habitat, conduct surveys in suitable habitat within the species' range that could be affected by CALFED actions to determine the presence and distribution of VELB.

Conservation Measure VELB-2—Implement Mitigation Measure VELB2

Implementation of this conservation measure is consistent with the following MSCS programmatic conservation measure for VELB.

- Until VELB has been recovered, implement the USFWS's guidelines for mitigating project impacts on VELB to compensate for CALFED impacts on the species.

5.3.1.5 Expected Outcomes with Implementation of Conservation Measures

Implementation of the conservation measures, including replacement of affected habitat, achieves the ASIP goal to avoid, minimize, and compensate for adverse impacts of project actions on VELB. Implementation of the conservation measures will help ensure that the existing abundance and distribution of VELB in the project area are maintained.

5.4 National Marine Fisheries Service–Covered Species

5.4.1 Central Valley Steelhead

5.4.1.1 Status

Central Valley steelhead was listed as threatened under the ESA (63 FR 13347, March 19, 1998). This distinct population segment (DPS) consists of steelhead in the Sacramento and San Joaquin River basins in the Central Valley. The Feather River Hatchery and the Coleman National Fish Hatchery steelhead populations, although previously included in the DPS, were not part of the listed steelhead population until January 5, 2006 (74 FR 834). The final rule designating Central Valley steelhead critical habitat was issued on September 2, 2005 (70 FR 52614).

5.4.1.2 Life History

There are two life history types of steelhead, stream-maturing or 'summer steelhead', and ocean-maturing or 'winter steelhead', based on the state of sexual maturity at the time of river entry and the duration of their spawning migration. Winter steelhead mature in the ocean and enter freshwater with well-developed gonads and spawn shortly after river entry. In contrast, winter steelhead enter freshwater with immature gonads and typically spend several months in freshwater before spawning. Winter steelhead are found in Central Valley rivers and streams (McEwan and Jackson 1996) and summer steelhead are found in tributaries of the Smith, Eel, Mad, Klamath, and Trinity River systems (McEwan and Jackson 1996: 38).

5.4.1.3 Historic and Current Distribution and Abundance

Historically, Central Valley steelhead spawned and reared in the most upstream portions of the Sacramento River–San Joaquin River system and its perennial tributaries. However, dams have resulted in a 95% reduction of river habitat available to anadromous salmonid fish, and reproducing runs of steelhead in the Central Valley are currently restricted to the Sacramento River and accessible tributaries (Reynolds et al. 1993).

Central Valley steelhead occur in the Sacramento, Feather, Yuba and San Joaquin Rivers (CALFED Bay-Delta Program 2003). Population levels of naturally spawned steelhead are lower than historical levels. Current populations are composed predominantly of hatchery fish.

5.4.1.4 Reasons for Decline

Factors that adversely affect steelhead include lethal water temperatures during egg incubation and early rearing, increased predation by non-native predators such as bass, loss of habitat, and entrainment loss to diversions (Moyle 2002).

5.4.1.5 Life History and Distribution in Action Area

In the Feather River, Central Valley steelhead are possibly a mixture of hatchery and wild fish. The Feather River Fish Hatchery raises and releases steelhead each year. Limited information exists regarding the abundance, location, and timing of steelhead spawning within the Feather River. Hatchery-produced fry are trucked from the hatchery for release downstream of the project site and would not be affected by the project. Returning adults use the Feather River in the project area as a migratory corridor from August through December to the hatchery or upstream spawning areas.

DWR performs redd surveys on the Feather River. Adult steelhead migrate up the river system beginning in August and spawn from December through March (Kindoff and Kurth 2003). Female adult steelhead deposit their eggs in excavated gravel nests (redds). Most spawning occurs between RMs 59 and 63.5 and between RMs 66 and 67 (Kindoff and Kurth 2003). Estimated natural reproduction was 163 steelhead in the Feather River in 2003. The hatchery maintains records of steelhead returns; counts since 1969 have ranged from a low of 78 in 1972 to a high of 2,587 in 1989, averaging 904 adults per year (California Department of Water Resources 2001).

Emigration timing of juvenile steelhead in the lower Feather River has not been well defined because of variable life history patterns and difficulty in capturing emigrating juveniles using standard capture methods (Seesholtz et al. 2004). Available data indicate that juvenile steelhead rear year-round primarily in the low flow channel (LFC) and upper reaches of the high flow channel (HFC) (upstream of the action area) and that most emigrate as yearlings or older juveniles in the winter and spring (California Department of Water Resources 2003; Seesholtz et al. 2004).

5.4.1.6 Critical Habitat in Action Area

The Feather River, from the confluence of the Yuba River upstream to Oroville Dam, is included in the critical habitat range for this species. Critical habitat consists of the water, substrate, and adjacent riparian zone of accessible estuarine and riverine reaches of the Sacramento River–San Joaquin River Delta.

5.4.1.7 Construction-Related Impacts

Potential effects related to project construction include localized disturbance or displacement of juvenile and adult fish from noise, suspended sediment, and turbidity generated during in-water construction activities.

Sedimentation and Turbidity

All construction activities that result in disturbance to soil and vegetation on the bank and channel of the Feather River may cause increases in sedimentation and turbidity of these waters. These conditions, if prolonged, could affect the growth, survival, and reproductive success of aquatic organisms. Prolonged exposure to high levels of suspended sediment can create:

- a loss of visual capability, leading to a reduction in feeding and growth rates;
- thickening of the gill epithelium, potentially causing loss of respiratory function;
- clogging and abrasion of gill filaments; and
- increases in stress levels, reducing the tolerance of fish to disease and toxicants (Waters 1995).

Bash et al. (2001) characterized the effects of suspended sediment and turbidity on salmonids into three general categories: physiological, behavioral, and habitat (Table 5-1).

Table 5-1. Effects of Suspended Sediment and Turbidity on Salmonids

Physiological	Behavioral	Habitat
Gill trauma	Avoidance	Reduction in spawning habitat
Osmoregulation	Territoriality	Effect on hyporheic upwelling
Blood chemistry	Foraging and predation	Reduction in benthic invertebrate habitat
Reproduction and growth	Homing and migration	Damage to redds

Source: Bash et al. 2001.

The effects of sediment on salmon depend on temperature, size, and angularity of the particles and the life stage (Bash et al. 2001). In general, adverse effects of turbidity increase with temperature, are greater for juveniles than for adults, and highly angular particles may have a greater adverse effect than smooth or rounded particles (Lake and Hinch 1999).

Physiological effects of particular relevance to this project are gill trauma and osmoregulation. Gill trauma occurs when gills are damaged by passing high levels of sediment across the gill membranes. Lake and Hinch (1999) found that highly angular particles caused greater damage to the gills of coho salmon than

did smooth particles although angularity was not related to mortality. An LC50 value (e.g., a lethal concentration of a substance which kills 50% of a sample population in a given time) of sockeye salmon increased with particle size (i.e., smaller particles are worse than larger ones). In laboratory experiments, cough frequency of juvenile coho salmon was elevated at 240 milligrams per liter (mg/L) (Bash et al. 2001).

Osmoregulation is a concern for salmonid adult and smolt transformation between fresh and salt water. The project is upstream of the Delta, where juvenile fish are entering the critical life history phase. During the transition period, juvenile salmonids are more susceptible to sediment impacts than they are at other times. During smoltification, LC50s have been reported to decline to 1,500 mg/L but rise to 30,000 mg/L during other periods (Bash et al. 2001).

Behavioral effects that could be a concern include avoidance of high levels of sediment by adult and juvenile salmonids as well as possible effects on foraging and predation. Avoidance is the most common result of increases in turbidity and sedimentation. Fish would not occupy areas that are not suitable for survival unless they have no other option. Therefore, habitat can become limiting in systems where high turbidity precludes a species from occupying habitat required for specific life stages.

High levels of suspended sediment can cause movement and redistribution of fish. Many fish, including juvenile salmonids, are sight feeders. Turbid waters reduce the fish's efficiency in locating and feeding on prey. Some fish, particularly juveniles, can become disoriented and leave areas where their main food sources are located, possibly resulting in reduced growth rates. Where fish are actively feeding, increased turbidity can decrease feeding success (Bash et al. 2001). Conversely, increased turbidity can provide protection for fish being preyed upon. Increased sediment loading can also degrade food-producing habitat downstream of the project area, interfere with photosynthesis, and result in the displacement of aquatic food organisms (e.g., benthic invertebrates).

Increased sedimentation and turbidity resulting from project construction would be temporary and limited to a small portion of the river during installation and removal of the cofferdam and removal of the existing intake structure. Implementation of a SWPPP, as discussed in Environmental Commitment HWQ-1, and restricting in-channel activities to the period from July 1 through October 31, would minimize sediment inputs and avoid the period of peak abundance of juvenile salmonids.

5.4.1.8 Underwater Noise and Vibrations from Pile Driving

Noise, vibrations, and other physical disturbances can harass fish, disrupt or delay normal activities, or cause injury or mortality. In fish, the hearing structures and swim bladder and surrounding tissues are particularly vulnerable

to high-pressure sounds; the ear is vulnerable to extreme pressure and motion, and the swim bladder expands and contracts with the passage of a pressure wave (Popper et al. 2006). The potential magnitude of effects depends on several factors, including the type and intensity of the sound, proximity of the action to the water body, timing of actions relative to the occurrence of sensitive life stages, and frequency and duration of activities. For most activities, the effects on fish would be limited to avoidance behavior in response to movements, noises, and shadows caused by construction personnel and equipment operating in or adjacent to the water body. In these instances, fish may be more vulnerable to predation if the disturbance causes fish to leave protective habitat. Injury or mortality may result from direct contact with machinery and materials or sound pressure (pile driving) if it occurs at high sound pressure levels.

There is little relevant scientific information that can be used to evaluate the effects of pile driving sound on the species of concern. Based on what is known about the general effects of sound on fish, these may include behavioral effects, physical injury, and mortality. The degree to which a fish exposed to pile driving sound would be affected is dependent on several variables, including: 1) species; 2) life stage; 3) body size; 4) distance from source; 5) type and size of pile and hammer; 6) depth of water around the pile; 7) peak sound pressure and frequency; and 8) presence/absence of a swimbladder; (Hastings and Popper 2005). Behavioral effects may include movement of fish away from important habitat, reduced feeding ability, and increased vulnerability to predators.

Terminology

Key terms used in pile driving noise assessment are defined below:

- *Peak sound pressure* refers to the highest absolute value of a measured waveform (i.e., sound pressure pulse as a function of time).
- *Sound exposure level (SEL)* is defined as the constant sound level acting for one second, which has the same amount of acoustic energy as the original sound. Expressed another way, the sound exposure level is a measure of the sound energy in a single pile driver strike.
- *Accumulated SEL ($SEL_{accumulated}$)* is the cumulative SEL resulting from successive pile strikes. $SEL_{accumulated}$ is based on the number of pile strikes and the SEL per strike; the assumption is made that all pile strikes are of the same SEL. $SEL_{accumulated}$ is calculated by adding the SEL from a single pile strike at a certain position or distance to 10 times the base 10 logarithm of the number of pile strikes:

  $$SEL_{accumulated} = SEL_{per\ strike} + 10 \log_{10} (\text{no. of pile strikes})$$

- *Root mean squared (RMS) sound level* is the average of squared sound pressures over the period of time that encompasses that portion of the waveform containing 90% of the sound energy.

Cofferdam installation would require both vibratory (70%) and impact (30%) pile driving over a period of two weeks. Twenty one of the 37 sheet piles would be installed in the wetted river channel; the remainder would be driven on dry land. The distance from the river (mean low flow) to the sheet piles driven on land would vary for each sheet pile; the furthest sheet pile would be approximately 7.5 meters from the river (mean low flow).

All Cast-in-Steel-Shell (CISS) piles would be driven within the cofferdam. The section of the cofferdam within the wetted channel would be dewatered prior to installation of the in-channel CISS piles. Although specific installation methods have not yet been fully identified, it is estimated that sheet pile installation would take approximately two weeks. Similarly, CISS pile installation would require two weeks; two piles would be driven per day and each pile would require 50 to 75 blows.

The interim threshold criteria for injury of fish exposed to the impact sound associated with pile driving are a cumulative sound exposure level ($SEL_{cumulative}$) of 187 decibels (dB) re: $1\mu Pa^2$/sec, and a peak sound pressure of 206 dB re: 1µPa (206 dB $_{Peak}$) in any single strike. These thresholds, referred to as the "dual criteria" were recently agreed upon by NOAA Fisheries, Federal Highways Administration, DFG, USFWS, and the state transportation agencies for California, Oregon, and Washington. Data on adverse behavioral responses of fish to pile driving sounds are limited; however USFWS has set the initial criterion at 150 dB RMS.

The potential for exposure of fish to underwater sound generated by pile driving was evaluated and is presented in the following sections. This analysis estimated the peak sound pressure and cumulative SEL using existing best available noise monitoring data from similar pile driving projects. Table 5-2 summarizes source noise levels assumed for each pile type and installation conditions based on data from California Department of Transportation (Caltrans) (California Department of Transportation 2006, 2007). Source noise levels for piles driven in a cofferdam or on land are assumed to be 10 dB less than source noise levels of piles driven in water. Estimated pile driving noise values (Table 5-2) and number of pile strikes in a day were used as input to the NOAA Fisheries Underwater Noise Calculation Spreadsheet model to calculate the distance from the pile driving noise source where the underwater sound level would attenuate to the peak or cumulative SEL threshold, and to estimate the accumulated SEL a stationary fish (conservative assumption) would be exposed to given a selected source noise level.

Table 5-2. Summary of Pile Driving Source Noise Levels (dB) at 10 meters[a]

Pile Type	Location	Driver	Peak	RMS	SEL
24" diameter steel shell	Water[b]	Impact	203	189	178
24" diameter steel shell	Land or in cofferdam[c]	Impact	193	179	168
Steel sheet*	Water	Vibratory	170	155	155
Steel sheet	Water	Impact	205	189	179
Steel sheet*	Land	Vibratory	160	140	140
Steel sheet	Land[c]	Impact	195	179	169

Source: California Department of Transportation 2007 except * California Department of Transportation 2006.

[a] Impact values are for a single strike. Vibratory values are for 1 second of operation.

[b] No piles will be driven in open water. This data is provided for reference in developing the attenuated source levels.

[c] Source levels for pile in a cofferdam or on land are assumed to be 10 dB less than level in water.

Key assumptions used in this analysis were:

CISS Piles

- Two CISS piles would be installed per day;
- Each CISS pile would require 75 strikes to be set (150 strikes total per day assuming installation of two piles per day); and
- Standard attenuation rate assumption of 4.5 dB per doubling of distance of pipe piles.

Steel Sheet Piles

- Actual driving occurs 40% of an eight hour work day (192 minutes);
- 70% of driving time is vibratory driving (134 minutes);
- 30% of driving time is impact driving (58 minutes) for a total of 600 strikes per day; and
- Attenuation rate assumption of 6 dB per doubling of distance for sheet piles to account for the higher frequency sound produced during sheet pile driving.

Table 5-3 summarizes calculated distances to NOAA Fisheries criterion levels for peak, accumulated SEL, and RMS values.

Table 5-3. Distances* to Criterion Levels

Pile Type	Location	Driver	Peak (206 dB)	RMS (150 dB)	SEL (187 dB > 2g fish)	SEL (183 dB < 2g fish)
24" diameter steel shell	Land or in cofferdam	Impact	1	858	15	28
Steel sheet	Water	Vibratory	0	18	18	18
Steel sheet	Water	Impact	9	891	98	155
Steel sheet	Land	Vibratory	0	3	3	3
Steel sheet	Land	Impact	3	282	31	49

* meters

Sheet Pile Installation

Vibratory Driving

Sound generated during vibratory driving of the cofferdam sheet piles is expected to be low. For sheet piles driven on land, sound levels at ten meters from the pile are estimated to be 160 dB $_{Peak}$ and 140 dB $_{SEL}$. For sheet piles driven within the wetted channel, sound levels at ten meters from the sheet pile are estimated to be slightly greater at 170 dB $_{Peak}$ and 155 dB $_{SEL}$ (Table 5-2). The injury threshold for peak sound levels (206 dB) would not be exceeded for vibratory pile driving on land or in water.

The injury thresholds for cumulative SEL (187 dB and 183 dB) would be exceeded within 3 meters of sheet piles driven with a vibratory hammer on land, and within 18 meters of sheet piles driven with a vibratory hammer in water (Table 5-3).

NOAA Fisheries typically assumes that fish exposed to underwater noise levels above a threshold of 150 dB RMS incur adverse behavioral effects. For this analysis, model results indicate that noise levels would exceed 150 dB RMS during all pile driving with the exception of sheet piles driven on land (Table 5-2).

Impact Driving

As previously stated, approximately 30% of the sheet pile installation would be conducted with an impact hammer. For sheet piles driven on land with an impact hammer, sound levels would be approximately 195 dB $_{Peak}$ and 169 dB $_{SEL}$at ten meters from the sheet pile. For sheet pile driven within the wetted channel sound levels would be approximately 205 dB $_{Peak}$ and 179 dB $_{SEL}$at ten meters from the sheet pile.

Model results indicate that the injury threshold for peak sound levels (206 dB) would not be exceeded for sheet piles driven with an impact hammer on land or in water within a distance of three meters and nine meters, respectively (Table 5-3). The model predicts that for cumulative SEL, the 187 dB criterion for fish 2 g

or larger would be exceeded within 98 meters of the sheet piles driven in water and within 31 meters of the sheet piles driven on land. The cumulative SEL for fish less than 2 g (183 dB) would be exceeded within 155 meters from sheet piles driven in water and within 49 meters from sheet piles driven on land.

CISS Pile Installation

At ten meters from the pile, the peak sound level during pile driving within the dewatered cofferdam or on land is estimated to be 193 dB (Table 5-2). This is well below the interim criterion of 206 dB. This criterion would not be exceeded at any distance greater than 1 meter from a CISS pile.

The model predicts that the cumulative SEL for fish 2 g or larger (187 dB) would be exceeded within 15 meters of a CISS pile driven within the dewatered cofferdam or on land. The cumulative SEL for fish less than 2 g would be exceeded within 28 meters of a CISS pile being driven on land or within the dewatered cofferdam.

It was assumed that fish in the vicinity would be stationary, i.e., not traveling through the area. It is unlikely that fish would remain static during pile driving, although it is unknown how far they would move during or between strikes. However, they are likely to change orientation and actively move away from, or avoid the area during the driving of piles.

Potential Effects on Fish

Adults

Adult spring- and fall-run Chinook salmon, steelhead, and green sturgeon may be present in the action area during installation of the cofferdam sheet piles and the CISS piles. It is anticipated that pile driving would expose some fish to underwater sound that exceeds the interim threshold for accumulated sound for fish larger than 2 g (187 dB $SEL_{accumulated}$). Central Valley steelhead adults use the Feather River in the action area as a migratory corridor from September through April. Spring- and fall-run Chinook salmon are likely to be present in the action area from February through December, respectively. Adult green sturgeon may use the action area as a migratory corridor and may be present in the lower Feather River from March through November, with highest abundance occurring during the period of April through mid-June.

There is the potential for injury or mortality due to underwater accumulated sound from pile driving for fish remaining within 155 meters of sheet piles being driven in the river during the time the impact hammer is used. Similarly, during the time sheet piles are impact driven on land there is the potential for fish remaining within 49 meters of the pile driving to be adversely affected. These conclusions are based on several conservative assumptions, as previously discussed. This analysis assumes that fish, were they to be in the area, would remain there during pile driving. Given that adult salmonids would be migrating

through the action area, and would likely exhibit avoidance behavior in response to pile driving noise and associated activities and actively move away from the construction area, injury or mortality is considered less likely than temporary harassment.

The hearing capabilities of green sturgeon are not known, but the ear structures in sturgeon are very different from teleost fish (Hastings and Popper 2005). Sturgeon do have swim bladders, so it is reasonable to assume that they could be adversely affected to some extent by pile driving noise exceeding the dual criteria thresholds. Therefore, there is the potential for adults migrating through the action area to incur injury as a result of pile driving noise should they pass within distances from the piles where criterion levels would be exceeded during pile driving (Table 5-3).

Juveniles

Small fish are more susceptible to injury by intense sound than are larger fish of the same species. The installation of the sheet piles and CISS piles would occur during the low flow period sometime between July 1 and October 31 when juvenile salmonid abundance is lowest in the action area. Juvenile Sacramento River winter-run Chinook salmon may use the action area for non-natal rearing; however, the potential occurrence of winter-run Chinook salmon is primarily limited to November through May. Therefore, restricting pile driving activities to the proposed construction time frame would minimize potential exposure of salmonids to pile driving noise.

It is important to note that there is a lack of significant cover or other important habitat features in the immediate project area that could attract juvenile salmonids and other fishes and increase the likelihood of impacts. However, the potential exists for juvenile salmonids and other small fishes (< 2g) to be injured or killed within 155 meters of the sheet piles during times when these piles are being driven by an impact hammer. The potential for injury or death of juvenile fish (< 2g) is reduced to 49 meters of piles that are being driven by an impact hammer on land.

Noise-Reduction Measures

Although specific thresholds for effects of underwater sound associated with pile driving are unknown, potential injury and mortality of fish associated with pile driving shall be avoided or minimized by implementing the following noise-reduction measures:

- In-channel construction, including riverbank and channel bed construction below the OHWM, would be limited to the summer low-flow period (July 1–October 31) to minimize potential exposure of juvenile salmonids to pile driving sounds.
- A cofferdam would be installed around the in-channel construction area, which would be dewatered before additional pile driving and/or construction activities. Once the outer sheet piling is completed, fish would not have

access to the construction site, and underwater sounds produced by pile driving would be attenuated.

- The number and size of piles will be limited to the minimum necessary to meet the engineering and design requirements of the project.
- The smallest pile driver and minimum force necessary will be used to complete the work.
- Vibratory hammers will be used whenever feasible. If use of an impact hammer cannot be avoided, a hydraulic hammer will be used. The force of the hammer blow can be controlled with hydraulic hammers, and reducing the impact force would reduce the intensity of the resulting sound.

Fish Stranding in Cofferdams

Closure of the cofferdam may trap fish that would ultimately die from stress, injury, and mortality caused by poor water quality, predation, dewatering, or construction activities within the cofferdam. Juvenile fish are most susceptible to entrapment because of their slower escape response and tendency to remain along shallow river margins.

Measures that would minimize potential adverse effects on listed fish species include restriction of cofferdam installation to the period of lowest juvenile salmonid abundance (July 1 to October 31), the construction of the cofferdam in an upstream to downstream direction, and implementation of a fish rescue plan, as described in Environmental Commitment BIO-5.

Aquatic and Riparian Habitat Alteration

Removal of Riparian Vegetation

Riparian vegetation directly influences the quality of salmonid habitat, affecting cover, food, instream habitat complexity, streambank stability, and water temperatures. Large woody debris (LWD) usually originates from riparian trees and provides cover and habitat complexity within the stream, essential components of fish habitat. Riparian vegetation also provides shade and an insulating canopy that moderates water temperatures in both summer and winter. Riparian vegetation provides a filter that reduces the transport of fine sediment to the stream, and the roots provide streambank stability and cover for rearing fish (Meehan 1991). Riparian vegetation influences the food chain of a stream, providing organic detritus and terrestrial insects. Because of the numerous ways riparian vegetation influences the stream ecosystem, the effects of altering riparian vegetation are highly variable, ranging from increased sedimentation and warmer stream temperatures to decreased food production and habitat complexity.

The proposed project would require the removal of riparian vegetation and SRA cover immediately adjacent to the new intake location. SRA habitat is defined as the near-shore aquatic habitat at the interface between the river and the adjacent riparian zone, where the riverbank is composed of earthen substrate supporting

riparian vegetation that overhangs or protrudes into the water, as well as the woody debris in the water, including logs, branches, and roots. SRA habitat also includes shallow water habitat, water velocity, and substrate (e.g., boulders). SRA habitat has been designated by USFWS as irreplaceable habitat (i.e., Resource Category 1).

Removal of riparian vegetation would occur along approximately 40 linear feet of the Feather River where existing shoreline vegetation would be cleared and replaced with riprap. However, SRA cover losses would be negligible because of the low quality of existing nearshore habitat, the presence of revetted banks, and the lack of significant in-stream and overhead cover at the project site.

Intake Structure and Riprap Installation

Approximately 0.17 acre of the channel bed and bank of the Feather River below the OHWM would be altered by installation of the intake structure and riprap. When riprap or other engineered structures are placed in or adjacent to stream channels to prevent erosion, the suitability of fish habitat is affected by changes in nearshore cover and local stream hydraulics. Riprap has been shown to reduce or eliminate new accretion of point bars and other surfaces for recruitment of riparian vegetation, arrest meander migration and limit lateral mobility of the channel, which decreases habitat complexity; incise the thalweg of the river next to the armored areas and narrow the low-flow channel width; reduce hydrodynamic complexity; reduce bank erosion, which reduces habitat complexity; impede riparian vegetation growth; and reduce the recruitment of woody vegetation falling into the river channel (U.S. Fish and Wildlife Service 2000).

Impacts to existing nearshore habitat would be negligible because of the low quality of existing habitat, the presence of existing revetted banks, and the lack of significant instream and overhead cover. The riparian habitat that is affected will be compensated for upstream or downstream of the site. Additionally, the intake structure and associated pilings and foundation may attract predatory fish species, potentially resulting in higher predation rates on juvenile salmonids and other fishes. However, predation associated with the facility is expected to be small, and likely negligible. The project is designed to minimize and avoid adverse effects related to scour and erosion and minimize turbulence that could disorient fish and increase vulnerability to predation.

5.4.1.9 Hazardous Materials and Chemical Spills

Construction-related activities (e.g., activities associated with the access route, storage and staging areas) could potentially impair water quality if hazardous chemicals (e.g., fuels and petroleum-based lubricants) or other construction materials are spilled or enter the Feather River. In general, construction-related chemical spills could potentially affect fisheries and aquatic resources by causing physiological stress, reducing biodiversity, altering primary and secondary production, interfering with fish passage, and causing direct mortality. As discussed in Chapter 2 (Environmental Commitment HAZ-1), the City would

minimize the potential for accidental spills of hazardous, toxic, or petroleum substances by preparing or requiring the construction contractor to prepare and implement a Spill Prevention Control and Countermeasure Plan (SPCCP).

5.4.2 Operation and Maintenance Activities

5.4.2.1 Impingement and Entrainment

Installation and operation of a fish screen would eliminate or substantially reduce the risk of fish entrainment at the project site relative to baseline conditions. The existing unscreened intake would be replaced with an approved fish screen designed to minimize entrainment and impingement of fish passing the intake structure. The City and Reclamation have worked with NOAA Fisheries, USFWS, and DFG to ensure that the fish screen and pumping plant facility are designed to meet the DFG and NOAA Fisheries fish screen performance criteria. The design was based on protective criteria for juvenile salmonids but also included consideration of green sturgeon.

Environmental Commitment BIO-6 includes preparation and implementation of an operations and maintenance plan and hydraulic monitoring plan to ensure that the fish screen and pumping plant are operated and maintained in accordance with the fish screen performance criteria.

5.4.2.2 Flow and Temperature Alteration

Changes in streamflow can affect the quantity and quality of fish habitat through effects on water depths, velocities, and, to some extent, water temperatures. In the lower Feather River, natural flow patterns are altered primarily by water storage, diversion, and hydroelectric projects upstream of Oroville Facilities, Lake Oroville operation, and diversions from Thermalito Afterbay (California Department of Water Resources 2007).

Water diversions in the action area can contribute to flow reductions and potentially affect special-status fish species. The primary species and life stages of concern are adult and juvenile Chinook salmon and steelhead because of their relative sensitivity to altered flows and water temperatures. The potential effects of increased water diversions include creating passage impediments for adults, reducing the amount of shallow edge habitat and cover available to juvenile fish, and increasing water temperatures. These mechanisms are recognized as potentially important to adult and juvenile salmon and steelhead in this portion of the river but have not been investigated. However, a general assessment of potential project effects can be made based on the magnitude and frequency to which flows and general habitat indicators will be affected.

Oroville Facilities are currently managed to meet minimum flow requirements and water temperature objectives for spring-run Chinook salmon, fall-run

Chinook salmon, and steelhead in the primary holding and spawning reaches of the Feather River upstream of the action area. The minimum flow requirement below Thermalito Afterbay is 1,700 cfs from October through March and 1,000 cfs from April through September. In critical years, the minimum flow can be reduced to 1,200 cfs from October to February and 1,000 cfs in March. However, flows vary substantially from year to year depending on annual runoff, flood management releases, downstream water supply and quality control commitments, and tributary inflows (California Department of Water Resources 2007).

Monthly mean flow records are available for three locations within the action area:

- Feather River at Yuba City—USGS Station 11407700
- Feather River at Shanghai Bend, USGS Station 11421700
- Feather River at Nicolaus, USGS Station 1142500

These gages were discontinued in the 1980s but the records are considered generally representative of baseline flows under current Oroville Facility operations (Table 5-4).

Table 5-4. Monthly Mean Flow (cfs) in the lower Feather River

Month	Yuba City 1964–1984	Shanghai Bend 1969–1980	Nicolaus 1969–1983
Jan	11,090	16,200	15,700
Feb	8,115	10,000	15,600
Mar	8,782	10,500	14,000
Apr	7,462	7,790	13,200
May	5,187	5,250	8,560
Jun	3,698	4,960	5,440
Jul	3,461	5,070	3,820
Aug	3,631	5,790	4,040
Sep	3,636	5,540	4,220
Oct	2,617	4,430	4,300
Nov	4,319	5,910	5,480
Dec	8,117	7,740	10,700

Under baseline conditions (represented by monthly Yuba City diversions in 2007), monthly diversion rates range from 12 to 34 cfs or 0.15–0.98% of the 1964–1984 monthly mean flows in the Feather River at Yuba City (Table 5-5). Downstream of Yuba City, the magnitude of diversion effects on Feather River flow is even smaller because of the flow contributions of the Yuba and Bear Rivers, as reflected by the gage records for Shanghai Bend and Nicolaus.

Table 5-5. Estimated Yuba City Monthly Diversion Rate in 2007

Month	Yuba City Diversion Rate 2006 (cfs)	Percentage of Feather River Flow (%)		
		Yuba City 1964–1984	Shanghai Bend 1969–1980	Nicolaus 1969–1983
Jan	14.0	0.13	0.09	0.09
Feb	12.0	0.15	0.12	0.08
Mar	18.0	0.20	0.17	0.13
Apr	19.0	0.25	0.24	0.14
May	27.0	0.52	0.51	0.32
Jun	32.0	0.87	0.65	0.59
Jul	34.0	0.98	0.67	0.89
Aug	33.0	0.91	0.57	0.82
Sep	27.0	0.74	0.49	0.64
Oct	19.0	0.73	0.43	0.44
Nov	19.0	0.44	0.32	0.35
Dec	19.0	0.23	0.25	0.18

Under the proposed action, the maximum diversion rate would be 48 mgd (74 cfs). Assuming year-round operation at full capacity, the proposed action could reduce river flows by an additional 40–62 cfs relative to 2007 diversion rates, resulting in a 0.7–2.8 % reduction in flow at Yuba City, a 0.5–1.7% reduction in flow at Shanghai Bend, and a 0.5–2.0% reduction in flow at Nicolaus (Table 5-6).

Table 5-6. Maximum Yuba City Diversion Rate under Proposed Action

Month	Maximum Diversion Rate (cfs)	Percentage of Feather River Flow (%)		
		Yuba City 1964–1984	Shanghai Bend 1969–1980	Nicolaus 1969–1983
Jan	74.3	0.67	0.46	0.47
Feb	74.3	0.92	0.74	0.48
Mar	74.3	0.85	0.71	0.53
Apr	74.3	1.00	0.95	0.56
May	74.3	1.43	1.42	0.87
Jun	74.3	2.01	1.50	1.37
Jul	74.3	2.15	1.47	1.95
Aug	74.3	2.05	1.28	1.84
Sep	74.3	2.04	1.34	1.76
Oct	74.3	2.84	1.68	1.73
Nov	74.3	1.72	1.26	1.36
Dec	74.3	0.92	0.96	0.69

In critically dry years, Feather River flows below Thermalito Afterbay above the Yuba River could be as low as 1,000 cfs during the spring and summer and 1,200 cfs in the fall and the winter. Assuming a worst-case scenario in which flows are at these minimum levels as far downstream as Yuba City, the proposed action could reduce flows in the Feather River by up to 6–7%. Under baseline conditions, up to 2–3% of the flow could be diverted. However, changes in river flow of this magnitude are very infrequent and are not expected to measurably change conditions for threatened and endangered species. Additionally, operational changes implemented by DWR during dry years when they are required to release water from Lake Oroville to satisfy in-basin entitlements and meet minimum flow requirements to protect fisheries resources in the Feather River may reduce any potential adverse effect.

Effects on Physical Habitat

General indicators of the effect of flow reductions on physical habitat are reductions in river stage, widths, and depths. Within the action area, these changes could affect the amount of shallow water and cover available to juvenile fish along the margins of the river. During the primary emigration and rearing months (December through June), maximum diversion rates under the proposed action could reduce monthly mean flows in the Feather River by 0.9–2.0% at Yuba City, 1.0–1.5% at Shanghai Bend, and 0.7–1.4% at Nicolaus (Table 5-6). In comparison, baseline diversion rates reduce monthly mean flows by 0.2–0.7% at Yuba City, 0.2–0.5% at Shanghai Bend, and 0.1–0.5% at Nicolaus. Thus, maximum diversion rates under the proposed action would be expected to cause slight reductions in river widths and depths which would result in slight

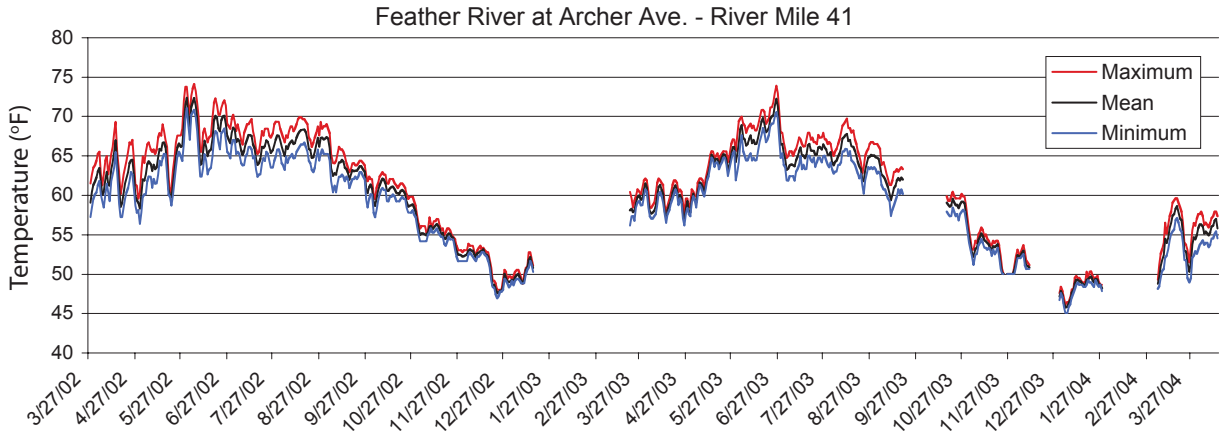
reductions in the availability of preferred habitat for juvenile fish. These reductions are not expected to measurably affect juvenile salmon and steelhead survival, growth, and migration success. The potential for adverse effects would increase slightly in dry years, but may be tempered by DWR water releases to satisfy in-basin entitlements and meet minimum flow requirements. However, changes in river flow during dry years are similarly not expected to measureably change the availability or quality of habitat.

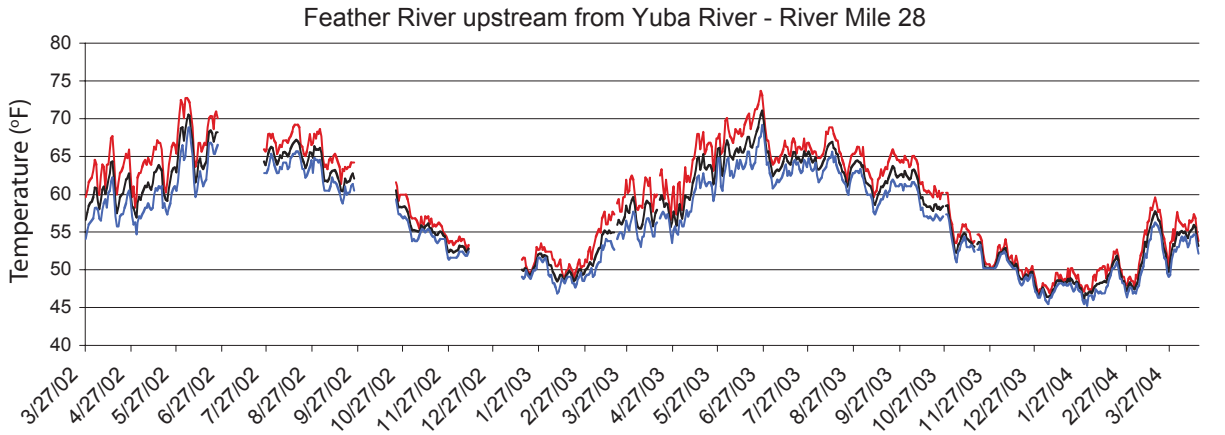
Deeper, main channel habitats used by adult salmon, steelhead, and sturgeon would be virtually unaffected by the proposed action. The only potential passage impediment in the action area is at Shanghai Bend where a hard clay bench forms a 3- to 5-foot waterfall, high-velocity chute, and shallow side channel at low flows. This bench has been identified as a potential passage impediment to adult sturgeon at low flows (California Department of Water Resources 2003c). During the primary migration periods of adult green sturgeon (March through July), maximum diversion rates under the proposed action could reduce monthly mean flows in the Feather River by 0.9–2.2% at Yuba City, 0.7–1.5% at Shanghai Bend, and 0.5–2.0% at Nicolaus (Table 5-5). In comparison, baseline diversion rates would reduce monthly mean flows by 0.2–0.8% at Yuba City, 0.1–0.5% at Shanghai Bend, and 0.1–0.7% at Nicolaus. Because of the small effect of these flow reductions on river depths and velocities, the proposed action is not likely to adversely affect passage conditions for adult sturgeon.

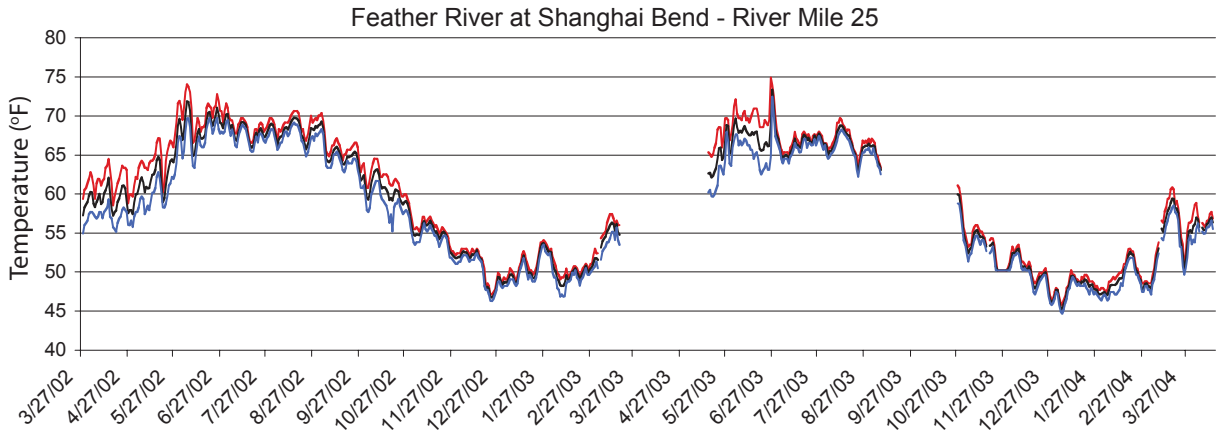
Effects on Water Temperature

Oroville Facilities are currently managed to meet water temperature objectives for spring-run Chinook salmon, fall-run Chinook salmon, and steelhead in the primary holding and spawning reaches of the Feather River upstream of the action area (California Department of Water Resources 2003). Water temperature objectives have been established for the Feather River Hatchery and the low flow channel upstream of Thermalito Afterbay Outlet (<65°F at Robinson Riffle, RM 61.6 from June 1 through September 30). Downstream of the Afterbay Outlet, water temperatures must be suitable for fall-run Chinook salmon during the fall months (after September 15) and suitable for American shad, striped bass, and other warmwater species from May through August (California Department of Water Resources 2003a).

Based on a review of the general emigration timing and water temperature responses of juvenile salmon, DWR concluded that emigrating juvenile salmon in the lower Feather River may experience thermal stress from elevated water temperatures in late May and June (California Department of Water Resources 2003). For example, in 2002 and 2003, mean and maximum daily water temperatures frequently exceeded 62.6°F (17°C) after mid-May and 68.0°F (20°C) through June in the lower Feather River downstream of Honcut Creek (California Department of Water Resources 2004a) (Figures 5-1 and 5-2). Adult spring-run and fall-run Chinook salmon may also be exposed to stressful water temperatures during their upstream migrations to holding and spawning areas in the late spring, summer, and early fall.







Source: DWR 2004

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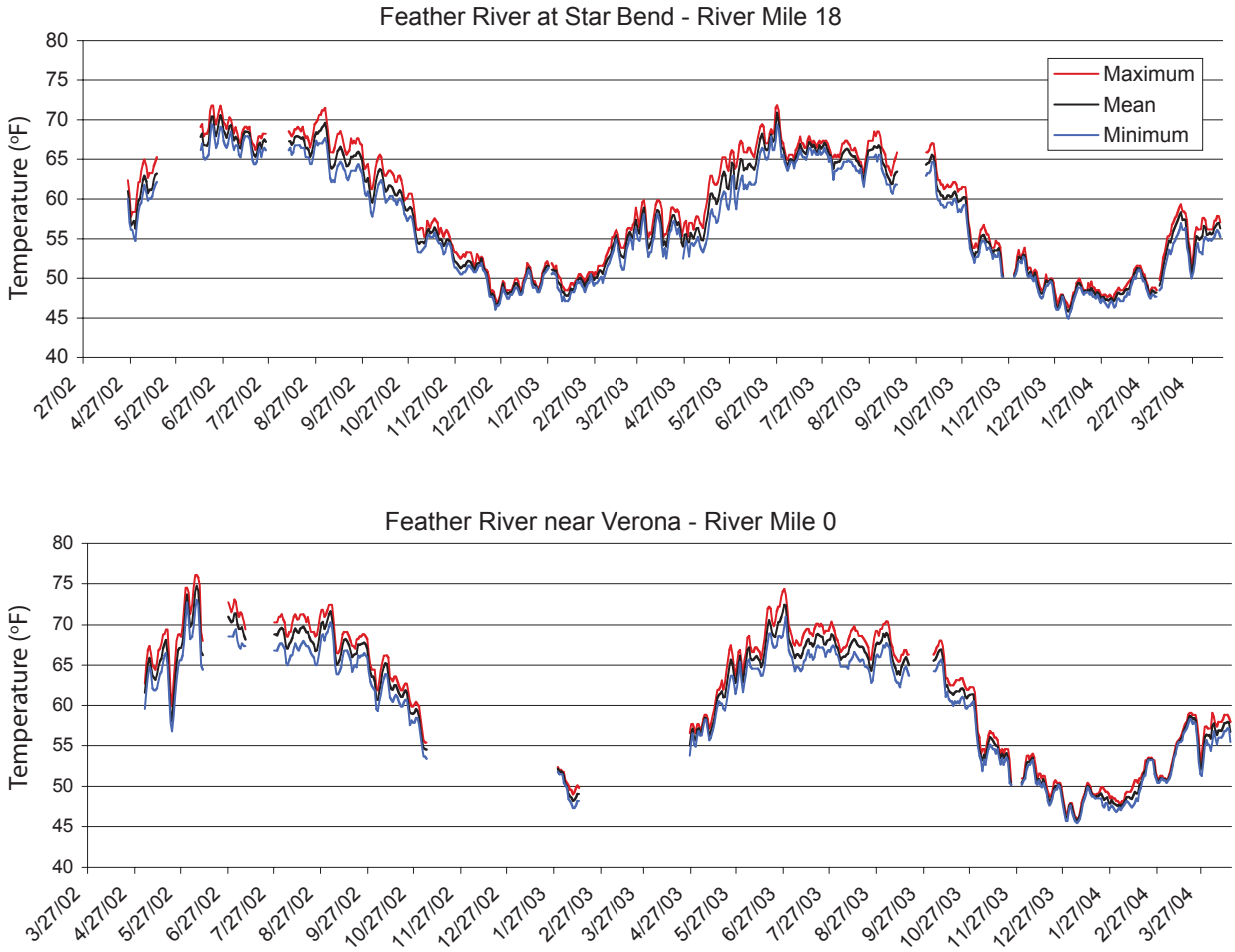
Figure 5-1
Water Temperatures in the Lower Feather River
(April 2002 - March 2004)



Source: DWR 2004

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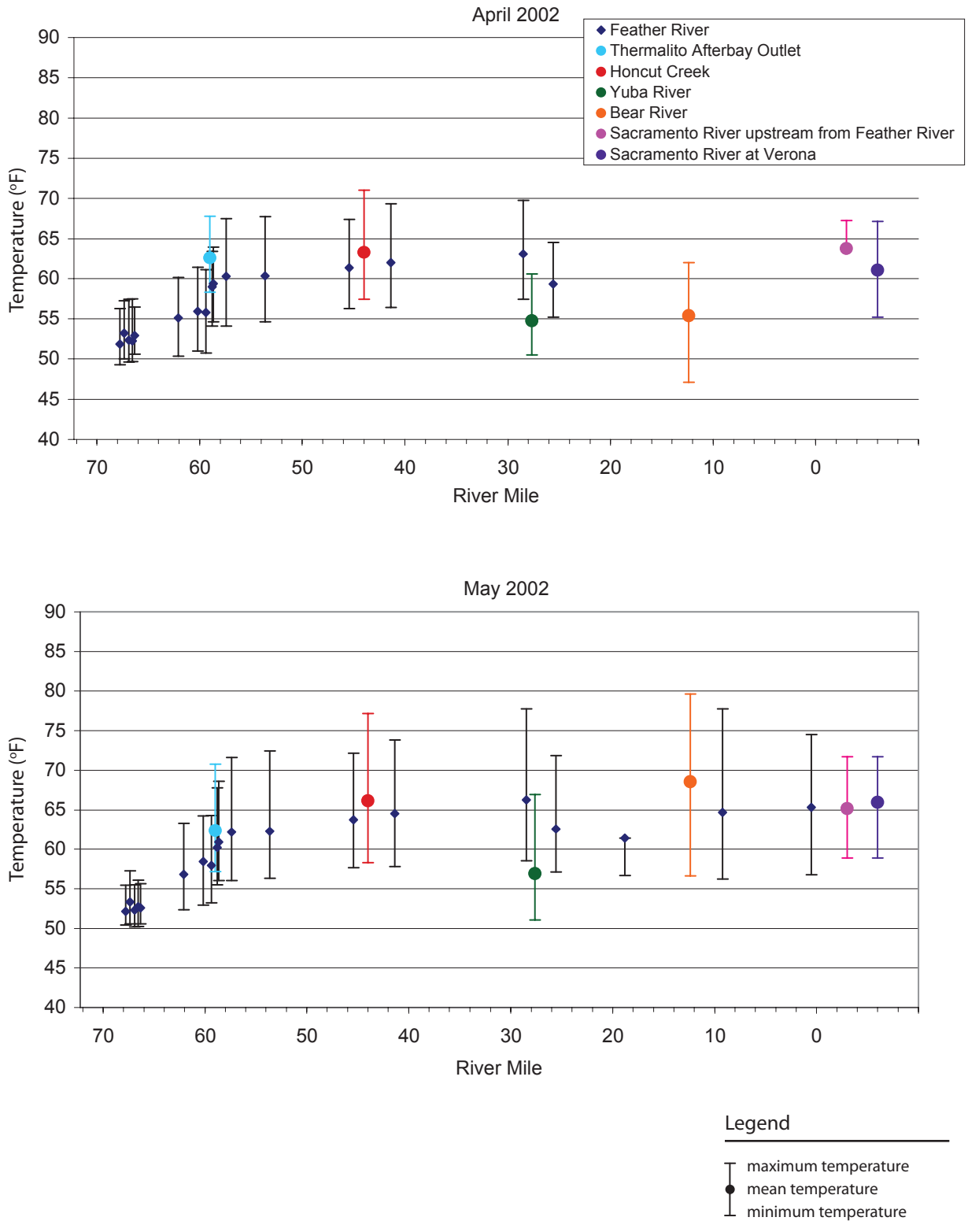
Figure 5-2
Water Temperatures in the Lower Feather River
(April 2002 - March 2004)



Source: DWR 2004

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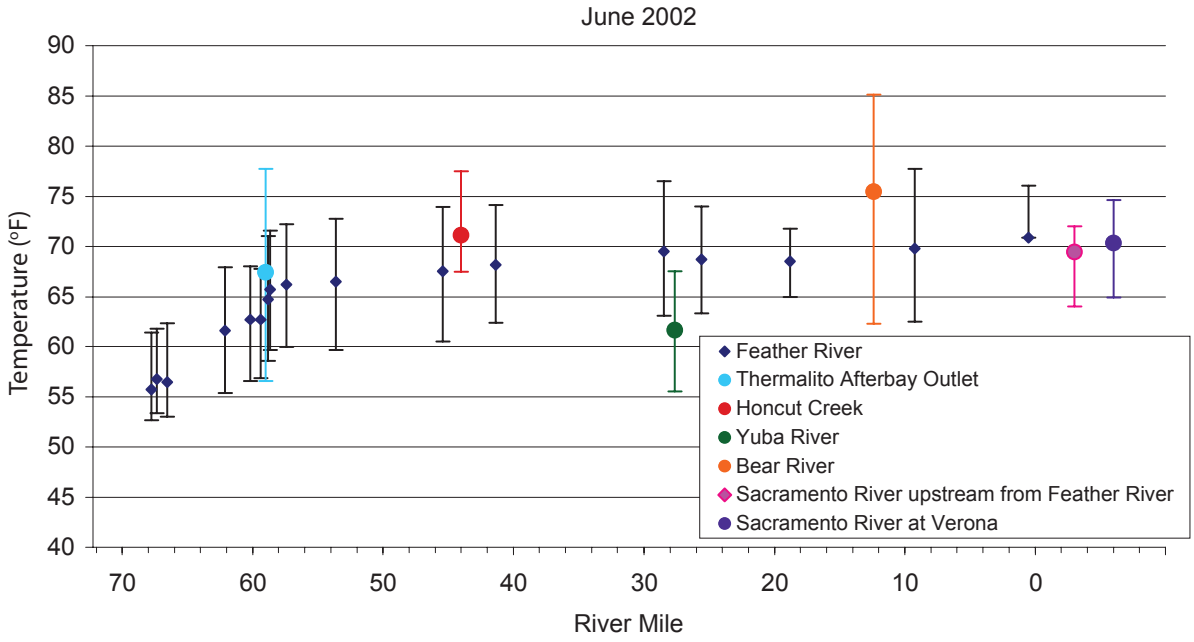
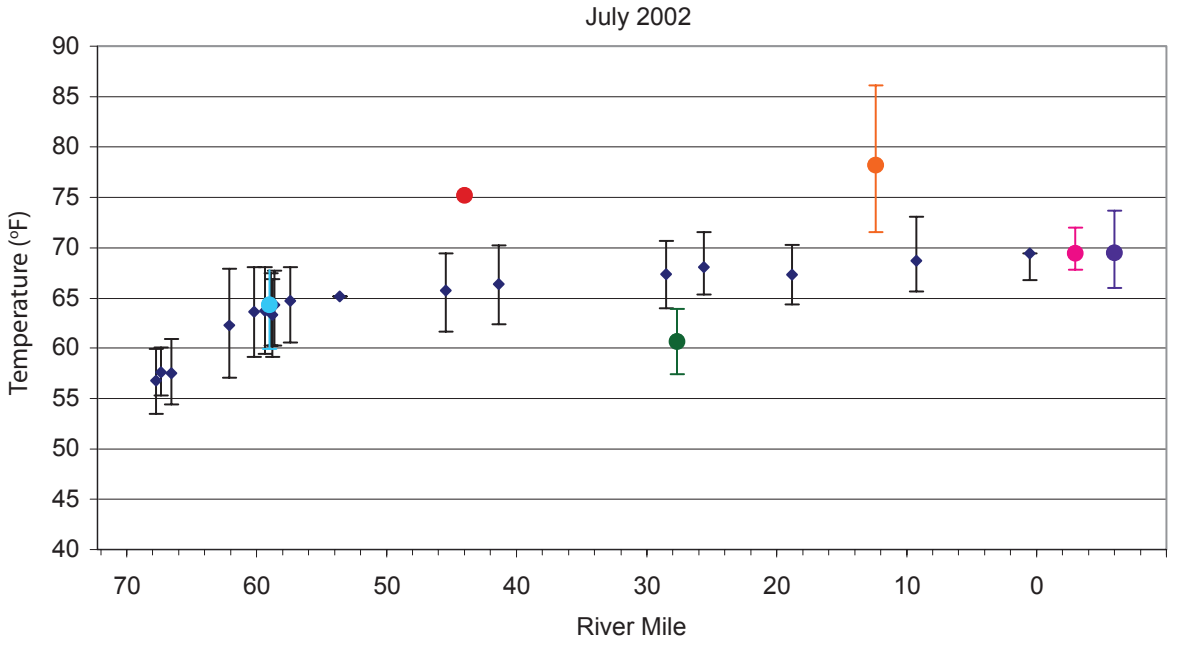
Figure 5-3
Monthly water temperatures in the lower Feather River, major tributaries, and Sacramento River in April and May 2002





Legend

maximum temperature
mean temperature
minimum temperature

Source: DWR 2004

06813.06 (11/08)

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Figure 5-4
Monthly water temperatures in the lower Feather River, major tributaries, and Sacramento River in June and July 2002

Water temperatures are coldest in the uppermost portions of the lower Feather River and warm progressively downstream during the spring, summer, and early fall. Recent water temperature modeling indicates that warming of the river downstream of Thermalito Afterbay Outlet is affected by release temperature, release discharge, tributary inflows, and atmospheric conditions (California Department of Water Resources 2004a). The effect of release temperature and discharge on river temperature decreases with increasing distance downstream from Oroville Dam as air temperature becomes the dominant influence on river temperature. For example, water temperatures measured throughout the river in June and July 2002 indicate that most of the warming in the Feather takes place between the Fish Barrier Dam and the Yuba River (California Department of Water Resources 2004). Except for the localized influence of tributary inflows, longitudinal profiles of mean and maximum daily water temperatures in the action area indicate that water temperatures have largely stabilized in this portion of the river during spring, summer, and early fall (Figures 5-3 and 5-4).

Given the location of the diversion and the magnitude of proposed diversion rates, the project is expected to have negligible effects on river temperature. Water temperature in the action area appears to be relatively insensitive to flow within the range of flows that typically occur during the spring, summer, and fall migration periods of Chinook salmon, steelhead, and green sturgeon. Removing water from the river can affect the magnitude or rate of heating or cooling in response to tributary inflows and fluctuating air temperatures but the slight reduction in flow resulting from the action is not likely to measurably affect these processes.

Sediment Management System

Salmonids are the fish species most likely to be affected by sediment management activities. The effects of sediment and turbidity on fish were addressed in Section 5.4.1.7.

The potential for effects on salmonids is likely greatest for adult fall-run Chinook salmon because their migration occurs when the ambient turbidity level in the river is typically at the lowest and when flow diversion and sediment return are typically the greatest. Other salmonids pass by the intake facility during winter and spring months when ambient turbidity levels are both typically much higher and variable and the ratio of flow diversion and sediment return to river flow is lowest. Therefore, potential changes to ambient conditions that may occur in the fall have the most potential to affect salmonids.

The plume is not expected to have any adverse effects on salmonids because the returned material is no different from that in the ambient turbidity, the plume would likely be spatially confined and occupy a small proportion of the flow width, and the suspended sediment levels would rapidly dissipate to levels approaching ambient levels a short distance from the return facility. Therefore, the plume should be easily avoided and bypassed by salmonids and other fishes.

5.4.3 Effects on Critical Habitat

Critical habitat for Central Valley spring-run Chinook salmon and Central Valley steelhead is designated within the project area. The action area lacks spawning sites and estuarine and marine habitats but does include freshwater rearing sites and freshwater migration corridors. Potential project effects on critical habitat include long-term beneficial effects on passage conditions for juvenile fish, short-term adverse effects on water quality, losses of riparian habitat within the project footprint, and long-term reductions in flow associated with increased diversion capacity.

The proposed action would result in long-term beneficial effects to critical habitat by improving passage conditions for Central Valley spring-run Chinook salmon and Central Valley steelhead. Replacement of the existing unscreened intake with a fish screen designed in accordance with current NOAA Fisheries and DFG screen performance criteria, and implementation of approved hydraulic and operations and maintenance plans would ensure that these benefits are maintained over the life of the project.

Temporary adverse effects on water quality would occur from noise, suspended sediment and turbidity, and cofferdam closure during construction activities. Restricting in-water activities to the period from July 1 through October 31 and implementing the environmental commitments would minimize the magnitude and duration of these adverse effects.

Potential project impacts on critical habitat include losses of riparian habitat within the project footprint. The proposed project footprint would encompass approximately 0.17 acre of channel bed and bank that is currently dominated by a simple streambank slope and rock revetment. The quality of juvenile rearing and migration habitat in the immediate project area is low because of the very limited amount of substantial “natural cover such as shade, submerged and overhanging large wood, log jams and beaver dams, aquatic vegetation, large rocks and boulders, side channels, and undercut banks.” Only small amounts of these essential elements that are present would be affected by the project. Because of the lack of significant SRA cover and the low quality of existing habitat, no adverse effects to critical habitat would occur in the project area.

Potential reductions in river flow associated with increases in diversion capacity are not expected to appreciably change water quantity, water temperature, and access to cover/shelter in the action area. Consequently, the action will not adversely affect critical habitat.

5.4.4 Effects on EFH

The effects of the proposed action on Chinook salmon EFH would be similar to those discussed for Critical Habitat in Section 5.4.3.

5.4.5 Yuba City Feather River Intake Screen Environmental Commitments

Implementation of project components is likely to adversely affect steelhead. Implementation of the proposed project includes the following environmental commitments (more fully described in Chapter 2) and/or mitigation measures to avoid, minimize, and compensate for impacts of implementation and mitigation-related activities on Central Valley steelhead.

- Environmental Commitment BIO-2: Minimize Entrainment of Juvenile Fish
- Environmental Commitment BIO-3: Implement Construction Period Limits
- Environmental Commitment BIO-4: Employ Noise-Reduction Measures to Minimize Noise Impacts on Special-Status Fish Species
- Environmental Commitment BIO-5: Avoid Stranding Impacts to Fish in Dewatered Areas
- Environmental Commitment BIO-6: Evaluate Performance of New Fish Screen
- Environmental Commitment HWQ-1: Prepare a SWPPP
- Environmental Commitment HWQ-2: Obtain General Dewatering Permit and Follow Dewatering Provisions
- Environmental Commitment HAZ-1: Prepare a Spill Prevention and Control and Countermeasure Plan
- Environmental Commitment ENV-1: Conduct an Environmental Training Program for Project Personnel

5.4.5.1 ASIP Conservation Measures

ASIP conservation measures for steelhead (SH) are described below. ASIP conservation measures correspond to the project's environmental commitments identified above.

Conservation Measure SH-1—Implement Environmental Commitment BIO-2

Implementation of this conservation measure is consistent with the following MSCS programmatic conservation measure for steelhead.

- Implement applicable conservation measures to avoid, minimize, and compensate for impacts on steelhead listed in MSCS Attachment D, "Summary of Potential Beneficial and Adverse Program Impacts and Conservation Measures," Table E-1, Prescription and Conservation Measures for Species with "R" Goals.

Conservation Measure SH-2—Implement Environmental Commitment BIO-3

Implementation of this conservation measure is consistent with the following MSCS programmatic conservation measure for steelhead.

- Implement applicable conservation measures to avoid, minimize, and compensate for impacts on steelhead listed in MSCS Attachment D, "Summary of Potential Beneficial and Adverse Program Impacts and Conservation Measures," Table E-1, Prescription and Conservation Measures for Species with "R" Goals.

Conservation Measure SH-3—Implement Environmental Commitment BIO-5

Implementation of this conservation measure is consistent with the following MSCS programmatic conservation measure for steelhead.

- Implement applicable conservation measures to avoid, minimize, and compensate for impacts on steelhead listed in MSCS Attachment D, "Summary of Potential Beneficial and Adverse Program Impacts and Conservation Measures," Table E-1, Prescription and Conservation Measures for Species with "R" Goals.

5.4.5.2 Expected Outcomes with Implementation of Conservation Measures

Implementation of the environmental commitments/conservation measures achieves the ASIP goal to avoid, minimize, and compensate for adverse impacts of proposed project actions on steelhead. Implementation of the conservation measures will help ensure that the existing abundance and distribution of steelhead in the project area are maintained.

5.4.6 Central Valley Spring-Run Chinook Salmon

5.4.6.1 Status

The Central Valley spring-run Chinook salmon ESU includes populations in the Sacramento River and its tributaries in California, including the Feather River, as well as the Feather River Hatchery spring-run Chinook program. They are listed as threatened under both CESA and ESA (70 FR 37160). The final rule designating critical habitat was issued on September 2, 2005 (70 FR 52598).

5.4.6.2 Life History

Adult Central Valley spring-run Chinook salmon emigrate from the ocean in late January to early February (California Department of Fish and Game 1998). Spring-run Chinook salmon adults leave the ocean and enter the Sacramento River primarily from March to June. From the Sacramento River, adult Central Valley spring-run Chinook salmon enter native tributaries primarily between mid April and mid June (National Marine Fisheries Service 2006). Stream flows must be sufficient to provide olfactory cues for migration and adult passage to upstream holding habitat. The ideal water temperature for upstream migration ranges from 38°to 56°F (3° to 15°C) (Bell 1991).

Adult spring-run Chinook salmon hold in the spawning areas during summer until their gonads mature and become ready for spawning. This is the primary characteristic that distinguishes the spring run from other runs of Chinook salmon. Spring-run Chinook salmon require cool freshwater while their gonads mature for several months over the summer. During this maturation period, spring-run Chinook salmon use mid- to high-elevation streams, which provide appropriate temperatures, and adequate flow, cover, and pool depth for over-summering (Yoshiyama et al. 1998). Tailwaters below dams may also provide suitable habitat during sexual maturation if cold water releases are made (National Marine Fisheries Service 2005a).

Spawning reportedly occurs between September and October, with a peak in September (National Marine Fisheries Service 2005a). The upper limit of the ideal temperature range for adult spawning is 57°F (14°C) (California Department of Fish and Game 1998). Fry emerge from November to March (Moyle 2002). The timing of egg incubation and hatching is temperature-dependent, i.e., embryo development time is a function of water temperature, with faster development (shorter times to hatch) occurring at elevated temperatures. The optimal temperature range for egg incubation is 44 to 54°F (7 to 12°C) (Rich 1997, as cited in California Department of Fish and Game 1998).

Emigration timing of spring-run Chinook salmon is variable; some juveniles begin emigration soon after emergence, while others remain over summer and begin emigration as yearlings the following fall, usually with the onset of storms (California Department of Fish and Game 1998). Chinook salmon spend between one and four years in the ocean before returning to their natal streams to spawn (National Marine Fisheries Service 2005a).

5.4.6.3 Historic and Current Distribution and Abundance

Historically, the Central Valley spring-run Chinook salmon ESU was distributed throughout the Sacramento River–San Joaquin River system, with a population

as high as 600,000 between the late 1880s and 1940s (California Department of Fish and Game 1998).

Mill, Deer, and Butte creeks in the Sacramento River system supported self-sustaining, persistent populations of spring-run Chinook salmon. In the late 1980s, population abundance in these creeks reached a low (5-year mean population sizes of 67–243 spawners), compared to a historical peak abundance of perhaps 700,000 spawners for the ESU (Good et al. 2005). As of 2001, abundance data indicate that since the early 1990s Central Valley spring-run Chinook salmon populations have increased in Mill, Deer, and Butte creeks (Good et al. 2005).

The upper Sacramento, Yuba, and Feather rivers are reported to support Central Valley spring-run Chinook salmon (CALFED Bay-Delta Program 2003). The population status in the upper Sacramento river is poorly documented, but the size is likely small; the degree of hybridization with fall-run Chinook salmon is unknown (Good et al. 2005). The Feather and Yuba rivers contain populations believed to be influenced by the Feather River Hatchery spring-run Chinook salmon stock, and there is concern that fall-run and spring-run Chinook salmon have hybridized in the hatchery (Good et al. 2005).

5.4.6.4 Reasons for Decline

The decline of spring-run Chinook salmon can be attributed to several factors including: water development for hydroelectric production, irrigation, domestic water supplies and flood control; entrainment in water diversions; riparian and aquatic habitat degradation; disease and predation; and genetic threats from the Feather River Hatchery spring-run Chinook salmon program (CALFED Bay-Delta Program 2003). Dams, regulated flows, entrainment of migrating fish into unscreened diversions, and elevated water temperatures have impacted important juvenile rearing habitat and migration corridors (Moyle 2002).

5.4.6.5 Life History and Distribution in Action Area

The action area contains the Feather River populations of Central Valley spring-run Chinook salmon. Adults and juveniles migrate through the action area. Adults hold and spawn approximately 45 miles upstream, in the uppermost 3 miles of accessible habitat below the Feather River Fish Hatchery (California Department of Water Resources 2001). The number of naturally spawning spring-run Chinook salmon in the Feather River has been estimated only periodically since the 1960s, with estimates ranging from two fish in 1978 to 2,908 in 1964. Adult spring-run Chinook salmon that return to the Feather River Fish Hatchery have been counted each year since 1963; their numbers have ranged from 146 to 1967 to 8,662 in 2003 (California Department of Fish and Game 2004a).

Based on run-time observations of spring-run Chinook salmon in the Feather River, adults are likely to be present in the action area during the upstream migration period between February and July. During this period, adults are assumed to actively migrate through the action area to summer holding habitat in the low flow channel below Oroville Dam.

Results from Feather River Chinook salmon emigration studies indicate that most juvenile Chinook salmon (both spring- and fall-run) emigrate soon after emergence at sizes less than 50 mm in length (Seesholtz et al. 2004). Emigration typically begins in mid-November, peaks between January and March, and continues through June (California Department of Water Resources 1999a, 1999b, 1999c; Seesholtz et al. 2004). Therefore, rearing and emigrating juveniles are likely present in the action area from mid-November through June, with the greatest abundance of individuals in January, February, and March. Little information is available on Chinook salmon emigration in the lowermost portion of the lower Feather River but most juveniles have probably emigrated from the river by mid-May in response to physiological cues and rising water temperatures.

5.4.6.6 Critical Habitat in Action Area

NOAA Fisheries designated critical habitat for Central Valley spring-run Chinook salmon on September 2, 2005 (70 FR 52488). Critical habitat consists of the water, substrate, and adjacent riparian zone of accessible estuarine and riverine reaches within the historical range of the Central Valley spring-run Chinook salmon ESU that can still be occupied by any life stage of Chinook salmon.

Critical habitat in the action area would be those areas that provide primary constituent elements, physical and biological features of the landscape necessary for survival and reproduction. This would include spawning habitat, freshwater rearing habitat, freshwater migration corridors, and estuarine areas.

The action area provides migratory and rearing habitat for Central Valley spring-run Chinook salmon. The essential features of freshwater salmonid habitat within the action area include adequate substrate, water quality, water quantity, water temperature, water velocity, cover/shelter, food, riparian vegetation, space, and safe passage conditions (National Marine Fisheries Service 2005a). Water temperature is a major determinant of the suitability of habitat for salmonids in the action area. Consequently, adults and juveniles primarily occur in the action area during the late fall, winter, and early spring when water temperatures are most favorable for migration and rearing. Because of ambient air temperatures, lack of riparian shading, and thermal inputs from agricultural outfall water, water temperatures are warmer than desired for salmonids from late spring through early fall (National Marine Fisheries Service 2005a).

Habitat within the action area is primarily used as juvenile rearing habitat and migratory habitat for adult and juvenile spring-run Chinook salmon. The channel

in the action area is confined by levees with little woody vegetation and generally lacks the attributes of high quality rearing habitat (i.e., shallow water, habitat complexity, and cover). The project area supports relatively little vegetation, except for a single large tree and shrubs and a dominance of low-growing grasses.

5.4.6.7 Essential Fish Habitat in Action Area

EFH is the aquatic habitat (water and substrate) necessary for fish to spawn, breed, feed, or grow to maturity that would allow a level of production needed to support a long-term, sustainable commercial fishery and contribute to a healthy ecosystem (National Marine Fisheries Service 1998). Consultation with NOAA Fisheries is required for potential effects on all runs of Chinook salmon because of their commercial value.

Fish in the project area that are covered under the EFH assessment are Central Valley spring-run Chinook salmon and Central Valley fall-/late fall–run Chinook salmon (described below). Important components of EFH for spawning, rearing, and migration include adequate:

- substrate composition;
- water quality;
- water quantity, depth, and velocity;
- channel gradient and stability;
- food;
- cover and habitat complexity;
- space;
- access and passage; and
- habitat connectivity.

EFH is included in the Feather River for spring-run Chinook salmon.

5.4.6.8 Project Impacts

Project impacts are the same as listed above for Central Valley steelhead.

Impacts on Critical Habitat

Impacts on critical habitat are the same as listed above for Central Valley steelhead.

5.4.6.9 Yuba City Feather River Intake Screen Environmental Commitments

The Environmental Commitments are the same as listed above in Section 5.4.5.

5.4.6.10 ASIP Conservation Measures

ASIP conservation measures for Central Valley spring-run Chinook salmon (SRCS) are described below. ASIP conservation measures correspond to the project's environmental commitments identified above.

Conservation Measure SRCS-1—Implement Environmental Commitment BIO-2

Implementation of this conservation measure is consistent with the following MSCS programmatic conservation measure for steelhead.

- Implement applicable conservation measures to avoid, minimize, and compensate for impacts on Central Valley spring-run Chinook salmon listed in MSCS Attachment D, "Summary of Potential Beneficial and Adverse Program Impacts and Conservation Measures," Table E-1, Prescription and Conservation Measures for Species with "R" Goals.

Conservation Measure SRCS-2—Implement Environmental Commitment BIO-3

Implementation of this conservation measure is consistent with the following MSCS programmatic conservation measure for Central Valley spring-run Chinook salmon.

- Implement applicable conservation measures to avoid, minimize, and compensate for impacts on Central Valley spring-run Chinook salmon listed in MSCS Attachment D, "Summary of Potential Beneficial and Adverse Program Impacts and Conservation Measures," Table E-1, Prescription and Conservation Measures for Species with "R" Goals.

Conservation Measure SRCS-3—Implement Environmental Commitment BIO-5

Implementation of this conservation measure is consistent with the following MSCS programmatic conservation measure for Central Valley spring-run Chinook salmon.

- Implement applicable conservation measures to avoid, minimize, and compensate for impacts on Central Valley spring-run Chinook salmon listed in MSCS Attachment D, "Summary of Potential Beneficial and Adverse Program Impacts and Conservation Measures," Table E-1, Prescription and Conservation Measures for Species with "R" Goals.

5.4.6.11 Expected Outcomes with Implementation of Conservation Measures

Implementation of the environmental commitments and conservation measures achieves the ASIP goal to avoid, minimize, and compensate for adverse impacts of proposed project actions on Central Valley spring-run Chinook salmon. Implementation of the conservation measures will help ensure that the existing abundance and distribution of spring-run Chinook salmon in the project area are maintained.

5.4.7 Sacramento River Winter-Run Chinook Salmon

5.4.7.1 Status

Sacramento River winter-run Chinook salmon were listed as threatened in November, 1990 (55 FR 46515). In January of 1994 their status was reclassified as endangered (59 FR 440) due to continued decline and increased variability of run sizes since 1989, the expectation of weak returns as a result of two small year classes (1991 and 1993), and continuing threats to populations; their endangered status was reaffirmed in June, 2005 (70 FR 37160). Critical habitat for Sacramento River winter-run Chinook salmon was designated in July, 1993 (50 FR 33212).

5.4.7.2 Life History

Adult Sacramento River winter-run Chinook salmon enter the Sacramento River basin between December and July, peaking in March (National Marine Fisheries Service 2006). Suitable temperatures for upstream migration range from 57 ° to 67 °F (14 ° to 19 °C) (National Marine Fisheries Service 1997b). Most Sacramento River winter-run Chinook salmon return to spawn as 3-year-olds (Moyle 2002). Spawning occurs from late April to early August, with peak spawning occurring in May or June (Moyle 2002).

Juvenile Sacramento River winter-run Chinook salmon reside in streams for approximately 5 to 10 months prior to emigration to the ocean (Moyle 2002). Emigration of juveniles past Red Bluff Diversion Dam begins in mid July and

can continue through March of the following year in dry years (National Marine Fisheries Service 1997).

Additional information on the life history and habitat requirements of Sacramento River winter-run Chinook salmon can be found in the NOAA Fisheries' biological opinion for this species based on their review of the Sacramento River Flood Control Project Critical Levee Erosion Repair project (2006).

5.4.7.3 Historic and Current Distribution and Abundance

Historically, Sacramento River winter-run Chinook salmon populations occurred in McCloud, Pit, and Little Sacramento rivers, as well as tributaries including Hat Creek and Fall River, with perhaps smaller populations in Battle Creek and the Calaveras River (Good et al. 2005). Following completion of Shasta Dam, distribution of winter-run Chinook salmon was limited to the Sacramento River, Battle Creek, and Calaveras River; presently, populations in Battle Creek and the Calaveras River are believed to have been extirpated (Good et al. 2005). It is estimated that in the 1960s Sacramento River winter-run Chinook salmon population approached 100,000 (National Marine Fisheries Service 2006). Populations declined to under 200 fish in the 1990s (Good et al. 2005), but have recently increased according to population estimates from 2003 to 2005.

Current distribution of winter-run Chinook salmon is limited to the mainstem Sacramento River to above the Red Bluff Diversion Dam (Good et al. 2005). In 2002 and 2003, winter-run population numbers have increased since their lows in the 1990's. From the Red Bluff Diversion Dam counts, 9,169 Chinook salmon passed by the dam in 2002. In 2003, 9,757 winter-run were counted passing the dam (California Department of Fish and Game 2004b). In 2006, an estimated 7,513 winter-run were counted at Red Bluff (Pacific Fishery Management Council 2007).

5.4.7.4 Reasons for Decline

Dams in the Central Valley have blocked access to all historical spawning grounds, altered water temperatures, and reduced habitat complexity (National Marine Fisheries Service 2007). Additionally, disease, predation and poor water quality due to toxicants, have contributed to the decline of the Sacramento winter-run Chinook salmon.

5.4.7.5 Life History and Distribution in Action Area

The action area provides migration and rearing habitat for Sacramento River winter-run Chinook salmon. Although winter-run Chinook salmon do not spawn

in the Feather River, out-of basin juveniles may use habitats within the action area for non-natal rearing and growth November through March.

5.4.7.6 Critical Habitat in Action Area

Critical habitat for Sacramento winter-run Chinook salmon was designated to include the Sacramento River from Keswick Dam (RM 302) to Chipps Island (RM 0) at the westward margin of the Sacramento-San Joaquin Delta (50 FR 3312). Designated critical habitat does not include the Feather River.

5.4.7.7 Essential Fish Habitat in Action Area

EFH is included in the Feather River for Sacramento River winter-run Chinook salmon. Refer to Section 5.4.6.7 for a discussion of EFH.

5.4.7.8 Project Impacts

Project impacts are the same as listed above for Central Valley steelhead.

Impacts on Critical Habitat

Impacts on critical habitat are the same as listed above for Central Valley steelhead.

5.4.7.9 Yuba City Feather River Intake Screen Environmental Commitments

The Environmental Commitments are the same as listed above in Section 5.4.5.

5.4.7.10 ASIP Conservation Measures

ASIP conservation measures for Sacramento winter-run Chinook salmon (WRCS) are described below. ASIP conservation measures correspond to the project's environmental commitments identified above.

Conservation Measure WRCS-1—Implement Environmental Commitment BIO-2

Implementation of this conservation measure is consistent with the following MSCS programmatic conservation measure for steelhead.

- Implement applicable conservation measures to avoid, minimize, and compensate for impacts on Sacramento winter-run Chinook salmon listed in MSCS Attachment D, "Summary of Potential Beneficial and Adverse Program Impacts and Conservation Measures," Table E-1, Prescription and Conservation Measures for Species with "R" Goals.

Conservation Measure WRCS-2—Implement Environmental Commitment BIO-3

Implementation of this conservation measure is consistent with the following MSCS programmatic conservation measure for Sacramento winter-run Chinook salmon.

- Implement applicable conservation measures to avoid, minimize, and compensate for impacts on Sacramento winter-run Chinook salmon listed in MSCS Attachment D, "Summary of Potential Beneficial and Adverse Program Impacts and Conservation Measures," Table E-1, Prescription and Conservation Measures for Species with "R" Goals.

Conservation Measure WRCS-3—Implement Environmental Commitment BIO-5

Implementation of this conservation measure is consistent with the following MSCS programmatic conservation measure for Sacramento winter-run Chinook salmon.

- Implement applicable conservation measures to avoid, minimize, and compensate for impacts on Sacramento winter-run Chinook salmon listed in MSCS Attachment D, "Summary of Potential Beneficial and Adverse Program Impacts and Conservation Measures," Table E-1, Prescription and Conservation Measures for Species with "R" Goals.

5.4.7.11 Expected Outcomes with Implementation of Conservation Measures

Implementation of the environmental commitments and conservation measures achieves the ASIP goal to avoid, minimize, and compensate for adverse impacts of proposed project actions on Sacramento winter-run Chinook salmon. Implementation of the conservation measures will help ensure that the existing

abundance and distribution of winter-run Chinook salmon in the project area are maintained.

5.4.8 Central Valley Fall-/Late Fall–Run Chinook Salmon

5.4.8.1 Status

The Central Valley fall-run/late fall-run Chinook salmon ESU includes all naturally spawned fall- and late-fall run populations of Chinook salmon in the Sacramento and San Joaquin basins and their tributaries, east of Carquinez Strait, California (National Marine Fisheries Service 1999). The Central Valley fall-run/late-fall-run Chinook salmon is a candidate species (formerly a Category 1 species) under the ESA (National Marine Fisheries Service 1999). The late fall-run Chinook salmon is listed as a California species of special concern.

5.4.8.2 Life History

Fall-run Chinook salmon are mostly ocean-type Chinook and are adapted for spawning in lowland reaches of large rivers and associated tributaries. Fall-run Chinook salmon migrate upstream to freshwater from August through November (Moyle 2002). The peak spawning period for fall-run Chinook salmon is October through November. Eggs are deposited in redds in gravel-bottom areas with relatively swift, cool (<60°F) water. The eggs hatch in three to four months, and the larvae remain in the gravel for another two to three weeks before emerging. Fall-run Chinook salmon fry emerge December through March and typically seek out shallow, nearshore habitat with slow water velocities (Moyle 2002). As they grow, they move to deeper, faster water. Juveniles have a brief rearing period, ranging from one to seven months, prior to emigration (Moyle 2002). Fall-run Chinook salmon juveniles emigrate between January and June.

The differences between fall- and late fall–run Chinook salmon are related to timing of migration into freshwater, timing of spawning, timing of juvenile emergence, and length of time juveniles remain in freshwater (Moyle 2002). Late fall–run Chinook salmon adults move upstream from October through April (Moyle 2002). Late fall–run are primarily stream-type and they typically enter freshwater in an immature state and hold until they are sexually mature. The peak spawning period for late fall–run Chinook salmon is February through March (Moyle 2002). Late fall–run fry emerge April through June (Moyle 2002). Stream residency for juveniles spans a period of seven to thirteen months. Relative to fall-run juveniles, late fall–run juveniles are comparatively large once emigration begins (Moyle 2002). Emigration for late fall–run generally occurs from June through December.

5.4.8.3 Historic and Current Distribution and Abundance

Historically, Central Valley fall-/late fall–run Chinook salmon occupied many streams of the Sacramento-San Joaquin watershed. Fall-run Chinook salmon used rivers and their tributaries in the Central Valley from the Kings River in the south to the Pit and McCloud rivers in the north (Schick et al. 2005). It is likely that late fall-run Chinook salmon used the Sacramento River and tributaries above Shasta Dam (Moyle et al. 1995). Fall-run Chinook salmon were the most abundant run in the Central Valley (Moyle 2002).

The overall population abundance for this ESU is relatively high, but the abundance of naturally produced fish is declining. Natural production is especially low in the San Joaquin River drainage (63 FR 11481; March 9, 1998). Barriers to fish passage on many streams and rivers limit upstream habitat.

5.4.8.4 Reasons for Decline

Several factors have contributed to the population decline of Central Valley fall-/late fall–run Chinook salmon and include:

- loss and degradation of spawning and rearing habitat;
- alteration of streamflows;
- over harvesting;
- entrainment into water diversions;
- blockage of migration routes;
- toxicant exposure; and
- loss of genetic viability from interbreeding with hatchery stocks.

5.4.8.5 Life History and Distribution in Action Area

Adult fall-run Chinook salmon pass through the action area from July through December as they migrate upstream to spawning areas upstream of the action area. Juvenile fall-run Chinook salmon rear and emigrate in the action area from December through June. Their seasonal abundance and emigration patterns are generally similar to that of spring-run Chinook salmon (see above).

5.4.8.6 Essential Fish Habitat in Action Area

EFH is included in the Feather River for fall-/late fall–run Chinook salmon. Refer to Section 5.4.6.7 for a discussion of EFH.

5.4.8.7 Project Impacts

Project impacts are the same as listed above for Central Valley steelhead.

5.4.8.8 Yuba City Feather River Intake Screen Environmental Commitments

The Environmental Commitments are the same as listed above in Section 5.4.5.

5.4.8.9 ASIP Conservation Measures

ASIP conservation measures for Central Valley fall-run Chinook salmon (FRCS) are described below. ASIP conservation measures correspond to the project's environmental commitments identified above.

Conservation Measure FRCS-1—Implement Environmental Commitment BIO-2

Implementation of this conservation measure is consistent with the following MSCS programmatic conservation measure for Central Valley fall-run Chinook salmon.

- Implement applicable conservation measures to avoid, minimize, and compensate for impacts on Central Valley fall-run Chinook salmon listed in MSCS Attachment D, "Summary of Potential Beneficial and Adverse Program Impacts and Conservation Measures," Table E-1, Prescription and Conservation Measures for Species with "R" Goals.

Conservation Measure FRCS-2—Implement Environmental Commitment BIO-3

Implementation of this conservation measure is consistent with the following MSCS programmatic conservation measure for Central Valley fall-run Chinook salmon.

- Implement applicable conservation measures to avoid, minimize, and compensate for impacts on Central Valley fall-run Chinook salmon listed in MSCS Attachment D, "Summary of Potential Beneficial and Adverse Program Impacts and Conservation Measures," Table E-1, Prescription and Conservation Measures for Species with "R" Goals.

Conservation Measure FRCS-3—Implement Environmental Commitment BIO-5

Implementation of this conservation measure is consistent with the following MSCS programmatic conservation measure for Central Valley fall-run Chinook salmon.

- Implement applicable conservation measures to avoid, minimize, and compensate for impacts on Central Valley fall-run Chinook salmon listed in MSCS Attachment D, "Summary of Potential Beneficial and Adverse Program Impacts and Conservation Measures," Table E-1, Prescription and Conservation Measures for Species with "R" Goals.

5.4.8.10 Expected Outcomes with Implementation of Conservation Measures

Implementation of the environmental commitments and conservation measures achieves the ASIP goal to avoid, minimize, and compensate for adverse impacts of proposed project actions on Central Valley fall-run Chinook salmon. Implementation of the conservation measures will help ensure that the existing abundance and distribution of fall-run Chinook salmon in the project area are maintained.

5.4.9 North American Green Sturgeon (Southern Distinct Population Segment)

5.4.9.1 Status

On April 7, 2006, NOAA Fisheries issued a final rule listing the Southern DPS of North American green sturgeon (*Acipenser medirostris)* as a threatened species. This determination was based on the reduction of potential spawning habitat, the severe threats to the single remaining spawning population, the inability to alleviate these threats with the conservation measures in place, and the decrease in observed numbers of juvenile Southern DPS green sturgeon collected in the past two decades compared to those collected historically (71 FR 17757, April 7, 2006).

Critical habitat for the North American green sturgeon has not been designated. NOAA Fisheries has proposed to designate critical habitat for the Southern DPS green sturgeon (73 FR 52084, September 8, 2008). The Sacramento River, lower Feather River, lower Yuba River, the Sacramento-San Joaquin Delta and Suisun, and San Pablo and San Francisco bays are included among the areas proposed as critical habitat in California.

5.4.9.2 Life History

The green sturgeon is anadromous, but it is the most marine-oriented of the sturgeon species. It enters rivers primarily to spawn, although its early life stages in freshwater may last as long as 2 years (Moyle 2002). Adults typically migrate upstream into rivers between late February and late July. Spawning occurs from March to July, with peak spawning from mid-April to mid-June. Green sturgeon are believed to spawn every 3 to 5 years, although recent evidence indicates that spawning may be as frequent as every 2 years (70 FR 17386). Peak spawning reportedly occurs between April and June (Bureau of Reclamation 2008). Little is known about the specific spawning habitat preferences of green sturgeon. Deep, cool pools with turbulent water and large cobble are believed to be the preferred spawning habitat of green sturgeon (Adams et al. 2002). It is believed that adult green sturgeon broadcast their eggs in deep, fast water over large cobble substrate, where the eggs settle into the interstitial spaces (Moyle 2002). Spawning is generally associated with water temperatures from 46 to 57 ºF (8 to 14°C). In the Central Valley, spawning occurs in the Sacramento River upstream of Hamilton City, perhaps as far upstream as Keswick Dam (Moyle 2002).

Spawning areas and migratory corridors provide rearing habitat for juvenile green sturgeon (Bureau of Reclamation 2008). Movement and foraging during downstream migration occurs at night for both larvae (approximately 10 days post hatch) and juveniles (73 FR 52084; Cech et al. 2000, as cited in Bureau of Reclamation 2008). Limited information is available on larval rearing habitat. The optimal temperature for larval growth is believed to be approximately 59ºF (15°C); temperatures outside the range of 52 to 66ºF (11 to 19°C) may be detrimental to growth (Cech et al. 2000, as cited in 73 FR 52084). Larvae complete metamorphosis to juveniles at 45 days post hatch (Deng et al. 2002). Juveniles inhabit the Sacramento–San Joaquin Delta until they are approximately 4 to 6 years old, when they migrate to the ocean (Kohlhorst et al. 1991).

5.4.9.3 Historic and Current Distribution and Abundance

In North America, green sturgeon are found in rivers from British Columbia south to the Sacramento River. In the Pacific Ocean, they range from the Bering Sea to Ensenada, Mexico (Moyle 2002). Historical spawning populations in California existed only in the Eel River and the Klamath-Trinity river system (Moyle 2002). Spawning has been confirmed in only three rivers, the Rogue River in Oregon, and the Klamath and Sacramento rivers in California (National Marine Fisheries Service 2008). Green sturgeon may spawn in the Feather River during high flow years (California Department of Fish and Game 2002) but sitings to confirm this have not yet been documented. Historic use of the Feather River, prior to construction of Oroville Dam, is unknown.

5.4.9.4 Reasons for Decline

Decline of the Southern DPS green sturgeon can be attributed to several factors, including loss of spawning habitat in the upper Sacramento and Feather rivers; entrainment by water project operations; limiting or lethal water temperatures; and commercial and recreational fisheries harvest (71 FR 17757, April 2006).

5.4.9.5 Life History and Distribution in Action Area

Historical and current records confirm the presence of adult green sturgeon in the Feather River (Beamesderfer et al. 2004; Seesholtz 2008 pers. comm.). In 2008, one adult was detected by a fixed telemetry monitor at Star Bend in May, and another adult was sighted in early June at Shanghai Bend (Seesholtz 2008 pers. comm.). In 2006, a dozen sturgeon, of which four were green sturgeon, were observed near the Thermalito Outlet on the Feather River (Seesholtz 2008 pers. comm.).

There are no records of larval or juvenile sturgeon, even before the Oroville Dam installation (National Marine Fisheries Service 2005b). As previously stated, there are unconfirmed reports that green sturgeon could spawn in the Feather River during high flow years (California Department of Fish and Game 2002). Adults likely use the action area for holding and migration.

5.4.9.6 Project Impacts

Project impacts are the same as listed above for Central Valley steelhead.

5.4.9.7 Yuba City Feather River Intake Screen Environmental Commitments

The Environmental Commitments are the same as listed above in Section 5.4.5.

5.4.9.8 ASIP Conservation Measures

ASIP conservation measures for green sturgeon (GS) are described below. ASIP conservation measures correspond to the project's environmental commitments identified above.

Conservation Measure GS-1—Implement Environmental Commitment BIO-2

Implementation of this conservation measure is consistent with the following MSCS programmatic conservation measure for green sturgeon.

- Implement applicable conservation measures to avoid, minimize, and compensate for impacts on green sturgeon listed in MSCS Attachment D, "Summary of Potential Beneficial and Adverse Program Impacts and Conservation Measures," Table E-1, Prescription and Conservation Measures for Species with "R" Goals.

Conservation Measure GS-2—Implement Environmental Commitment BIO-3

Implementation of this conservation measure is consistent with the following MSCS programmatic conservation measure for green sturgeon.

Implement applicable conservation measures to avoid, minimize, and compensate for impacts on green sturgeon listed in MSCS Attachment D, "Summary of Potential Beneficial and Adverse Program Impacts and Conservation Measures," Table E-1, Prescription and Conservation Measures for Species with "R" Goals.

5.4.9.9 Expected Outcomes with Implementation of Conservation Measures

Implementation of the environmental commitments and conservation measures achieves the ASIP goal to avoid, minimize, and compensate for adverse impacts of proposed project actions on green sturgeon. Implementation of the conservation measures will help ensure that the existing abundance and distribution of green sturgeon in the project area are maintained.

5.5 California Department of Fish and Game—Covered Species

5.5.1 Swainson's Hawk

5.5.1.1 Status in the Project Area

The Swainson's hawk is a state-listed threatened species and is a migratory bird species protected under the federal Migratory Bird Treaty Act (MBTA). Swainson's hawk breeding range occurs from southwestern Canada to northern Mexico. Swainson's hawks are summer residents in the study area, and small

numbers of this species are known to winter in the Delta. In the Central Valley, Swainson's hawks primarily nest in riparian areas adjacent to agricultural fields or pastures, although isolated trees or roadside trees are sometimes used (California Department of Fish and Game 1994). Swainson's hawks nest in mature trees, and the preferred tree species are valley oak, cottonwood, willows, sycamores, and walnuts. Nest sites are typically located in the vicinity of suitable foraging areas. The primary foraging areas for Swainson's hawk are open agricultural and pasture lands (California Department of Fish and Game 1994).

Foraging habitat for Swainson's hawk consists of relatively open stands of grass-dominated vegetation, sparse shrub lands, and even croplands. Swainson's hawks tend to nest almost exclusively in large, sparsely vegetated flatlands characterized by valleys, plateaus, broad floodplains, and large expanses of desert (Bloom 1980). In California, these birds typically return to nest sites from early March to April (later in more northern areas of the state). Migratory flocks begin forming in late August and September and most birds are on their wintering grounds by November.

There are two CNDDB occurrences of Swainson's hawks in the study area (California Natural Diversity Database 2007). Both of these occurrences are north of Yuba City and are more than 1 mile from the project area. There is no Swainson's hawk foraging habitat in the project area and there is limited foraging habitat in lands adjacent to the access road. Large trees adjacent to the project area may provide suitable nesting or roosting habitat for Swainson's hawk.

5.5.1.2 Project Impacts

Implementation of the project could result in take of Swainson's hawk should construction occur during breeding season (15 March through 15 October). There is only one suitable nest tree in the project footprint; however, the riparian woodland habitats adjacent to the project area and access road provide potential nesting and roosting habitat for this species. Project implementation was assumed to have an adverse impact on the Swainson's hawk if project activities could result in the loss or disturbance of riparian woodland habitat or agricultural lands (for foraging) while this species is present in the project area.

The project was also assumed to have an adverse impact on the Swainson's hawk if project activities could result in the removal of a nest tree during the breeding season (March 1–September 15), nest abandonment, or forced fledging within ½ mile of project-related activities. This approach to assessing impacts on nesting Swainson's hawks is consistent with DFG guidelines for the species (California Department of Fish and Game 1994).

There are no known nest trees within one mile of the project site. Preconstruction surveys will be carried out prior to construction to confirm absence. Upland cropland that may be disturbed by the project consists of a walnut orchard that does not provide foraging habitat for Swainson's hawk. The

narrow bands of ruderal habitat adjacent to the access road and orchard provide low-quality foraging habitat for this species.

5.5.1.3 Mitigation Measures

Implementation of project components and mitigation measures that include the restoration of affected habitats could result in a low, unquantifiable level of effect on Swainson's hawk. The following mitigation measures have been developed to avoid, minimize, and compensate for impacts of implementing the project components on the Swainson's hawk (SWHA).

Mitigation Measure SWHA1—Conduct Preconstruction Surveys to Locate Swainson's Hawk Nest Sites

Preconstruction surveys for Swainson's hawk will be conducted at and adjacent to all locations to be disturbed by construction activities to ensure that this species is not nesting in these locations. Surveys will also be performed at all mitigation sites prior to implementation of the mitigation features. Preconstruction surveys will consist of surveying all potential nest sites within 0.5 mile of proposed construction areas and mitigation sites. Surveys will be performed several times during the breeding season to avoid and minimize impacts on late-nesting birds. Nest sites will be marked on an aerial photograph, and the position will be recorded using GPS. Preconstruction survey data will be used in accordance with Conservation Measures SWHA-2, SWHA-3, and SWHA-4.

Mitigation Measure SWHA2—Minimize Construction-Related Disturbances within 0.5 Mile of Active Nest Sites

Portions of the construction activities will occur throughout the year and will overlap with the Swainson's hawk breeding season. The City will provide the locations of active nest sites identified during the preconstruction surveys to DFG and will coordinate with DFG on appropriate avoidance and minimization measures on a case-by-case basis.

To the greatest extent practicable, major construction activities that will occur within 0.5 mile of an active Swainson's hawk nest will be avoided during the breeding season. If practicable, depending on project components and schedule, construction activities that will result in the greatest disturbance to an active nest site will be deferred until after or as late in the breeding season as possible. If construction or other project-related activities that may cause nest abandonment or forced fledging are necessary within the buffer zone, the City will monitor the nest site. Monitoring will be performed by a qualified wildlife biologist. The biological monitor will notify DFG if the nest or nestlings are abandoned and the nestlings are still alive to determine the appropriate actions. The City will fund

the recovery and hacking (controlled release) of the nestlings. This mitigation measure was developed based on a DFG staff report for Swainson's hawk (provide citation).

Mitigation Measure SWHA3—Avoid Removal of Occupied Nest Sites

As stated under Mitigation Measure SWHA1, preconstruction surveys will be performed to identify active nest sites before implementing construction activities. Before the start of the nesting season, the City will remove suitable nest trees in locations where trees are scheduled for removal. Additionally, before February 15 of each construction season, the City will remove all suitable nesting habitat for migratory birds in areas where vegetation is scheduled to be cleared. Removal of vegetation before the nesting season will ensure that occupied nests are not removed. If construction activities require the removal of additional vegetation not previously designated for removal, the City will perform clearance surveys to determine whether nesting hawks are present. If additional tree removal is required, it will be deferred until after the breeding season.

Mitigation Measure SWHA4—Replace Lost Foraging and Nesting Habitat

To compensate for the loss of potential nesting habitat, the City will provide mitigation for the loss of riparian trees, as required by DFG.

- To compensate for the loss of nesting habitat, the City will replace affected riparian vegetation as described in Chapter 2. As part of this mitigation, the City will develop the revegetation plan to ensure that three replacement trees are planted for each tree that is affected, as required by DFG.

5.5.1.4 ASIP Conservation Measures

ASIP conservation measures for the Swainson's hawk are described below.

Conservation Measure SWHA-1—Implement Mitigation Measures SWHA1 and SWHA3

Implementation of this conservation measure is consistent with the following MSCS programmatic conservation measure for the Swainson's hawk.

- Before implementing actions that could result in take or the loss or degradation of occupied habitat, conduct surveys in suitable habitat within portions of the species' range that CALFED actions could affect to determine the presence and distribution of the species.

Conservation Measure SWHA-2—Implement Mitigation Measure SWHA2

Implementation of this conservation measure is consistent with the following MSCS programmatic conservation measure for the Swainson's hawk.

- Avoid or minimize actions within 5 miles of active nest sites that could result in disturbance during the breeding period (March 1–September 15).

Conservation Measure SWHA-4—Implement Mitigation Measure SWHA4

Implementation of this conservation measure is consistent with the following MSCS programmatic conservation measure for the Swainson's hawk.

- To the extent consistent with CALFED objectives, adhere to DFG mitigation guidelines for avoiding or minimizing impacts of actions on the Swainson's hawk.

5.5.1.5 Expected Outcomes with Implementation of Conservation Measures

Implementation of the conservation measures achieves the ASIP goal to avoid, minimize, and compensate for adverse impacts of project actions on the Swainson's hawk. Implementation of the conservation measures would help ensure that the existing abundance and distribution of the Swainson's hawk in the project area are maintained.

5.5.2 Black-Crowned Night Heron (Rookery)

5.5.2.1 Status in Project Area

Black-crowned night-herons are permanent residents in the Central Valley (Zeiner et al. 1990). Throughout most of California, the black-crowned night-heron's breeding season is from February to July; in the northeastern portion of the state, it is from April to August. Nests are made of sticks, debris, or marsh plants and are built either in trees or on the ground (Cogswell 1977). The heron roosts during the day in dense trees or dense emergent wetland plants. Its diet comprises fish, amphibians, insect larvae, crustaceans, other invertebrates, reptiles, and small mammals (Zeiner et al. 1990).

Black-crowned night-herons are expected to occur in the study area because the riparian habitat along the Feather River provides suitable rookery locations. Because of the frequent disturbance associated with the existing LLPS it is unlikely that they nest in the immediate vicinity of the intake structure. There are

no CNDDB records for rookeries in the study area (California Natural Diversity Database 2007).

5.5.2.2 Project Impacts

Implementation of the project components may result in take of black-crowned night-heron rookeries. Although it is unlikely that rookeries occur in the project footprint, the riparian woodland and riparian scrub habitats in the vicinity of the project area provide nesting habitat for this species. Project implementation was assumed to have an adverse impact on the black-crowned night-heron if project activities could result in the loss or disturbance of active rookeries.

The project was assumed to have an adverse impact on black-crowned night-heron rookery sites if project activities could result in the removal of a nest tree during the breeding season, nest abandonment, or forced fledging (March 1–September 15) within 0.25 mile of project-related activities. Project may result in the direct removal of black-crowned night-heron rookeries or disturbance of occupied rookeries. Rookery impacts will occur only if black-crowned night-herons are nesting at the time the trees are removed or disturbed by these activities.

Project implementation will result in the removal of 0.05 acre of riparian habitat. The reduction in extent of available nest trees present in riparian woodland and scrub in the study area is relatively small. Preconstruction surveys will be performed throughout the spring to determine whether nest sites are located within 0.25 mile of proposed project activities.

Noise and visual disturbances associated with operation of equipment and other construction- and maintenance-related activities within 0.25 mile of occupied nest sites could adversely affect nesting black-crowned night-herons. Noise and visual disturbances of sufficient magnitude could result in nest abandonment, reduction in the level of care provided by adults for eggs and young (e.g., duration of brooding, frequency of feeding), or forced fledging. If these situations occur, it could reduce the likelihood for successful production of young during the year of disturbance. The number of nests or young that could be affected will be determined annually during the preconstruction surveys and active construction period surveys, as described below.

5.5.2.3 Mitigation Measures

Implementation of project components mitigation measures that include the restoration of affected habitats could result in a low, unquantifiable level of take of black-crowned night-heron rookeries. The following mitigation measures have been developed to avoid, minimize, and compensate for impacts of implementing project components. These mitigation measures are designed to

avoid and minimize impacts of construction- and restoration-related activities on black-crowned night-heron rookeries (BCNH).

Mitigation Measure BCNH1—Conduct Preconstruction Surveys to Locate Black-Crowned Night-Heron Rookeries

Preconstruction surveys for black-crowned night-heron rookeries will be conducted at and adjacent to all locations to be disturbed by construction to ensure that this species is not nesting in these locations. Surveys will also be performed at all mitigation sites prior to implementation of the mitigation features. Preconstruction surveys will consist of surveying all potential nest sites within 0.25 mile of proposed construction and mitigation sites. Surveys will be performed several times during the breeding season to avoid and minimize impacts on late-nesting birds. Rookery locations will be marked on an aerial photograph, and the position will be recorded using GPS. Preconstruction survey data will be used in accordance with conservation measures listed below.

Mitigation Measure BCNH2—Minimize Construction-Related Disturbances within 0.25 Mile of Active Rookeries

Portions of the construction activities will occur throughout the year and will overlap with the black-crowned night-heron breeding season. To the greatest extent practicable, major construction activities that will occur within 0.25 mile of an active black-crowned night-heron rookery will be avoided during the breeding season. If practicable, construction activities that will result in the greatest disturbance to an active rookery will be deferred until after or as late in the breeding season as possible. The City will provide the locations of active rookeries identified during the preconstruction surveys to DFG and will coordinate with DFG on appropriate avoidance and minimization measures on a case-by-case basis.

Mitigation Measure BCNH3—Avoid Removal of Occupied Rookeries

As stated under Mitigation Measure BCNH1, preconstruction surveys will be performed to identify active rookeries before implementing construction activities. Before the start of the nesting season, the City will remove suitable nest trees in locations where trees are scheduled for removal. Additionally, before February 15 of each construction season, the City will remove all suitable nesting habitat areas where vegetation is scheduled to be cleared. Removal of vegetation before the nesting season will ensure that occupied nests are not removed. If construction activities require the removal of additional vegetation not previously designated for removal, the City will perform clearance surveys to determine whether nesting black-crowned night-herons are present. If rookeries are present, vegetation removal will be deferred until after the breeding season.

Mitigation Measure BCNH4—Replace Lost Breeding Habitat

The City will compensate for the unavoidable loss of riparian habitat caused by implementation by restoring or enhancing in-kind riparian habitat. This compensation will restore or enhance in-kind habitat at a ratio of 2 acres for each acre affected, as described in the mitigation measures for riparian habitat in Chapter 2.

5.5.2.4 ASIP Conservation Measures

ASIP conservation measures for the black-crowned night-heron are described below.

Conservation Measure BCNH-1—Implement Mitigation Measure BCNH1

Implementation of this conservation measure is consistent with the following MSCS programmatic conservation measure for the black-crowned night-heron.

- Before implementing actions that could result in take or the loss or degradation of occupied habitat, conduct surveys in suitable habitat within portions of the species' range that could be affected by CALFED actions to determine the presence and distribution of the species.

Conservation Measure BCNH-2—Implement Mitigation Measure BCNH2

Implementation of this conservation measure is consistent with the following MSCS programmatic conservation measure for the black-crowned night-heron.

- Avoid or minimize (except as noted in specific species conservation measures) CALFED actions that could result in take of evaluated species or the loss or degradation of habitat occupied by evaluated species.

Conservation Measure BCNH-3—Implement Mitigation Measure BCNH3

Implementation of this conservation measure is consistent with the following MSCS programmatic conservation measure for the black-crowned night-heron.

- Before implementing actions that could result in take or the loss or degradation of occupied habitat, conduct surveys in suitable habitat within portions of the species' range that could be affected by CALFED actions to determine the presence and distribution of the species.

Conservation Measure BCNH-4—Implement Mitigation Measure BCNH4

Implementation of this conservation measure is consistent with the following MSCS programmatic conservation measures for the black-crowned night-heron.

- To the extent consistent with CALFED objectives, manage lands purchased or acquired under conservation easements to maintain or increase current population levels of resident evaluated species.
- Restore or enhance 2–5 acres of additional in-kind habitat for each acre of affected habitat near where impacts are incurred before implementing actions that could result in the loss or degradation of riparian habitat.

5.5.2.5 Expected Outcomes with Implementation of Conservation Measures

Implementation of the conservation measures, including replacement of affected breeding habitat, achieves the ASIP goal to avoid, minimize, and compensate for adverse impacts of project actions on black-crowned night-heron rookeries. Implementation of the conservation measures will help ensure that the existing abundance and distribution of black-crowned night-heron rookeries in the project area are maintained.

5.5.3 Cooper's Hawk

5.5.3.1 Status in Project Area

The Cooper's hawk breeds throughout most of California in a variety of woodland habitats, including riparian and oak woodlands (Zeiner et al. 1990). Although Cooper's hawks have not been recorded in the study area (California Natural Diversity Database 2007) and formal surveys have not been performed to determine whether this species is present, Cooper's hawk are expected to be a permanent resident in the study area because riparian habitat along the Feather River provides nesting, roosting, and foraging habitat for the Cooper's hawk.

5.5.3.2 Project Impacts

Implementation of project components may result in take of Cooper's hawk. The project was assumed to have an adverse impact on the Cooper's hawk if project activities could result in the removal of a nest tree during the breeding season, nest abandonment, or forced fledging (March 1–September 15) within 0.25 mile of project-related activities. This approach to assessing impacts on nesting Cooper's hawks is consistent with DFG guidelines for raptors (California Department of Fish and Game 1994).

Construction activities could result in the direct removal of Cooper's hawk foraging habitat and removal or disturbance of occupied nest sites. Although it is unlikely that nest sites occur in the project footprint, the riparian woodland and riparian scrub habitats in the vicinity of the project area provide nesting habitat for this species. Nest site removal or disturbance will occur only if Cooper's hawks are nesting at the time the trees are removed or disturbed by these activities.

Project implementation will result in the removal of 0.05 acre of riparian woodland that could support active nest sites. The reduction in extent of available nest trees present in riparian woodlands in the study area is relatively small. Because nest sites for Cooper's hawk may vary from year to year, the number of nest sites that could be affected by the project may vary annually. Preconstruction surveys will be performed throughout the spring to determine whether nest sites are located within 0.25 mile of proposed project activities.

Noise and visual disturbances associated with operation of equipment and other construction- and maintenance-related activities within 0.25 mile of occupied nest sites could adversely affect nesting Cooper's hawks. Noise and visual disturbances of sufficient magnitude could result in nest abandonment, reduction in the level of care provide by adults for eggs and young (e.g., duration of brooding, frequency of feeding), or forced fledging. If these situations occur, it could reduce the likelihood for successful production of young during the year of disturbance. The number of nests or young that could be affected will be determined annually during the preconstruction surveys and active construction period surveys, as described below.

5.5.3.3 Mitigation Measures

Implementation of project components and mitigation measures that include the restoration of affected habitats could result in a low, unquantifiable level of take of the Cooper's hawk. The following mitigation measures have been developed to avoid, minimize, and compensate for impacts of implementing project components and mitigation-related activities on the Cooper's hawk (COHA).

Mitigation Measure COHA1—Conduct Preconstruction Surveys to Locate Cooper's Hawk Nest Sites

Preconstruction surveys for Cooper's hawk will be conducted at and adjacent to all locations to be disturbed by construction to ensure that this species is not nesting in these locations. Surveys will also be performed at all mitigation sites prior to implementation of the mitigation features. Preconstruction surveys will consist of surveying all potential nest sites within 0.25 mile of proposed construction features and mitigation sites. Surveys will be performed several times during the breeding season to avoid and minimize impacts on late-nesting

birds. Nest sites will be marked on an aerial photograph, and the position will be recorded using GPS.

Mitigation Measure COHA2—Minimize Construction-Related Disturbances within 0.25 Mile of Active Nest Sites

Portions of the construction activities will occur throughout the year and will overlap with the Cooper's hawk breeding season. To the greatest extent practicable, major construction activities that will occur within 0.25 mile of an active Cooper's hawk nest will be avoided during the breeding season. If practicable, construction activities that will result in the greatest disturbance to an active nest site will be deferred until after or as late in the breeding season as possible. The City will provide the locations of active nest sites identified during the preconstruction surveys to DFG and will coordinate with DFG on appropriate avoidance and minimization measures on a case-by-case basis.

Mitigation Measure COHA3—Avoid Removal of Occupied Nest Sites

As stated under Mitigation Measure COHA1, preconstruction surveys will be performed to identify active nest sites before implementing construction activities. Before the start of the nesting season, the City will remove suitable nest trees in locations where trees are scheduled for removal. Additionally, before February 15 of each construction season, the City will remove all suitable nesting habitat in areas where vegetation is scheduled to be cleared. Removal of vegetation before the nesting season will ensure that occupied nests are not removed. If construction activities require the removal of additional vegetation not previously designated for removal, the City will perform clearance surveys to determine whether nesting hawks are present. If nest sites are present, tree removal will be deferred until after the breeding season.

Mitigation Measure COHA4—Replace Lost Breeding Habitat

The City will compensate for the unavoidable loss of up to 0.05 acres riparian habitat caused by construction by restoring or enhancing in-kind riparian habitat at a ratio of 2 acres for each acre affected, as described in the mitigation measures for riparian habitat in Chapter 2.

5.5.3.4 ASIP Conservation Measures

ASIP conservation measures for the Cooper's hawk are described below.

Conservation Measure COHA-1—Implement Mitigation Measure COHA1

Implementation of this conservation measure is consistent with the following MSCS programmatic conservation measures for the Cooper's hawk.

- Before implementing actions that could result in take or the loss or degradation of occupied habitat, conduct surveys in suitable habitat within portions of the species' range that could be affected by CALFED actions to determine the presence and distribution of the species.
- Before implementing CALFED actions that could result in the loss or degradation of traditional nesting territories or nest sites, conduct surveys in suitable nesting habitat within portions of this species' breeding range that could be affected by CALFED actions to locate active nest sites.

Conservation Measure COHA-2—Implement Mitigation Measure COHA2

Implementation of this conservation measure is consistent with the following MSCS programmatic conservation measure for the Cooper's hawk.

- Avoid or minimize disturbances to nesting pairs that could be associated with implementing CALFED actions within 0.25 mile of active nest sites during the nesting period (March–August).

Conservation Measure COHA-3—Implement Mitigation Measure COHA3

Implementation of this conservation measure is consistent with the following MSCS programmatic conservation measures for the Cooper's hawk.

- Avoid or minimize (except as noted in specific species conservation measures) CALFED actions that could result in take of evaluated species or the loss or degradation of habitat occupied by evaluated species.
- Avoid or minimize actions that could result in the loss of traditional nesting trees.

Conservation Measure COHA-4—Implement Mitigation Measure COHA4

Implementation of this conservation measure is consistent with the following MSCS programmatic conservation measure for the compensation of riparian habitat.

- Restore or enhance 2–5 acres of additional in-kind habitat for each acre of affected habitat near where impacts are incurred before implementing actions that could result in the loss or degradation of habitat.

5.5.3.5 Expected Outcomes with Implementation of Conservation Measures

Implementation of the conservation measures, including replacement of affected breeding and foraging habitat, achieves the ASIP goal to avoid, minimize, and compensate for adverse impacts of project actions on Cooper's hawk. Implementation of the conservation measures will help ensure that the existing abundance and distribution of the Cooper's hawk in the project area are maintained.

5.5.4 Great Blue Heron

5.5.4.1 Status in Project Area

Great blue herons nest in colonies in the tops of secluded large snags or live trees. Nest colonies, or rookeries, may be located near shallow water feeding areas but may be as far as 10 miles from shallow water areas. Great blue herons will also forage in grasslands, suitable agricultural lands, and pasture lands. In the study area, riparian habitat provides nesting and roosting habitat for this species. Shallow water areas on the Feather River and agricultural lands provide suitable foraging habitat for this species.

Great blue herons are expected to occur in the study area because the riparian habitat along the Feather River provides suitable rookery locations. Because of the frequent disturbance associated with the existing pump station it is unlikely that they nest in the immediate vicinity of the intake structure. There are no CNDDB records for rookeries in the study area (California Natural Diversity Database 2007).

5.5.4.2 Project Impacts

Implementation of the project components may result in take of great blue heron rookeries. Although it is unlikely that rookeries occur in the project footprint, the

riparian woodland and riparian scrub habitats in the vicinity of the project area provide nesting habitat for this species. Project implementation was assumed to have an adverse impact on the great blue heron if project activities could result in the loss or disturbance of active rookeries.

The assessment of project impacts on great blue heron rookery sites is based on the proximity of known rookeries to proposed project features or activities. The project was assumed to have an adverse impact on great blue heron rookery sites if project activities could result in the removal of a nest tree during the breeding season, nest abandonment, or forced fledging (March 1–September 15) within 0.25 mile of project-related activities.

Project implementation will result in the removal of 0.05 acre of riparian habitat that could support active nest sites. The reduction in extent of available nest trees present in riparian habitat in the study area is relatively small. Because great blue herons return to the same rookery each year, the number of rookeries that could be affected by the project is not expected to vary annually unless a new rookery is formed or some other action unrelated to the project removes or disturbs an existing rookery. Preconstruction surveys will be performed throughout the spring to determine whether nest sites are located within 0.25 mile of proposed project activities.

Noise and visual disturbances associated with operation of equipment and other construction-related activities within 0.25 mile of occupied nest sites could adversely affect nesting great blue herons. Noise and visual disturbances of sufficient magnitude could result in nest abandonment, reduction in the level of care provided by adults for eggs and young (e.g., duration of brooding, frequency of feeding), or forced fledging. If these situations occur, it could reduce the likelihood for successful production of young during the year of disturbance. The number of nests or young that could be affected will be determined annually during the preconstruction surveys and active construction period surveys, as described below.

5.5.4.3 Mitigation Measures

Implementation of project components and mitigation measures that include the restoration of affected habitats could result in a low, unquantifiable level of take of great blue heron rookeries. The following mitigation measures have been developed to avoid, minimize, and compensate for impacts of implementing project components and mitigation-related activities on great blue heron rookeries. These mitigation measures are designed to avoid and minimize impacts of construction- and restoration-related activities on great blue heron rookeries (GBHE).

Mitigation Measure GBHE1—Conduct Preconstruction Surveys to Locate Great Blue Heron Rookeries

Preconstruction surveys for great blue heron rookeries will be conducted at and adjacent to all locations to be disturbed by construction to ensure that this species is not nesting in these locations. Surveys will also be performed at all mitigation sites prior to implementation of the mitigation features. Preconstruction surveys will consist of surveying all potential nest sites within 0.25 mile of proposed construction features and mitigation sites. Surveys will be performed several times during the breeding season to avoid and minimize impacts on late-nesting birds. Rookery locations will be marked on an aerial photograph, and the position will be recorded using GPS. Preconstruction survey data will be used in accordance with conservation measures listed below.

Mitigation Measure GBHE2—Minimize Construction-Related Disturbances within 0.25 Mile of Active Rookeries

Portions of the construction activities will occur throughout the year and will overlap with the great blue heron breeding season. To the greatest extent practicable, major construction activities that will occur within 0.25 mile of an active great blue heron rookery will be avoided during the breeding season. If practicable, construction activities that will result in the greatest disturbance to an active rookery will be deferred until after or as late in the breeding season as possible. The City will provide the locations of active rookeries identified during the preconstruction surveys to DFG and will coordinate with DFG on appropriate avoidance and minimization measures on a case-by-case basis.

Mitigation Measure GBHE3—Avoid Removal of Occupied Rookeries

As stated under Mitigation Measure GBHE1, preconstruction surveys will be performed to identify active rookeries before implementing construction or mitigation activities. Before the start of the nesting season, the City will remove suitable nest trees in locations where trees are scheduled for removal. Additionally, before February 15 of each construction season, the City will remove all suitable nesting habitat areas where vegetation is scheduled to be cleared. Removal of vegetation before the nesting season will ensure that occupied nests are not removed. If construction activities require the removal of additional vegetation not previously designated for removal, the City will perform clearance surveys to determine whether nesting great blue herons are present. If rookeries are present, vegetation removal will be deferred until after the breeding season.

Mitigation Measure GBHE4—Replace Lost Breeding Habitat

The City will compensate for the unavoidable loss of riparian habitat caused by project implementation by restoring or enhancing in-kind riparian habitat. This compensation will restore or enhance in-kind habitat at a ratio of 2 acres for each acre affected, as described in the mitigation measures for riparian habitat in Chapter 2.

5.5.4.4 ASIP Conservation Measures

ASIP conservation measures for the great blue heron are described below.

Conservation Measure GBHE-1—Implement Mitigation Measure GBHE1

Implementation of this conservation measure is consistent with the following MSCS programmatic conservation measure for the great blue heron.

- Before implementing actions that could result in take or the loss or degradation of occupied habitat, conduct surveys in suitable habitat within portions of the species' range that could be affected by CALFED actions to determine the presence and distribution of the species.

Conservation Measure GBHE-2—Implement Mitigation Measure GBHE2

Implementation of this conservation measure is consistent with the following MSCS programmatic conservation measure for the great blue heron.

- Avoid or minimize (except as noted in specific species conservation measures) CALFED actions that could result in take of evaluated species or the loss or degradation of habitat occupied by evaluated species.

Conservation Measure GBHE-3—Implement Mitigation Measure GBHE3

Implementation of this conservation measure is consistent with the following MSCS programmatic conservation measure for the great blue heron.

- Before implementing actions that could result in take or the loss or degradation of occupied habitat, conduct surveys in suitable habitat within portions of the species' range that could be affected by CALFED actions to determine the presence and distribution of the species.

Conservation Measure GBHE-4—Implement Mitigation Measure GBHE4

Implementation of this conservation measure is consistent with the following MSCS programmatic conservation measures for the great blue heron.

- To the extent consistent with CALFED objectives, manage lands purchased or acquired under conservation easements to maintain or increase current population levels of resident evaluated species.
- Restore or enhance 2–5 acres of additional in-kind habitat for each acre of affected habitat near where impacts are incurred before implementing actions that could result in the loss or degradation of riparian habitat.

5.5.4.5 Expected Outcomes with Implementation of Conservation Measures

Implementation of the conservation measures, including replacement of affected breeding habitat, achieves the ASIP goal to avoid, minimize, and compensate for adverse impacts of project actions on great blue heron rookeries. Implementation of the conservation measures will help ensure that the existing abundance and distribution of great blue heron rookeries in the project area are maintained.

5.5.5 Great Egret (Rookery)

5.5.5.1 Status in Project Area

Great egrets nest in colonies in the tops of secluded large snags or live trees. Great egrets require groves of trees that are suitable for nesting and roosting, are relatively isolated from human activities, and are found near aquatic foraging areas. Great egrets typically nest from March to July and populations are concentrated near nesting colonies. After nesting, individuals disperse over a wide range (Zeiner et al. 1990).

Nests are constructed from sticks and stems of marsh plants and are built in large trees. Great egrets feed and rest in fresh and saline emergent wetlands; along the margins of estuaries, lakes, and slow-moving streams; on mudflats and salt ponds; and on irrigated croplands and pastures. They primarily eat fishes, amphibians, snakes, snails, crustaceans, insects, and small mammals (Zeiner et al. 1990).

Great egrets are expected to occur in the study area because the riparian habitat along the Feather River provides suitable rookery locations. Because of the frequent disturbance associated with the existing pump station it is unlikely that they nest in the immediate vicinity of the intake structure. There are no CNDDB

records for rookeries in the study area (California Natural Diversity Database 2007).

5.5.5.2 Project Impacts

Implementation of the project components may result in take of great egret rookeries. Although it is unlikely that rookeries occur in the project footprint, the riparian woodland and riparian scrub habitats in the vicinity of the project area provide nesting habitat for this species. Project implementation was assumed to have an adverse impact on the great egret if project activities could result in the loss or disturbance of active rookeries.

The assessment of project impacts on great egret rookery sites is based on the proximity of known rookeries to proposed project features or activities. The project was assumed to have an adverse impact on great egret rookery sites if project activities could result in the removal of a nest tree during the breeding season, nest abandonment, or forced fledging (March 1–September 15) within 0.25 mile of project-related activities.

Construction activities and implementation of mitigation features may result in the direct removal of great egret rookeries or disturbance of occupied rookeries. Rookery removal or disturbance will occur only if great egrets are nesting at the time the trees are removed or disturbed by these activities.

Project implementation will result in the removal of 0.05 acre of riparian habitat that could support active nest sites. The reduction in extent of available nest trees present in riparian woodlands in the study area is relatively small. Because great egrets return to the same rookery each year, the number of rookeries that could be affected by the project is not expected to vary annually unless a new rookery is formed or some other action unrelated to the project removes or disturbs an existing rookery. Preconstruction surveys will be performed throughout the spring to determine whether nest sites are located within 0.25 mile of proposed project activities.

Noise and visual disturbances associated with operation of equipment and other construction- and maintenance-related activities within 0.25 mile of occupied nest sites could adversely affect nesting great egrets. Noise and visual disturbances of sufficient magnitude could result in nest abandonment, reduction in the level of care provided by adults for eggs and young (e.g., duration of brooding, frequency of feeding), or forced fledging. If these situations occur, it could reduce the likelihood for successful production of young during the year of disturbance. The number of nests or young that could be affected will be determined annually during the preconstruction surveys and active construction period surveys, as described below.

5.5.5.3 Mitigation Measures

Implementation of project components and mitigation measures that include the restoration of affected habitats could result in a low, unquantifiable level of take of great egret rookeries. The following mitigation measures have been developed to avoid, minimize, and compensate for impacts of implementing project components and mitigation-related activities on great egret rookeries. These mitigation measures are designed to avoid and minimize impacts of construction- and restoration-related activities on great egret rookeries (GREG).

Mitigation Measure GREG1—Conduct Preconstruction Surveys to Locate Great Egret Rookeries

Preconstruction surveys for great egret rookeries will be conducted at and adjacent to all locations to be disturbed by construction to ensure that this species is not nesting in these locations. Surveys will also be performed at all mitigation sites prior to implementation of the mitigation features. Preconstruction surveys will consist of surveying all potential nest sites within 0.25 mile of proposed construction and mitigation sites. Surveys will be performed several times during the breeding season to avoid and minimize impacts on late-nesting birds. Rookery locations will be marked on an aerial photograph, and the position will be recorded using GPS. Preconstruction survey data will be used in accordance with conservation measures listed below.

Mitigation Measure GREG2—Minimize Construction-Related Disturbances within 0.25 Mile of Active Rookeries

Portions of the construction activities will occur throughout the year and will overlap with the great egret breeding season. To the greatest extent practicable, major construction activities that will occur within 0.25 mile of an active great egret rookery will be avoided during the breeding season. If practicable, construction activities that will result in the greatest disturbance to an active rookery will be deferred until after or as late in the breeding season as possible. The City will provide the locations of active rookeries identified during the preconstruction surveys to DFG and will coordinate with DFG on appropriate avoidance and minimization measures on a case-by-case basis.

Mitigation Measure GREG3—Avoid Removal of Occupied Rookeries

As stated under Mitigation Measure GREG1, preconstruction surveys will be performed to identify active rookeries before implementing construction or mitigation activities. Before the start of the nesting season, the City will remove suitable nest trees in locations where trees are scheduled for removal. Additionally, before February 15 of each construction season, the City will

remove all suitable nesting habitat areas where vegetation is scheduled to be cleared. Removal of vegetation before the nesting season will ensure that occupied nests are not removed. If construction or mitigation activities require the removal of additional vegetation not previously designated for removal, the City will perform clearance surveys to determine whether nesting great egrets are present. If rookeries are present, vegetation removal will be deferred until after the breeding season.

Mitigation Measure GREG4—Replace Lost Breeding Habitat

The City will compensate for the unavoidable loss of riparian habitat caused by project implementation by restoring or enhancing in-kind riparian habitat. This compensation will restore or enhance in-kind habitat at a ratio of 2 acres for each acre affected, as described in the mitigation measures for riparian habitat in Chapter 2.

5.5.5.4 ASIP Conservation Measures

ASIP conservation measures for the great egret are described below.

Conservation Measure GREG-1—Implement Mitigation Measure GREG1

Implementation of this conservation measure is consistent with the following MSCS programmatic conservation measure for the great egret.

- Before implementing actions that could result in take or the loss or degradation of occupied habitat, conduct surveys in suitable habitat within portions of the species' range that could be affected by CALFED actions to determine the presence and distribution of the species.

Conservation Measure GREG-2—Implement Mitigation Measure GREG2

Implementation of this conservation measure is consistent with the following MSCS programmatic conservation measure for the great egret.

- Avoid or minimize (except as noted in specific species conservation measures) CALFED actions that could result in take of evaluated species or the loss or degradation of habitat occupied by evaluated species.

Conservation Measure GREG-3—Implement Mitigation Measure GREG3

Implementation of this conservation measure is consistent with the following MSCS programmatic conservation measure for the great egret.

- Before implementing actions that could result in take or the loss or degradation of occupied habitat, conduct surveys in suitable habitat within portions of the species' range that could be affected by CALFED actions to determine the presence and distribution of the species.

Conservation Measure GREG-4—Implement Mitigation Measure GREG4

Implementation of this conservation measure is consistent with the following MSCS programmatic conservation measures for the great egret.

- To the extent consistent with CALFED objectives, manage lands purchased or acquired under conservation easements to maintain or increase current population levels of resident evaluated species.
- Restore or enhance 2–5 acres of additional in-kind habitat for each acre of affected habitat near where impacts are incurred before implementing actions that could result in the loss or degradation of riparian habitat.

5.5.5.5 Expected Outcomes with Implementation of Conservation Measures

Implementation of the conservation measures, including replacement of affected breeding habitat, achieves the ASIP goal to avoid, minimize, and compensate for adverse impacts of project actions on great egret rookeries. Implementation of the conservation measures will help ensure that the existing abundance and distribution of great egret rookeries in the project area are maintained.

5.5.6 Snowy Egret (Rookery)

5.5.6.1 Status in Project Area

Snowy egrets nest in single-species or mixed-species colonies (Parsons and Master 2000). Nests are built in low, dead trees or shrubs out of sticks and the stems of marsh plants. Nests may be built near freshwater lakes or built on the banks of marshes out of tules (Cogswell 1977). The breeding season is from late March to mid-May in southern and central California and late April through late August in northern California (Zeiner et al. 1990).

Snowy egrets are often observed in saltwater marshes, tidal lagoons, tidal estuaries, and along the banks of lakes, rivers, and streams hunting for food. Snowy egrets feed on a wide variety of prey, including fish, crayfish and other crustaceans, reptiles, amphibians, aquatic and terrestrial insects, and small mammals (Parsons and Master 2000).

Snowy egrets are expected to occur in the study area because the riparian habitat along the Feather River provides suitable rookery locations. Because of the frequent disturbance associated with the existing pump station it is unlikely that they nest in the immediate vicinity of the intake structure. There are no CNDDB records for rookeries in the study area (California Natural Diversity Database 2007).

5.5.6.2 Project Impacts

Implementation of the project components may result in take of snowy egret rookeries. Although it is unlikely that rookeries occur in the project footprint, the riparian woodland and riparian scrub habitats in the vicinity of the project area provide nesting habitat for this species. Project implementation was assumed to have an adverse impact on the snowy egret if project activities could result in the loss or disturbance of active rookeries.

The assessment of project impacts on snowy egret rookery sites is based on the proximity of known rookeries to proposed project features or activities. The project was assumed to have an adverse impact on snowy egret rookery sites if project activities could result in the removal of a nest tree during the breeding season, nest abandonment, or forced fledging (March 1–September 15) within 0.25 mile of project-related activities.

Project implementation will result in the removal of 0.05 acre of riparian habitat that could support active nest sites. The reduction in extent of available nest trees present in riparian habitat in the study area is relatively small. Because snowy egrets may return to the same rookery each year, the number of rookeries that could be affected by the project is not expected to vary annually unless a new rookery is formed or some other action unrelated to the project removes or disturbs an existing rookery. Preconstruction surveys will be performed throughout the spring to determine whether nest sites are located within 0.25 mile of proposed project activities.

Noise and visual disturbances associated with operation of equipment and other construction- and maintenance-related activities within 0.25 mile of occupied nest sites could adversely affect nesting snowy egrets. Noise and visual disturbances of sufficient magnitude could result in nest abandonment, reduction in the level of care provided by adults for eggs and young (e.g., duration of brooding, frequency of feeding), or forced fledging. If these situations occur, it could reduce the likelihood for successful production of young during the year of disturbance. The number of nests or young that could be affected will be

determined annually during the preconstruction surveys and active construction period surveys, as described below.

5.5.6.3 Mitigation Measures

Implementation of project components and mitigation measures that include the restoration of affected habitats could result in a low, unquantifiable level of take of snowy egret rookeries. The following mitigation measures have been developed to avoid, minimize, and compensate for impacts of implementing project components and mitigation-related activities on snowy egret rookeries. These mitigation measures are designed to avoid and minimize impacts of construction- and restoration-related activities on snowy egret rookeries (SNEG).

Mitigation Measure SNEG1—Conduct Preconstruction Surveys to Locate Snowy Egret Rookeries

Preconstruction surveys for snowy egret rookeries will be conducted at and adjacent to all locations to be disturbed by construction to ensure that this species is not nesting in these locations. Surveys will also be performed at all mitigation sites prior to implementation of the mitigation features. Preconstruction surveys will consist of surveying all potential nest sites within 0.25 mile of proposed construction features and mitigation sites. Surveys will be performed several times during the breeding season to avoid and minimize impacts on late-nesting birds. Rookery locations will be marked on an aerial photograph, and the position will be recorded using GPS. Preconstruction survey data will be used in accordance with conservation measures listed below.

Mitigation Measure SNEG2—Minimize Construction-Related Disturbances within 0.25 Mile of Active Rookeries

Portions of the construction activities will occur throughout the year and will overlap with the snowy egret breeding season. To the greatest extent practicable, major construction activities that will occur within 0.25 mile of an active snowy egret rookery will be avoided during the breeding season. If practicable, construction activities that will result in the greatest disturbance to an active rookery will be deferred until after or as late in the breeding season as possible. The City will provide the locations of active rookeries identified during the preconstruction surveys to DFG and will coordinate with DFG on appropriate avoidance and minimization measures on a case-by-case basis.

Mitigation Measure SNEG3—Avoid Removal of Occupied Rookeries

As stated under Mitigation Measure SNEG1, preconstruction surveys will be performed to identify active rookeries before implementing construction or mitigation activities. Before the start of the nesting season, the City will remove suitable nest trees in locations where trees are scheduled for removal. Additionally, before February 15 of each construction season, the City will remove all suitable nesting habitat areas where vegetation is scheduled to be cleared. Removal of vegetation before the nesting season will ensure that occupied nests are not removed. If construction or mitigation activities require the removal of additional vegetation not previously designated for removal, the City will perform clearance surveys to determine whether nesting snowy egrets are present. If rookeries are present, vegetation removal will be deferred until after the breeding season.

Mitigation Measure SNEG4—Replace Lost Breeding Habitat

The City will compensate for the unavoidable loss of riparian habitat caused by project implementation by restoring or enhancing in-kind riparian habitat. This compensation will restore or enhance in-kind habitat at a ratio of 2 acres for each acre affected, as described in the mitigation measures for riparian habitat in Chapter 2.

5.5.6.4 ASIP Conservation Measures

ASIP conservation measures for the snowy egret are described below.

Conservation Measure SNEG-1—Implement Mitigation Measure SNEG1

Implementation of this conservation measure is consistent with the following MSCS programmatic conservation measure for the snowy egret.

- Before implementing actions that could result in take or the loss or degradation of occupied habitat, conduct surveys in suitable habitat within portions of the species' range that could be affected by CALFED actions to determine the presence and distribution of the species.

Conservation Measure SNEG-2—Implement Mitigation Measure SNEG2

Implementation of this conservation measure is consistent with the following MSCS programmatic conservation measure for the snowy egret.

- Avoid or minimize (except as noted in specific species conservation measures) CALFED actions that could result in take of evaluated species or the loss or degradation of habitat occupied by evaluated species.

Conservation Measure SNEG-3—Implement Mitigation Measure SNEG3

Implementation of this conservation measure is consistent with the following MSCS programmatic conservation measure for the snowy egret.

- Before implementing actions that could result in take or the loss or degradation of occupied habitat, conduct surveys in suitable habitat within portions of the species' range that could be affected by CALFED actions to determine the presence and distribution of the species.

Conservation Measure SNEG-4—Implement Mitigation Measure SNEG4

Implementation of this conservation measure is consistent with the following MSCS programmatic conservation measures for the snowy egret.

- To the extent consistent with CALFED objectives, manage lands purchased or acquired under conservation easements to maintain or increase current population levels of resident evaluated species.
- Restore or enhance 2–5 acres of additional in-kind habitat for each acre of affected habitat near where impacts are incurred before implementing actions that could result in the loss or degradation of riparian habitat.

5.5.6.5 Expected Outcomes with Implementation of Conservation Measures

Implementation of the conservation measures, including replacement of affected breeding habitat, achieves the ASIP goal to avoid, minimize, and compensate for adverse impacts of project actions on snowy egret rookeries. Implementation of the conservation measures will help ensure that the existing abundance and distribution of snowy egret rookeries in the project area are maintained.

5.1.1 Double-Crested Cormorant (Rookery)

5.1.1.1 Status in Project Area

Double-crested cormorants nest in large colonies in large trees near suitable foraging habitat (Zeiner et al. 1990). The breeding season is from April through July central California. Double-crested cormorants occur in a wide range of habitats ranging from slow-moving rivers and other waterways, lakes, estuaries and coastal waters. Cormorants primarily feed on fish but may occasionally take, crayfish and other crustaceans and insects.

Double-crested cormorants are expected to occur in the study area because the riparian habitat along the Feather River provides suitable rookery locations. Because of the frequent disturbance associated with the existing pump station it is unlikely that they nest in the immediate vicinity of the intake structure. There are no CNDDB records for rookeries in the study area (California Natural Diversity Database 2007).

5.1.1.2 Project Impacts

Implementation of the project components may result in take of double-crested cormorant rookeries. Although it is unlikely that rookeries occur in the project footprint, the riparian woodland and riparian scrub habitats in the vicinity of the project area provide nesting habitat for this species. Project implementation was assumed to have an adverse impact on the double-crested cormorant if project activities could result in the loss or disturbance of active rookeries.

The assessment of project impacts on double-crested cormorant rookery sites is based on the proximity of known rookeries to proposed project features or activities. The project was assumed to have an adverse impact on double-crested cormorant rookery sites if project activities could result in the removal of a nest tree during the breeding season, nest abandonment, or forced fledging (March 1–September 15) within 0.25 mile of project-related activities.

Project implementation will result in the removal of 0.05 acre of riparian habitat that could support active nest sites. The reduction in extent of available nest trees present in riparian habitat in the study area is relatively small. Because double-crested cormorant may return to the same rookery each year, the number of rookeries that could be affected by the project is not expected to vary annually unless a new rookery is formed or some other action unrelated to the project removes or disturbs an existing rookery. Preconstruction surveys will be performed throughout the spring to determine whether nest sites are located within 0.25 mile of proposed project activities.

Noise and visual disturbances associated with operation of equipment and other construction- and maintenance-related activities within 0.25 mile of occupied nest sites could adversely affect nesting double-crested cormorants. Noise and

visual disturbances of sufficient magnitude could result in nest abandonment, reduction in the level of care provided by adults for eggs and young (e.g., duration of brooding, frequency of feeding), or forced fledging. If these situations occur, it could reduce the likelihood for successful production of young during the year of disturbance. The number of nests or young that could be affected will be determined annually during the preconstruction surveys and active construction period surveys, as described below.

5.1.1.3 Mitigation Measures

Implementation of project components and mitigation measures that include the restoration of affected habitats could result in a low, unquantifiable level of take of double-crested cormorant rookeries. The following mitigation measures have been developed to avoid, minimize, and compensate for impacts of implementing project components and mitigation-related activities on double-crested cormorant rookeries. These mitigation measures are designed to avoid and minimize impacts of construction- and restoration-related activities on double-crested cormorant rookeries (DCCO).

Mitigation Measure DCCO1—Conduct Preconstruction Surveys to Locate Double-Crested Cormorant Rookeries

Preconstruction surveys for double-crested cormorant rookeries will be conducted at and adjacent to all locations to be disturbed by construction to ensure that this species is not nesting in these locations. Surveys will also be performed at all mitigation sites prior to implementation of the mitigation features. Preconstruction surveys will consist of surveying all potential nest sites within 0.25 mile of proposed construction features and mitigation sites. Surveys will be performed several times during the breeding season to avoid and minimize impacts on late-nesting birds. Rookery locations will be marked on an aerial photograph, and the position will be recorded using GPS. Preconstruction survey data will be used in accordance with conservation measures listed below.

Mitigation Measure DCCO2—Minimize Construction-Related Disturbances within 0.25 Mile of Active Rookeries

Portions of the construction activities will occur throughout the year and will overlap with the double-crested cormorant breeding season. To the greatest extent practicable, major construction activities that will occur within 0.25 mile of an active double-crested cormorant rookery will be avoided during the breeding season. If practicable, construction activities that will result in the greatest disturbance to an active rookery will be deferred until after or as late in the breeding season as possible. The City will provide the locations of active rookeries identified during the preconstruction surveys to DFG and will

coordinate with DFG on appropriate avoidance and minimization measures on a case-by-case basis.

Mitigation Measure DCCO3—Avoid Removal of Occupied Rookeries

As stated under Mitigation Measure DCCO1, preconstruction surveys will be performed to identify active rookeries before implementing construction or mitigation activities. Before the start of the nesting season, the City will remove suitable nest trees in locations where trees are scheduled for removal. Additionally, before February 15 of each construction season, the City will remove all suitable nesting habitat areas where vegetation is scheduled to be cleared. Removal of vegetation before the nesting season will ensure that occupied nests are not removed. If construction or mitigation activities require the removal of additional vegetation not previously designated for removal, the City will perform clearance surveys to determine whether nesting double-crested cormorant are present. If rookeries are present, vegetation removal will be deferred until after the breeding season.

Mitigation Measure DCCO4—Replace Lost Breeding Habitat

The City will compensate for the unavoidable loss of riparian habitat caused by project implementation by restoring or enhancing in-kind riparian habitat. This compensation will restore or enhance in-kind habitat at a ratio of 2 acres for each acre affected, as described in the mitigation measures for riparian habitat in Chapter 2.

5.1.1.4 ASIP Conservation Measures

ASIP conservation measures for the double-crested cormorant are described below.

Conservation Measure DCCO-1—Implement Mitigation Measure DCCO1

Implementation of this conservation measure is consistent with the following MSCS programmatic conservation measure for the double-crested cormorant.

- Before implementing actions that could result in take or the loss or degradation of occupied habitat, conduct surveys in suitable habitat within portions of the species' range that could be affected by CALFED actions to determine the presence and distribution of the species.

Conservation Measure DCCO-2—Implement Mitigation Measure DCCO2

Implementation of this conservation measure is consistent with the following MSCS programmatic conservation measure for the double-crested cormorant.

- Avoid or minimize (except as noted in specific species conservation measures) CALFED actions that could result in take of evaluated species or the loss or degradation of habitat occupied by evaluated species.

Conservation Measure DCCO-3—Implement Mitigation Measure DCCO3

Implementation of this conservation measure is consistent with the following MSCS programmatic conservation measure for the double-crested cormorant.

- Before implementing actions that could result in take or the loss or degradation of occupied habitat, conduct surveys in suitable habitat within portions of the species' range that could be affected by CALFED actions to determine the presence and distribution of the species.

Conservation Measure DCCO-4—Implement Mitigation Measure DCCO4

Implementation of this conservation measure is consistent with the following MSCS programmatic conservation measures for the double-crested cormorant.

- To the extent consistent with CALFED objectives, manage lands purchased or acquired under conservation easements to maintain or increase current population levels of resident evaluated species.
- Restore or enhance 2–5 acres of additional in-kind habitat for each acre of affected habitat near where impacts are incurred before implementing actions that could result in the loss or degradation of riparian habitat.

5.1.1.5 Expected Outcomes with Implementation of Conservation Measures

Implementation of the conservation measures, including replacement of affected breeding habitat, achieves the ASIP goal to avoid, minimize, and compensate for adverse impacts of project actions on double-crested cormorant rookeries. Implementation of the conservation measures will help ensure that the existing abundance and distribution of double-crested cormorant rookeries in the project area are maintained.

5.5.7 White-Tailed Kite

5.5.7.1 Status in the Project Area

The white-tailed kite is a state fully protected species. This species typically breeds in open country with scattered trees, nesting in trees usually located near water. Potential white-tailed kite nesting and roosting habitat exists near the LLPS and intake structure. The open space areas near the project area provide potential foraging habitat. In addition, the large trees adjacent to the river and LLPS may provide suitable nesting or roosting habitat for white-tailed kite.

There are no CNDDB occurrences of white-tailed kite in the project area however, the nearest known white-tailed kite nest was recorded approximately 6.15 miles from the LLPS (California Natural Diversity Database 2007). Although formal surveys have not been performed to determine whether this species is present, white-tailed kite are expected to be a permanent resident in the study area because riparian habitat along the Feather River provides nesting, roosting, and foraging habitat for this species.

5.5.7.2 Project Impacts

The riparian habitat in the vicinity of the project area provides nesting and roosting habitat for this species. The project was assumed to have an adverse impact on the white-tailed kite if project activities could result in the removal of a nest tree during the breeding season (March 1–September 15), nest abandonment, or forced fledging within 0.25 mile of project-related activities. This approach to assessing impacts on nesting white-tailed kites is consistent with DFG guidelines for raptors (California Department of Fish and Game 1994).

Construction activities will result in the removal of approximately 0.05 acre of riparian habitat. Although it is unlikely that rookeries occur in the project footprint, the riparian woodland and riparian scrub habitats in the vicinity of the project area provide nesting habitat for this species. The reduction in extent of available nest trees in the study area is relatively small. Because the location of white-tailed kite nest sites may vary from year to year, the number of nest sites that could be affected by the project may vary annually. Preconstruction surveys will be performed throughout the spring to determine whether nest sites are located within 0.5 mile of proposed project activities.

Noise and visual disturbances associated with operation of equipment and other construction- and maintenance-related activities within 0.25 mile of occupied nest sites could adversely affect nesting white-tailed kites. Noise and visual disturbances of sufficient magnitude could result in nest abandonment, reduction in the level of care provide by adults for eggs and young (e.g., duration of brooding, frequency of feeding), or forced fledging. If these situations occur, it could reduce the likelihood for successful production of young during the year of disturbance. The number of nests or young that could be affected will be

determined annually during the preconstruction surveys and active construction period surveys and appropriate measures to avoid effects will be implemented, as described below.

5.5.7.3 Mitigation Measures

The following mitigation measures have been developed to avoid, minimize, and compensate for impacts of implementing project components and mitigation-related activities on white-tailed kite (WTKI) habitat.

Mitigation Measure WTKI1—Conduct Preconstruction Surveys to Locate White-Tailed Kite Nest Sites

Preconstruction surveys for white-tailed kites will be conducted at and adjacent to all locations to be disturbed by construction to ensure that this species is not nesting in these locations. Surveys will also be performed at all mitigation sites prior to implementation of the mitigation features. Preconstruction surveys will consist of surveying all suitable nest sites within 0.50 mile of proposed construction and mitigation sites. Surveys will be performed several times during the breeding season to avoid and minimize impacts on late-nesting birds. Nest sites will be marked on an aerial photograph, and the position will be recorded using GPS. Preconstruction survey data will be used in accordance with Conservation Measures WTKI-2, WTKI-3, and WTKI-4.

Mitigation Measure WTKI2—Minimize Construction-Related Disturbances within 0.25 Mile of Active Nest Sites

Portions of the construction activities will occur throughout the year and will overlap with the white-tailed kite breeding season. To the greatest extent practicable, major construction activities that will occur within 0.25 mile of an active white-tailed kite nest will be avoided during the breeding season. If practicable, construction activities that will result in the greatest disturbance to an active nest site will be deferred until after or as late in the breeding season as possible. The City will provide the locations of active nest sites identified during the preconstruction surveys to DFG and will coordinate with DFG on appropriate avoidance and minimization measures on a case-by-case basis.

Mitigation Measure WTKI3—Avoid Removal of Occupied Nest Sites

As stated under Mitigation Measure WTKI1, preconstruction surveys will be performed to identify active nest sites before implementing construction or mitigation activities. Based on these preconstruction surveys, the City will remove any suitable nest trees in locations where trees are scheduled to be

removed and all suitable nesting habitat in areas where vegetation is scheduled to be cleared before the start of the nesting season (February 15). Removal of vegetation before the nesting season will ensure that occupied nests are not removed. If construction or mitigation activities require the removal of additional vegetation not previously designated for removal, the City will perform clearance surveys to determine whether nesting kites are present. If nest sites are present, tree removal will be deferred until after the breeding season.

Mitigation Measure WTKI4—Replace Lost Breeding Habitat

The City will compensate for the unavoidable loss of suitable nesting habitat in the project area by restoring or enhancing in-kind habitat. This compensation will restore or enhance in-kind habitat at a ratio of 2 acres for each acre affected, as described in the mitigation measures for riparian habitat in Chapter 2.

Mitigation Measure WTKI5—Replace Lost Foraging Habitat

To the extent practicable, natural habitats and agricultural habitats adjacent to occupied nesting habitats will be restored or enhanced to create a buffer zone of natural habitat. This buffer zone would protect nesting pairs from adverse impacts that could be associated with future changes in land use on nearby lands and provide foraging and nesting habitat suitable for the natural expansion of populations.

The City will compensate for the unavoidable loss of suitable foraging habitat in the project area by restoring or enhancing in-kind habitat. Implementation of Mitigation Measure UPCR2, Compensate for the Loss of Upland Cropland, will replace affected upland cropland that provides foraging habitat for white-tailed kite.

The City will compensate for the loss of ruderal vegetation that may provide suitable foraging habitat for white-tailed kites by implementing BMPs. BMPs relevant to ruderal vegetation will include reseeding disturbed areas following completion of construction activities. Ruderal habitat will be reseeded with a noninvasive native and naturalized grass and forb seed mix that will replace the habitat values lost as a result of construction activities.

5.5.7.4 ASIP Conservation Measures

ASIP conservation measures for the white-tailed kite are described below.

Conservation Measure WTKI-1—Implement Mitigation Measure WTKI1

Implementation of this conservation measure is consistent with the following MSCS programmatic conservation measure for the white-tailed kite:

- Before implementing CALFED actions that could result in the loss or degradation of occupied nesting habitat or disturbance to nesting pairs, conduct surveys in suitable nesting habitat within the breeding range of the white-tailed kite to locate active nest sites.

Conservation Measure WTKI-2—Implement Mitigation Measures WTKI2

Implementation of this conservation measure is consistent with the following MSCS programmatic conservation measure for the white-tailed kite.

- Avoid or minimize disturbances to nesting pairs that could be associated with implementing CALFED actions within 0.25 mile of active nest sites during the nesting period (February–September).

Conservation Measure WTKI-3—Implement Mitigation Measure WTKI3

Implementation of this conservation measure is consistent with the following MSCS programmatic conservation measure for the white-tailed kite.

- Avoid or minimize CALFED actions that could result in the loss of traditional nesting trees.

Conservation Measure WTKI-4—Implement Mitigation Measures WTKI4 and WTKI5

Implementation of these conservation measures is consistent with the following MSCS programmatic conservation measures for the white-tailed kite.

- Restore or enhance 2–5 acres of suitable nesting habitat near affected areas for each acre of occupied nesting habitat that is converted to unsuitable nesting habitat as a result of CALFED actions. Restored or enhanced compensation habitat should be located in areas that support nesting pairs near valley oak woodlands.
- To the extent consistent with ERP objectives, enhance and restore natural habitats and agricultural habitats adjacent to occupied nesting habitats to create a buffer zone of natural habitat. This buffer zone would protect nesting pairs from adverse impacts that could be associated with future

changes in land use on nearby lands and provide foraging and nesting habitat suitable for the natural expansion of populations.

5.5.7.5 Expected Outcomes with Implementation of Conservation Measures

Implementation of the conservation measures, including replacement of affected breeding and roosting habitat, achieves the ASIP goal to avoid, minimize, and compensate for adverse impacts of project actions on the white-tailed kite. Implementation of the conservation measures will help ensure that the existing abundance and distribution of the white-tailed kite in the project area are maintained.

5.5.8 Western Pond Turtle

5.5.8.1 Status in the Project Area

The western pond turtle inhabits permanent or nearly permanent waters with little or no current (Behler and King 1998). The channel banks of inhabited waters usually have thick vegetation, but basking sites, such as logs, rocks, or open banks, must also be present (Zeiner et al. 1988). Eggs are laid in nests along sandy banks of large, slow-moving streams or in upland areas, including grasslands, woodlands, and savannas.

There are no CNDDB occurrences of western pond turtle in the study area (California Natural Diversity Database 2007) however this species is expected to occur throughout the study area, including the project area. The Feather River provides suitable aquatic habitat for this species and the river banks and surrounding upland areas provide suitable nesting habitat.

5.5.8.2 Project Impacts

Riverine habitat and adjacent uplands in the project area provide habitat for this species. Project implementation was assumed to have an adverse impact on the western pond turtle if project activities could result in the loss or disturbance of riverine habitat.

The assessment of project impacts on western pond turtle is based on the proximity of known occurrences of this species to proposed project features or activities and the presence of suitable habitat in the project area. Construction activities could result in the direct removal or disturbance of 0.05 acres of western pond turtle breeding habitat. In-water work will result in the temporary disturbance of 0.05 acres of open water habitat and 0.3 acres of ruderal habitat that provide suitable habitat for western pond turtle.

5.5.8.3 Mitigation Measures

Implementation of project components and mitigation measures that include the restoration of affected habitats could result in a low, unquantifiable level of take of the western pond turtle. The following mitigation measures have been developed to avoid, minimize, and compensate for impacts of implementing project components and mitigation-related activities on western pond turtle (WEPT).

Mitigation Measure WEPT1—Perform Preconstruction Clearance Surveys for Western Pond Turtle

Western pond turtles are known to occur in the Feather River. Because this is a large, open system, it is not feasible to clear and permanently exclude all western pond turtles from the site. Preconstruction surveys will be conducted by a qualified biologist to determine the approximate population density of turtles in the construction areas. The City will install sheetpiles, coffer dams, or other measures to minimize sedimentation between the in-channel construction zones and adjacent waterways. This system will minimize the degradation of aquatic habitats outside the construction zone and inhibit the movement of turtles into the construction zone. Turtles occurring in the work area will be captured and relocated by a qualified biologist to a nearby location outside the work area.

To avoid the loss of western pond turtle and eggs as a result of construction, the City will install exclusion fencing on the channel banks to prevent turtles from nesting in the work areas. The exclusion fencing will consist of plastic orange mesh exclusion fence material or silt fence material. Fences will be installed to a depth of 6 inches below the ground surface to prevent turtles from going under the fence. Fences will be installed before the nesting season (i.e., March 1) and remain in place through August. The fencing may be removed prior to grading.

A qualified biologist will be present during all in-channel activities to relocate western pond turtles outside the construction zones.

Mitigation Measure WEPT2—Replace Lost Breeding and Foraging Habitat

The City will compensate for the unavoidable loss of up to 0.05 acre of riverine habitat by restoring or enhancing in-kind habitat. This compensation will restore or enhance in-kind habitat at a ratio of 2 acres for each acre affected, as described in the mitigation measures for riverine aquatic habitat in Chapter 4.

The City will compensate for the loss of ruderal vegetation that may provide suitable nesting habitat for the western pond turtle by implementing BMPs. BMPs relevant to ruderal vegetation will include reseeding disturbed areas following completion of construction activities. Ruderal habitat will be reseeded

with a noninvasive native and naturalized grass and forb seed mix that will replace the habitat values lost as a result of construction activities.

5.5.8.4 ASIP Conservation Measures

ASIP conservation measures for the western pond turtle are described below.

Conservation Measure WEPT-1—Implement Mitigation Measure WEPT1

Implementation of this conservation measure is consistent with the following MSCS programmatic conservation measure for the western pond turtle.

- To the extent practicable, capture individuals from habitat that would be affected by CALFED actions, and relocate them to nearby suitable existing, restored, or enhanced habitat.

Conservation Measure WEPT-2—Implement Mitigation Measure WEPT2

Implementation of this conservation measure is consistent with the following MSCS programmatic conservation measure for the western pond turtle.

- Where CALFED actions would adversely affect occupied habitat,
  - acquire, protect, and manage 1–5 acres of existing occupied habitat for each acre within the same area of occupied habitat affected by CALFED actions, or
  - enhance or restore 1–5 acres of suitable habitat near affected areas for each acre of occupied habitat affected.

5.5.8.5 Expected Outcomes with Implementation of Conservation Measures

Implementation of the conservation measures, including replacement of affected breeding and foraging habitat, achieves the ASIP goal to avoid, minimize, and compensate for adverse impacts of project actions on the western pond turtle. Implementation of the conservation measures will help ensure that the existing abundance and distribution of western pond turtle in the project area are maintained.

5.5.9 River Lamprey

5.5.9.1 Status

River lamprey are currently listed by DFG as a Species of Special Concern, but have no other state or federal listing status.

5.5.9.2 Life History

Although the river lamprey is native to California, the biology of the species has not been studied in the state. What is known about the river lamprey's life history is based on the biology of the species from British Columbia. Unless otherwise noted, the following discussion is based on this information. The timing of life history landmarks may differ given differences between British Columbia and California (Moyle 2002).The river lamprey is anadromous and migrates from the ocean to rivers and smaller tributaries to spawning grounds. Adults enter freshwater in the fall and move upstream to suitable spawning habitat (Moyle 2002). They undergo sexual maturation in freshwater streams. Spawning occurs in clean gravelly riffles from February through May.

River lamprey eggs hatch into ammocoetes and remain in freshwater for approximately three to five years in silty backwaters or stream edges where they bury in the sediments and filter feed on various microorganisms (Moyle 2002). Transformation from ammocoete to adult typically begins when ammocoetes are nearly 5 inches long (California Department of Water Resources 2004d) and occurs in the summer over a period of nine to ten months (Moyle 2002). Young adults enter the ocean in late spring and spend three to four months there before migrating back to freshwater (Moyle 2002). Adult lamprey prey on other fish and may reach a total length of around 17cm (Moyle et al. 1995).

5.5.9.3 Historic and Current Distribution and Abundance

The river lamprey is known to occur from San Francisco Bay to near Juneau, Alaska. The species is considered more abundant in the lower Sacramento-San Joaquin River system than in other streams in California, but few surveys for river lamprey have been conducted (Moyle 2002). Population trends are unknown in California; however, declines may be attributed to the degradation of freshwater spawning and rearing habitat. River lamprey are common in British Columbia, the center of their geographic range.

5.5.9.4 Reasons for Decline

Habitat alterations due to dams, water diversions and pollutants have contributed to the decline of the river lamprey.

5.5.9.5 Life History and Distribution in Action Area

River lamprey adults are likely to occur in action area during upstream movements to spawning areas in September through May. It is unlikely that spawning would occur in the immediate project area based on reported spawning preferences (gravelly riffles in small tributaries). Ammocoetes are not likely to occur in the immediate project area because of upstream distribution and a preference for low-velocity shallows and backwaters away from main channels. Timing of downstream movements of juveniles and immature adults is unknown but may occur in winter and spring based on reported timing of ocean entrance (late spring).

5.5.9.6 Project Impacts

Project impacts are the same as listed above for Central Valley steelhead.

5.5.9.7 Yuba City Feather River Intake Screen Environmental Commitments

The Environmental Commitments are the same as listed above in Section 5.4.5.

5.5.9.8 ASIP Conservation Measures

No conservation measures for river lamprey are included in the MSCS. Implementation of the Environmental Commitments listed above for the project will minimize effects on river lamprey.

5.5.9.9 Expected Outcomes with Implementation Conservation Measures

Project effects on river lamprey will be minimized with implementation of the Environmental Commitments listed above.

5.5.10 Hardhead

5.5.10.1 Status

Hardhead are currently listed by DFG as a Species of Special Concern, but have no other state or federal listing status.

5.5.10.2 Life History

Hardhead are typically found in small to large streams at low- to mid-elevation. Hardhead usually occur in the same habitats as Sacramento sucker and Sacramento pikeminnow. Based on occurrence, hardhead prefer warmer water temperatures than salmonids; reported optimal water temperatures for hardhead range from 75.2 to 82.4ºF (24 to 28ºC [Moyle 2002]).

Most hardhead reach sexual maturity at 3 years (Moyle 2002) and spawn in spring (May and April); however, spawning may take place as late as August (University of California Cooperative Extension 2008). Hardhead in small streams spawn in near their resident pools, whereas hardhead in larger streams and lakes may move 30 to 75 km to find suitable spawning grounds (University of California Cooperative Extension 2008). Spawning may occur in pools, runs, or riffles typically on gravel and rocky substrate. The early life history of hardhead is not well known. It is believed that larval and postlarval hardhead remain under dense, flooded vegetative cover or fallen branches along stream or lake edges. As the juveniles grow, they move into deeper water (Moyle 2002).

5.5.10.3 Historic and Current Distribution and Abundance

Historically, hardhead were widely distributed and abundant in Central California. Today they are widely distributed in low- to mid-elevation streams in the Sacramento-San Joaquin drainage, and their range extends from the Kern River to the Pit River, and they are also present in the Russian River. In the San Joaquin drainage, hardhead are distributed in tributary streams, but absent from valley reaches of the San Joaquin River (California Department of Water Resources 2004b). In the Sacramento drainage, hardhead are present primarily in the Sacramento River and larger tributary streams (Moyle 2002). With the exception of the Napa River, hardhead are not present in San Francisco Bay streams (California Department of Water Resources 2004b). Hardhead are not as abundant as they once were. Reports indicate that hardhead populations are becoming increasingly isolated from one another making them more vulnerable to localized extinction (Moyle 2002).

5.5.10.4 Reasons for Decline

Habitat loss and predation by non-native fishes (e.g., smallmouth bass) are the primary cause of hardhead decline (Moyle 2002). Suitable habitat has been eliminated, and upstream areas isolated, as a result of increased water diversions.

5.5.10.5 Life History and Distribution in Action Area

Adult and juvenile hardhead may occur year-round in the action area. In spring, primarily during April and May, adults may move through the action area during upstream migration to spawning areas. Based on reported spawning preference (gravelly riffles in small tributaries), spawning in the immediate project area is unlikely.

5.5.10.6 Project Impacts

Project impacts are the same as for Central Valley steelhead.

Yuba City Feather River Intake Screen Environmental Commitments

The Environmental Commitments are the same as for Central Valley steelhead.

5.5.10.7 ASIP Conservation Measures

ASIP conservation measures for hardhead are addressed in the MSCS but do not apply to the impacts identified for this project. Implementation of the Environmental Commitments listed above for the project will minimize effects on hardhead.

5.5.10.8 Expected Outcomes with Implementation Conservation Measures

Project effects on hardhead will be minimized with implementation of the Environmental Commitments listed above.

5.5.11 Sacramento Splittail

5.5.11.1 Status

The Sacramento splittail was federally listed as threatened on February 8, 1999 (64 FR 5963), and delisted on September 22, 2003 (68 FR 55139). The splittail is a California species of special concern due to uncertainties regarding long-term abundance trends.

5.5.11.2 Life History

Sacramento splittail typically mature at the end of their second year, and adults migrate upstream to forage and spawn in February through May (Moyle 2002). Splittail spawn from February into early July over flooded vegetation, although peak activity is usually in March and April (Moyle et al. 2003). The onset of spawning is associated with rising water levels, lower water temperature and increasing day length (Moyle et al. 2003).

Splittail eggs are attached to submerged vegetation or other submerged substrate and hatch within three to five days after spawning (Moyle et al. 2003). Sacramento splittail larvae remain in shallow, weedy areas close to the spawning sites for 10 to 14 days following hatch, and move into deeper water as they mature and swimming ability increases (California Department of Water Resources 2004c). Young-of-year splittail are typically captured in large numbers at the State Water Project and Central Valley Project pumping plants in the south Delta in late May through mid-July, indicative of a seasonal downstream movement (Moyle et al. 2003).

5.5.11.3 Historic and Current Distribution and Abundance

The Sacramento splittail is endemic to rivers, lakes and sloughs of the Central Valley. Historically, they were found in the Sacramento River as far upstream as Redding, and in the American River up to Folsom (Moyle et al. 2003). In the Feather River, Sacramento splittail were found as far upstream as Oroville (Moyle et al. 2003). Historic abundance of Sacramento splittail is not known, but they were considered relatively common and widely distributed in the Bay-Delta estuary through the early 1960s (Moyle et al. 2003).

Currently, splittail are found most frequently in the Sacramento River below the mouth of the Feather River and their numbers become increasingly limited in an upstream direction, particularly during summer and fall (Moyle et al. 2003). In wet years during winter and spring adults may migrate upstream in the Sacramento River as far as the Red Bluff Diversion Dam and into the lower Feather and American rivers (Moyle 2002; Moyle et al. 2003).

5.5.11.4 Reasons for Decline

Loss and degradation of riverine spawning and rearing habitat and changes in hydrology have reduced Sacramento splittail populations. Flood control practices have created artificial hydrologic conditions that may act to reduce the regularity of flooding in floodplain habitat (e.g., Yolo Bypass). Other factors contributing to splittail population decline include variations in climate, introduction of non-native predators and competitors, toxic substances, and exploitation (Moyle 2002).

5.5.11.5 Life History and Distribution in Action Area

Sacramento splittail adults are assumed to occur in the action area during upstream migration to spawning areas in February through May. Juveniles may occur in the action area during downstream migration to the Bay-Delta estuary. Because of the lack of preferred spawning and nursery habitat (flooded shallow-water habitat with submerged vegetation), spawning, larval, or juvenile rearing are unlikely in the immediate project area.

5.5.11.6 Project Impacts

Project impacts are the same as for Central Valley steelhead.

Yuba City Feather River Intake Screen Environmental Commitments

The Environmental Commitments are the same as for Central Valley steelhead.

5.5.11.7 ASIP Conservation Measures

ASIP conservation measures for Sacramento splittail (SPT) are described below. ASIP conservation measures correspond to the project's environmental commitments identified above.

Conservation Measure SPT-1—Implement Environmental Commitment 1

Implementation of this conservation measure is consistent with the following MSCS programmatic conservation measure for Central Valley fall-run Chinook salmon.

- Implement applicable conservation measures to avoid, minimize, and compensate for impacts on Sacramento splittail listed in MSCS Attachment

D, "Summary of Potential Beneficial and Adverse Program Impacts and Conservation Measures," Table D-20, "Estuarine Fish Group: Summary of Potential Beneficial and Adverse CALFED Effects

Conservation Measure SPT-2—Implement Environmental Commitment 2

Implementation of this conservation measure is consistent with the following MSCS programmatic conservation measure for Central Valley fall-run Chinook salmon.

- Implement applicable conservation measures to avoid, minimize, and compensate for impacts on Sacramento splittail listed in MSCS Attachment D, "Summary of Potential Beneficial and Adverse Program Impacts and Conservation Measures," Table D-20, "Estuarine Fish Group: Summary of Potential Beneficial and Adverse CALFED Effects

5.5.11.8 Expected Outcomes with Implementation Conservation Measures

Implementation of the environmental commitments and conservation measures achieves the ASIP goal to avoid, minimize, and compensate for adverse impacts of proposed project actions on Sacramento splittail. Implementation of the conservation measures will help ensure that the existing abundance and distribution of splittail in the project area are maintained.

5.6 Interrelated and Interdependent Effects

Interrelated actions are those that are part of a larger action and depend on the larger action for their justification. Interdependent actions are those that have no significant independent utility apart from the proposed action.

Reclamation and the City are not aware of any interrelated or interdependent effects of the proposed action.

Chapter 6
Assessment of Cumulative Impacts

6.1 Introduction

This chapter describes the likely impacts on federally listed ASIP-covered species of future nonfederal activities, including future state, tribal, local, and private actions that are reasonably certain to occur in the project area, in combination with the new fish screen. Future federal actions that are unrelated to the fish screen are not considered in this chapter because they require separate consultation pursuant to Section 7 of the ESA (U.S. Fish and Wildlife Service and National Marine Fisheries Service 1998). Cumulative impacts on species that are not federally listed will be addressed in the Environmental Assessment/Initial Study.

Federally listed fish and wildlife species that are covered under this ASIP are:

- Central Valley fall-/late fall–run Chinook salmon,
- Central Valley spring-run Chinook salmon,
- Sacramento River Winter-Run Chinook Salmon
- Central Valley steelhead,
- Green sturgeon, and
- VELB.

The area for analyzing cumulative impacts on ASIP-covered fish and wildlife (collectively referred to as biological resources in this cumulative impacts analysis) was determined to be the study area. The study area includes the area covered by the USGS quadrangle surveyed as part of the CNDDB search. The study area represents the probable area in which project impacts on biological resources could interact with other development and have significant cumulative impacts on sensitive biological resources.

6.2 Related and Reasonably Foreseeable Nonfederal Actions

This analysis incorporates all reasonably foreseeable, relevant projects and focuses on those projects that, when combined with the Yuba City Feather River fish screen, could contribute to cumulative impacts.

The following criteria were used to identify the projects that were evaluated in the analysis of cumulative impacts.

- The action is under active consideration.
- The action has recently completed project-level environmental documentation, or environmental documents are in some stage of active completion.
- The action will be completed or operational within the timeframe being considered for the proposed project (assumed to be 2010).
- The action, in combination with the proposed project's alternatives, has the potential to affect the same resources.

Nonfederal projects meeting these criteria are included in this cumulative impacts analysis. This cumulative impacts analysis also considered the following factors to determine whether the proposed project would result in significant cumulative impacts on biological resources:

- historical and currently known distribution of special-status wildlife species in the study area and statewide;
- extent of sensitive biological resources protected on public lands and current known threats to these resources on private lands (e.g., proposed development, current agricultural practices, and land management practices); and
- documented impacts associated with approved or pending future projects in the study area.

Based on these factors, the fish screen project, in combination with past, present, or reasonably foreseeable future projects, could have a cumulative impact on ASIP-covered fish and wildlife species that are known to occur in the study area. However, these projects are not expected to result in a significant cumulative decline of listed species. No additional conservation measures are required beyond those proposed for the potential impacts described in Chapter 5.

There are no known projects that are reasonably certain to occur within the project area that would not require separate consultation pursuant to ESA Section 7. Nonetheless, potential cumulative effects may include any continuing or future non-federal diversions of water that may entrain adult or larval fish or that may decrease outflows incrementally, thereby changing the position of habitat for the species.

6.3 Cumulative Impacts on ASIP-Covered Fish and Wildlife Species

The following sections describe cumulative impacts on ASIP-covered fish and wildlife species.

6.3.1 Fish

Future state, tribal, local, and private activities in the study area are anticipated to occur, and environmental conditions affected by future activities may harm aquatic life and habitat necessary to sustain the listed species.

Decline of listed and proposed threatened and endangered species is primarily attributable to habitat factors. These factors include changes to:

- channel morphology,
- substrate,
- estuarine habitat conditions,
- riparian areas,
- contaminants,
- biological communities,
- flow, and
- fish passage.

Major activities potentially contributing to the decline of the listed fish species in the Feather River include:

- entrainment in diversions,
- urbanization and associated point and nonpoint discharges,
- agricultural discharges,
- channelization, and
- altered hydrology attributable to diversions and upstream reservoir operations.

Increased contaminant inputs from future activities are of particular concern. Water quality in the Feather River is impaired because of industrial, urban, and agricultural discharges, including stormwater runoff.

Environmental commitments implemented during construction activities would avoid or minimize contaminant inputs. The completed project would not contribute to cumulative contaminant inputs.

The footprint of the new pumping facility may result in habitat loss for listed fish species and could contribute to cumulative impacts of other activities. The impact, however, would be small. The footprint of the new fish screen is similar to the existing footprint of the existing fish screen and has been sited to minimize impacts on valuable habitats. Habitat quality would be similar to existing conditions following the temporary disturbance of substrate.

Additional cumulative effects may result from the discharge of point- and nonpoint-source chemical contaminant discharges. These contaminants include selenium and numerous pesticides and herbicides associated with discharges related to agricultural and urban activities. The introduction of exotic species may occur when the levees are breached or when separate creeks or river systems are reconnected during various projects. Exotic species can displace native species that provide food for larval fish.

Other potential cumulative effects on fish could include: wave action in the water channel caused by boats that may degrade riparian and wetland habitat and erode banks; dumping of domestic and industrial garbage; urban land uses that result in increased discharges of pesticides, herbicides, oil, and other contaminants into the water; agricultural practices; and unscreened river diversions.

Development in the City's sphere of influence has the potential to result in direct, indirect, and cumulative effects on species and habitats under USFWS, NOAA Fisheries, or DFG's jurisdiction. For purposes of the ASIP, it is assumed that state, local, and private actions resulting in habitat conversion in the City's sphere of influence would be subject to all applicable environmental regulations and that impacts to listed species, critical habitat, and EFH would be avoided, minimized, and mitigated through measures identified in cooperation with NOAA Fisheries, USFWS, and DFG as appropriate.

Implementation of the environmental commitments and ASIP conservation measures will substantially avoid, minimize, and compensate for adverse impacts on listed fish species.

6.3.2 Wildlife

The City and Reclamation are not aware of specific projects that might affect VELB or its critical habitat that are currently under review by state, county, and local authorities. Nevertheless, continued human population growth in the Central Valley and other parts of California is expected to drive further development of agriculture, cities, industry, transportation, and water resources in the foreseeable future. Some of these future activities will not be subject to federal jurisdiction (and thus are considered to enter into cumulative effects) and are likely to result in loss of the riparian and other habitats where elderberry plants and VELB live.

The potential impacts of growth within the City's sphere of influence were analyzed in the City's 2004 General Plan Update. Anticipated growth would occur primarily as in-fill or as a conversion from agriculture in areas immediately adjacent to existing residential and commercial uses. None of the growth is planned for areas that are currently undeveloped (City of Yuba City 2004). Because the areas planned for growth are currently developed and are surrounded by development, the impacts of that growth on federally listed species, including VELB, is expected to be minimal.

Additionally, the Yuba-Sutter Natural Community Conservation Plan/Habitat Conservation Plan (NCCP/HCP) is currently being developed and a recent Science Advisors Report for that effort has recommended that the plan include the Yuba City area.

The proposed project would accommodate the City's conversion from groundwater supplies to surface water supplies and the City's planned growth. Biological impacts associated with that growth are expected to be minimal because it would occur in already-developed areas within the City's sphere of influence. Additionally, future impacts associated with regional growth may be addressed by the Yuba-Sutter NCCP/HCP.

Implementation of the environmental commitments and ASIP conservation measures will substantially avoid, minimize, and compensate for adverse impacts on VELB.

6.3.3 Determination

Based on the information presented above, the determination is made that even with the environmental commitments included in the project description, the project may contribute to cumulative effects on listed species. However, with the proposed measures, the effects are likely to be minor and localized, and would not jeopardize the continued existence of listed species in the area.

Finally, it should be emphasized that the proposed action directly contributes to overall recovery efforts of listed spring-run Chinook salmon and steelhead by screening an existing unscreened diversion on a major migration route. By adhering to the NOAA Fisheries and DFG fish screen performance criteria, the new fish screen is expected to minimize entrainment and impingement and consequent injury and mortality of juvenile salmonids at the project site. This is considered a long-term beneficial effect to listed species, critical habitat, and EFH.

Chapter 7
Conclusions

The proposed action would result in long-term beneficial effects to listed fish species, critical habitat, and EFH by minimizing entrainment and improving passage conditions for Central Valley spring-run Chinook salmon, Central Valley fall/late fall–run Chinook salmon, Central Valley steelhead, and North America green sturgeon. Replacement of the existing unscreened intake with a fish screen designed in accordance with current NOAA Fisheries and DFG screen performance criteria, and implementation of approved hydraulic and operations and maintenance plans would ensure that these benefits are maintained for the life of the project.

Incidental take of listed species may occur as a result of harassment and temporary impairment of feeding and other behavior patterns (e.g., predator avoidance) from noise, suspended sediment, and turbidity generated during in-water construction activities. There is also potential for injury or mortality of fish during pile driving, installation and dewatering of the cofferdam, and potential fish salvage operations. Restricting in-water activities to the period from July 1 through October 31 and implementing the environmental commitments would minimize the potential for incidental take of listed species and the potential for adverse effects on other special-status species.

Potential project impacts on critical habitat and EFH include losses of riparian habitat within the project footprint and reductions in river flow related to the increased diversion capacity. The proposed project footprint would encompass approximately 0.17 acre of channel bed and bank that is currently dominated by a simple levee slope and rock revetment. Because of the lack of significant SRA cover and the low quality of existing habitat, no adverse effects to critical habitat would occur in the project area. Potential reductions in river flow associated with increases in diversion capacity are expected to have negligible effects on listed species and habitat in the action area.

A summary of impacts on ASIP-covered species is provided in Table 7-1.

Table 7-1. Summary of Impacts on ASIP-Covered Species

	Status[a]			Impact on Species			
Species Name	Federal	State	Other	No Effect	Not Likely to Adversely Affect	May Affect, May Adversely Affect	May Affect Designated Critical Habitat
Birds							
Black-crowned night-heron (rookery)	–	–	SC			X	
Cooper's hawk	–	CSC	–			X	
Great blue heron (rookery)	–	–	SC			X	
Great egret (rookery)	–	–	SC			X	
Snowy egret (rookery)	–	–	SC			X	
Swainson's hawk	–	CT	–			X	
White-tailed kite	SC	FP	–			X	
Reptiles							
Western pond turtle	SC	CSC	SC			X	
Fish							
Central Valley fall-/late fall–run Chinook salmon ESU	C	CSC	–			X	
Central Valley spring-run Chinook salmon ESU	T	CT	–			X	X
Central Valley steelhead ESU	T	–	–			X	X
Sacramento River winter-run Chinook salmon	E	E	–			X	
Green sturgeon	PT	CSC	–			X	
Splittail	SC	CSC	–			X	
Hardhead	–	CSC	–			X	
River Lamprey	–	CSC	–			X	
Invertebrates							
Valley elderberry longhorn beetle	T	–	–		X		

Note: ESU = evolutionary significant unit.

[a] Status:

Federal

E = Listed as endangered under the federal Endangered Species Act (ESA).
T = Listed as threatened under ESA.
C = Candidate for listing under ESA.
SC = Federal species of concern.

State

CE = Listed as endangered under the California Endangered Species Act (CESA).
CT = Listed as threatened under CESA.
R = Listed as rare under California Native Plant Protection Act.
CSC = California species of special concern.
FP = Fully protected under the California Fish and Game Code.

Other

1B = CNPS List 1B.
2 = CNPS List 2.
SC = Other species of concern identified by CALFED.

7.1 Species Afforded Federal Protection

The following analysis specifically pertains to: (1) species listed under the federal ESA; (2) species proposed for listing under the federal ESA; (3) designated critical habitat; (4) proposed critical habitat; and (5) EFH.

Federally-listed species discussed in this chapter include: (1) Sacramento River winter-run Chinook salmon; (2) Central Valley spring-run Chinook salmon; (3) Central Valley steelhead; (4) the southern DPS of green sturgeon; and (5) VELB. Critical habitat discussions include critical habitat designated for: (1) Sacramento River winter-run Chinook salmon; (2) Central Valley spring-run Chinook salmon; and (3) Central Valley steelhead. EFH discussions are only applicable for Chinook salmon.

This section is divided into two subsections, Section 7.1.1, addressing fish species, and Section 7.1.2, addressing terrestrial species.

7.1.1 Fish Species

The following discussion provides conclusions and determinations concerning whether the Yuba City Feather River Intake Screen Project is likely to adversely affect the above-listed fish species. Under ESA Section 7, and the implementing regulations promulgated by NOAA Fisheries and USFWS, formal consultation between Reclamation and NOAA Fisheries and/or USFWS is required if a proposed action "may affect listed species or designated critical habitat," unless Reclamation determines with NOAA Fisheries' and USFWS' written concurrence, "…that the proposed action is not likely to adversely affect any listed species or critical habitat." (50 CFR 402.14(a)-(b)(1)). The conclusions and determinations described below also consider the amount of degradation that listed species can withstand relative to the described environmental baseline (Chapter 5). The Proposed action would improve conditions in the action area for listed fish species covered in this ASIP (i.e., Sacramento River winter-run Chinook salmon, Central Valley spring-run Chinook salmon, Central Valley steelhead, and the southern DPS of green sturgeon), particularly anadromous salmonids, by removing an unscreened diversion and replacing it with a state-of-the-art screen compliant with current NOAA Fisheries/CDFG screen criteria. This long-term improvement would reduce or eliminate the amount of entrainment caused by the City's existing intake. The habitat modifications associated with the proposed action (i.e., construction of a state-of-the-art screened diversion) that reduce entrainment and impingement potential would reduce salmonid mortality. Hence, the proposed action would be consistent with programmatic actions under the ERP, particularly: *"…construction of fish screens that use the best available technology* (CALFED Bay-Delta Program 2000)."

While the Proposed action generally would have beneficial effects on aquatic species covered in this ASIP, particularly anadromous salmonids, incidental take may occur, primarily from construction-related activities. The proposed action

would involve construction near, and in, the Feather River within the action area. Short-term effects associated with the project may include (depending on the particular species being evaluated): (1) increased erosion, sedimentation and turbidity; (2) creation of hydrostatic pressure waves, noise, and vibration; (3) introduction of potential hazardous materials and chemical spills into waterways; (4) creation of stranding and entrainment potential in the cofferdam; (5) increased predation risk; and (6) obstructions to fish passage.

7.1.1.1 Central Valley Steelhead, Sacramento River Winter-Run Chinook Salmon, Central Valley Spring-Run Chinook Salmon, Southern Distinct Population Segment of Green Sturgeon

The proposed action "*may affect, and is likely to adversely affect*" these listed fish species. This conclusion is the appropriate finding in the event the long-term effect of a proposed action is beneficial to the listed species, but the proposed action also is likely to cause some short-term adverse effects. If incidental take is anticipated to occur as a result of a proposed action, a "*may affect, and is likely to adversely affect*" determination should be made. A *"may affect, and is likely to adversely affect"* determination requires the initiation of formal Section 7 consultation (U.S. Fish and Wildlife Service and National Marine Fisheries Service 1998).

As discussed above, the proposed action will improve conditions in the action area for listed aquatic species covered in this ASIP.

However, the potential exists for take of juvenile listed fish associated with: the removal of SRA habitat; pile driving; fish stranding and entrainment resulting from cofferdam placement; and dewatering, riprap placement, and increased predation resulting from in-stream construction activities. Although specific conservation measures have been included in this ASIP to minimize the effects of SRA removal, pile driving operations, cofferdam dewatering, and riprap placement, the potential still exists for take of listed juvenile fish associated with the Proposed action. Thus, *"may affect, and is likely to adversely affect"* is the appropriate finding regarding the proposed action potential effects on listed juvenile fish.

Although the proposed action may adversely affect listed fish, the proposed action is not "*likely to jeopardize the continued existence of"* these fish species. The proposed action is not expected to directly or indirectly appreciably reduce the likelihood of the survival and recovery of these listed fish species in the wild by reducing their reproduction, numbers, or distribution.

7.1.1.2 Central Valley Spring-Run Chinook Salmon and Central Valley Steelhead Critical Habitat

The proposed action "*may adversely affect*" critical habitat for these listed fish species with critical habitat. As discussed above, the proposed action would improve conditions in the action area for listed aquatic species covered in this ASIP, including conditions in the critical habitat designated for these listed fish species. However, removal of SRA habitat in the action area would have the potential to reduce habitat availability or suitability for these listed fish species. To minimize the effects of SRA removal the City will restore habitat adjacent to the intake and/or will purchase the appropriate credits at an agency-approved mitigation bank. The final number of credits to be purchased will be determined by NOAA Fisheries staff.

Although the proposed action *"may adversely affect"* critical habitat for these listed fish species, the proposed action would not result in the destruction or adverse modification of designated critical habitat at the ESU level. The proposed action would not adversely affect the critical habitat constituent elements or their management in a manner likely to appreciably diminish or preclude the role of that habitat in the survival or recovery of these listed fish species. If an action affects critical habitat, but does not appreciably diminish the value of constituents essential to the species conservation, the adverse modification threshold is not exceeded (U.S. Fish and Wildlife Service and National Marine Fisheries Service 1998).

Chinook Salmon Essential Fish Habitat

The proposed action "*is not likely to adversely affect*" EFH for Chinook salmon. EFH is defined as those waters and substrate necessary to fish for spawning, breeding, feeding, and growth to maturity. EFH designations occur only in aquatic areas necessary to support federally managed marine and anadromous fish. Unlike critical habitat, upland areas, riparian buffer zones and other terrestrial areas adjacent to rivers and coasts cannot be designated as EFH (National Marine Fisheries Service 2002c). The proposed action would improve conditions in the action area for listed aquatic species covered in this ASIP, including EFH conditions. Removal of SRA habitat would be the only adverse habitat-based effect associated with the proposed action with the potential to reduce anadromous salmonid habitat availability or suitability. However, according to the definition of EFH, removal of SRA habitat should not factor in the evaluation of potential effects on EFH.

7.1.2 Terrestrial Species

The following discussion provides conclusions and determinations concerning whether the proposed action is likely to adversely affect the federally-listed terrestrial species covered in this ASIP. The only federally-listed terrestrial

species that would be affected by the proposed action is the VELB. VELB is listed as threatened under the ESA.

7.1.2.1 Valley Elderberry Longhorn Beetle

The proposed action is "*not likely to adversely affect*" VELB. No elderberry shrubs are to be removed, however, numerous shrubs/stems are located in the vicinity of the project. The nearest shrubs are less than 100 feet from the LLPS, but 20 feet outside the footprint for proposed project activities. The City will attempt to perform construction operations without affecting elderberry shrubs and to maintain a 100-foot buffer zone, where feasible, around all elderberry shrubs. Additionally, the project may result in take of VELB if elderberry shrubs have become established at the LLPS since the time of the last survey. Regardless, no shrubs would be directly affected by the construction activity. If incidental take is anticipated to occur as a result of a proposed action, an "*is likely to adversely affec*t" determination must be made. A "*not likely to adversely affect*" determination requires the initiation of informal Section 7 consultation under ESA (U.S. Fish and Wildlife Service and National Marine Fisheries Service 1998). The proposed action is not expected to directly or indirectly appreciably reduce the likelihood of survival and recovery of VELB in the Central Valley.

7.2 State-Listed Species and other Evaluated Species

The following analysis pertains to species that are not listed under ESA, but are either listed under CESA, are designated as California species of special concern, or are included in the CALFED MSCS. Because, for this document, take is defined as under the ESA, conclusions for species not listed under the ESA are based on other considerations, which are less stringent than ESA regulations.

7.2.1 Fish Species

The species analyzed in this section include Central Valley fall-run/late fall-run Chinook salmon, Sacramento splittail, hardhead, and river lamprey.

7.2.1.1 Central Valley Fall-Run/Late Fall–Run Chinook Salmon

The proposed action would not be expected to result in reduced long-term population levels of Central Valley fall-run/late fall–run Chinook salmon, although some temporary habitat degradation may occur. Central Valley fall-run/late fall–run Chinook salmon present in the action area would benefit from

the reduced entrainment with conversion of the screened intake. Moreover, a Fish Rescue and Salvage Plan would be implemented prior to cofferdam dewatering, which would minimize potential construction-related effects to species present in the action area, including fall-run/late fall–run Chinook salmon.

7.2.1.2 Sacramento Splittail

The proposed action would not be expected to result in reduced long-term population levels of Sacramento splittail. Juvenile Sacramento splittail are not believed to use the Feather River for rearing to great extent. However, the Sacramento splittail that are present in the action area would benefit from reduced entrainment associated with conversion to the screened intake. Moreover, a fish rescue plan would be implemented prior to cofferdam dewatering, which would minimize potential construction related effects to species present in the action area, including Sacramento splittail.

7.2.1.3 Hardhead

The proposed action would not be expected to result in reduced long-term population levels of hardhead. The hardhead that are present in the action area would benefit from reduced entrainment associated with conversion to the screened intake. Moreover, a Fish Rescue and Salvage Plan would be implemented prior to cofferdam dewatering, which would minimize potential construction-related effects to species present in the action area, including hardhead.

7.2.1.4 River Lamprey

The proposed action would not be expected to result in reduced long-term population levels of river lamprey. In the unlikely event that river lamprey are present in the action area, they would benefit from the reduced entrainment associated with conversion to the screened intake. Moreover, a Fish Rescue and Salvage Plan would be implemented prior to cofferdam dewatering, which would minimize potential construction-related effects to species present in the action area, including river lamprey.

7.2.2 Terrestrial Species

The species analyzed in this section is the Swainson's hawk. The Proposed action "*may affect, but is not likely to adversely affect*" the other terrestrial species that were addressed in this ASIP.

7.2.2.1 Swainson's Hawk

The proposed action would not be expected to result in reduced nesting success or other long-term adverse effects on Swainson's hawks. Although Swainson's hawk nest sites are located in the region, no known nest trees or foraging habitat would be removed by construction activities. Pre-construction surveys would be conducted to minimize the potential for construction-related effects to this species. If an active nest is located within 0.5 mile of construction activities, a biological monitor will be present to ensure that the nesting pair is not disturbed.

Chapter 8
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Appendix A

Fish Rescue and Salvage Plan

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The following protection measures will be incorporated to minimize potential effects on fish populations, primarily as a result of construction of the cofferdam for the new intake structure, and to safely rescue fish from the cofferdam before dewatering activities.

Visual Estimate of Fish within Cofferdam

A sheet pile cofferdam will be constructed on the waterside of the riverbank along the outermost edge of the intake structure footprint. The cofferdam will be constructed by placement of drilled or driven piers within the river. Before the cofferdam is completely enclosed, biologists will conduct a visual survey for anadromous salmonids and other fish species by snorkeling within the cofferdam area and using a counting device to record the number of any fish visually observed. Snorkeling will begin at the upstream end of the cofferdam and continue to the downstream end. The biologists will specify the type of fish observed, specifically steelhead or Chinook salmon. The visual surveys will be performed twice. The first survey will serve as a baseline and a second survey will check the accuracy of the first survey. If a major discrepancy is noted between the first and second surveys, a third survey will be performed.

Placement of Crowding Net

Upon the completion of the visual surveys, a crowding net will be placed at the upstream end of the cofferdam. The net will span the width of the cofferdam and will be placed at a depth sufficient to span the deepest reaches of the cofferdam. Biologists or other project staff will move the net from the upstream end of the cofferdam to the downstream end and attach it to a sheet panel pile, thus creating an exclusion area to keep fish from entering the cofferdam. Once the crowding net is in place, divers will conduct another visual survey to determine if fish are located within the cofferdam. If fish remain within the cofferdam, the netting procedure would be repeated. The net would be collapsed, removed from both ends of the cofferdam and gathered together to the surface. Captured fish would immediately be removed from the net and returned to the river.

Reporting Requirements

Upon the completion of the fish rescue and salvage activities, a Fish Salvage Operation Report will be submitted to NOAA Fisheries for review and comment. The report will document the procedures implemented to rescue and salvage fish within the cofferdam and will include information on the number of fish salvaged and the type and size of fish and special-status fish salvaged. The project proponents will respond to any comments by NOAA Fisheries on the report and submit a finalized version in order to comply with appropriate reporting requirements for the project.