San Joaquin River Restoration Program:

Salmon Conservation and Research Facility and Related Fisheries Management Actions Project

Draft Environmental Impact Report
Volume I – Main body

October 2013

CALIFORNIA DEPARTMENT OF FISH & WILDLIFE

Horizon WATER and ENVIRONMENT

San Joaquin River Restoration Program: Salmon Conservation and Research Facility and Related Management Actions Project

Volume I — Main Body

Draft Environmental Impact Report

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Acronyms and Abbreviations

§	Section
μg/m³	micrograms per cubic meter
1990 CAA	Clean Air Act Amendments of 1990
AADT	annual average daily traffic
AB	Assembly Bill
ADCP	Acoustic Doppler Current Profiler
af	acre-feet
AIS	Aquatic Invasive Species
AP	Alquist-Priolo
APCD	air pollution control district
AQAP	air quality attainment plan
AQMD	Air Quality Management District
AST	aboveground storage tank
BAU	business as usual
Bay Area	San Francisco Bay Area
BDCP	Bay Delta Conservation Plan
BFE	base flood elevation
bgs	below ground surface
BKD	bacterial kidney disease
BMI	benthic macro-invertebrate
BMPs	Best Management Practices
BOD	biological oxygen demand
BPS	Best Performance Standards
Business Plan Act	Hazardous Materials Release Response Plans and Inventory Law of 1985
C	Celsius
CAA	Clean Air Act
CAAP	concentrated aquatic animal production
CAAQS	California Ambient Air Quality Standards
CABA	Center for Aquatic Biology and Aquaculture
Cal EMA	California Emergency Management Agency
CAL FIRE	California Department of Forestry and Fire Protection
Cal-IPC	California Invasive Plant Council
Cal. Code Regs.	California Code of Regulations
Cal/EPA	California Environmental Protection Agency
Cal/OSHA	California Department of Industrial Relations Division of Occupational Safety and Health
CALEEMOD	California Emissions Estimator Model
Caltrans	California Department of Transportation
CARB	California Air Resources Board
CCAA	California Clean Air Act
CCAP	Climate Change Action Plan
CCP	Comprehensive Conservation Plan
CCR	California Code of Regulations

CDFA	California Department of Food and Agriculture
CDFW	California Department of Fish and Wildlife
CEQA	California Environmental Quality Act
CERCLA, or Superfund Act	Comprehensive Environmental Response, Compensation, and Liability Act
CESA	California Endangered Species Act
CFR	Code of Federal Regulations
cfs	cubic feet per second
cm	centimeter
CMU	Concrete Masonry Unit
CNDDB	California Natural Diversity Database
CNPS	California Native Plant Society
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalent
Commission	California Fish and Game Commission
Conservancy	San Joaquin River Conservancy
Conservancy Act	San Joaquin River Conservancy Act
Cortese List	Hazardous Waste and Substances Sites List
CRHR	California Register of Historical Resources
CRPR	California Rare Plant Rank
CSLC	California State Lands Commission
CSUF	California State University, Fresno
CTS	California tiger salamander
CUPA	Certified Unified Program Agency
CVFPB	Central Valley Flood Protection Board
CVP	Central Valley Project
CVPIA	Central Valley Project Improvement Act
CWA	Clean Water Act
CWT	Coded-wire tags
CWY	coded-wire tag
cy	cubic yard(s)
dB	decibel
dBA	A-weighted decibel
dbh	diameter at breast height
DEIR	Draft Environmental Impact Report
Delta	Sacramento-San Joaquin Delta
DGS	Department of General Services
DIDSON	Dual-frequency Identification Sonar
DO	dissolved oxygen
DOC	Department of Conservation
DPM	diesel particulate matter
DTSC	California Department of Toxic Substances Control
DWR	California Department of Water Resources
EC	electrical conductivity
EDR	Environmental Data Resources, Inc.
EFH	Essential Fish Habitat

EIR	Environmental Impact Report
EIS	Environmental Impact Statement
EO	Executive Order
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
ESA	Environmental Site Assessment
ESU	Evolutionarily Significant Unit
F	Fahrenheit
F&G Code	Fish and Game Code
FCRTA	Fresno County Rural Transit Agency
FEMA	Federal Emergency Management Agency
FID	Facility Inventory Database
FINDS	Facility Index System Database
FMFCD	Fresno Metropolitan Flood Control District
FMP	Fisheries Management Plan
FRFH	Feather River Fish Hatchery
ft^2	square feet
FTA	Federal Transit Administration
FWUA	Friant Water Users Authority
gal	gallon
GAMAQI	*Guide for Assessing and Mitigating Air Quality Impacts*
GEA	Grasslands Ecological Area
GHG	greenhouse gas
Guidelines	*Guidelines for the Preparation of Traffic Impact Studies within the County of Fresno*
H_2O_2	hydrogen peroxide
HACCP	Hazard Analysis and Critical Control Point Plan
HAZNET	Hazardous Waste Manifests Database
HCP	Habitat Conservation Plan
HFB	Hills Ferry Barrier
HGMP	Hatchery Genetic Management Plan
HSRG	Hatchery Scientific Review Group
HVAC	heating, ventilation, and air conditioning
Hz	hertz
I-	Interstate
IHNV	infectious hematopoietic necrosis virus
INAD	Investigational New Animal Drugs
Interim Facility	Interim Conservation Facility
IPN	infectious pancreatic necrosis
ITE	Institute of Transportation Engineers
$KMnO_4$	potassium permanganate
kWh	kilowatt-hours
L_{dn}	day-night level
L_{eq}	equivalent sound level
L_{max}	maximum sound level
L_{min}	minimum sound level
LOS	Level of Service

Lost Lake Master Plan	*Lost Lake Park Master Plan*
LUST	leaking underground storage tank
Lv	vibration velocity level
L_x	percentile-exceeded sound level
M&I	municipal and industrial
MBTA	Migratory Bird Treaty Act
MEI	Maximally Exposed Individual
mg/L	milligrams per liter
MLD	Most Likely Descendent
MRFH	Mokelumne River Fish Hatchery
MRH	Merced River Hatchery
MRZ-2	Mineral Resource Zone 2
MSL	mean sea level
NAAQS	National Ambient Air Quality Standards
NaCl	salt
NAHC	Native American Heritage Commission
NAVD88	North American Vertical Datum of 1988
NCCP	Natural Community Conservation Plan
NEHRPA	National Earthquake Hazards Reduction Program Act
NEPA	National Environmental Policy Act
NFIP	National Flood Insurance Program
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NO_2	nitrogen dioxide
NOP	Notice of Preparation
NO_X	nitrogen oxide
NPDES	National Pollution Discharge Elimination System
NPPA	Native Plant Protection Act
NRDC	Natural Resources Defense Council
NRDC v. Rodgers 2006	*Natural Resources Defense Council (NRDC) et al. v. Kirk Rodgers et al.*
NSB	National Scenic Byways
NTU	nephelometric turbidity unit
NWR	National Wildlife Refuge
NZMS	New Zealand mud snail (*Potamopyrgus antipodarum)*
O_3	ozone
OCID	Orange Cove Irrigation District
OSHA	U.S. Department of Labor, Occupational Safety and Health Administration
Parkway Master Plan	*San Joaquin Parkway Master Plan*
Pb	lead
PCB	polychlorinated biphenyls
PEIS/R	Program Environmental Impact Statement/Report
PFMC	Pacific Coast Management Council
PG&E	Pacific Gas and Electric Company
PIT	Passive Integrated Transponder
PM_{10}	inhalable particulate matter 10 micrometers in diameter or

	smaller
$PM_{2.5}$	fine particulate matter 2.5 micrometers in diameter or smaller
Porter-Cologne Act	California Porter-Cologne Water Quality Control Act
ppm	parts per million
PPV	peak particle velocity
PRC	Public Resources Code
Project or Proposed Project	Salmon Conservation and Research Facility and Related Fisheries Management Actions Project
PSU	Practical Salinity Units
RACT	Reasonably Available Control Technology
RCP	reinforced concrete pipe
RCRA	Resource Conservation and Recovery Act
RCRA-SQG	Resource Conservation and Recovery Act small-quantity generator
REC	recognized environmental condition
Reclamation	U.S Department of the Interior, Bureau of Reclamation
Regional Bicycle Plan	*Fresno County Regional Bicycle & Recreational Trails Master Plan*
RHA	Rivers and Harbors Act
RM	river mile
RMP/GP	*Millerton Lake Resource Management Plan and General Plan*
ROG	reactive organic gas
RST	rotary screw trap
RTP	regional transportation plan
RWQCB	Regional Water Quality Control Board
SB	Senate Bill
SCARF	Salmon Conservation and Research Facility
Settlement Act	San Joaquin River Restoration Settlement Act of 2009
SFHA	Special Flood Hazard Areas
SFMP	Pacific Coast Salmon Fishery Management Plan
SHZP	Seismic Hazards Zonation Program
SIP	state implementation plan
SJFH	San Joaquin Fish Hatchery
SJKF	San Joaquin kit fox
SJMSCP	San Joaquin County Multi-Species Habitat Conservation and Open Space Plan
SJR	San Joaquin River
SJRC	San Joaquin River Conservancy
SJRPCT	San Joaquin River Park and Conservation Trust
SJRRP	San Joaquin River Restoration Program
SJVAB	San Joaquin Valley Air Basin
SJVAPCD	San Joaquin Valley Air Pollution Control District
SMARA	State Surface Mining and Reclamation Act
SO_2	sulfur dioxide
SO_x	sulfur oxides
SP	State Park

SR	State Route
SRA	State Recreation Area
State Agency MOU	Memorandum of Understanding between the Settling Parties and CDFW and DWR
State Parks	California Department of Parks and Recreation
SWEEPS	Statewide Environmental Evaluation and Planning System
SWF/LF	Solid-Waste Facility/Landfill
SWP	State Water Project
SWPPP	Stormwater Pollution Prevention Plan
SWRCB	State Water Resources Control Board
SWRCY	Recycling Facilities in California Database
TAC	toxic air contaminant
Task Force	San Joaquin River Parkway Task Force
TCP	traditional cultural properties
TDS	total dissolved solids
TMDL	Total Maximum Daily Loads
TMP	Traffic Management Plan
TSS	total suspended solids
UBC	Uniform Building Code
USACE	U.S. Army Corps of Engineers
USC	United States Code
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
UST	underground storage tank
V/C	volume-to-capacity
VdB	root-mean-square vibration velocity in decibels
VERA	Voluntary Emission Reduction Agreement
VHS	viral hemorrhagic septicemia
VOC	volatile organic compound
vpd	vehicles per day
WMUDS/SWAT	Waste Management Unit Database
WPT	western pond turtle
WWD	Waterworks District
YOY	young-of-the-year

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EXECUTIVE SUMMARY

Introduction

The California Department of Fish and Wildlife (CDFW), formerly known as the California Department of Fish and Game, has prepared this Draft Environmental Impact Report (DEIR) to provide the public, responsible agencies, and trustee agencies with information about the potential environmental effects of the proposed Salmon Conservation and Research Facility (SCARF) and Related Fisheries Management Actions Project (Project or Proposed Project). This DEIR was prepared in compliance with the California Environmental Quality Act (CEQA) of 1970 (as amended) and the State CEQA Guidelines (California Code of Regulations [CCR] title 14, section (§) 15000 et seq.).

San Joaquin River Restoration Program Background

The San Joaquin River Restoration Program (SJRRP) arises from the Settlement Agreement reached as a result of federal court action in *Natural Resources Defense Council (NRDC) et al. v. Kirk Rodgers et al.* (*NRDC v. Rodgers* 2006). The U.S. Department of the Interior, U.S. Department of Commerce, NRDC, and the Friant Water Users Authority (FWUA) signed the Settlement Agreement. The Settlement Agreement identified two major goals of the SJRRP: 1) a Restoration Goal to restore and maintain fish populations in good condition, including naturally reproducing and self-sustaining populations of salmon and other fish in the Restoration Area (defined as the main stem of the San Joaquin River from below Friant Dam to the confluence with the Merced River), and 2) a Water Management Goal. Pursuant to a Memorandum of Understanding between the Settling Parties and CDFW and the Department of Water Resources (DWR) (State Agency MOU), CDFW and DWR agreed to assist the Settling Parties in the Settlement's implementation, consistent with the State Agencies' authorities, resources, and broader regional resource strategies. The Implementing Agencies of the SJRRP are the Bureau of Reclamation (Reclamation) and U.S. Fish and Wildlife Service (USFWS) from the U.S. Department of the Interior, the National Marine Fisheries Service (NMFS) from the U.S. Department of Commerce, and CDFW and DWR from the State of California Natural Resources Agency (See Appendix A, *NRDC v. Rodgers Memorandum of Understanding between Settling Parties and State of California*, for a copy of the State Agency MOU).

Project Purpose and Objectives

The purpose of the Proposed Project is to manage and conserve native salmon and their San Joaquin River habitats for their ecological significance, as well as enhance public recreation.

CDFW would support implementation of the SJRRP Restoration Goal through implementation of the Proposed Project.

The Proposed Project's objectives are as follows:

- Support and assist implementation of the Settlement Agreement, including the following:
  - Support the Settling Parties in achieving the SJRRP Restoration Goal, consistent with CDFW's authorities, resources, and broader regional resource strategies; and
  - Fulfill the other commitments identified in the State Agency MOU pertaining to the Settlement Agreement.
- Produce a spring-run Chinook salmon stock on the San Joaquin River that is genetically diverse, while minimizing impacts to source populations.
- Provide a controlled laboratory environment for conducting fish research.
- Manage Chinook salmon runs in the Restoration Area and, specifically, the potential for hybridization between runs.
- Monitor and conduct research that will direct Chinook salmon management within the Restoration Area.
- Fulfill CDFW's mission to manage California's diverse fish, wildlife, and plant resources, and the habitats on which they depend, for their ecological values and for their use and enjoyment by the public.
- Fulfill CDFW's obligation to conserve, protect, and manage fish, wildlife, native plants, and habitats necessary for biologically sustainable populations of those species and as a trustee agency for fish and wildlife resources pursuant to Fish and Game Code section 1802.

Project Location

The following terminology is used to describe the geographic extent of the Proposed Project (as shown on Figures ES-1 and ES-2):

- **Potentially Affected Area**: Includes the portions of the San Joaquin River watershed, Sacramento River watershed, Sacramento–San Joaquin Delta (Delta), San Francisco Bay, and Pacific Ocean that are accessible to salmon released under the Proposed Project.
- **Project Area**: Includes areas in which physical actions that are part of the Proposed Project would take place. This includes the SCARF site (defined below), broodstock collection sites, quarantine sites, Chinook salmon production and reintroduction sites, and fisheries management and research areas.

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California Department of Fish and Wildlife
California Department of General Services

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Miles

Data Sources:
Chinook salmon fall late-fall run abundace (CDFW)
Central Valley steelhead distribution (NMFS)
Central Valley Chinook Ocean Extents (Williams 2006)
NHD hydro-layer
Base Map: National Geographic

Figure ES-1: Potentially Affected Area

SCARF and Related Management Actions Project
Draft Environmental Impact Report

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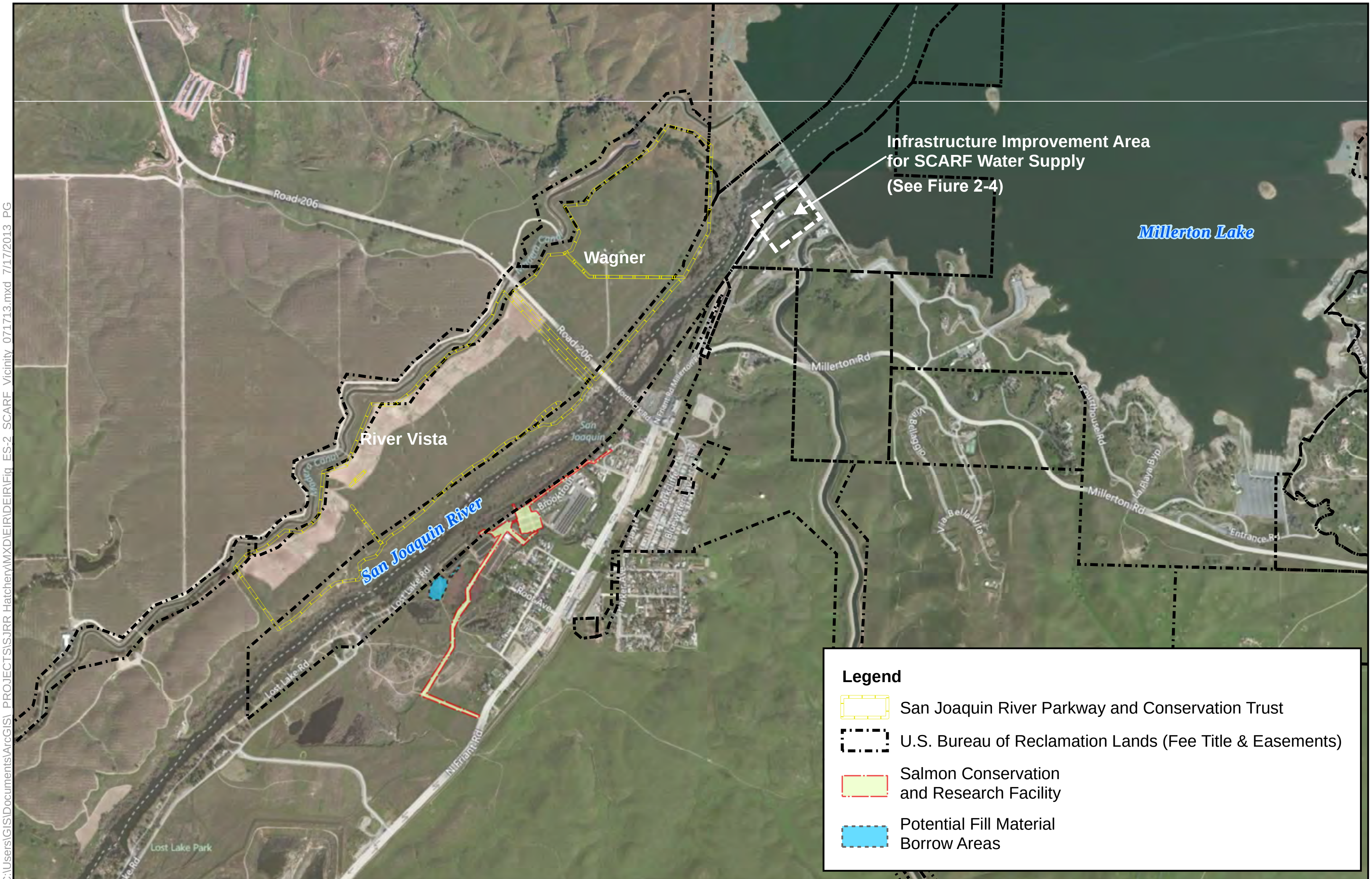

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California Department of General Services

Figure ES-2: Salmon Conservation and Research Facility Vicinity Map

SCARF and Related Management Actions Project
Draft Environmental Impact Report

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- **Restoration Area**: Includes the San Joaquin River below Friant Dam to the confluence of the Merced River, as set forth in the Settlement Agreement.
- **SCARF site**: Includes the physical boundaries of the proposed SCARF site, which would be located at the address currently listed as 17372 Brook Trout Drive in Friant, Fresno County, California. The SCARF site is adjacent to the San Joaquin River approximately 1.1 miles downstream of Friant Dam, immediately west of CDFW's existing San Joaquin Fish Hatchery (SJFH). When used as part of the impact analysis, the term "SCARF site" also includes the location of proposed water supply conveyance improvements at the base of Friant Dam.

Project Overview

The Proposed Project involves five principal actions:

1. Construct and operate the SCARF;
2. Reintroduce Chinook salmon to the Restoration Area (including donor stock collection, broodstock development, and/or direct translocation);
3. Manage Chinook salmon runs in the Restoration Area within the context of basin-wide conditions and strategies;
4. Conduct fisheries research and monitoring in the Restoration Area; and
5. Manage and support recreation within the Restoration Area.

The primary purpose of the SCARF is to produce Chinook salmon for reintroduction to the San Joaquin River. The SCARF also would serve as a research facility for studies related to Chinook salmon in the Restoration Area. The SCARF would provide CDFW with the ability to use relatively small numbers of Chinook salmon eggs and juveniles collected from various donor populations to develop a broodstock. This broodstock would enable CDFW to produce a conservation stock that is genetically diverse, while minimizing impacts to source populations. The SCARF would include structures, a parking area, water supply and wastewater systems, drainage and stormwater management, an access road, up to two staff residences, and other ancillary improvements.

CDFW operates a small-scale Interim Conservation Facility (Interim Facility) at the proposed SCARF site. The Interim Facility began culturing fall-run Chinook salmon in 2011 to provide the SJRRP with experience rearing Chinook salmon at the site. The Interim Facility began receiving annual collections of juvenile spring-run Chinook salmon from the Feather River Fish Hatchery (FRFH) in spring 2013. These fish would be used to develop broodstock at the Interim Facility.

Under the Proposed Project, CDFW proposes to release the spring-run Chinook offspring from the broodstock (i.e., conservation stock) to the Restoration Area no earlier than 2015. The broodstock population may periodically be reduced to not exceed the carrying capacity of the facility, and fish unnecessary for broodstock may be placed in the San Joaquin River and allowed to spawn naturally in the Restoration Area or outmigrate at an earlier date.

However, spring-run Chinook would only be placed in the San Joaquin River if federal Endangered Species Act (ESA) section 10(j) experimental population designation and associated section 4(d) rules have been adopted. The final version of these rules is pending. In addition, in October 2012, NMFS issued a 5-year 10(a)(1)(A) enhancement of species permit to USFWS which authorizes take of Central Valley spring-run Chinook salmon from the FRFH for scientific research and enhancement activities to establish broodstock methodologies, and to allow collection of eggs and/or juveniles from the FRFH to initiate studies associated with the SJRRP for a five-year period. In December 2012, CDFW issued a concurrence pursuant to CDFW Code section 2080.3(a)(3) that the 10(a)(1)(A) permit will further the conservation of Central Valley spring-run Chinook salmon (CDFW 2012) (See Chapter 6, *Fisheries,* for more information on Fish and Game Code section 2080.3 and NMFS' proposed regulations and permitting). Although Feather River spring-run Chinook returning to the FRFH are initially being used to establish SCARF broodstock, the long-term goal is to collect from multiple (naturally spawning) source stocks to maximize genetic diversity, and fitness of the experimental population. After the SCARF is completed and operational, which is planned for early 2016, the Interim Facility would be integrated into the SCARF.

Public Involvement Process

Scoping Comment Period

An NOP for the Proposed Project was prepared pursuant to the State CEQA Guidelines (CEQA Guidelines § 15082) and circulated to the Office of Planning and Research's State CEQA Clearinghouse on November 21, 2012, with hard copies circulated on November 26, 2012 (see Appendix B, *Notice of Preparation*). CDFW conducted public scoping meetings on consecutive days in Fresno and Sacramento to solicit input from the public and interested public agencies. Notices of the meetings were mailed to interested parties (see Appendix B, *Notice of Preparation*); in addition, scoping meeting information was published in local newspapers and on CDFW's website (http://www.dfg.ca.gov/news/pubnotice/) prior to the events to solicit attendance.

The Scoping Meetings were held at the following locations:

- Fresno, CA — December 4th, 2012, 5:00 to 8:00 p.m., at the California Retired Teachers Association building (3930 E. Saginaw Way, Fresno, CA 93726); and
- Sacramento, CA — December 5th, 2012, 6:00 to 8:00 p.m., at the Department of Health Care Services and Department of Public Health Building (1500 Capitol Avenue, Sacramento, CA 95814).

Both meetings used the same format, and interested parties were invited to attend one or both meetings. Besides CDFW and contractor staff, eight individuals attended the two scoping meetings, including members of the general public and representatives from state and federal agencies, as well as non-governmental organizations. The meetings began with an open house where CDFW and contractor staff were available to engage in one-on-one conversations to discuss and answer questions about the Proposed Project and the CEQA process. CDFW staff then gave a brief presentation to provide an overview of the SJRRP, the

Proposed Project, and the CEQA process. Afterwards, the public was given an opportunity to provide verbal and written scoping comments. One individual provided verbal comments. All of the meeting materials from the scoping meetings, including the sign-in sheets, PowerPoint presentation, posters, etc., have been included in Appendix C, *Meeting Materials.*

CDFW also accepted written comments at the meetings, as well as during the 35-day scoping period. Comment forms were distributed at the scoping meetings for submission of written comments during or after the meeting. During the scoping period, 10 comment letters were received. These comments have been included in this DEIR as Appendix D, *Comments Received on the Notice of Preparation*. Information contained in the NOP (project description, range of topics, etc.) has been refined based on the input received in public comments on the NOP and is reflected in the text of this DEIR.

Draft EIR Public Comment Period

CDFW has prepared this DEIR, as informed by public and agency input received during the scoping period, to disclose potentially significant environmental impacts associated with the Proposed Project. CDFW is circulating this DEIR for a 45-day public review and comment period beginning on Monday October 7, 2013 and ending on Thursday, November 21, 2013. During this period, CDFW will hold two public meetings, in Fresno and Sacramento. The purpose of public circulation and the public meetings is to provide agencies and interested individuals with opportunities to comment on or express concerns regarding the contents of the DEIR. The meetings will begin with a brief overview of the Proposed Project and the analysis and conclusions set forth in the DEIR. This introductory presentation will be followed by the opportunity for interested members of the public to provide oral and written comments to CDFW regarding the Proposed Project and the DEIR.

The dates, times, and exact locations of the public meetings will be published in local newspapers prior to the events and are included in the Notice of Availability of this DEIR.

Submittal of Written Comments

Written comments concerning this DEIR can be submitted at the public meetings described above or at anytime during the DEIR public review period from Monday, October 7, 2013 to Thursday, November 21, 2013. All comments must be received by 5:00 p.m. on Thursday, November 21, 2013, directed to the name and address listed below:

California Department of Fish and Wildlife
Attn: Gerald Hatler
SCARF Draft EIR Comments
1234 E. Shaw Avenue
Fresno, CA 93710

E-mail: REG4SCARFCEQA@wildlife.ca.gov

Submittal of written comments via e-mail (Microsoft Word format) would be greatly appreciated. Written comments received in response to the DEIR during the public review period will be addressed in a Response to Comments section of the Final EIR.

All documents mentioned herein or related to this Project can be reviewed online at the CDFW website (http://www.dfg.ca.gov/news/pubnotice/).

Areas of Known Controversy and Issues to be Resolved

CEQA Guidelines Section 15123(b) requires that an Executive Summary identify "areas of controversy known to a lead agency including issues raised by agencies and the public." To date, a number of issues have been raised regarding the Proposed Project and/or the overall SJRRP which may be considered controversial, including the following:

- The potential impacts of wild[1] broodstock collection from naturally spawning spring-run Chinook salmon.
- Lack of available data regarding the existing condition of the Restoration Area, and uncertainty about the ability to successfully reintroduce Chinook salmon and establish self-sustaining populations within the Restoration Area.
- The effects of the SCARF water supply on existing or future hydroelectric power generation and/or associated facilities at Friant Dam.
- The effects of the SJRRP on recreational fishing.
- The potential for groundwater seepage to occur within the Restoration Area as a result of Interim and Restoration flows, and resulting damage to properties along the river.
- Uncertainty regarding the physical condition of levees in the Restoration Area.
- Uncertainty regarding the ability to release full Restoration Flows under the schedule anticipated in the Settlement Agreement.

Note that several of these issues (e.g., groundwater seepage, ability to release flows) do not relate specifically to the actions contemplated under the Proposed Project, but are related to the larger SJRRP. This DEIR does not attempt to address or resolve issues not directly related to the Proposed Project.

Level of DEIR Analysis: Project versus Program

When an agency proposes a program of related activities that are geographically linked, would take place as logical parts of a series of events, or would be carried out under the same authorizing statutory or regulatory authority, the agency can choose to prepare a

[1] The term wild is used to describe fish that are hatched and spend their entire life cycle in nature regardless of their parentage, and wild populations are groups of interbreeding fish hatched in nature—a substantial portion of their parents may be hatchery strays. Also, a distinction is made regarding where spawning occurs by the terms hatchery spawning, of which a portion of the fish spawned (broodstock) in the hatchery may be of wild origin, and natural spawning, of which a portion of the fish spawning in nature may be of hatchery origin.

program EIR. The program EIR generally analyzes broad environmental effects of a program with the acknowledgment that site-specific environmental review may be required for particular aspects or portions of the program when those aspects are proposed for implementation (CEQA Guidelines, § 15168). This DEIR is considered a Program EIR because it proposes a program of related activities that would be carried out under the same authorizing statutory and regulatory authority.

In Chapter 2 of this DEIR ("Project Description"), the various Project actions are described at a level of specificity that corresponds to the amount of information available relative to each action, and not all actions are described at the same level of detail. The details of the impact analysis correspond to this variability. As a result, certain aspects of the Proposed Project are evaluated at a project level, while others are evaluated programmatically. Chapter 3 of this DEIR provides further details regarding which aspects of the Proposed Project are evaluated at a "Project" versus "Program" level, and each impact title also specifies the level of analysis.

That said, the intent of this DEIR is to capture adequately the impacts of many components of the Proposed Project at the project level such that future tiered CEQA documentation does not become necessary. However, it is possible that as certain aspects of the Project are further defined, particularly those actions evaluated programmatically in this DEIR, they could result in the conclusion that new, different, or more significant impacts are possible than have been disclosed. To the extent that it is necessary, elements of the Project may undergo further evaluation in future tiered CEQA documentation.

Conservation Measures for Biological Resources that May Be Affected by Program-level Actions

CDFW has developed conservation measures for biological resources to avoid and minimize impacts that may result from the Proposed Project activities evaluated programmatically in this DEIR. The Conservation Measures are provided in Appendix I, *California Department of Fish and Wildlife Conservation Measures for Biological Resources That May Be Affected by Program-level Action*s. The Conservation Measures are intended to be applied as mitigation for components of the Proposed Project that have been developed to and evaluated at the programmatic level of detail, such as wild broodstock collection, fisheries management, and recreation enhancements. These Conservation Measures address the range of possible species that could be present at the various potential sites for these actions, and identify appropriate mitigation approaches depending upon actual site conditions.

Significant Impacts

This section presents the significant impacts that were identified in the DEIR. This is not a comprehensive discussion of impacts of the Proposed Project; the reader is directed to Table ES-1, *Summary of Impacts and Mitigation Measures*, at the end of this chapter for additional information. Environmental resource topics with the potential for significant environmental impacts and evaluated in detail in this DEIR are as follows:

- Aesthetics
- Air Quality
- Biological Resources—Fisheries
- Biological Resources—Vegetation and Wildlife
- Cultural Resources
- Geology, Soils, and Seismicity
- Greenhouse Gas Emissions
- Hazards and Hazardous Materials
- Hydrology, Geomorphology, and Water Quality
- Land Use and Planning
- Noise
- Recreation
- Traffic and Transportation
- Utilities and Service Systems

Chapters 4 through 18 of this DEIR address each of these environmental resource topics and the impacts of the Proposed Project in more detail.

Significant and Unavoidable Impacts

Impacts of Wild Broodstock Collection

Collection of broodstock from naturally spawning spring-run Chinook donor stock populations has potential for significant impacts on these naturally spawning populations. Prior to collection, CDFW would be required to obtain a ESA section 10(a)(1)(A) permit from NMFS (or as a sub-grantee to USFWS), which would include conditions designed to be protective of spring-run Chinook salmon and non-target species, including take thresholds and monitoring criteria for broodstock collection from naturally spawning spring-run Chinook donor stock populations. When implementing broodstock collection, CDFW would adhere to all ESA section 10(a)(1)(A) permit conditions for collection of eggs and juveniles from naturally spawning donor stocks. Information pertinent to the impact assessment for broodstock collection and an approach to determine collection thresholds are included in Mitigation Measure FISH-REINTRO-1. This mitigation measure is intended to provide a context for these impacts and take thresholds. However, because sufficient details or specific take thresholds do not currently exist, the evaluation is programmatic in nature. As a result, specific mitigation measures or performance standards cannot be identified at this time. CEQA requires that specific mitigation and/or performance standards be provided to avoid improper mitigation deferral. It is the intent of CDFW to not have significant adverse impacts on naturally spawning spring-run Chinook populations. However, because full compliance with CEQA's standards for mitigation is not possible at this time, CDFW is conservatively finding this impact as significant and unavoidable both at the project level, and cumulatively. Future more detailed analysis will be conducted as necessary through tiered CEQA documentation prior to broodstock collection from naturally spawning spring-run Chinook populations.

Spread of Aquatic Invasive Species through Recreational Fishing Enhancements

Improved access to recreational facilities in Reach 1 of the Restoration Area would encourage increased vehicular (including off-road) and foot traffic in the vicinity of the facilities, and increased boat traffic in the river. Higher vehicular and boat traffic increases the likelihood that aquatic invasive species (AIS) (e.g., New Zealand mud snail, quagga and zebra mussels, didymo) and pathogens (viruses, parasites) from other waters may be spread to the San Joaquin River if special efforts are not made by members of the public to clean and disinfect contaminated vehicles, boats, boat trailers, and fishing equipment.

Impacts associated with AIS and pathogens have the potential to significantly impact fish and aquatic habitats. Even with existing public education programs such as those available at the Stop Aquatic Hitchhikers! website (http://www.protectyourwaters.net/prevention/prevention_generic.php), this impact is considered significant. Because no other feasible mitigation exists beyond the measures currently in place, this impact is considered significant and unavoidable.

Greenhouse Gas Emissions from Construction Activities

In general, the Proposed Project's greenhouse gas (GHG) emissions, including those generated by the construction and operation of the SCARF and operational activities would be below the threshold of significance. However, the Proposed Project may involve construction activities related to fish segregation weirs and recreational fishing enhancements that would generate GHG emissions. While it is unlikely that these activities would emit significant levels of GHGs, sufficient details are not available at this time regarding the construction activities to allow for a quantitative analysis of emissions. Furthermore, while mitigation measures have been identified should emissions be anticipated to exceed the threshold, such mitigation may not be feasible or adequate to reduce emissions below the threshold. For this reason, while unlikely, construction-related GHG emissions for these project components could be significant, and impacts were therefore found to be significant and unavoidable.

In addition, GHG emissions contribute to the adverse effects of global warming, and GHG emissions as a result of the Proposed Project are unavoidable. As a whole, the Proposed Project would make a considerable contribution to significant cumulative impacts related to GHG emissions, a cumulatively significant and unavoidable impact.

Alternatives Considered

The purpose of the alternatives analysis in an EIR is to describe a range of reasonable alternatives to the Proposed Project that could feasibly attain most of the objectives of the

Proposed Project while reducing or eliminating one or more of the Proposed Project's significant effects. The range of alternatives considered must include those that offer substantial environmental advantages over the Proposed Project and may be feasibly accomplished in a successful manner considering economic, environmental, social, technological, and legal factors.

The following alternatives have been evaluated for their potential feasibility and their ability to achieve most of the Proposed Project objectives while avoiding, reducing, or minimizing significant impacts identified for the Proposed Project:

- No Project Alternative
- Spring-Run Only Alternative
- Hatchery Broodstock Only Alternative
- SCARF Siting Alternative

In addition, a number of alternatives were considered, but ultimately dismissed from further analysis for one or more of the following reasons: (1) they would not sufficiently meet the Proposed Project objectives; (2) they were determined to be infeasible; or (3) they would not avoid or substantially reduce one or more significant impacts of the Proposed Project. Please refer to Section 19.4, *Alternatives Considered but Dismissed,* in Chapter 19, *Alternatives*, for a description of these alternatives.

No Project Alternative

Under the No Project Alternative, CDFW would not construct the SCARF or conduct any related actions. Other agencies besides CDFW could choose to implement the Proposed Project activities; however, it is speculative as to which agencies might undertake some of the Proposed Project actions, which actions might be undertaken and what impacts or benefits might arise. In addition, the Interim Facility may still be operated, but it is unclear the extent to which it would be used, and for what purpose. Therefore, for the purposes of evaluating this alternative, the analysis assumes that none of the Proposed Project actions or Interim Facility operations would occur.

If this alternative were implemented, the benefits of the Proposed Project would not be realized, and CDFW's commitments under the Memorandum of Understanding would not be met. Overall, this alternative would fail to meet project objectives. All beneficial and adverse impacts of the Proposed Project would be avoided.

Spring-Run Only Alternative

The Spring-Run Only Alternative would reintroduce only spring-run Chinook salmon to the Restoration Area. No fall-run Chinook salmon would be actively reintroduced. While volitional reintroduction of fall-run Chinook salmon would be likely, CDFW would focus its management activities on spring-run. For example, segregation weirs would be operated with the primary focus of ensuring fall-run Chinook do not interfere with spring-run spawning, rather than attempting to balance spawning of both runs. As a result, spring-run reintroduction efforts may experience increased success by avoiding potential issues such as redd superimposition or competition for resources between spring-run and fall-run Chinook in the Restoration Area. That said, the benefits associated with fall-run reintroduction activities would be diminished. Overall, this alternative would be anticipated to have reduced impacts compared to the Proposed Project, to the extent it would avoid impacts associated with fall-run reintroduction. This would particularly be the case with respect to the active fall-run reintroduction approaches that may be conducted under the Proposed Project (e.g., broodstock collection). It also may increase the success of spring-run reintroduction efforts through mechanisms described above.

Hatchery Broodstock Only Alternative

Under the Hatchery Broodstock Only Alternative, rather than using a combination of broodstock from FRFH and wild sources, only the FRFH would be used to provide a source of spring-run broodstock. No wild sources of broodstock would be used. Hatchery broodstock has been shown to exhibit lower fitness than wild counterparts and FRFH spring-run Chinook salmon have a known history of introgression with fall-run Chinook salmon. As such, this may impede achievement of Proposed Project objectives. However, this alternative would avoid any potential impacts associated with collection of wild broodstock. The alternative could result in a longer period needed to establish a self-sustaining population of spring-run Chinook, thereby increasing the duration of SCARF operation and extending the time period for impacts of operational activities and other related management actions.

SCARF Siting Alternative

Under this alternative, the SCARF would be constructed at an alternate site. The criteria for an alternate site for the SCARF include factors such as proximity to the river, proximity to Friant Dam, site ownership, and access to utilities and infrastructure. The River Vista parcel opposite the San Joaquin River from SCARF site was identified because it generally meets these criteria, although the site does not possess the same level of infrastructure. This alternative would achieve Proposed Project objectives to a similar degree as the Proposed Project and avoid impacts at the proposed SCARF site. However, the impacts at the alternative SCARF site would generally be similar to those of the planned SCARF site, and it may result in additional impacts associated with development and extensions of infrastructure (water, sewer, electricity, site access, etc.). Finally, this alternative would be inconsistent with applicable land use plans at the River Vista parcel and require a land use change prior to implementation.

Environmentally Superior Alternative

Because each of the alternatives has fundamentally different characteristics, comparison of their environmental impacts and benefits is not simple. However, considering all aspects on balance, the SCARF Siting Alternative is considered the environmentally superior alternative. It would achieve all of the Proposed Project's objectives to a similar degree as the Proposed Project, and as a result would have the same environmental benefits related to fish reintroduction. It would also have site-specific impacts similar to the SCARF site, although it may have slightly greater impacts related to site development by not being located adjacent to the hatchery or with easy access to necessary infrastructure, and by being inconsistent with local land use plans. However, in the context of the other alternatives, the environmental benefits associated with achieving Proposed Project objectives are considered to outweigh any potential adverse impacts associated with this alternative.

It bears noting that while the Proposed Project is not an "alternative," and as such cannot be selected as the environmentally superior alternative, it would have the same benefits of the environmentally superior alternative, while avoiding some of the adverse impacts related to site development by not being located adjacent to the existing hatchery or within easy access to necessary infrastructure. As such, the Proposed Project is considered environmentally superior to the SCARF Siting Alternative.

Summary of Impacts and Levels of Significance

The impacts of the Proposed Project, proposed mitigation, and significance conclusions before and after mitigation are discussed in detail in Chapters 4 through 18 of this DEIR. Table ES-1 summarizes the impacts, mitigation measures, and levels of significance identified in this document.

Table ES-1. Summary of Potential Impacts and Mitigation Measures

Impact	Level of Significance	Mitigation Measures	Level of Significance after Mitigation (if applicable)
Chapter 4. Aesthetics			
Impact AES-CONSTRUCT-1: Adverse Effects on Scenic Vistas from the SCARF Construction	Less than Significant	n/a	n/a
Impact AES-CONSTRUCT-2: Damage to Scenic Resources along a Scenic Corridor, Including, but Not Limited to, Trees, Rock Outcroppings, and Historic Buildings within a State Scenic Highway	Less than Significant	n/a	n/a
Impact AES-CONSTRUCT-3: Changes to Existing Visual Character or Quality from SCARF Construction	Potentially Significant	Mitigation Measure AES-CONSTRUCT-3a: Materials and Colors Used in Construction of SCARF Facilities Shall be Compatible with the Surrounding Built and Natural Environments. Mitigation Measure AES-CONSTRUCT-3b: Landscaping of SCARF Facilities Shall Consist of Native Vegetation. Mitigation Measure AES-CONSTRUCT-3c: Pipelines and Utilities Serving SCARF Facilities Shall be Installed Underground.	Less than Significant
Impact AES-CONSTRUCT-4: New Sources of Light or Glare from the SCARF Construction	Potentially Significant	Mitigation Measure AES-CONSTRUCT-4: Exterior Construction Security Lighting Shall Be Hooded and Directed Downward.	Less than Significant
Impact AES-OP-1: Adverse Effects on Scenic Vistas and Visual Character from SCARF Operations	Potentially Significant	Mitigation Measure AES-CONSTRUCT-3a (above) Mitigation Measure AES-CONSTRUCT-3b (above) Mitigation Measure AES-CONSTRUCT-3c (above)	Less than Significant

Table ES-1. Summary of Potential Impacts and Mitigation Measures

Impact	Level of Significance	Mitigation Measures	Level of Significance after Mitigation (if applicable)
Impact AES-OP-2: New Sources of Light or Glare from the SCARF Operations	Potentially Significant	Mitigation Measure AES-OP-2a: Permanent Exterior Lighting Shall Be Designed to Protect the Darkness of Nighttime Skies. Mitigation Measure AES-OP-2b: SCARF Structures Shall Be Constructed to Avoid Surface Glare.	Less than Significant
Impact AES-REINTRO-1: Adverse Effects on Scenic Vistas from Fish Reintroduction	Less than Significant	n/a	n/a
Impact AES-REINTRO-2: Damage to Scenic Resources along a Scenic Corridor, Including, but Not Limited to, Trees, Rock Outcroppings, and Historic Buildings within a State Scenic Highway	Less than Significant	n/a	n/a
Impact AES-REINTRO-3: Changes to Existing Visual Character or Quality from Fish Reintroduction	Less than Significant	n/a	n/a
Impact AES-REINTRO-4: New Sources of Light or Glare from Fish Reintroduction	No Impact	n/a	n/a
Impact AES-MANAGEMENT-1: Adverse Effects on Scenic Vistas from Fisheries Management	Less than Significant	n/a	n/a
Impact AES-MANAGEMENT-2: Damage to Scenic Resources along a Scenic Corridor, Including, but Not Limited to, Trees, Rock Outcroppings, and Historic Buildings within a State Scenic Highway	No Impact	n/a	n/a
Impact AES-MANAGEMENT-3: Changes to Existing Visual Character or Quality from Fisheries Management	Less than Significant	n/a	n/a
Impact AES-MANAGEMENT-4: New Sources of Light or Glare from Fisheries Management	No Impact	n/a	n/a

Table ES-1. Summary of Potential Impacts and Mitigation Measures

Impact	Level of Significance	Mitigation Measures	Level of Significance after Mitigation (if applicable)
Impact AES-MONITORING-1: Adverse Effects on Scenic Vistas from Fisheries Research and Monitoring	Less than Significant	n/a	n/a
Impact AES-MONITORING-2: Damage to Scenic Resources along a Scenic Corridor, Including, but Not Limited to, Trees, Rock Outcroppings, and Historic Buildings within a State Scenic Highway	No Impact	n/a	n/a
Impact AES-MONITORING-3: Changes to Existing Visual Character or Quality from Fisheries Research and Monitoring	Less than Significant	n/a	n/a
Impact AES-MONITORING-4: New Sources of Light or Glare from Fisheries Research and Monitoring	No Impact	n/a	n/a
Chapter 5. Air Quality			
Impact AQ-CONSTRUCT-1: Potential for SCARF Construction to Conflict with or Obstruct Implementation of the SJVAPCD Air Quality Plan	Less than Significant	n/a	n/a
Impact AQ-CONSTRUCT-2: Potential for SCARF Construction to Violate ROG, NO_x, PM_{10}, $PM_{2.5}$, CO, or SO_x Significance Thresholds and Contribute Substantially to an Existing or Projected Air Quality Violation	Less than Significant	n/a	n/a
Impact AQ-CONSTRUCT-3: Potential for SCARF Construction to Expose Sensitive Receptors to Substantial Pollutant Concentrations	Less than Significant	n/a	n/a
Impact AQ-CONSTRUCT-4: Potential for SCARF Construction to Create Objectionable Odors Affecting a Substantial Number of People	Less than Significant	n/a	n/a

Table ES-1. Summary of Potential Impacts and Mitigation Measures

Impact	Level of Significance	Mitigation Measures	Level of Significance after Mitigation (if applicable)
Impact AQ-OP-1: Potential for Operation of the SCARF to Conflict with or Obstruct Implementation of the SJVAPCD's Air Quality Plans and Result in an Increase in ROG, NO_x, PM_{10}, $PM_{2.5}$, CO, and SO_X Emissions that Exceed SJVAPCD Significance Thresholds	Less than Significant	n/a	n/a
Impact AQ-OP-2: Potential for SCARF Operations to Expose Sensitive Receptors to Substantial Pollutant Concentrations	Less than Significant	n/a	n/a
Impact AQ-OP-3: Potential for SCARF Operations to Create Objectionable Odors Affecting a Substantial Number of People	Potentially Significant	Mitigation Measure AQ-OP-3: Fish Disposal Limitations.	Less than Significant
Impact AQ-REINTRO-1: Potential for Fish Reintroduction Activities to Conflict with or Obstruct Implementation of the Applicable Air Districts' Air Quality Plans; Increase ROG, NO_x, PM_{10}, $PM_{2.5}$, CO, and SO_X Emissions such that They Exceed the Applicable Air Districts' Significance Thresholds; or Expose Sensitive Receptors to Substantial Pollutant Concentrations	Less than Significant	n/a	n/a
Impact AQ-REINTRO-2: Potential for Fish Reintroduction Activities to Create Objectionable Odors Affecting a Substantial Number of People	Less than Significant	n/a	n/a
Impact AQ-MANAGEMENT-1: Potential for Construction of Fish Segregation Weirs to Conflict with or Obstruct Implementation of the SJVAPCD's Air Quality Plans; Exceed SJVAPCD ROG, NO_x, PM_{10}, $PM_{2.5}$, CO, and SO_X Significance Thresholds; or Expose Sensitive Receptors to Substantial Pollutant Concentrations	Potentially Significant	Mitigation Measure AQ-MANAGEMENT-1. Prepare Project-Level Quantitative Analysis of Construction Related Air Quality Emissions, and Implement Measures to Cap Emissions.	Less than Significant

Table ES-1. Summary of Potential Impacts and Mitigation Measures

Impact	Level of Significance	Mitigation Measures	Level of Significance after Mitigation (if applicable)
Impact AQ-MANAGEMENT-2: Potential for Operation of the Fish Segregation Weirs to Conflict with or Obstruct Implementation of the SJVAPCD's Air Quality Plans; Increase ROG, NO_x, PM_{10}, $PM_{2.5}$, CO, and SO_X Emissions such that They Exceed SJVAPCD Significance Thresholds; or Expose Sensitive Receptors to Substantial Pollutant Concentrations	Less than Significant	n/a	n/a
Impact AQ-MANAGEMENT-3: Potential for Fish Segregation Weir Construction or Operation to Create Objectionable Odors Affecting a Substantial Number of People	Less than Significant	n/a	n/a
Impact AQ-MONITORING-1: Potential for Fisheries Research and Monitoring Activities to Conflict with or Obstruct Implementation of the SJVAPCD's Air Quality Plans; Increase ROG, NO_x, PM_{10}, $PM_{2.5}$, CO, and SO_X Emissions such that They Exceed SJVAPCD Significance Thresholds; or Expose Sensitive Receptors to Substantial Pollutant Concentrations	Less than Significant	n/a	n/a
Impact AQ-RECREATION-1: Potential for Construction Activities Related to Enhancing Recreational Fishing Opportunities to Conflict with or Obstruct Implementation of SJVAPCD's Air Quality Plans; Exceed the SJVAPCD's ROG, NO_x, PM_{10}, $PM_{2.5}$, CO, and SO_x Significance Thresholds; or Expose Sensitive Receptors to Substantial Pollutant Concentrations	Potentially Significant	Mitigation Measure AQ-MANAGEMENT-1 (above)	Less than Significant

Table ES-1. Summary of Potential Impacts and Mitigation Measures

Impact	Level of Significance	Mitigation Measures	Level of Significance after Mitigation (if applicable)
Impact AQ-RECREATION-2: Potential for Operational Activities Related to Enhancing Recreational Fishing Opportunities to Conflict with or Obstruct Implementation of SJVAPCD's Air Quality Plans; Exceed the SJVAPCD's ROG, NO_x, PM_{10}, $PM_{2.5}$, CO, and SO_x Significance Thresholds; or Expose Sensitive Receptors to Substantial Pollutant Concentrations	Less than Significant	n/a	n/a
Impact AQ-RECREATION-3: Recreation Management Construction Activities Could Create Objectionable Odors Affecting a Substantial Number of People	Less than Significant	n/a	n/a
Chapter 6. Biological Resources—Fisheries			
Impact FISH-CONSTRUCT-1: Sedimentation and Turbidity in the San Joaquin River from Construction-related Erosion, Which Could Adversely Impact Fish and Their Habitat	Potentially Significant	Mitigation Measure GEO-CONSTRUCT-1a (below) Mitigation Measure GEO-CONSTRUCT-3 (below)	Less than Significant
Impact FISH-CONSTRUCT-2: Risk of Release of Construction-related Hazardous Materials, Chemicals, and Waste to the San Joaquin River, Potentially Harming Fish	Potentially Significant	Mitigation Measure GEO-CONSTRUCT-1a (below)	Less than Significant
Impact FISH-CONSTRUCT-3: Alterations of Riparian or Instream Fish Habitat from SCARF Construction	Potentially Significant	Mitigation Measure BIO-CONSTRUCT-11a (below) Mitigation Measure BIO-CONSTRUCT-11b (below)	Less than Significant
Impact FISH-CONSTRUCT-4: Alter the Behavior or Cause Physical Harm to Special-Status Fish Species during Construction	Potentially Significant	Mitigation Measure FISH-CONSTRUCT-4a: Relocate Special-Status Fish Species Outside of the Work Area. Mitigation Measure FISH-CONSTRUCT-4b: Monitor and Maintain Fish Exclosure.	Less than Significant

Table ES-1. Summary of Potential Impacts and Mitigation Measures

Impact	Level of Significance	Mitigation Measures	Level of Significance after Mitigation (if applicable)
Impact FISH-OP-1: Alterations to Water Quality in the San Joaquin River Due to Return Flows from the SCARF	Less than Significant	n/a	n/a
Impact FISH-OP-2: Release of Chemicals and Pharmaceuticals Associated with Aquaculture into the San Joaquin River	Less than Significant	n/a	n/a
Impact FISH-OP-3: Accidental or Otherwise Unauthorized Releases of Hatchery Fish due to Major Flood Events, Natural Disasters (e.g., Earthquakes), or Human Disturbance (e.g., Vandalism)	Less than Significant	n/a	n/a
Impact FISH-OP-4: Spread of Fish Pathogens from SCARF-produced Fish into Wild Fish Populations in the San Joaquin River	Less than Significant	n/a	n/a
Impact FISH-OP-5: Inadvertent Propagation or Spread of Invasive or Nuisance Species	Less than Significant	n/a	n/a
Impact FISH-OP-6: Adverse Effects of Hatchery Operation on Aquatic Food Webs	Less than Significant	n/a	n/a
Impact FISH-REINTRO-1: Disturbance to Suitable Spawning and Rearing Habitat, Damage to Existing Redds, and Overharvest of Eggs and Juveniles during Broodstock Collection	Potentially Significant	Mitigation Measure FISH-REINTRO-1: Determine Stream-specific Take Thresholds.	Significant and Unavoidable
Impact FISH-REINTRO-2: Spread of AIS from Contaminated Equipment Used for Collection of Eggs or Juveniles of Naturally Spawning Chinook Salmon	Less than Significant	n/a	n/a
Impact FISH-REINTRO-3: Reductions in Fitness or Population Viability of Naturally Spawning Chinook Salmon due to Straying of Conservation Stock	Less than Significant	n/a	n/a

Table ES-1. Summary of Potential Impacts and Mitigation Measures

Impact	Level of Significance	Mitigation Measures	Level of Significance after Mitigation (if applicable)
Impact FISH-REINTRO-4: Reductions in Fitness or Population Viability of Naturally Spawning Chinook Salmon due to Straying by Fish Translocated from the Feather River Fish Hatchery	Less than Significant	n/a	n/a
Impact FISH-REINTRO-5: Adverse Effects on Other Native or Special-Status Fish Species from Release of SCARF-produced Juveniles through Disease Transmission, Predation, and Competition for Food, Space, or Other Limited Resources	Less than Significant	n/a	n/a
Impact FISH-REINTRO-6: Cascading Effects in Aquatic Food Webs from Chinook Salmon Produced either within the Restoration Area or by the SCARF	Beneficial	n/a	n/a
Impact FISH-REINTRO-7: Outbreeding Depression and Reduced Fitness from Hybridization between Fall-Run and Spring-Run Chinook Salmon within the Restoration Area	Less than Significant	n/a	n/a
Impact FISH-MANAGEMENT-1: Impacts on Special-Status Aquatic Species during Construction of Fish Segregation Weirs or Barriers	Potentially Significant	Mitigation Measure FISH-MANAGEMENT-1: Implement Conservation Measures prior to and during Construction Activities.	Less than Significant
Impact FISH-MANAGEMENT-2: Impacts to Aquatic Species from Bank Destabilization, Erosion, and Increased Sedimentation during Installation and Operation of Weirs and Barriers or Trap and Haul Activities	Potentially Significant	Mitigation Measure GEO-CONSTRUCT-1a (below) Mitigation Measures GEO-MANAGEMENT-1a (below) Mitigation Measures GEO-MANAGEMENT-1b (below)	Less than Significant
Impact FISH-MANAGEMENT-3: Concentration of Predators, including Piscivorous Fish, Birds, and Mammals, Resulting from the Increased Structure (Cover) Provided by Segregation Weirs or Barriers	Less than Significant	n/a	n/a

Table ES-1. Summary of Potential Impacts and Mitigation Measures

Impact	Level of Significance	Mitigation Measures	Level of Significance after Mitigation (if applicable)
Impact FISH-MANAGEMENT-4: Interference with Reintroduction of Fall-Run Chinook Salmon into the Restoration Area due to Operation of Weirs to Segregate Fall-Run from Spring-Run Chinook Salmon	No Impact	n/a	n/a
Impact FISH-MANAGEMENT-5: Interference of Segregation Weirs or Trap and Haul Activities with Movements of Other Large-Bodied (Non-Target) Fish, including Federally Listed Species such as Central Valley Steelhead and Green Sturgeon	Potentially Significant	Mitigation Measure FISH-MANAGEMENT-5a: Monitor Fish Communities in the Vicinity of Segregation Weirs and Traps. Mitigation Measure FISH-MANAGEMENT-5b: Develop and Implement Measures that Allow Special-Status Large Bodied Fishes to Bypass Weirs and Traps.	Less than Significant
Impact FISH-MANAGEMENT-6: Effects on Chinook Salmon in San Joaquin River Tributaries due to Non-Operation of Hills Ferry Barrier	Beneficial	n/a	n/a
Impact FISH-MANAGEMENT-7: Impacts on Aquatic Species Associated with Disturbance of Sediment Transport Regimes and Accumulation of Organic Material Resulting from Operation of Segregations Weirs or Barriers	Less than Significant	n/a	n/a
Impact FISH-MANAGEMENT-8: Impacts on Fish Associated with Deployment of Fish Trapping Devices for Trap and Haul Activities or Segregation Weirs	Potentially Significant	Mitigation Measure FISH-MANAGEMENT-5a (above) Mitigation Measure FISH-MANAGEMENT-5b (above) Mitigation Measure FISH-MANAGEMENT-8a: Check Traps Daily and Minimize Handling of Fish. Mitigation Measure FISH-MANAGEMENT-8b: Adaptively Manage Trap Operations.	Less than Significant

Table ES-1. Summary of Potential Impacts and Mitigation Measures

Impact	Level of Significance	Mitigation Measures	Level of Significance after Mitigation (if applicable)
Impact FISH-MONITORING-1: Unintended Consequences on the Health of Hatchery or Wild Populations from Fish Used in SCARF-related Laboratory Experiments	Less than Significant	n/a	n/a
Impact FISH-MONITORING-2: Incidental Mortalities as a Result of Field Research and Monitoring Activities	Potentially Significant	Mitigation Measure FISH-MONITORING-2a: Implement Standard Protocols for Active Sampling of Aquatic Species. Mitigation Measure FISH-MONITORING-2b: Use Passive Sampling Techniques in place of Active Sampling Techniques, When Appropriate. Mitigation Measure FISH-MONITORING-2c: Use Observational Techniques in place of Traditional Capture Techniques, When Appropriate. Mitigation Measure FISH-MONITORING-2d: Check Rotary Screw Traps Daily. Mitigation Measure Impact FISH-MONITORING-2e: Adaptively Manage Trap Operations.	Less than Significant
Impact FISH-MONITORING-3: Inadvertent Spread of Invasive Species or Disease by Researchers	Less than Significant	n/a	n/a
Impact FISH-RECREATION-1: Impacts on Special-Status Fish Species during Construction of Improvements at Recreational Angling Sites	Potentially Significant	Mitigation Measure FISH-RECREATION-1: Implement Conservation Measures prior to and during Construction of Recreational Enhancements.	Less than Significant
Impact FISH-RECREATION-2: Spread of Disease between Stocked and Wild Fish during Stocking of Off-Channel Ponds for Recreational Fishing	Less than Significant	n/a	n/a

Table ES-1. Summary of Potential Impacts and Mitigation Measures

Impact	Level of Significance	Mitigation Measures	Level of Significance after Mitigation (if applicable)
Impact FISH-RECREATION-3: Inadvertent Harvesting of Listed Salmonids as a Result of Improved Access for Recreational Fishing Enhancements	Less than Significant	n/a	n/a
Impact FISH-RECREATION-4: Riparian or Instream Habitat Degradation or Spread of Invasive Species or Pathogens from Recreational Fishing Enhancements	Potentially Significant	No feasible mitigation measures have been identified.	Significant and Unavoidable
Chapter 7. Biological Resources—Vegetation and Wildlife			
Impact BIO-CONSTRUCT-1: Impacts to Special-Status Plant Species	Potentially Significant	Mitigation Measure BIO-CONSTRUCT-1a: Perform Focused Surveys for Special-Status Plant Species. Mitigation Measure BIO-CONSTRUCT-1b: Avoid or Minimize Impacts to Special Status Plant Species.	Less than Significant
Impact BIO-CONSTRUCT-2: Impacts to Special-Status Vernal Pool Branchiopods	Potentially Significant	Mitigation Measure BIO-CONSTRUCT-2a: Perform 2 Years of Surveys for Special Status Vernal Pool Branchiopods. Mitigation Measure BIO-CONSTRUCT-2b: Avoid Impacts to Suitable Vernal Pool Branchiopods Habitat. Mitigation Measure BIO-CONSTRUCT-2c: Replace Vernal Pool Branchiopod Habitat.	Less than Significant

Table ES-1. Summary of Potential Impacts and Mitigation Measures

Impact	Level of Significance	Mitigation Measures	Level of Significance after Mitigation (if applicable)
Impact BIO-CONSTRUCT-3: Impacts to California Tiger Salamander and Western Spadefoot	Potentially Significant	Mitigation Measure BIO-CONSTRUCT-3a: Conduct Protocol-Level Surveys for California Tiger Salamander. Mitigation Measure BIO-CONSTRUCT-3b: Avoid Impacts to Suitable Upland California Tiger Salamander. Mitigation Measure BIO-CONSTRUCT-3c: Minimize Construction-related Impacts to California Tiger Salamander. Mitigation Measure BIO-CONSTRUCT-3d: Minimize Construction-related Impacts to Western Spadefoot.	Less than Significant
Impact BIO-CONSTRUCT-4: Impacts to Western Pond Turtle	Potentially Significant	Mitigation Measure BIO-CONSTRUCT-4: Implement Pre-construction Surveys and Minimization Measures for Western Pond Turtle.	Less than Significant
Impact BIO-CONSTRUCT-5: Impacts to Burrowing Owl	Potentially Significant	Mitigation Measure BIO-CONSTRUCT-5: Implement Pre-construction Surveys and Minimization Measures for Burrowing Owls.	Less than Significant
Impact BIO-CONSTRUCT-6: Impacts to Raptors including Special-status Species	Potentially Significant	Mitigation Measure BIO-CONSTRUCT-6a: Implement Pre-construction Surveys and Minimization Measures for Bald Eagle and Golden Eagle. Mitigation Measure BIO-CONSTRUCT-6b: Implement Pre-construction Surveys and Minimization Measures for Swainson's Hawk and White-tailed Kite. Mitigation Measure BIO-CONSTRUCT-6c: Implement Pre-construction Surveys and Minimization Measures for Non-listed Raptors	Less than Significant

Table ES-1. Summary of Potential Impacts and Mitigation Measures

Impact	Level of Significance	Mitigation Measures	Level of Significance after Mitigation (if applicable)
Impact BIO-CONSTRUCT-7: Impacts to Special-Status Passerine Species and Birds Protected under the MBTA	Potentially Significant	Mitigation Measure BIO-CONSTRUCT-7a: Implement Pre-construction Surveys and Minimization Measures for Special-Status Passerine Species. Mitigation Measure BIO-CONSTRUCT-7b: Implement Pre-construction Surveys for Birds Protected under the MBTA.	Less than Significant
Impact BIO-CONSTRUCT-8: Impacts to Special Status Bat Species	Potentially Significant	Mitigation Measure BIO-CONSTRUCT-8a: Conduct Pre-Construction Surveys for Bat Species. Mitigation Measure BIO-CONSTRUCT-8b: Avoid and Minimize Impacts to Roosting/Breeding Sites. Mitigation Measure BIO-CONSTRUCT-8c: Replace Bat Roosting/Breeding Sites.	Less than Significant
Impact BIO-CONSTRUCT-9: Impacts to American Badger	Potentially Significant	Mitigation Measure BIO-CONSTRUCT-9: Conduct Pre-Construction Surveys and Minimization Measures for American Badger.	Less than Significant
Impact BIO-CONSTRUCT-10: Impacts to San Joaquin Kit Fox	Potentially Significant	Mitigation Measure BIO-CONSTRUCT-10: Conduct Pre-construction Surveys and Minimization Measures for San Joaquin Kit Fox.	Less than Significant
Impact BIO-CONSTRUCTION-11: Impacts to Riparian Habitat and Freemont Cottonwood Woodlands	Potentially Significant	Mitigation Measure BIO-CONSTRUCT-11a: Minimize Area of Disturbance of Riparian Habitat. Mitigation Measure BIO-CONSTRUCT-11b: Develop and Implement Revegetation Plan for Riparian Habitat Disturbed by Construction.	Less than Significant

Table ES-1. Summary of Potential Impacts and Mitigation Measures

Impact	Level of Significance	Mitigation Measures	Level of Significance after Mitigation (if applicable)
Impact BIO-CONSTRUCT-12 Impacts to Federally Protected Wetlands	Potentially Significant	Mitigation Measure BIO-CONSTRUCT-12a: Obtain Regulatory Permits for Work Activities Taking Place in Wetlands and Waters of the United States and the State. Mitigation Measure BIO-CONSTRUCT-12b: Avoidance of and Mitigation for Incidental Fill.	Less than Significant
Impact BIO-CONSTRUCT-13: Construction of the SCARF Could Interfere with Wildlife Movement, Established Wildlife Corridors, or the Use of Native Wildlife Nursery Sites	Less than Significant	n/a	n/a
Impact BIO-CONSTRUCT-14: Conflict with Local Policies Protecting Biological Resources	Less than Significant	n/a	n/a
Impact BIO-OP-1: Impacts to Special-Status Wildlife Species and Their Habitats	Less than Significant with Mitigation	Mitigation Measure AES-CONSTRUCT-4 (above)	Less than Significant
Impact BIO-OP-2: Impacts to Riparian Habitat	Less than Significant	n/a	n/a
Impact BIO-OP-3: Impacts to Federally Protected Wetlands	Less than Significant	n/a	n/a
Impact BIO-OP-4: Noise Effects on Wildlife	Less than Significant	n/a	n/a
Impact BIO-REINTRO-1: Impacts to Special-Status Plant Species during Broodstock Collection, Translocation, or Fish Reintroduction	Less than Significant	n/a	n/a
Impact BIO-REINTRO-2: Impacts to Special-Status Wildlife Species during Broodstock Egg Collection	Less than Significant	n/a	n/a
Impact BIO-REINTRO-3: Impacts to Special-Status Wildlife Species during Broodstock Juvenile Collection	Potentially Significant	Mitigation Measure BIO-REINTRO-3: Conduct Project-level Assessment of Activity, and Implement Conservation Measures to Avoid, Minimize, or Mitigate Impacts.	Less than Significant

Table ES-1. Summary of Potential Impacts and Mitigation Measures

Impact	Level of Significance	Mitigation Measures	Level of Significance after Mitigation (if applicable)
Impact BIO-REINTRO-4: Impacts to Riparian Habitat and Other Sensitive Natural Communities during Broodstock Collection, Translocation, or Fish Reintroduction	Less than Significant	n/a	n/a
Impact BIO-REINTRO-5: Impacts to Federally Protected Wetlands during Broodstock Collection, Translocation, or Fish Reintroduction	Less than Significant	n/a	n/a
Impact BIO-REINTRO-6: Potential for Broodstock Collection to Interfere with Wildlife Movement, Established Wildlife Corridors, or the Use of Native Wildlife Nursery	Potentially Significant	Mitigation Measure FISH-MANAGEMENT-8a (above) Mitigation Measure FISH-MONITORING-2d (above)	Less than Significant
Impact BIO-MANAGEMENT-1: Impacts to Special-Status Species during Construction of Fish Segregation Weirs and Barriers	Potentially Significant	Mitigation Measure BIO-REINTRO-3 (above)	Less than Significant
Impact BIO-MANAGEMENT-2: Operation of Fish Segregation Weirs/Barriers and Other Instream Equipment Could Interfere with Wildlife Movement, Established Wildlife Corridors, or the Use of Native Wildlife Nursery	Potentially Significant	Mitigation Measure FISH-MANAGEMENT-8a (above) Mitigation Measure FISH-MONITORING-2d (above)	Less than Significant
Impact BIO-MONITORING-1: Impacts to Special-Status Plant Species during Research and Monitoring Activities	Potentially Significant	Mitigation Measure BIO-REINTRO-3 (above)	Less than Significant
Impact BIO-MONITORING-2: Impacts to Special-Status Wildlife Species during Research and Monitoring Activities	Potentially Significant	Mitigation Measure FISH-MANAGEMENT-8a (above) Mitigation Measure BIO-REINTRO-3 (above) Mitigation Measure BIO-MONITORING-2d (above)	Less than Significant

Table ES-1. Summary of Potential Impacts and Mitigation Measures

Impact	Level of Significance	Mitigation Measures	Level of Significance after Mitigation (if applicable)
Impact BIO-MONITORING-3: Impacts to Riparian Habitat, Sensitive Natural Communities and Federally Protected Wetlands during Research and Monitoring Activities	Potentially Significant	Mitigation Measure BIO-REINTRO-3 (above)	Less than Significant
Impact BIO-MONITORING-4: Impacts to Wildlife Movement and Nursery Sites during Research and Monitoring Activities	Potentially Significant	Mitigation Measure FISH-MANAGEMENT-8a (above) Mitigation Measure FISH-MONITORING-2d (above)	Less than Significant
Impact BIO-RECREATION-1: Impacts to Special-Status Plant Species during Construction of Improvements at Recreational Angling Sites	Potentially Significant	Mitigation Measure BIO-REINTRO-3 (above)	Less than Significant
Impact BIO-RECREATION-2: Impacts to Special-Status Plant Species by Increased Traffic of Anglers and Other Recreational Users	Potentially Significant	Mitigation Measure BIO-RECREATION-2: Preserve and Protect Special-Status Plant Populations in the Vicinity of Recreational Enhancement Areas. Mitigation Measure BIO-REINTRO-3 (above)	Less than Significant
Impact BIO-RECREATION-3: Impacts to Special-Status Wildlife Species during Construction of Improvements at Recreational Angling Sites	Potentially Significant	Mitigation Measure BIO-REINTRO-3 (above)	Less than Significant
Impact BIO-RECREATION-4: Impacts to Special-Status Wildlife Species by Increased Traffic of Recreational Anglers	Less than Significant	n/a	n/a
Impact BIO-RECREATION-5: Construction of Angling Enhancements May Impact Riparian Habitat and Other Sensitive Natural Communities	Potentially Significant	Mitigation Measure BIO-REINTRO-3 (above)	Less than Significant
Impact BIO-RECREATION-6: Impacts to Federally Protected Wetlands Associated With Construction of Angling Enhancements	Potentially Significant	Mitigation Measure BIO-REINTRO-3 (above)	Less than Significant

Table ES-1. Summary of Potential Impacts and Mitigation Measures

Impact	Level of Significance	Mitigation Measures	Level of Significance after Mitigation (if applicable)
Impact BIO-RECREATION-7: Construction of Angling Enhancements Could Interfere With Wildlife Movement, Established Wildlife Corridors, or the Use of Native Wildlife Nursery Sites	Potentially Significant	Mitigation Measure BIO-REINTRO-3 (above)	Less than Significant
Chapter 8. Cultural Resources			
Impact CR-CONSTRUCT-1: A Substantial Adverse Impact on Archaeological Resources from Project Construction	Potentially Significant	Mitigation Measure CR-CONSTRUCT-1a: Evaluate Cultural Resources for Eligibility for Inclusion in the CRHR, and Implement Appropriate Mitigation Measures for Eligible Resources. Mitigation Measure CR-CONSTRUCT-1b: Immediately Halt Construction if Cultural Resources are Discovered.	Less than Significant
Impact CR-CONSTRUCT-2: A Substantial Adverse Impact to Built Environment Site URS-02, the Existing San Joaquin Fish Hatchery	No Impact	n/a	n/a
Impact CR-CONSTRUCT-3: Disturb Human Remains, including Those Interred Outside of Formal Cemeteries within the SCARF Construction Area	Potentially Significant	Mitigation Measure CR-CONSTRUCT-3: Immediately Halt Construction if Human Remains are Discovered and Implement California Health and Safety Code. Mitigation Measure CR-CONSTRUCT-1b (above)	Less than Significant
Impact CR-MANAGEMENT-1: Impacts on CRHR-eligible Archaeological Resources from Weir Construction, Demolition, or Modification and Trap and Haul Activities	Potentially Significant	Mitigation Measure CR-CONSTRUCT-1a (above) Mitigation Measure CR-CONSTRUCT-1b (above)	Less than Significant
Impact CR-MANAGEMENT-2: Impacts to CRHR-eligible Structures from Weir Construction, Demolition, or Modification	Potentially Significant	Mitigation Measure CR-CONSTRUCT-1a (above) Mitigation Measure CR-CONSTRUCT-1b (above)	Less than Significant

Table ES-1. Summary of Potential Impacts and Mitigation Measures

Impact	Level of Significance	Mitigation Measures	Level of Significance after Mitigation (if applicable)
Impact CR-MANAGEMENT-3: Disturb Human Remains, Including Those Interred Outside of Formal Cemeteries from Weir Construction, Demolition, or Modification	Potentially Significant	Mitigation Measure CR-CONSTRUCT-1b (above) Mitigation Measure CR-CONSTRUCT-3 (above)	Less than Significant
Impact CR-RECREATION-1: Impacts on CRHR-eligible Archaeological Resources from Recreation Enhancement Actions	Potentially Significant	Mitigation Measure CR-CONSTRUCT-1a (above) Mitigation Measure CR-CONSTRUCT-1b (above)	Less than Significant
Impact CR-RECREATION-2: Impacts to CRHR-eligible Structures from Recreation Enhancements	Potentially Significant	Mitigation Measure CR-CONSTRUCT-1a (above) Mitigation Measure CR-CONSTRUCT-1b (above)	Less than Significant
Impact CR-RECREATION-3: Disturb Human Remains, Including Those Interred outside of Formal Cemeteries, from Recreation Enhancement	Potentially Significant	Mitigation Measure CR-CONSTRUCT-1b (above) Mitigation Measure CR-CONSTRUCT-3 (above)	Less than Significant
Chapter 9. Geology, Soils and Seismicity			
Impact GEO-CONSTRUCT-1: Potential for Substantial Soil Erosion or the Loss of Topsoil from SCARF Construction	Potentially Significant	Mitigation Measure GEO-CONSTRUCT-1a: Implement Construction Best Management Practices to Minimize Erosion and the Loss of Topsoil. Mitigation Measure GEO-CONSTRUCT-1b: Comply with Cal/OSHA Requirements for Excavation Slopes. Mitigation Measure GEO-CONSTRUCT-1c: Design Cut-and-Fill Slopes to Minimize Erosion.	Less than Significant
Impact GEO-CONSTRUCT-2: Risk of Settlement at the SCARF Site as a Result of Soil Instability and Expansion	Potentially Significant	Mitigation Measure GEO-CONSTRUCT-2a: Test Fill for Recommended Compaction and Moisture Content, and Apply Appropriate Measures to Reach Desired Content When Necessary. Mitigation Measure GEO-CONSTRUCT-2b: Ensure Fill Soils Contain Adequate Binder.	Less than Significant

Table ES-1. Summary of Potential Impacts and Mitigation Measures

Impact	Level of Significance	Mitigation Measures	Level of Significance after Mitigation (if applicable)
Impact GEO-CONSTRUCT-3: Risk of Subsidence and Collapse On-site as a Result of Shallow Groundwater Levels	Potentially Significant	Mitigation Measure GEO-CONSTRUCT-3: Accommodate Shallow Groundwater and Potential Perched Groundwater and Seepage throughout the Project Excavation Sites.	Less than Significant
Impact GEO-CONSTRUCT-4: Risk of On-site Structure Instability	Potentially Significant	Mitigation Measure GEO-CONSTRUCT-4: Take Recommended Grading and Fill Actions to Maximize Foundation Stability	Less than Significant
Impact GEO-CONSTRUCT-5: Potential Seismic Risks Resulting from the Geographic Location of the Proposed SCARF Site	Less than Significant	n/a	n/a
Impact GEO-OP-1: Significant Increase in Discharge Flow as a Consequence of SCARF Operations, Resulting in Substantial Soil Erosion along the Return Flow Outfall Channel	Potentially Significant	Mitigation Measure GEO-OP-1: Conduct an Additional Investigation into the Flow Capacity of Impacted Channels and Implement the Investigation's Recommendations.	Less than Significant
Impact GEO-OP-2: Increased Domestic Waste Production	Less than Significant	n/a	n/a
Impact GEO-OP-3: Potential for Project Structures, Specifically the Aeration Tower and Rearing/Holding/Quarantine Tanks, to Affect Soil Stability	No Impact	n/a	n/a
Impact GEO-OP-4: Expose Workers and Nearby Community Members to Increased Seismic and Related Risks from SCARF Construction	Less than Significant	n/a	n/a
Impact GEO-MANAGEMENT-1: Potential for Erosion due to Disturbance of the Streambank or Stream Channel from the Installation, Removal, or Repurposing of Segregation Weirs and Trap and Haul Activities	Potentially Significant	Mitigation Measure GEO-MANAGEMENT-1a: Stabilize Soils to Avoid Increasing Erosion on Streambanks. Mitigation Measure GEO-MANAGEMENT-1b: Use Energy Dissipaters to Minimize Turbidity at the Point of Discharge	n/a

Table ES-1. Summary of Potential Impacts and Mitigation Measures

Impact	Level of Significance	Mitigation Measures	Level of Significance after Mitigation (if applicable)
Impact GEO-MONITORING-1: Potential for Erosion due to Disturbance of the Streambank or Stream Channel from the Installation, Operation or Removal of Research and Monitoring Equipment	Potentially Significant	Mitigation Measure GEO-MANAGEMENT-1a (above) Mitigation Measure GEO-MANAGEMENT-1b (above)	Less than Significant
Impact GEO-RECREATION-1: Required Geotechnical Investigation as a Result of Additional Structural Improvements before Initiation of Recreation Management Activities	Potentially Significant	Mitigation Measure GEO-RECREATION-1: Conduct a Geotechnical Investigation and Incorporate Report Recommendations into the Design and Construction of any Future Recreation Management Roads or Facilities.	Less than Significant
Impact GEO-RECREATION-2: Potential Loss of Soil Productivity and Potential Degradation of Receiving Waters Resulting from Soil Erosion or the Loss of Topsoil Caused by Construction Activities Associated with Enhancing Fishing Opportunities in or Near the Recreation Area	Potentially Significant	Mitigation Measure GEO-CONSTRUCT-1a (above) Mitigation Measure GEO-CONSTRUCT-1b (above)	Less than Significant
Chapter 10. Greenhouse Gas Emissions			
Impact GHG-CONSTRUCT-1: Potential for SCARF Construction to Generate Substantial GHG Emissions	Less than Significant	n/a	n/a
Impact GHG-CONSTRUCT-2: Potential for SCARF Construction to Conflict with the SJVAPCD's or CARB's Applicable Plans, Policies, or Regulations Adopted for the Purpose of Reducing the Emissions of GHGs	No Impact	n/a	n/a
Impact GHG-OP-1: Potential for SCARF Operation to Generate Substantial GHG Emissions	Less than Significant	n/a	n/a
Impact GHG-OP-2: Potential for SCARF Operation to Conflict with the CARB's Applicable Plans, Policies, or Regulations Adopted for the Purpose of Reducing the Emissions of GHGs	Less than Significant	n/a	n/a

Table ES-1. Summary of Potential Impacts and Mitigation Measures

Impact	Level of Significance	Mitigation Measures	Level of Significance after Mitigation (if applicable)
Impact GHG-REINTRO-1: Potential for Fish Reintroduction Activities to Generate Substantial GHG Emissions or Conflict with the CARB's Applicable Plans, Policies, or Regulations Adopted for the Purpose of Reducing the Emissions of GHGs	Less than Significant	n/a	n/a
Impact GHG-MANAGEMENT-1: Potential for Construction of Fish Segregation Weirs to Generate Substantial GHG Emissions or Conflict with the CARB's Applicable Plans, Policies, or Regulations Adopted for the Purpose of Reducing the Emissions of GHGs	Potentially Significant	Mitigation Measure GHG-MANAGEMENT-1: Prepare Project-Level Quantitative Analysis of Construction-Related GHG Emissions, and Implement Measures to Reduce and/or Offset Emissions.	Significant and Unavoidable
Impact GHG-MANAGEMENT-2: Potential for Operation of Fish Segregation Weirs and Traps to Generate Substantial GHG Emissions or Conflict with the CARB's Applicable Plans, Policies, or Regulations Adopted for the Purpose of Reducing the Emissions of GHGs	Less than Significant	n/a	n/a
Impact GHG-MONITORING-1: Potential for Fisheries Research and Monitoring Activities to Generate Substantial GHG Emissions or Conflict with the CARB's Applicable Plans, Policies, or Regulations Adopted for the Purpose of Reducing the Emissions of GHGs	Less than Significant	n/a	n/a
Impact GHG-RECREATION-1: Potential for Construction Activities Related to Enhancing Recreational Fishing Opportunities to Generate Substantial GHG Emissions or Conflict with the CARB's Applicable Plans, Policies, or Regulations Adopted for the Purpose of Reducing the Emissions of GHGs	Potentially Significant	Mitigation Measure GHG-MANAGEMENT-1 (above)	Significant and Unavoidable

Table ES-1. Summary of Potential Impacts and Mitigation Measures

Impact	Level of Significance	Mitigation Measures	Level of Significance after Mitigation (if applicable)
Impact GHG-RECREATION-2: Potential for Operational Activities Related to Enhancing Recreational Fishing Opportunities to Generate Substantial GHG Emissions or Conflict with the CARB's Applicable Plans, Policies, or Regulations Adopted for the Purpose of Reducing the Emissions of GHGs	Less than Significant	n/a	n/a
Chapter 11. Hazards and Hazardous Materials			
Impact HAZ-CONSTRUCT-1: Risk to the Public or Environment, including Nearby Sensitive Receptors, due to an Accidental Spill Resulting from the Transport, Use, and Disposal of Hazardous Materials during SCARF Construction	Less than Significant	n/a	n/a
Impact HAZ-CONSTRUCT-2: Potential for SCARF Construction to Be Located on a Site which Is Included on a List of Hazardous Materials Sites Compiled Pursuant to California Government Code Section 65962.5, and Create a Significant Hazard to the Public or the Environment	No Impact	n/a	n/a
Impact HAZ-CONSTRUCT-3: Potential for SCARF Construction Activities to Impede Fire or Emergency Response Because of a Temporary Increase in Vehicle Traffic	Potentially Significant	Mitigation Measure HAZ-CONSTRUCT-3: Implement a Construction Management Plan to Minimize Interference with Emergency Response.	Less than Significant
Impact HAZ-CONSTRUCT-4: Potential Fire Hazard from the Use of Construction Equipment within or near Vegetation Areas in the Proposed SCARF Site	Less than Significant	n/a	n/a
Impact HAZ-OP-1: Risk to the Public or Environment, Including Nearby Sensitive Receptors, from an Accidental Spill during Transport, Use, and Disposal of Hazardous Materials as Part of SCARF Operations	Less than Significant	n/a	n/a

Table ES-1. Summary of Potential Impacts and Mitigation Measures

Impact	Level of Significance	Mitigation Measures	Level of Significance after Mitigation (if applicable)
Impact HAZ-OP-2: Potential for the Proposed SCARF Site to Create a Significant Hazard to the Public and the Environment by Being Located on a Site Included on a List of Hazardous Materials Sites Compiled Pursuant to California Government Code Section 65962.5	No Impact	n/a	n/a
Impact HAZ-OP-3: Potential for SCARF Operations to Impair Implementation of, or Physically Interfere with, an Adopted Emergency Response Plan or Emergency Evacuation Plan	Less than Significant	n/a	n/a
Impact HAZ-OP-4: Potential Fire Hazard from the Use of Equipment within or near Vegetated Areas in the Proposed SCARF Site during SCARF Operations	Less than Significant	n/a	n/a
Impact HAZ-REINTRO-1: Potential for Fish Reintroduction Activities to Pose a Risk to the Public or Environment, including Nearby Sensitive Receptors, in the Event of an Accidental Spill from the Transport, Use, and Disposal of Hazardous Materials	Less than Significant	n/a	n/a
Impact HAZ-REINTRO-2: Potential for Fish Reintroduction Activities to Impair Implementation of, or Physically Interfere with, an Adopted Emergency Response Plan or Emergency Evacuation Plan	Less than Significant	n/a	n/a
Impact HAZ-REINTRO-3: Potential for Fish Reintroduction Activities to Take Place on a Site that Is Included on a List of Hazardous Materials Sites Compiled Pursuant to California Government Code Section 65962.5	Less than Significant	n/a	n/a

Table ES-1. Summary of Potential Impacts and Mitigation Measures

Impact	Level of Significance	Mitigation Measures	Level of Significance after Mitigation (if applicable)
Impact HAZ-REINTRO-4: Potential Fire Hazard from the Use of Equipment for Fish Reintroduction within or near Vegetated Areas	Less than Significant	n/a	n/a
Impact HAZ-MANAGEMENT-1: Potential for Construction and Operation of Fish Segregation Weirs to Pose a Risk to the Public or Environment, Including Nearby Sensitive Receptors, in the Event of an Accidental Spill from the Transport, Use, and Disposal of Hazardous Materials	Less than Significant	n/a	n/a
Impact HAZ-MANAGEMENT-2: Potential for Construction of Fish Segregation Weirs to Impair Implementation of, or Physically Interfere with, an Adopted Emergency Response Plan or Emergency Evacuation Plan	Potentially Significant	Mitigation Measure HAZ-CONSTRUCT-3 (above)	Less than Significant
Impact HAZ-MANAGEMENT-3: Potential for Fish Segregation Weirs to Be Constructed on a Site that Is Included on a List of Hazardous Materials Sites Compiled Pursuant to California Government Code Section 65962.5	Potentially Significant	Mitigation Measure HAZ-MANAGEMENT-3: Prepare Project-Level Quantitative Analysis of Site-specific Current and Historical Hazardous Materials, Implement Recommendations in the Phase I Environmental Site Assessment, and Comply with all Applicable Regulations.	Less than Significant
Impact HAZ-MANAGEMENT-4: Potential that Operation Weirs and Other of Fisheries Management Activities May Take Place on a Site Included on a List of Hazardous Materials Sites Compiled Pursuant to California Government Code Section 65962.5	Less than Significant	n/a	n/a
Impact HAZ-MANAGEMENT-5: Potential for Operation of Fish Segregation Weirs and Trap and Haul Activities to Impair Implementation of, or Physically Interfere with, an Adopted Emergency Response Plan or Emergency Evacuation Plan	Less than Significant	n/a	n/a

Table ES-1. Summary of Potential Impacts and Mitigation Measures

Impact	Level of Significance	Mitigation Measures	Level of Significance after Mitigation (if applicable)
Impact HAZ-MANAGEMENT-6: Potential for the Use of Equipment within or near Vegetated Areas in the Project Area for Fisheries Management Activities to Present a Potential Fire Hazard	Less than Significant	n/a	n/a
Impact HAZ-MONITORING-1: Potential for Fisheries Research and Monitoring Activities to Pose a Risk to the Public and Environment, Including Nearby Sensitive Receptors, in the Event of an Accidental Spill during the Transport, Use, and Disposal of Hazardous Materials	Less than Significant	n/a	n/a
Impact HAZ-MONITORING-2: Potential for Fisheries Research and Monitoring Activities to Take Place on a Site Included on a List of Hazardous Materials Sites Compiled Pursuant to California Government Code Section 65962.5	Less than Significant	n/a	n/a
Impact HAZ-MONITORING-3: Potential for Fisheries Research and Monitoring to Impair Implementation of, or Physically Interfere with, an Adopted Emergency Response Plan or Emergency Evacuation Plan	Less than Significant	n/a	n/a
Impact HAZ-MONITORING-4: Potential Fire Hazard Associated with the Use of Equipment for Fisheries Research and Monitoring Activities within or near Vegetated Areas	Less than Significant	n/a	n/a
Impact HAZ-RECREATION-1: Potential Risk to the Public or Environment, including Nearby Sensitive Receptors, from an Accidental Spill during Transport, Use, and Disposal of Hazardous Materials during Construction and Operational Activities Associated with Enhancing Recreational Fishing Opportunities	Less than Significant	n/a	n/a

Table ES-1. Summary of Potential Impacts and Mitigation Measures

Impact	Level of Significance	Mitigation Measures	Level of Significance after Mitigation (if applicable)
Impact HAZ-RECREATION-2: Potential for Construction and Operations Activities Related to Enhancing Recreational Fishing Opportunities to Take Place on a Site that Is Included on a List of Hazardous Materials Sites Compiled Pursuant to California Government Code Section 65962.5	Potentially Significant	Mitigation Measure HAZ-MANAGEMENT-3 (above)	Less than Significant
Impact HAZ-RECREATION-3: Potential for Recreation Management Activities to Take Place within Two Miles of a Public Airport or Private Airstrip	Potentially Significant	Mitigation Measure HAZ-RECREATION-3: Research and Consult Applicable Comprehensive Airport Land Use Plans Before Construction Activities.	Less than Significant
Impact HAZ-RECREATION-4: Potential for Construction Activities Related to Enhancing Recreational Fishing Opportunities to Impair Implementation of, or Physically Interfere with, an Adopted Emergency Response Plan or Emergency Evacuation Plan	Potentially Significant	Mitigation Measure HAZ-CONSTRUCT-3 (above)	Less than Significant
Impact HAZ-RECREATION-5: Potential for Operational Activities Related to Enhancing Recreational Fishing Opportunities to Impair Implementation of, or Physically Interfere with, an Adopted Emergency Response Plan or Emergency Evacuation Plan	Less than Significant	n/s	n/s
Impact HAZ-RECREATION-6: Potential Fire Hazard from the Use of Equipment within or near Vegetated Areas	Less than Significant	n/s	n/s
Chapter 12. Hydrology, Geomorphology, and Water Quality			
Impact HYD-CONSTRUCT-1: Violate Water Quality Standards or Waste Discharge Requirements or Otherwise Substantially Degrade Water Quality during SCARF Construction	Potentially Significant	Mitigation Measure GEO-CONSTRUCT-1a (above) Mitigation Measure GEO-CONSTRUCT-1c (above)	Less than Significant

Table ES-1. Summary of Potential Impacts and Mitigation Measures

Impact	Level of Significance	Mitigation Measures	Level of Significance after Mitigation (if applicable)
Impact HYD-CONSTRUCT-2: Substantially Deplete Groundwater Supplies or Interfere Substantially with Groundwater Recharge, Resulting in a Net Deficit in Aquifer Volume or Lowering of the Local Groundwater Table Level from SCARF Construction	Less than Significant	n/a	n/a
Impact HYD-CONSTRUCT-3: Substantially Alter the Existing Drainage Pattern of the Site or Area, Including through the Alteration of the Course of a Stream or Rivers, Resulting in Substantial Erosion or Siltation On-site or Off-site from SCARF Construction	Potentially Significant	Mitigation Measure GEO-CONSTRUCT-1a (above) Mitigation Measure GEO-CONSTRUCT-1c (above)	Less than Significant
Impact HYD-CONSTRUCT-4: Substantially Alter the Existing Drainage Pattern of the Site or Area, Including Through the Alteration of the Course of a Stream or River, or Substantially Increase the Rate or Amount of Surface Runoff Resulting in Flooding On-site or Off-site from SCARF Construction	Less than Significant	n/a	n/a
Impact HYD-CONSTRUCT-5: Place Housing Within a 100-Year Flood Hazard Area, As Mapped on a Federal Flood Hazard Boundary or Flood Insurance Map or Other Flood Hazard Delineation Map from SCARF Construction	Less than Significant	n/a	n/a
Impact HYD-CONSTRUCT-6: Place Structures Within a 100-year Flood Hazard Area Resulting in Impeding or Redirecting Flood Flows from SCARF Construction	Potentially Significant	Mitigation Measure HYD-CONSTRUCT-6: Perform Flood Analysis and Conform to Standards in Fresno County Code	Less than Significant

Table ES-1. Summary of Potential Impacts and Mitigation Measures

Impact	Level of Significance	Mitigation Measures	Level of Significance after Mitigation (if applicable)
Impact HYD-CONSTRUCT-7: Expose People or Structures to Significant Risk of Loss, Injury or Death Involving Flooding, Including Flooding Resulting from the Failure of a Levee or Dam during SCARF Construction	Less than Significant	n/a	n/a
Impact HYD-CONSTRUCT-8: Contribute to Inundation by Seiche, Tsunami, or Mudflow from SCARF Construction	No Impact	n/a	n/a
Impact HYD-OP-1 Create or Contribute Runoff Water Exceeding the Capacity of Existing or Planned Stormwater Drainage Systems or Provide Substantial Additional Sources of Polluted Runoff from SCARF Operations	Less than Significant	n/a	n/a
Impact HYD-OP-2: Effects of SCARF Return Flows on Downstream Flooding and Flood Risk	Less than Significant	n/a	n/a
Impact HYD-OP-3: Exposure of People and Structures to Flood Risk from SCARF Operations	Potentially Significant	Mitigation Measure HYD-CONSTRUCT-6 (above)	Less than Significant
Impact HYD-OP-4: Effects of Hatchery Diversions for SCARF Operations on Surface Water Supply	Less than Significant	n/a	n/a
Impact HYD-OP-5: Effects on Groundwater Supplies from SCARF Operations	Less than Significant	n/a	n/a
Impact HYD-OP-6: Water Quality Effects of SCARF Operations to Total Suspended Solids and Turbidity	Less than Significant	n/a	n/a
Impact HYD-OP-7: Water Quality Effects of SCARF Operations to Dissolved Oxygen, pH and Salinity	Less than Significant	n/a	n/a
Impact HYD-OP-8: Water Quality Effects of SCARF Operations on Eutrophication of Receiving Waters	Less than Significant	n/a	n/a
Impact HYD-OP-9: Effects of SCARF Operations on Discharge Water Temperature	Less than Significant	n/a	n/a

Table ES-1. Summary of Potential Impacts and Mitigation Measures

Impact	Level of Significance	Mitigation Measures	Level of Significance after Mitigation (if applicable)
Impact HYD-OP-10: Water Quality Effects of SCARF Return Flow Discharges Containing Aquaculture Chemicals and Drugs	Less than Significant	n/a	n/a
Impact HYD-OP-11: Effects on Groundwater Quality from SCARF Operations	Less than Significant	n/a	n/a
Impact HYD-REINTRO-1: Impacts of Turbidity from Broodstock Collection	Less than Significant	n/a	n/a
Impact HYD-REINTRO-2: Water Quality Effects of Chinook Salmon Releases into the San Joaquin River	Less than Significant	n/a	n/a
Impact HYD-MANAGEMENT-1: Effects on Water Quality & Hydrology from Barrier Construction	Potentially Significant	Mitigation Measure GEO-CONSTRUCT-1a (above) Mitigation Measure GEO-CONSTRUCT-1c (above)	Less than Significant
Impact HYD-MANAGEMENT-2: Effects on Water Quality & Hydrology from Barrier Operation and Trap and Haul Efforts	Less than Significant	n/a	n/a
Impact HYD-MONITORING-1: Impacts on Turbidity from Installation of Fish Monitoring Equipment and Fish Monitoring Activities	Potentially Significant	Mitigation Measure FISH-MONITORING-2b (above) Mitigation Measure FISH-MONITORING-2c (above)	Less than Significant
Impact HYD-MONITORING-2: Water Quality Effects of Fish Research and Monitoring Activities	Less than Significant	n/a	n/a
Impact HYD-RECREATION-1: Effects on Water Quality & Hydrology from Construction of Improvements at Recreational Angling Sites	Potentially Significant	Mitigation Measure GEO-CONSTRUCT-1a (above) Mitigation Measure GEO-CONSTRUCT-1c (above)	Less than Significant
Impact HYD-RECREATION-2: Effects on Water Quality from Increased Foot Traffic of Anglers and Other Recreational Users	Less than Significant	n/a	n/a
Chapter 13. Land Use and Planning			

Table ES-1. Summary of Potential Impacts and Mitigation Measures

Impact	Level of Significance	Mitigation Measures	Level of Significance after Mitigation (if applicable)
Impact LU-OP-1: Potential for the SCARF to Divide an Established Community	No Impact	n/a	n/a
Impact LU-OP-2: Potential for the SCARF to Conflict with Existing and Planned Land Uses within or adjacent to the SCARF Site or with Applicable Land Use Plans, Policies, and Regulations	No Impact	n/a	n/a
Impact LU-OP-3: The SCARF Would Not Conflict with any Habitat Conservation Plans, Natural Community Conservation Plans, or other Local Habitat Conservation Plans	No Impact	n/a	n/a
Impact LU-MANAGEMENT-1: Potential for the Fish Segregation Weirs or Trap and Haul Efforts to Conflict with Existing and Planned Land Uses within or adjacent to the Weir, Trap, or Other Sites or with Applicable Land Use Plans, Policies, and Regulations	Potentially Significant	Mitigation Measure LU-MANAGEMENT-1: Ensure Consistency of Land Use.	Less than Significant
Impact LU-RECREATION-1: Potential for Enhanced Recreational Ponds to Divide an Established Community between Friant Dam and State Route 99	No Impact	n/a	n/a
Impact LU-RECREATION-2: Potential for Enhanced Recreational Ponds to Conflict with Land Use Plans, Policies, or Regulations or adjacent Existing and Planned Land Uses	Potentially Significant	Mitigation Measure LU-RECREATION-2: Avoid Locations with Land Use Conflicts.	Less than Significant
Impact LU-RECREATION-3: Potential for Enhanced Recreational Facilities to Conflict with Habitat Conservation Plans, Natural Community Conservation Plans, or Other Local Habitat Conservation Plans	No Impact	n/a	n/a

Table ES-1. Summary of Potential Impacts and Mitigation Measures

Impact	Level of Significance	Mitigation Measures	Level of Significance after Mitigation (if applicable)
Chapter 14. Noise			
Impact NOISE-CONSTRUCT-1: Potential for SCARF Construction to Expose Persons to or Generate Noise Levels in Excess of Standards Established in a Local General Plan or Noise Ordinance or in the Applicable Standards of Other Agencies	Less than Significant	n/a	n/a
Impact NOISE-CONSTRUCT-2: Potential for SCARF Construction to Expose Persons to Excessive Ground-borne Vibration or Ground-borne Noise Levels	Less than Significant	n/a	n/a
Impact NOISE-OP-1: Potential for SCARF Operations to Result in a Substantial Permanent Increase in Ambient Noise Levels in the Project Vicinity above Levels Existing without the Project or Result in the Generation of Noise Levels in Excess of Standards Established in a Local General Plan or Noise Ordinance or in the Applicable Standards of Other Agencies	Potentially Significant	Mitigation Measure NOISE-OP-1: Implement Noise Control Measures to Reduce Noise Generated by Mechanical Equipment.	Less than Significant
Impact NOISE-OP-2: Potential for SCARF Operations to Expose Persons to Excessive Ground-borne Vibration or Ground-borne Noise Levels	Less than Significant	n/a	n/a
Impact NOISE-REINTRO-1: Potential for Truck Transport of Fish Stock to Substantially Increase Noise Levels within the Project Area	Less than Significant	n/a	n/a
Impact NOISE-REINTRO-2: Potential for Truck Transport of Fish Stock to Expose Persons to Excessive Ground-borne vibration or Ground-borne Noise Levels	Less than Significant	n/a	n/a

Table ES-1. Summary of Potential Impacts and Mitigation Measures

Impact	Level of Significance	Mitigation Measures	Level of Significance after Mitigation (if applicable)
Impact NOISE-MANAGEMENT-1: Potential for Construction of Fish Segregation Weirs to Substantially Increase Noise Levels	Potentially Significant	Mitigation Measure NOISE-MANAGEMENT-1: Implement Noise Control Measures for Construction Activities.	Less than Significant
Impact NOISE-MANAGEMENT-2: Potential for Construction of Fish Segregation Weirs to Expose Persons to Excessive Ground-borne Vibration or Ground-borne Noise Levels	Less than Significant	n/a	n/a
Impact NOISE-MONITORING-1: Potential for Research and Monitoring Activities to Expose Persons to Noise and Vibration Levels that Exceed Applicable Standards Established by a Local General Plan or Noise Ordinance or by Agencies with Jurisdiction	Less than Significant	n/a	n/a
Impact NOISE-RECREATION-1: Potential for Recreation Management Activities to Expose Persons to Noise and Vibration Levels that Exceed Applicable Standards Established by a Local General Plan or Noise Ordinance or by Agencies with Jurisdiction	Potentially Significant	Mitigation Measure NOISE MANAGEMENT-1 (above)	Less than Significant
Chapter 15. Recreation			
Impact REC-CONSTRUCT-1: Temporary Closure of the San Joaquin Hatchery Public Access and Trail Project Could Result in an Increase in Recreational Use at Neighboring Facilities during SCARF Construction, such that a Substantial Deterioration of Facilities Would Occur	Potentially Significant	Mitigation Measure REC-CONSTRUCT-1a: Reroute the Trail during Construction. Mitigation Measure REC-CONSTRUCT-1b: Provide Signage during Construction. Mitigation Measure REC-CONSTRUCT-1c: Rebuild the Trail if Damaged during Construction.	Less than Significant

Table ES-1. Summary of Potential Impacts and Mitigation Measures

Impact	Level of Significance	Mitigation Measures	Level of Significance after Mitigation (if applicable)
Impact REC-OP-1: SCARF On-site Operations Would Not Increase Use of Existing Recreational Facilities such that Substantial Deterioration of Existing Facilities Would Occur	Less than Significant	n/a	n/a
Impact REC-OP-2: Operation of SCARF Would Provide New Recreational Facilities	Beneficial	n/a	n/a
Impact REC-REINTRO-1: An Increase in Recreational Opportunities Would Occur in the Potentially Affected Area from the Reintroduction of Chinook Salmon	Beneficial	n/a	n/a
Impact REC-MANAGEMENT-1: Operation of Fish Segregation Weirs and/or Equipment associated with Trap and Haul Activities Could Interfere with Recreational Boat Traffic such that Substantial Physical Deterioration of Existing Facilities Would Occur or New Facilities Would Need to Be Built that Could Have an Adverse Impact on the Environment	Less than Significant	n/a	n/a
Impact REC-MONITORING-1: Potential for Research and Monitoring Activities to Affect Boating in the Restoration Area such that Substantial Physical Deterioration of Existing Facilities Would Occur or New Facilities Would Need to Be Built that Could Have an Adverse Impact on the Environment	Less than Significant	n/a	n/a
Impact REC-RECREATION-1: Restriction of Angling Opportunities Could Occur in Spawning Areas, Resulting in Substantial Physical Deterioration of Existing Recreational Facilities	Less than Significant	n/a	n/a

Table ES-1. Summary of Potential Impacts and Mitigation Measures

Impact	Level of Significance	Mitigation Measures	Level of Significance after Mitigation (if applicable)
Impact REC-RECREATION-2: Construction or Altering of Fishing Ponds Could Have an Adverse Physical Impact on the Environment	(See Impact Discussion)	(See Impact Discussion)	(See Impact Discussion)
Chapter 16. Traffic and Transportation			
Impact TR-CONSTRUCT-1: Potential Impacts on Roadway and Intersection Operating Conditions from SCARF Construction-related Traffic	Potentially Significant	Mitigation Measure HAZ-CONSTRUCT-3 (above)	Less than Significant
Impact TR-CONSTRUCT-2: Potential Impacts on Transit, Bicycle, and Pedestrian Facilities from SCARF Construction-related Traffic	Potentially Significant	Mitigation Measure HAZ-CONSTRUCT-3 (above)	Less than Significant
Impact TR-OP-1: Potential Impacts on Roadway and Intersection Operating Conditions from SCARF Operational Traffic	Less than Significant	n/a	n/a
Impact TR-OP-2: Potential Impacts on Transit, Bicycles, and Pedestrian Facilities from SCARF Operational Traffic	Less than Significant	n/a	n/a
Impact TR-REINTRO-1: Potential Impacts on Roadway and Intersection Operating Conditions from Fish Reintroduction-related Trips	Less than Significant	n/a	n/a
Impact TR-REINTRO-2: Potential Impacts on Transit, Bicycle, and Pedestrian Facilities from Fish Reintroduction-related Trips	Less than Significant	n/a	n/a
Impact TR-MANAGEMENT-1: Potential Impacts on Roadway and Intersection Operating Conditions from Fish Segregation Weir Construction and Operation	Less than Significant	n/a	n/a
Impact TR-MANAGEMENT-2: Potential Impacts on Roadway and Intersection Operating Conditions from Trap and Haul Efforts during Fisheries Management	Less than Significant	n/a	n/a

Table ES-1. Summary of Potential Impacts and Mitigation Measures

Impact	Level of Significance	Mitigation Measures	Level of Significance after Mitigation (if applicable)
Impact TR-MANAGEMENT-3: Potential Impacts on Transit, Bicycle, and Pedestrian Facilities from Fish Segregation Weir Construction and Operation and Trap and Haul Activities	Less than Significant	n/a	n/a
Impact TR-MONITORING-1: Potential Impacts on Roadway and Intersection Operations from Trips Associated with Fisheries Research and Monitoring Activities	Less than Significant	n/a	n/a
Impact TR-MONITORING-2: Potential Impacts on Transit, Bicycle, and Pedestrian Facilities from Trips Associated with Fisheries Research and Monitoring Activities	Less than Significant	n/a	n/a
Impact TR-RECREATION-1: Potential Impacts on Roadway and Intersection Operations from Trips Associated with Recreation Management Activities	Less than Significant	n/a	n/a
Impact TR-RECREATION-2: Potential Impacts on Transit, Bicycle, and Pedestrian Facilities from Trips Associated with Recreation Activities	Less than Significant	n/a	n/a
Chapter 17. Utilities and Service Systems			
Impact UTL-CONSTRUCT-1: Domestic Wastewater Generation and Disposal during SCARF Construction	No Impact	n/a	n/a
Impact UTL-CONSTRUCT-2: Use of Water for SCARF Construction	Less than Significant	n/a	n/a
Impact UTL-CONSTRUCT-3: Disposal of Solid Waste Generated during SCARF Construction	Less than Significant	n/a	n/a
Impact UTL-CONSTRUCT-4: Disposal of Hazardous Materials Generated during SCARF Construction	Less than Significant	n/a	n/a

Table ES-1. Summary of Potential Impacts and Mitigation Measures

Impact	Level of Significance	Mitigation Measures	Level of Significance after Mitigation (if applicable)
Impact UTL-CONSTRUCT-5: Energy Consumption during SCARF Construction	Less than Significant	n/a	n/a
Impact UTL-OP-1: Availability of Supplies to Accommodate Non-Potable Water Use during SCARF Operations	Less than Significant	n/a	n/a
Impact UTL-OP-2: Effects of Potable Water Use for SCARF on Water Supplies	Less than Significant	n/a	n/a
Impact UTL–OP-3: Wastewater and Solid Waste Generation during SCARF Operations	Less than Significant	n/a	n/a
Impact UTL-OP-4: Stormwater Generation during SCARF Operations	Less than Significant	n/a	n/a
Impact UTL-OP-5: Long-term Increase in Energy Usage from SCARF Operations	Less than Significant	n/a	n/a
Impact UTL-REINTRO-1: Effects of Broodstock Collection from the Feather River Fish Hatchery on Hatchery Operations	No Impact	n/a	n/a
Impact UTL-MANAGEMENT-1: Domestic Wastewater Generation and Disposal during Construction of Fish Segregation Weirs	No Impact	n/a	n/a
Impact UTL-MANAGEMENT-2: Use of Water for Construction of Fish Segregation Weirs	Less than Significant	n/a	n/a
Impact UTL-MANAGEMENT-3: Disposal of Solid Waste Generated during Construction of Fish Segregation Weirs	Less than Significant	n/a	n/a
Impact UTL-MANAGEMENT-4: Disposal of Hazardous Materials Generated during Construction of Fish Segregation Weirs	Less than Significant	n/a	n/a
Impact UTL-MANAGEMENT-5: Energy Consumption during Construction of Fish Segregation Weirs	Less than Significant	n/a	n/a

Table ES-1. Summary of Potential Impacts and Mitigation Measures

Impact	Level of Significance	Mitigation Measures	Level of Significance after Mitigation (if applicable)
Impact UTL-RECREATION-1: Domestic Wastewater Generation and Disposal during Construction of Recreational Fishing Enhancements	No Impact	n/a	n/a
Impact UTL-RECREATION-2: Use of Water for Construction of Recreational Fishing Enhancements	Less than Significant	n/a	n/a
Impact UTL-RECREATION-3: Disposal of Solid Waste Generated during Construction of Recreational Fishing Enhancements	Less than Significant	n/a	n/a
Impact UTL-RECREATION-4: Disposal of Hazardous Materials Generated during Construction of Recreational Fishing Enhancements	Less than Significant	n/a	n/a
Impact UTL-RECREATION-5: Energy Consumption during Construction of Recreational Fishing Enhancements	Less than Significant	n/a	n/a
Chapter18. Other Statutory Considerations			
Impact CUM-1. Effects on Agricultural Resources	No Impact	n/a	n/a
Impact CUM-2. Contributions to Non-Attainment Status of Criteria Air Pollutants	Potentially Significant	Mitigation Measure AQ-MANAGEMENT-1 (above)	Less than Significant
Impact CUM-3. Effects on Fish Species and Their Habitats	Beneficial	n/a	n/a
Impact CUM-4. Effects of Wild Broodstock Collection	Potentially Significant	Mitigation Measure FISH-REINTRO-1 (above)	Significant and Unavoidable
Impact CUM-5. Effects on Terrestrial Vegetation, Wildlife, and Sensitive Communities	Potentially Significant	Mitigation Measures BIO-CONSTRUCT-1a through -10 (above) Mitigation Measures BIO-CONSTRUCT-11a and -11b (above) Mitigation Measures BIO-CONSTRUCT-12a and -12b (above)	Less than Significant

Table ES-1. Summary of Potential Impacts and Mitigation Measures

Impact	Level of Significance	Mitigation Measures	Level of Significance after Mitigation (if applicable)
Impact CUM-6. Effects on the Generation of Greenhouse Gas Emissions	Potentially Significant	Mitigation Measure GHG-MANAGEMENT-1 (above)	Significant and Unavoidable
Impact CUM-7. Effects on Hydrology and Water Quality	Less than Significant	n/a	n/a
Impact CUM-8. Effects on Hydropower Operations Upstream of the SCARF Site	Less than Significant	n/a	n/a
Impact CUM-9. Effects on Recreational Fishing	Less than Significant	n/a	n/a

Chapter 1
INTRODUCTION

The California Department of Fish and Wildlife (CDFW) has prepared this Draft Environmental Impact Report (DEIR) to provide the public, responsible agencies, and trustee agencies with information about the potential environmental effects of the proposed Salmon Conservation and Research Facility (SCARF) and Related Fisheries Management Actions Project (Project or Proposed Project). This DEIR was prepared in compliance with the California Environmental Quality Act (CEQA) of 1970 (as amended) and CEQA Guidelines (Cal. Code Regs., tit. 14, § 15000 et seq.).

1.1 Program Background

The San Joaquin River Restoration Program (SJRRP) arises from the Settlement Agreement reached as a result of federal court action in *Natural Resources Defense Council (NRDC) et al. v. Kirk Rodgers et al.* (*NRDC v. Rodgers* 2006). The U.S. Department of the Interior, U.S. Department of Commerce, NRDC, and the Friant Water Users Authority (FWUA) signed the Settlement Agreement. The Settlement Agreement identified two major goals of the SJRRP: 1) a Restoration Goal to restore and maintain fish populations in good condition, including naturally reproducing and self-sustaining populations of salmon and other fish in the Restoration Area (defined as the main stem of the San Joaquin River from below Friant Dam to the confluence with the Merced River, as shown in Figure 1-1), and 2) a Water Management Goal. Pursuant to a Memorandum of Understanding between the Settling Parties and CDFW and the Department of Water Resources (DWR) (State Agency MOU), CDFW and DWR agreed to assist the Settling Parties in the Settlement Agreement's implementation, consistent with the State Agencies' authorities, resources, and broader regional resource strategies. The Implementing Agencies of the SJRRP are the Bureau of Reclamation (Reclamation) and the U.S. Fish and Wildlife Service (USFWS) from the U.S. Department of Interior, the National Marine Fisheries Service (NMFS) from the U.S. Department of Commerce, and CDFW and DWR from the State of California Natural Resources Agency. (See Appendix A, *NRDC v. Rodgers Memorandum of Understanding between Settling Parties and State of California,* for a copy of the State Agency MOU).

In 2012, DWR and USBR completed a Program Environmental Impact Statement/Report (PEIS/R) evaluating the SJRRP pursuant to CEQA and the National Environmental Policy Act (NEPA) (Reclamation and DWR 2012). This DEIR leverages the analysis conducted in the PEIS/R where relevant. More information regarding the overall SJRRP can be found on the program's website: http://www.restoresjr.net/.

In furtherance of the State Agency MOU, CDFW proposes to undertake several related actions, including (1) constructing and operating the SCARF; (2) reintroducing Chinook salmon to the Restoration Area[1] (including donor stock collection, broodstock development, and/or direct translocation); (3) managing Chinook salmon runs in the Restoration Area; (4) conducting research and monitoring related to Chinook salmon in the San Joaquin River;, and (5) managing and supporting recreation within the Restoration Area. These actions would be adaptively managed to address uncertainties, such as changes in abundance of source populations, regulatory obligations, flow conditions/constraints, fish stocking, and passage/habitat conditions within the Restoration Area.

1.2 Overview of CEQA Requirements

CEQA's basic purposes are to:

1. Inform governmental decision-makers and the public about the potential, significant environmental effects of proposed activities.
2. Identify the ways that environmental damage can be avoided or significantly reduced.
3. Prevent significant, avoidable damage to the environment by requiring implementation of feasible mitigation measures or project alternatives that would substantially lessen any significant effects that a project would have on the environment.
4. Disclose to the public the reasons why a governmental agency approved the project in the manner the agency chose if significant environmental effects are involved.

With certain strictly limited exceptions, CEQA requires all state and local government agencies to consider the environmental consequences of projects over which they have discretionary authority before approving or carrying out projects. CEQA establishes both procedural and substantive requirements that agencies must satisfy to meet CEQA's objectives. For example, the agency with principal responsibility for approving or carrying out a project (the lead agency) must first assess whether a proposed project would result in significant environmental impacts. If there is substantial evidence that the project would result in significant environmental impacts, CEQA requires that the agency prepare an Environmental Impact Report (EIR), analyzing both the proposed project and a reasonable range of potentially feasible alternatives.

As described in the CEQA Guidelines (Cal. Code Regs., tit. 14, § 15121, subd. (a)), an EIR is an informational document that assesses potential environmental effects of a proposed project, and identifies mitigation measures and alternatives to the project that could reduce or avoid potentially significant environmental impacts. Other key CEQA requirements include developing

[1] The Restoration Area includes the San Joaquin River below Friant Dam to the confluence of the Merced River, as set forth in the Settlement Agreement.

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California Department of General Services

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Miles

Source: US Bureau of Reclamation

Figure 1-1: San Joaquin River Restoration Area

SCARF and Related Management Actions Project
Draft Environmental Impact Report

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a plan for implementing and monitoring the success of the identified mitigation measures and carrying out specific public notice and distribution steps to facilitate public involvement in the environmental review process. As an informational document used in the planning and decision-making process, an EIR's purpose is not to recommend either approval or denial of a project. Note that an EIR does not expand or otherwise provide independent authority of the lead agency to impose mitigation measures or avoid project-related significant environmental impacts beyond the authority already within the lead agency's jurisdiction.

1.3 Scope and Intent of this Document

In proposing to conduct the various activities identified in Chapter 2 of this DEIR, CDFW is proposing to carry out and approve a discretionary project subject to CEQA (CEQA Guidelines, § 15378). CDFW will use the analyses presented in this DEIR, and the public response to it and the whole of the administrative record, to evaluate the Proposed Project's environmental impacts and to further modify, approve, or deny approval of the Proposed Project.

1.3.1 Type of EIR: Program EIR

When an agency proposes a program of related activities that are geographically linked, would take place as logical parts of a series of events, or would be carried out under the same authorizing statutory or regulatory authority, the agency can choose to prepare a program EIR. The program EIR generally analyzes broad environmental effects of a program with the acknowledgement that site-specific environmental review may be required for particular aspects or portions of the program when those aspects are proposed for implementation (CEQA Guidelines, § 15168). This DEIR is considered a Program EIR because it proposes a program of related activities that would be carried out under the same authorizing statutory and regulatory authority.

In Chapter 2 of this DEIR ("Project Description"), the various project actions are described at a level of specificity that corresponds to the amount of information available relative to each action, and not all actions are described at the same level of detail. The details of the impact analysis correspond to this variability. As a result, certain aspects of the Proposed Project are evaluated at a project level, while others are evaluated programmatically. Chapter 3 of this DEIR provides further details regarding which aspects of the Proposed Project are evaluated at a "Project" versus "Program" level.

It is the intent of this DEIR is to capture adequately the impacts of many components of the Proposed Project at the project-level such that future tiered CEQA documentation does not become necessary. However, it is possible that as certain aspects of the Project are further defined, particularly those actions evaluated programmatically in this DEIR, they could result in the conclusion that new, different, or more significant impacts are possible than have been disclosed. To the extent that it is necessary, elements of the Project may undergo further evaluation in future tiered CEQA documentation.

1.3.2 Baseline Conditions

Under CEQA, the environmental setting or "baseline" serves as a gauge to assess changes to existing physical conditions that will occur as a result of a proposed project. Per CEQA Guidelines (Cal. Code Regs., tit. 14, § 15125), for purposes of an EIR, the environmental setting is normally the existing physical conditions in and around the vicinity of the proposed project as those conditions exist at the time the Notice of Preparation (NOP) is published.

Note that certain activities that are a part of the Proposed Project are already being carried out on an ongoing basis. As such, these activities are considered a part of the baseline conditions, and the impact analysis in this DEIR instead focuses on the increment of change that would result from the Proposed Project. For instance, the Feather River Fish Hatchery (a potential source of stocks for the Proposed Project) is already operational, and was previously evaluated in past CEQA documents. Therefore, rather than evaluate all of the impacts of the Feather River Fish Hatchery operation, this DEIR evaluates the impacts of any changes in those existing operations that would result from carrying out the Proposed Project.

1.4 CEQA Process

The following discussion explains the steps in the CEQA process.

1.4.1 Initial Study/Notice of Preparation

An NOP for the Proposed Project was prepared pursuant to the State CEQA Guidelines (CEQA Guidelines § 15082) and circulated to the Office of Planning and Research's State CEQA Clearinghouse on November 21, 2012, with hard copies circulated on November 26, 2012. The scoping period continued for 35 days and concluded on December 26, 2012. The NOP presented general background information on the Proposed Project, the scoping process, the environmental issues to be addressed in the EIR, and the anticipated uses of the EIR. The NOP was posted on the CDFW website, and more than 550 hard copies of the NOP were distributed by certified mail to a broad range of stakeholders including state, federal, and local regulatory agencies and jurisdictions, water utilities, non-profit organizations, and property owners in the vicinity of the Proposed Project. In addition, on November 26, 2012, an announcement of the release of the NOP, including the dates, times, and locations of scoping meetings, was published in the *Fresno Bee, Sacramento Bee,* and *Chico Enterprise Record.* The NOP is included in this DEIR in Appendix B, *Notice of Preparation*.

1.4.2 Scoping Comments and Meetings

To provide the public, as well as responsible and trustee agencies, an opportunity to ask questions and submit comments on the scope of the EIR and the Proposed Project, public scoping meetings were held during the public scoping period. CDFW conducted scoping meetings on consecutive days in Fresno and Sacramento to solicit input from the public and interested public agencies. As described above, notices of the meetings were mailed to interested parties; in addition, scoping meeting information was published in local newspapers and on CDFW's website (http://www.dfg.ca.gov/news/pubnotice/) prior to the events to solicit attendance.

The Scoping Meetings were held at the following locations:

- Fresno, CA — December 4th, 2012, 5:00 to 8:00 p.m., at the California Retired Teachers Association building (3930 E. Saginaw Way, Fresno, 93726); and
- Sacramento, CA — December 5th, 2012, 6:00 to 8:00 p.m., at the Department of Health Care Services and Department of Public Health Building (1500 Capitol Avenue, Sacramento, CA 95814).

Both meetings used the same format and interested parties were invited to attend one or both meetings. Besides CDFW and contractor staff, eight individuals attended the scoping meetings, including members of the general public and representatives from state and federal agencies, as well as non-governmental organizations. The meetings began with an open house where CDFW and contractor staff were available to engage in one-on-one conversations to discuss and answer questions about the Proposed Project and the CEQA process. CDFW staff then gave a brief presentation to provide an overview of the SJRRP, the Proposed Project, and the CEQA process. Afterwards, the public was given an opportunity to provide verbal and written scoping comments. One individual provided verbal comments. All of the meeting materials from the scoping meetings, including the sign-in sheets, PowerPoint presentation, posters, etc., have been included in this DEIR as Appendix C, *Meeting Materials*.

CDFW accepted prepared written comments at the meetings, as well as during the 35-day scoping period. Comment forms were distributed at the scoping meetings for submission of written comments during or after the meeting. During the scoping period, 10 comment letters were received. These comments have been included in this DEIR as Appendix D, *Comments Received on the Notice of Preparation*. Information contained in the NOP (project description, range of topics, etc.) has been refined based on the input received in public comments on the NOP and is reflected in the text of this DEIR.

1.4.3 Draft EIR

CDFW has prepared this DEIR, as informed by public and agency input received during the scoping period, to disclose potentially significant environmental impacts associated with the Proposed Project. Where any such impacts are significant, feasible mitigation measures and potentially feasible alternatives that substantially lessen or avoid such effects are identified and discussed. The public review period provides the public an opportunity to provide input to the lead agency on the DEIR.

1.4.4 Public Review and Meetings

The DEIR is currently undergoing public review for 45 days. During this period, CDFW will hold two public meetings, in Fresno and Sacramento. The meetings will begin with a brief overview of the Proposed Project and the analysis and conclusions set forth in the DEIR. This introductory presentation will then be followed by the opportunity for interested members of the public to provide oral and written comments to CDFW regarding the

Proposed Project and the DEIR. Commenters may provide oral or written comments, or both.

The dates, times, and exact locations of the public meetings will be published in local newspapers prior to the events and are included in the Notice of Availability of this DEIR.

1.4.5 Final EIR

Written and oral comments received in response to the DEIR will be addressed in a Response to Comments document which, together with the DEIR and any related changes to the substantive discussion in the DEIR, will constitute the Final EIR. The Final EIR, in turn, will inform CDFW's exercise of its discretion as a lead agency under CEQA in deciding whether or how to approve the Proposed Project.

1.5 Organization of this DEIR

This DEIR contains the following components:

Volume I — Main Body

Executive Summary. A summary of the Project, a description of the issues of concern, Project alternatives, and a summary of environmental impacts and mitigation measures are provided in this chapter.

Chapter 1, *Introduction*. This chapter describes the purpose and organization of the EIR and its preparation, review, and certification process.

Chapter 2, *Project Description*. This chapter summarizes the Project, including a description of the Project purpose and objectives, a brief description of the Project area, proposed actions that would be taken under the Project, and related permits and approvals associated with the activity.

Chapter 3, *Environmental Impacts*. This chapter is an introduction to the impact analysis conducted in this DEIR. This chapter also identifies resource topic areas determined not to be affected by the Project.

Chapters 4-17 describe the environmental resources and potential environmental impacts of the Project. Each of these chapters describes the existing setting and background information for the resource topic area under consideration to aid the reader in understanding the conditions that could be affected by the Proposed Project. In addition, each of these chapters includes a discussion of the criteria used in determining the significance levels of the Project's environmental impacts. Each of these chapters also provides mitigation measures to reduce, where possible, the adverse effects of potentially significant impacts.

Chapter 18, *Other Statutory Considerations*. This chapter addresses the Proposed Project's potential to contribute to cumulative impacts. Chapter 18 also outlines the Proposed Project's potential to induce growth and identifies significant, irreversible environmental changes resulting from the Project.

Chapter 19, *Alternatives Analysis*. This chapter describes the process by which alternatives to the Proposed Project were developed and screened, evaluates their likely environmental impacts, and identifies the environmentally superior alternative.

Chapter 20, *Report Preparation*, lists the individuals involved in preparing this DEIR.

Chapter 21, *References*, provides a bibliography of printed references, websites, and personal communications used in preparing this DEIR.

Volume II — Appendices

Appendix A contains the State Agency MOU pertaining to the Settlement Agreement.

Appendix B is the Notice of Preparation issued by CDFW.

Appendix C presents the materials used during the scoping meetings.

Appendix D contains the comments received on the Notice of Preparation.

Appendix E presents the Best Management Practices (BMPs) for Collection and Transport of Salmonid Eggs and Juveniles.

Appendix F presents BMPs for Aquatic Invasive Species.

Appendix G contains the air quality and greenhouse gas emission calculations.

Appendix H presents supporting documentation related to the evaluations of fisheries.

Appendix I contains the CDFW's Conservation Measures for Biological Resources that May Be Affected by Program-level Actions.

Appendix J presents supporting documentation related to the evaluation of vegetation and wildlife.

Appendix K presents the technical report for the cultural resources analysis, including Native American consultation, and telephone and e-mail communications, conducted during document preparation.

Appendix L presents the EDR Radius Map Report.

Appendix M presents the Draft Emergency Evacuation Plan for the SCARF.

Appendix N presents noise data and related photographs.

1.6 Impact Terminology and Use of Language in CEQA

This DEIR uses the following terminology to describe environmental effects of the Proposed Program:

- A finding of *no impact* is made when the analysis concludes that the Project would not affect the particular environmental resource or issue.
- An impact is considered *less than significant* if the analysis concludes that there would be no substantial adverse change in the environment and that no mitigation is needed.

- An impact is considered *significant* or *potentially significant* if the analysis concludes that there could be a substantial adverse effect on the environment.
- An impact is considered *less than significant with mitigation* if the analysis concludes that there would be no substantial adverse change in the environment with the inclusion of the mitigation measures described.
- An impact is considered *significant and unavoidable* if the analysis concludes that there could be a substantial adverse effect on the environment and no feasible mitigation measures are available to reduce the impact to a less than significant level.
- An impact is considered *beneficial* if the analysis concludes that there would be a positive change in the environment.
- *Mitigation* refers to specific measures or activities adopted to avoid, minimize, rectify, reduce, eliminate, or compensate for an impact.
- A *cumulative impact* can result when a change in the environment results from the incremental impact of a project when added to other related past, present, or reasonably foreseeable future projects. Significant cumulative impacts may result from individually minor but collectively significant projects. The cumulative impacts analysis in this DEIR focuses on whether the Proposed Project's incremental contribution to other significant cumulative impacts caused by past, present, or probable future projects is cumulatively considerable (i.e., significant).
- Because the term "significant" has a specific usage in evaluating impacts under CEQA, it is used only to describe the significance of impacts and is not used in other contexts within this document. Synonyms such as "substantial" have been used when not discussing the significance of an environmental impact.

1.7 Submittal of Comments

CDFW is circulating this DEIR for a 45-day public review and comment period that will end on Thursday, November 21, 2013. As discussed above, CDFW will host two public meetings during this period where oral and written comments will be received. The purpose of public circulation and the public meetings is to provide agencies and interested individuals with opportunities to comment on or express concerns regarding the contents of this DEIR. Specific dates, times and locations for these meetings will be provided in the Notice of Availability, on CDFW's website, and through several other methods.

Written comments concerning this DEIR can be submitted at the public meetings described above or at anytime during the DEIR public review period. All comments must be received by 5:00 p.m. on Thursday, November 21, 2013, directed to the name and address listed below:

California Department of Fish and Wildlife
Attn: Gerald Hatler
SCARF Draft EIR Comments

1234 E. Shaw Avenue
Fresno, CA 93710
E-mail: REG4SCARFCEQA@wildlife.ca.gov

Submittal of written comments via e-mail (Microsoft Word format) would be greatly appreciated. Written comments received in response to this DEIR during the public review period will be addressed in a Response to Comments section of the Final EIR.

All documents mentioned herein or related to this Project can be reviewed online at the CDFW website (http://www.dfg.ca.gov/news/pubnotice/).

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Chapter 2
PROJECT DESCRIPTION

2.0 Overview

This chapter describes the Proposed Project, including its purpose and objectives, location, proposed actions, and necessary permits and approvals.

2.1 Project Purpose

Under the Proposed Project, CDFW (formerly known as the California Department of Fish and Game) would support the implementation of the SJRRP Restoration Goal, "to restore and maintain fish populations in 'good condition' in the main stem of the San Joaquin River below Friant Dam to the confluence of the Merced River, including naturally reproducing and self-sustaining populations of salmon and other fish." The Project also would manage and conserve native salmon and the San Joaquin River habitat they occupy for their ecological significance, as well as provide for recreation and enjoyment by current and future citizens.

2.2 Project Objectives

The Proposed Project's objectives are as follows:

- Support and assist implementation of the Settlement Agreement, including the following:
  - Support the Settling Parties in achieving the SJRRP Restoration Goal, consistent with CDFW's authorities, resources, and broader regional resource strategies; and
  - Fulfill the other commitments identified in the State Agency MOU pertaining to the Settlement Agreement.
- Produce a spring-run Chinook salmon stock on the San Joaquin River that is genetically diverse, while minimizing impacts to source populations.
- Provide a controlled laboratory environment for conducting fish research.
- Manage Chinook salmon runs in the Restoration Area and, specifically, the potential for hybridization between runs.
- Monitor and conduct research that will direct Chinook salmon management within the Restoration Area.

- Fulfill CDFW's mission to manage California's diverse fish, wildlife, and plant resources, and the habitats on which they depend, for their ecological values and for their use and enjoyment by the public.
- Fulfill CDFW's obligation to conserve, protect, and manage fish, wildlife, native plants, and habitats necessary for biologically sustainable populations of those species and as a trustee agency for fish and wildlife resources pursuant to Fish and Game Code section 1802.

2.3 Project Location

The following terminology is used to describe the geographic extent of the Proposed Project:

- **Potentially Affected Area**: Includes the portions of the San Joaquin River watershed, Sacramento River watershed, Sacramento–San Joaquin Delta (Delta), San Francisco Bay, and Pacific Ocean that are accessible to salmon released under the Proposed Project.
- **Project Area**: Includes areas in which physical actions that are part of the Proposed Project would take place. This includes the SCARF site (defined below), broodstock collection sites, quarantine sites, Chinook salmon production and reintroduction sites, and fisheries management and research areas.
- **Restoration Area**: Includes the San Joaquin River below Friant Dam to the confluence of the Merced River, as set forth in the Settlement Agreement.
- **SCARF site**: Includes the physical boundaries of the proposed SCARF site, which would be located at the address currently listed as 17372 Brook Trout Drive in Friant, Fresno County, California. The SCARF site is adjacent to the San Joaquin River approximately 1.1 miles downstream of Friant Dam, immediately west of CDFW's existing San Joaquin Fish Hatchery (SJFH). When used as part of the impact analysis, the term "SCARF site" also includes the location of proposed water supply conveyance improvements at the base of Friant Dam.

Figure 2-1 depicts the boundaries of the above-mentioned geographic areas and locations.

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Horizon WATER and ENVIRONMENT

Prepared for:
California Department of Fish and Wildlife
California Department of General Services

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Data Sources:
Chinook salmon fall late-fall run abudance (CDFW)
Central Valley steelhead distribution (NMFS)
Central Valley Chinook Ocean Extents (Williams 2006)
NHD hydro-layer
Base Map: National Geographic

Figure 2-1: Potentially Affected Area

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2.4 Proposed Project Actions

2.4.1 SJRRP Background

As part of the early planning process for implementation of the Settlement Agreement, the Implementing Agencies created a SJRRP Fisheries Management Plan (FMP) (SJRRP 2010a). This document laid out an approach to adaptively manage the reintroduction of Chinook salmon to the San Joaquin River. The FMP also identified fish population goals for the SJRRP. These goals provide a framework for implementation of the Restoration Goal, which CDFW seeks to support through the Proposed Project. These goals are:

- Establish natural populations of spring-run and/or fall-run Chinook salmon that are specifically adapted to conditions in the upper San Joaquin River. Allow natural selection to operate on the population to produce a strain that has its timing of upstream migration, spawning, outmigration, and physiological and behavioral characteristics adapted to conditions in the San Joaquin River. In the case of spring-run Chinook salmon, the initial population would likely be established from Sacramento River Basin stock.
- Establish populations of spring-run and/or fall-run Chinook salmon that are genetically diverse so they are not subject to the genetic problems of small populations, such as founder's effects, inbreeding, and the high risk of extinction from catastrophic events. The minimum population threshold established in the Settlement Agreement was set with this goal in mind and suggests genetic and population monitoring would be required.
- Establish populations of spring-run and fall-run Chinook salmon that are demographically diverse in any given year, so returning adults represent more than two age classes. Given the vagaries of ocean conditions, the likelihood of extreme droughts, and other factors that can stochastically affect Chinook salmon numbers in any given year, resiliency of the populations requires that multiple cohorts be present. Chinook salmon populations in the Central Valley are dominated by three-year-old fish, plus two-year-old males (also known as jacks), partly as the result of the effect of fisheries harvest and hatchery mating practices. Both population resiliency and genetic diversity require that four-, five-, and even six-year-old Chinook salmon be part of the population each year.
- Each established San Joaquin River population (spring-run, fall-run) should show no substantial signs of hybridizing with the other. In addition, each established San Joaquin River population (spring-run, fall-run) should show no substantial signs of genetic mixing with non-target hatchery stocks.
- Establish a balanced, integrated, adaptive community of fishes having a species composition and functional organization similar to what would be expected in the Sacramento–San Joaquin Basin.

Under the SJRRP, restoration actions will be taken such that habitat in the San Joaquin River upstream of confluence with the Merced River would be adequate to allow passage and survival of introduced salmon.

2.4.2 Overview

The Proposed Project involves five principal actions:

1. Construct and operate the SCARF;
2. Reintroduce Chinook salmon to the Restoration Area (including donor stock collection, broodstock development, and/or direct translocation);
3. Manage Chinook salmon runs in the Restoration Area within the context of basin-wide conditions and strategies;
4. Conduct fisheries research and monitoring in the Restoration Area; and
5. Manage and support recreation within the Restoration Area.

This section continues with detailed descriptions of these actions that comprise the Proposed Project. Several technical terms related to aquaculture and hatchery operations are used throughout this document. Definitions of key terms, as they relate to the Proposed Project, are as follows:

- **Donor stock**: Eggs or juvenile fish collected from hatchery or wild[1] populations that are used to establish broodstock or directly translocated to the San Joaquin River.
- **Broodstock**: Fish intended for breeding and development of conservation stock.
- **Conservation stock**: Fish produced at the SCARF and ultimately released in the Restoration Area or used for research purposes.
- **Captive rearing**: Raising eggs or juvenile fish to produce conservation stock or broodstock.
- **Eyed Egg:** A fish egg containing an embryo that has developed enough so that the black spot of the eyes are visible through the egg membrane. It indicates that the egg is less sensitive to movement and can be handled safely, e.g., for transportation.
- **Redd:** A fish nest, consisting of a depression, usually a pit or a trough in the stream gravel, dug in preparation for, or during, spawning. Eggs are laid,

[1] The term “wild” is used to describe fish that are hatched and spend their entire life cycle in nature regardless of their parentage. Wild populations are groups of interbreeding fish hatched in nature—however, a substantial portion of their parents may be hatchery strays. Also, a distinction is made regarding where spawning occurs by the terms “hatchery spawning,” of which a portion of the fish spawning (broodstock) in the hatchery may be of wild origin, and “natural spawning,” of which a portion of the fish spawning in nature may be of hatchery origin.

fertilized, and covered with gravel, and larvae are hidden in the redd. The eggs are oxygenated by the current.

- **Smolt production:** Captive rearing of eggs or juvenile fish to the smolt or pre-smolt stage for release to the wild. The smolt stage is the stage at which the fish can migrate from freshwater to the ocean.
- **Translocation**: Moving fish or eggs from their stream of origin for direct release into the San Joaquin River.
- **Trap and Haul:** Capturing and moving fish from one location to another in the San Joaquin River (generally within the Restoration Area).
- **Volitional release:** A system which allows juveniles to leave SCARF aquaculture tanks and enter the San Joaquin River at their own will (or volition).

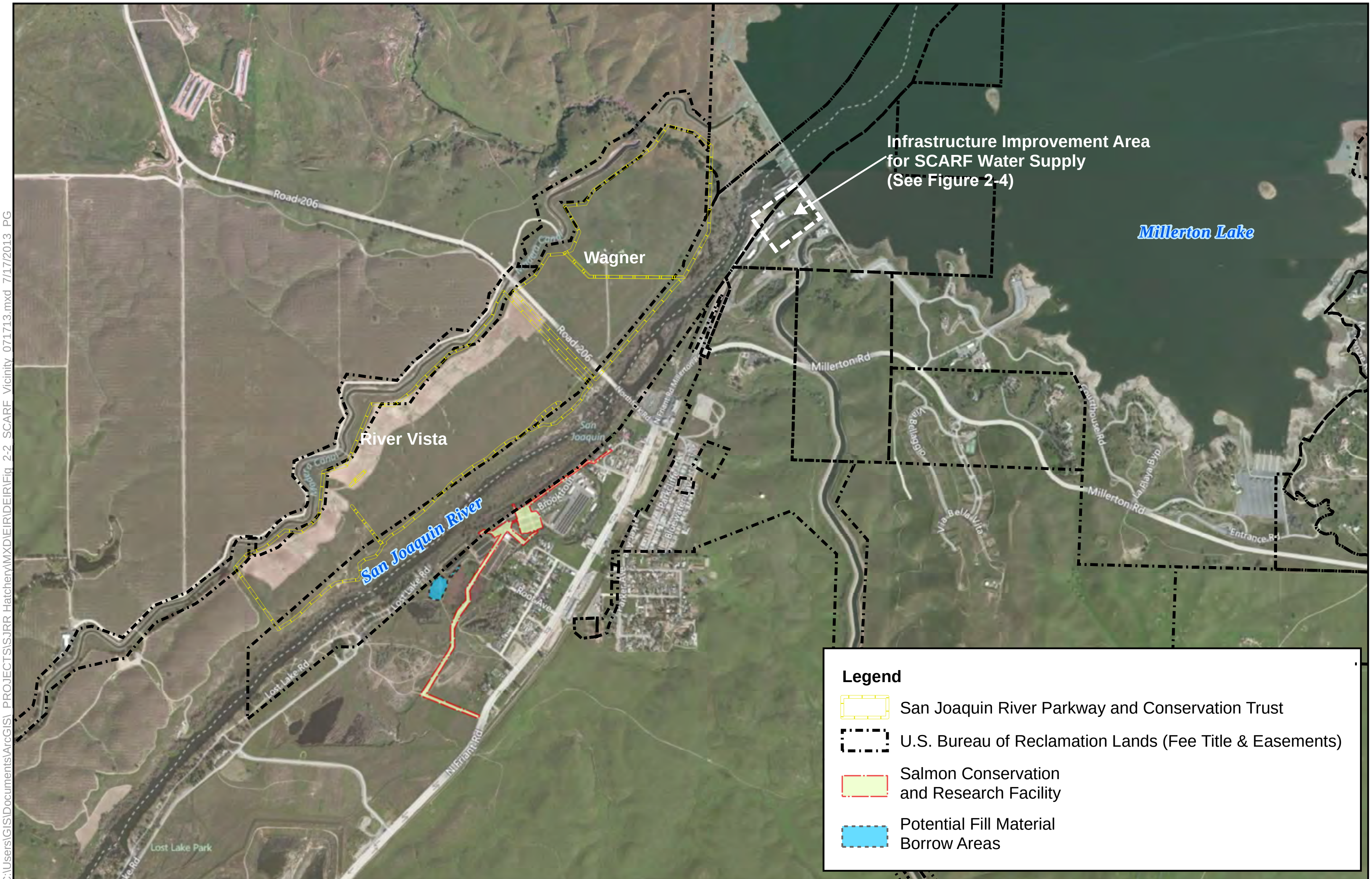
2.4.3 Salmon Conservation and Research Facility (SCARF)

The Proposed Project includes the construction and operation of the SCARF and associated improvements. The primary purpose of the SCARF is to produce Chinook salmon for reintroduction to the San Joaquin River. The SCARF would provide CDFW with the ability to use relatively small numbers of Chinook salmon eggs and juveniles collected from various donor populations to develop a broodstock. This broodstock would enable CDFW to produce a conservation stock that is genetically diverse, while minimizing impacts to source populations. Thus, the SCARF would play an important role in achieving the SJRRP spring-run Chinook salmon population objectives established in the FMP (SJRRP 2010a).

CDFW operates a small-scale Interim Conservation Facility (Interim Facility) at the proposed SCARF site. The Interim Facility began culturing fall-run Chinook salmon in 2011 to provide the SJRRP with experience rearing Chinook salmon at the site. The Interim Facility currently consists of large circular tanks (16-20 feet in diameter), several smaller tanks, and incubation equipment. These tanks are planned for reuse at the SCARF, although several of them may be moved. The Interim Facility began receiving annual collections of juvenile spring-run Chinook salmon from the Feather River Fish Hatchery (FRFH) in spring 2013. These fish would be used to develop broodstock at the Interim Facility. It is important to note that the Interim Facility is not sufficiently large to produce the numbers of fish needed to develop a founding stock for the San Joaquin River. Rather, the Interim Facility was designed to begin broodstock development and conduct experiments to determine the viability of, and define the parameters for, the SCARF. At full capacity, the Interim Facility would be able to raise and spawn 50–100 pairs of Chinook salmon per year, including up to four-year classes. Features that would be a part of the SCARF but are not part of the Interim Facility include a greater amount of laboratory space, a volitional release channel, and other features to support the larger-scale fish production activities that would occur at the SCARF.

Under the Proposed Project, CDFW proposes to release the spring-run Chinook offspring from the broodstock (i.e., conservation stock) to the Restoration Area no earlier than 2015. The broodstock population may periodically be reduced to not exceed the carrying capacity of the facility, and fish unnecessary for broodstock may be placed in the San Joaquin River and allowed to spawn naturally in the Restoration Area or outmigrate at an earlier date. However, spring-run Chinook would only be placed in the San Joaquin River if federal Endangered Species Act (ESA) section 10(j) experimental population designation and associated section 4(d) rules have been adopted. In January 2013, NMFS published a proposed rule for nonessential experimental population designation under section 10(j) and take provisions for reintroduction of spring-run Chinook salmon under section 4(d). The comment period for the proposed rule closed on March 4, 2013. As of the end of August 2013, the final version of the rule is pending. In addition, in October 2012, NMFS issued Permit 14868, a 5-year 10(a)(1)(A) enhancement of species permit to USFWS which authorizes take of Central Valley spring-run Chinook salmon from the FRFH for scientific research and enhancement activities to establish broodstock methodologies, and to allow collection of eggs and/or juveniles from the FRFH to initiate studies associated with the SJRRP for a five-year period. In December 2012, CDFW issued a concurrence pursuant to CDFW Code section 2080.3(a)(3) that Permit 14868 will further the conservation of Central Valley spring-run Chinook salmon (CDFG 2012) (See Chapter 6, *Fisheries* for more information on Fish and Game Code section 2080.3, and NMFS' proposed regulations and permitting). After the SCARF is completed and operational, which is planned for early 2016, the Interim Facility would be integrated into the SCARF.

The preliminary plans for the SCARF are shown in Figures 2-2 and 2-3. CDFW anticipates that the final design for the SCARF may include some modifications to the preliminary plans.



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Horizon
WATER and ENVIRONMENT
Prepared for:
California Department of Fish and Wildlife
California Department of General Services

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Imagery Source: Reclamation; Bing Maps

Figure 2-2: Salmon Conservation and Research Facility Vicinity Map

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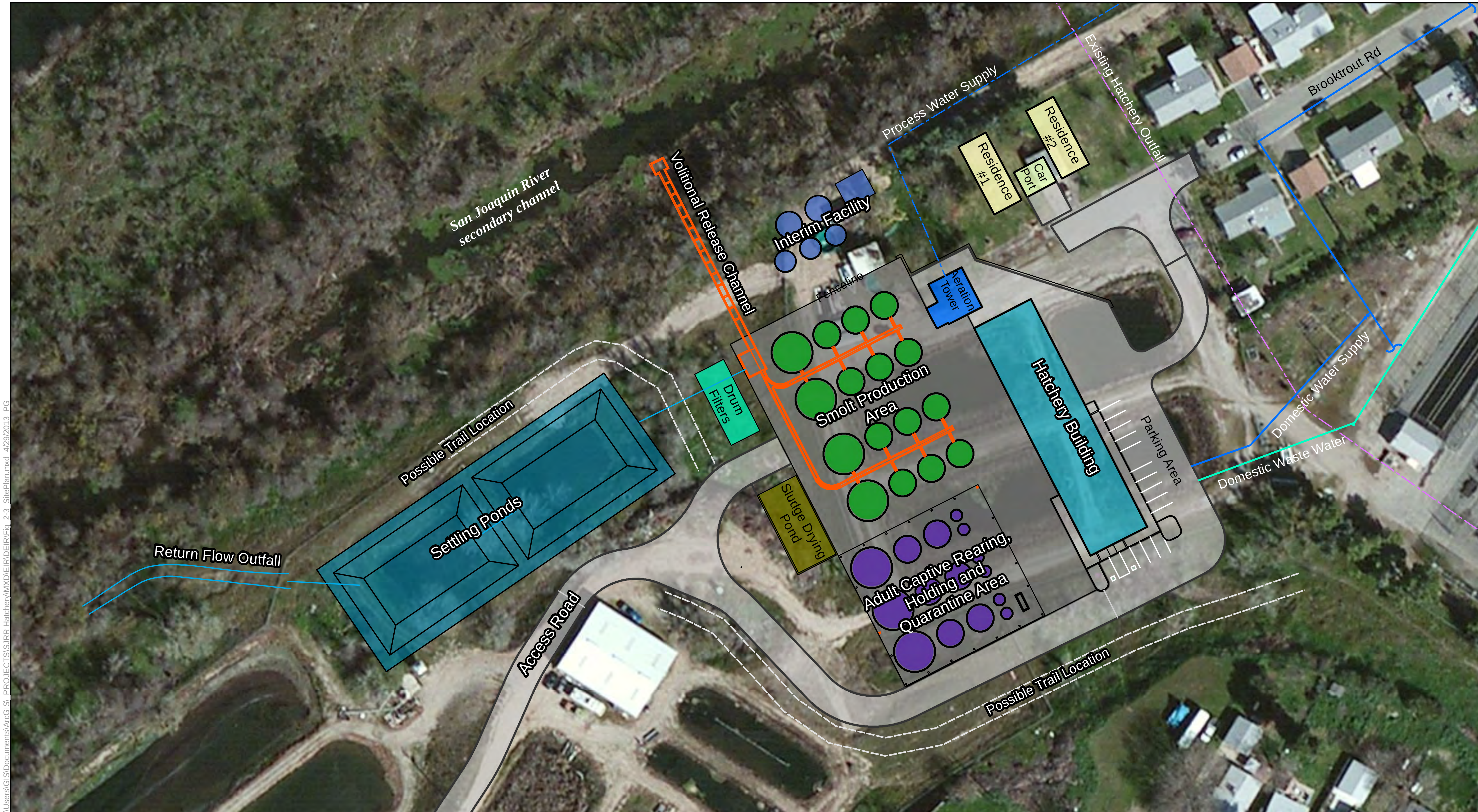

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Imagery Source: Bing Maps

Figure 2-3: Detailed Site Plan for the Salmon Conservation and Research Facility

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Description of Facilities

The SCARF would include structures, a parking area, water supply and wastewater systems, drainage and stormwater management, an access road, up to two staff residences, and other ancillary improvements. Descriptions of these facilities follow.

Structures

Structures that would be part of the SCARF include a hatchery building; a smolt production, captive rearing, and holding facility consisting of different sized containers or vessels and piping and concrete channels for drains and volitional fish releases; and up to two staff residences. A general description of each structure is provided below.

Hatchery Building: The main hatchery building would be a single-story building covering approximately 8,200 square feet (ft^2). Figure 2-3 shows the proposed location of the structure. The exterior facing and roof would be constructed of metal or a Concrete Masonry Unit (CMU)/metal combination. Approximately half of the building would be occupied by offices for staff, a break room/conference room, restrooms, and research facilities. The other half of the building would include a mud room, a freezer, dry feed storage, general work and storage areas, a pump room, and tanks and equipment used in rooms for egg incubation and fry production.

Smolt Production Area and Volitional Release Channel: This would be an open-air area consisting of twelve 20-foot and four 30-foot diameter circular culture tanks used for smolt production. Individual tanks would be covered with domes, netting, or other material suitable to prevent predation by birds and other animals and to prevent escape. All tanks would have bottom and side drains to convey accumulated waste and permit volitional release of fish, respectively. A series of concrete channels would be constructed and attached to the side drains of the tanks to provide drainage and volitional fish releases to the secondary channel of the San Joaquin River. Ventria (operable openings) on the side of the tanks would allow fish to voluntarily enter the release channel system during periods of fish outmigration. The volitional release channel would terminate in the secondary channel of the San Joaquin River where outmigrating fish could enter the river (Figure 2-3). Holding tanks, as with all tanks at the facility, would be fitted with bottom drains to allow continuous through-flow of water and waste. Flow characteristics of water in circular tanks are such that the vortex of water with accumulated fish waste is funneled to bottom drains within each of the tanks. These bottom drains would continuously capture and convey waste out of the tanks and to the treatment system.

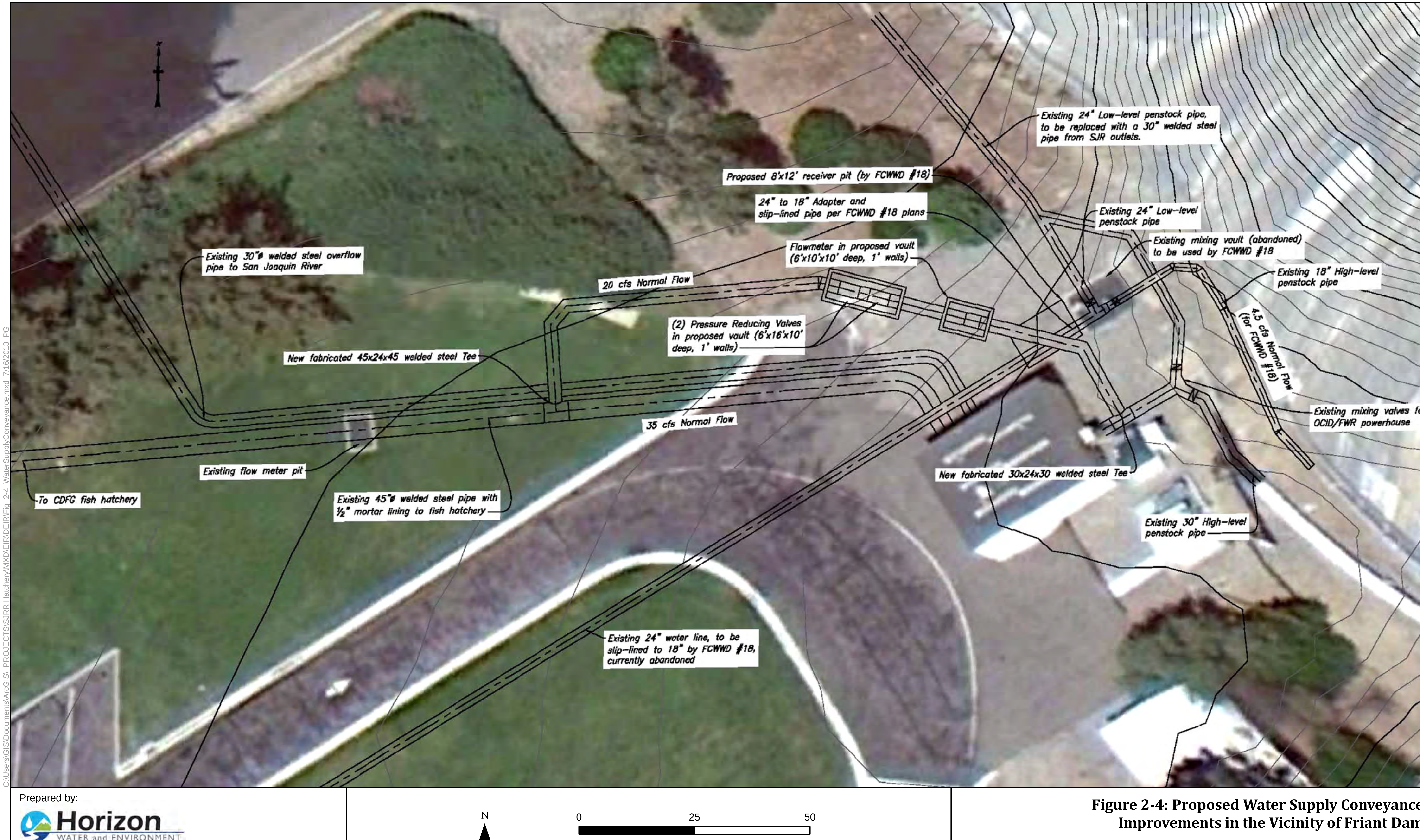
Adult Captive Rearing, Holding and Quarantine Area: This would be a canopy-covered area consisting of six 8-foot, six 20-foot, and three 30-foot diameter circular culture tanks (Figure 2-3). The 8-foot diameter tanks would be used for early feeding and juvenile segregations; the larger tanks would be used for rearing fish up to three years of age, adult holding, and quarantine. The canopy above this area would be constructed of metal. The individual tanks would be covered with domes, netting, or other material suitable to prevent predation by birds and other animals, and to prevent escape. These tanks also would have bottom drains to continuously capture and convey waste out of the tanks and to the treatment system.

Fish Propagation Water Supply & Treatment System

Water Supply: Reclamation currently delivers a continuous flow of 35 cubic feet per second (cfs) to the SJFH for aquaculture operations. This water is diverted from the Friant-Kern Canal (approximately 75 feet above Friant Dam's south abutment) and the San Joaquin River outlet works at Friant Dam. Flows from these diversions are mixed and then pass through the Fishwater Release Powerplant located at the base of Friant Dam (Figure 2-4). This power plant is owned and operated by the Orange Cove Irrigation District (OCID). After passing through the Fishwater Release Powerplant, the flow is conveyed to the SJFH via a 45-inch steel pipe which is capable of handling approximately 65 cfs.

SCARF operations will require up to 20 cfs. This flow can be conveyed through the existing 45-inch steel pipe that delivers water to the SJFH. However, OCID is limited to a diversion of 35 cfs through its license from the State Water Resources Control Board (SWRCB), and the turbine generator and other power plant infrastructure are currently operating at their rated capacity. Thus, the additional 20 cfs for the SCARF would either need to bypass the Fishwater Release Powerplant or the plant and its license would need to be modified to accommodate the additional flow. Because Reclamation is responsible for improvements on federal land, Reclamation conducted an appraisal-level study to evaluate alternatives for delivering 20 cfs to the SCARF (Reclamation 2013). The study determined that the most cost effective means to provide the water to the SCARF would be to construct a bypass around the Fishwater Release Powerplant.

Figure 2-4 provides a conceptual engineering plan for water supply improvements necessary to bypass the Fishwater Release Powerplant. Reclamation would complete the design and construction of these improvements, which are anticipated to include increasing the diameter of the Friant-Kern outlet works and San Joaquin River outlet works, as well as constructing a tee bypass around the Fishwater Release Powerplant (Figure 2-4). These may consist of both buried and aboveground components. Once the bypass is completed, the additional 20 cfs for the SCARF would be conveyed to the SJFH aeration tower via the existing 45-inch steel pipe. As part of its activities under the Proposed Project, CDFW would construct a new buried 30-inch water line that would connect the SCARF to the existing 45-inch line. The new 30-inch pipeline would begin just upstream of the SJFH aeration tower and end at the proposed SCARF aeration tower (Figure 2-2).



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Horizon WATER and ENVIRONMENT

Prepared for:
California Department of Fish and Wildlife
California Department of General Services

Source: Reclamation 2013

Figure 2-4: Proposed Water Supply Conveyance Improvements in the Vicinity of Friant Dam

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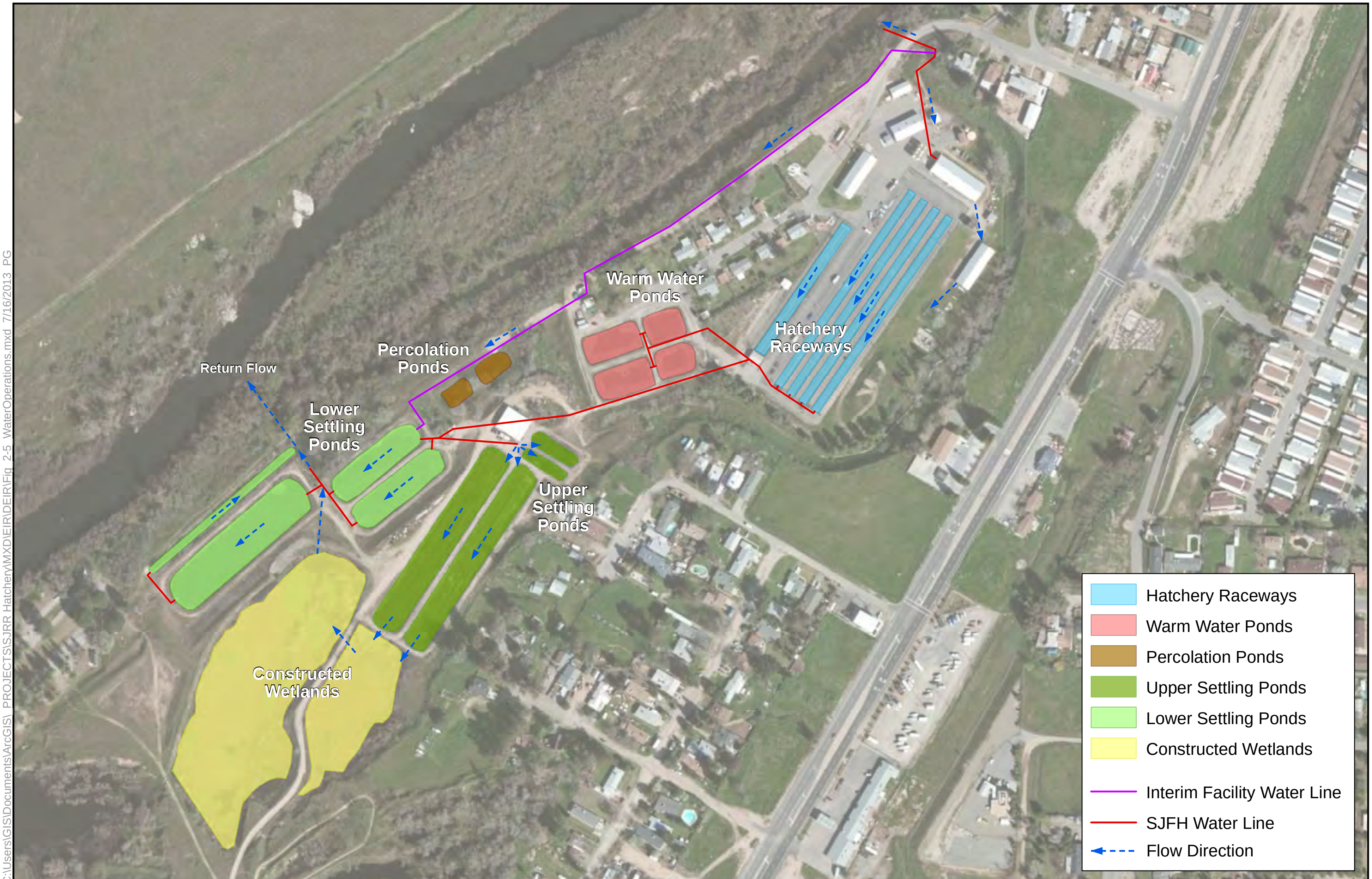

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California Department of General Services

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Imagery Source: Bing Maps

Figure 2-5: Water Operations of the San Joaquin Fish Hatchery and Interim Conservation Facility

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Aeration Tower and Primary Filtration System: The aeration tower would be used to oxygenate water and remove undesirable dissolved gasses that may be present in the water supply before it is used at the SCARF. The aeration tower would operate under gravity feed; no pumps or mechanized equipment would be required. The aeration tower would be constructed north of the hatchery building and east of the smolt production area (Figure 2-3). The aeration tower assembly would cover approximately 1,050 ft^2 and be approximately 24 feet high. Water used for outdoor culture tanks would be distributed directly from the aeration assembly to outdoor culture tanks. Water used for incubation and fry production would pass from the aeration tower and through a primary filter and ultraviolet treatment system, which would sit on a 180-ft^2 platform adjacent to the aeration tower, prior to entering the hatchery building.

Treatment System: The following bullets describe the current plans for the SCARF process water treatment system. These systems will be designed to ensure adequate capacity to store, convey, and treat SCARF process water, as well as other inputs (such as stormwater, SJFH discharges, etc.).

- **Microscreen Drum Filters and Sludge Drying Bed:** Microscreen drum filters would be used to treat return flows from culture operations in the hatchery building and bottom drains of fish culture tanks. The microscreen drum filters would remove solids from the return flows. The filters would operate under gravity feed; no pumps or mechanized equipment would be required. The microscreen drum filters would be constructed between existing percolation ponds and the proposed smolt production area (Figure 2-3). Solid waste (sludge) from microscreen drum filters would be dried on a sludge-drying bed adjacent to the filters (Figure 2-3), then used as feed by the worm farm that operates in the SJFH settling ponds (Figure 2-5). Alternatively, the sludge might be taken off-site for disposal at a municipal solid waste facility, if it is not needed by the worm farm.

- **Settling Ponds:** Two existing vegetation-lined settling ponds would be used to treat return flows from the SCARF. The ponds are currently being used to percolate water discharged from the Interim Facility (Figure 2-5). The vegetated ponds would be used to detain water from the SCARF (e.g., for settling of solids, nutrient uptake, and conversion by aquatic plants) prior to discharge to the San Joaquin River.

- **Return flow outfall:** From the vegetated SCARF settling ponds, water would flow either directly into the secondary channel of the San Joaquin River or through a 24-inch pipe into the SJFH settling ponds, before eventually discharging to the secondary channel of the San Joaquin River. See Figure 2-5, *Water Use and Management* depicting these facilities, and "On-site Operations," below, for a discussion of treatment methods. Outfall water quality will be monitored as required by the Central Valley Regional Water Quality Control Board, and CDFW would follow other applicable permit requirements.

Domestic Water Supply & Wastewater

Water Supply: Domestic water supply for the hatchery building and residences would be provided through a new connection to the domestic supply serving the SJFH (Figure 2-3). The water treatment system for the SJFH would be upgraded to accommodate the increased demand from the SCARF.

Wastewater: Domestic wastewater from the hatchery building and residences would be discharged to the septic system serving the SJFH (Figure 2-3). This septic system was recently upgraded and has sufficient capacity to support domestic wastewater from the hatchery building and residences (Pers. comm. Siemering 2013)

Drainage, Stormwater, and Utilities

On-Site Drainage and Stormwater Management: Runoff from the main building pad (i.e., the area for the hatchery building, fish culture tanks, and parking) would be collected, pre-treated, and routed overland into catch basins and released into an existing 42-inch reinforced concrete pipe (RCP) that serves the SJFH. This pipe discharges stormwater to the secondary channel of the San Joaquin River. Runoff from the main building pad would be pre-treated before entering the pipe with catch basin inserts to trap pollutants (e.g., sediment, hydrocarbons, trash). Runoff from other facilities, such as the access road and ancillary improvements, would follow existing stormwater drainage patterns. Additionally, the Proposed Project would re-route the underground stormwater drainage pipes into the existing 42-inch RCP.

Off-Site Drainage and Stormwater Management: The SCARF site receives drainage from land to the south and east of the site. This drainage is currently routed into the four non-operational aquaculture ponds on the SCARF site via underground pipes. As part of the Proposed Project, the underground stormwater lines would be rerouted to the settling ponds of the SJFH (Figure 2-5).

Utilities: Electricity is currently provided by Pacific Gas and Electric Company (PG&E). Site electrical is mainly run overhead, with drops to existing buildings and residences. A pad mount transformer and underground distribution would be installed for new structures that are part of the Proposed Project. Communication lines (phone, internet) would be installed underground. Natural gas would be provided to the hatchery building and residences by connecting to the propane tanks that supply the SJFH.

Solid Waste Disposal: Waste generated at the SCARF would be collected and disposed of by a local solid waste disposal company. As mentioned previously, solid waste from microscreen drum filters would be dried at the on-site sludge drying bed, then used as feed by the worm farm that operates in the SJFH settling ponds or taken off-site for disposal. At times, the SCARF may need to dispose of excess or diseased fish. Some carcasses from hatchery mortalities will be frozen and generally disposed of through the hatchery solid waste disposal system, which would ultimately be sent to the American Avenue Landfill.

Staff Residences

Up to two residences would be constructed, purchased, or rented to provide housing for SCARF staff. CDFW is currently investigating the following options for the staff residences:

1. *Single-story residences*: This option includes construction of single-story residences with living areas on the ground level (Figure 2-3). The living areas would be subject to inundation during a 100-year flood event. An Emergency Evacuation Plan would be prepared that prescribes protocols to protect the safety of residents in the event of a large flood.
2. *Two-story residences*: Under this option, the ground level of the residences would be used for storage and/or parking, and the living area would be constructed above the base flood elevation on the second story. The buildings would be designed and adequately anchored to resist flotation, collapse, and lateral movement of the structure resulting from hydrodynamic and hydrostatic loads, including the effects of buoyancy. The garage would be designed to allow for automatic entry of floodwaters.
3. *Off-site residences*: Residences may be located off the SCARF site, though nearby. This option may include purchase or rental of existing homes in Friant, or purchase of vacant parcels and construction of new residences.
4. *Mobile housing*: CDFW may elect to provide mobile housing (e.g., trailers or modular homes) on the SCARF site. The living areas would be subject to inundation during a 100-year flood event. An Emergency Evacuation Plan would be prepared that prescribes protocols to protect the safety of residents in the event of a large flood.

Access Road & Parking

Access Road: Access to the site would be provided by improving East Belcher Avenue, which extends from North Friant Road to the SCARF site (Figure 2-2). Improvements to the road would include widening it to a maximum of 24 feet with a maximum of 3:1 (horizontal:vertical) side slopes, and placement of asphalt concrete paving over an aggregate base. The easternmost section of the access road (approximately 500 feet) closest to the SCARF would be routed over an undeveloped portion of the site (Figure 2-3). Improvements to the access road would require placement of fill (see "Construction" in this section for more detailed information).

Parking: Seventeen parking spaces would be provided for the SCARF: five for staff, ten for visitors, and two handicap-accessible visitor spaces. The parking lot would be located adjacent to the hatchery building and would be surfaced with asphalt concrete and reinforced concrete paving.

Ancillary Improvements

Fencing: The SCARF would be surrounded by a 6-foot-high chain link fence with three strands of barbwire. Sliding gates would be installed at the vehicle entrances to the site.

Fire Water Line and Hydrants: A below-ground 6-inch or 8-inch water line would be connected to three fire hydrants spread throughout the site.

Landscaping & Irrigation: There would be limited landscaping and irrigation.

Lighting: Light standards would be installed throughout the site for security purposes, each with a timer and manual override.

Flag pole: An aluminum flag pole, with exposed height of 30 feet, would be installed near the hatchery building.

Construction

Construction Methods

Site Preparation and Earthwork: Site preparation would include clearing and grubbing, import of fill, placement of fill, and compaction. Clearing and grubbing would be conducted with standard excavators, bulldozers, as well as other necessary equipment and hand labor. All demolished materials and debris would be disposed of off-site at an appropriate location selected by the construction contractor. The quantity of these generated solid waste materials would be relatively small, and waste likely would be transported to American Avenue Landfill, located approximately 45 miles from the project site in Kerman, California. For the purposes of the impact analysis, the disposal site has been assumed to be located within one hour's travel time from the SCARF site.

Excavation for site preparation would extend to depths of approximately 10 feet below ground surface (bgs) in areas where buildings and structures would be located. Disused aquaculture ponds in the footprint of the main building pad would be dewatered, over-excavated, and backfilled. Approximately 18,800 cubic yards (cy) of fill material would be used to prepare the main building pad. Approximately 12,100 cy of fill material would be taken from borrow sites on adjacent state-owned lands (Figure 2-2). The remainder of the fill would be imported to the site. Fill would be delivered to the building sites by conventional haul trucks (15–20 cy per load). For the purposes of the impact analysis, any and all sources of off-site fill material are assumed to be located within 30-minutes travel time of the SCARF site (each way). Fill material would be placed with an excavator and compacted with a compactor or roller. The finished grade of the main building pad would be approximately six feet higher than the existing ground surface.

Buildings and Structures: Construction of buildings and structures would include the following activities:

- forming, rebar installation, concrete delivery and placement;

- structural steel work (assembly, welding);
- electrical/instrumentation work;
- masonry construction; and
- installation of mechanical equipment and piping.

Pipelines and Underground Utilities: Pipelines and underground utilities would be installed in open trenches by using conventional cut-and-cover construction techniques. This would involve clearing and grubbing, trenching and shoring, pipe installation, backfill, and surface restoration.

Access Road: Approximately 4,800 cy of fill material would be used to create the embankments for the access road. As described above, the fill material would be taken from borrow sites on adjacent state-owned lands or imported to the site. Road surfacing would consist of Portland cement concrete and/or asphalt concrete overlaying a Class 2 aggregate base. Aggregate base and the top 6 inches of pavement subgrade would be compacted to 95% relative compaction with drum rollers. Water trucks would be used to ensure uniform moisture conditions within the base course and subgrade before compaction. Pavers and haul trucks would be used to place and initially compact an asphalt mixture, while concrete mixer trucks would be used to deliver Portland cement concrete.

Construction Equipment

The main pieces of equipment that may be used are:

- track-mounted excavator
- small crane
- end dump truck
- ten-wheel dump truck
- paving equipment
- flat-bed delivery truck
- concrete truck
- bulldozer
- backhoe
- compactor
- front-end loader
- water truck
- forklift
- compressors/jack hammers
- grader
- mowing equipment (e.g., weed eaters, commercial lawnmowers)

Construction Fencing and Best Management Practices

The construction area would be fenced for safety and security purposes. The construction contractor would be required to install fencing around environmentally sensitive areas, as appropriate, to protect sensitive resources or habitats. To the extent feasible, the contractor would retain trees in the SCARF site greater than 5 inches diameter at breast height (dbh), and provide protection for these trees throughout construction.

Construction Schedule

Construction of the Proposed Project is anticipated to begin in early 2015 and be completed in early 2016. Table 2-1 provides an estimated construction schedule. Construction activities would occur Monday through Friday between 7:30 a.m. and 4:30 p.m. After-hours work and work on Saturdays, Sundays, and State holidays may be permitted at the discretion of the State. The construction schedule and/or activities would (or may) be adjusted to avoid or minimize impacts on sensitive wildlife species, as necessary.

Table 2-1. Estimated Construction Schedule for the SCARF

Project Component	Approximate Construction Schedule
Mobilization	February 2015
Clearing and Grubbing	March 2015 – April 2015
Site Preparation and Access Road	March 2015 – June 2015
Underground Infrastructure	July 2015 – September 2015
Building Slabs	July 2015 – October 2015
Facilities Construction	September 2015 – December 2015
Utilities, Electrical, and Plumbing	October 2015 – December 2015
Ancillary Improvements/Finishings	November 2015 – January 2016

Construction Vehicle Trips

Construction activities would require up to approximately 10 workers with up to a maximum total of 25 roundtrips per day. The grading activities for the Proposed Project would require approximately 1,400 haul-truck trips over an approximately 66-day period, which averages to approximately 22 haul-truck trips spread throughout the day. The anticipated primary access routes used for ingress/egress to the construction site would be North Friant Road and the unpaved access road, East Belcher Avenue.

On-Site Operations

In general, the SCARF operations would involve development and maintenance of spring-run Chinook broodstock to produce juveniles that would be released in the Restoration Area. A description of the on-site operations of the SCARF and supporting activities is provided below.

<u>Aquaculture</u>

The SCARF would provide for a full range of fish culture activities, including spawning, egg incubation, juvenile rearing, adult holding, tagging, and release or transfer. As part of SJRRP planning, CDFW has worked with the SJRRP to develop a Hatchery Genetic Management Plan (HGMP) (Börk and Adelizi 2010) for the proposed SCARF. The document provides more details of the proposed aquaculture operations, which are summarized below.

The process for developing a conservation stock would begin with the broodstock reared at the Interim Facility. As mentioned above, the Interim Facility began receiving juvenile spring-run Chinook salmon from the FRFH in the spring of 2013. These fish would be used to develop broodstock at the Interim Facility. Once the SCARF is constructed, conservation stock development would continue there.

As restoration progresses, spring-run Chinook salmon captured on the San Joaquin River would increasingly be used in the hatchery program. Salmon collected as eggs or juveniles or fertilized eggs collected from returning adults would be used for captive rearing. Over time, CDFW desires to place an increasing emphasis on using wild returns over hatchery returns at the SCARF. Additionally, under the Proposed Project, CDFW may collect eggs or juveniles from naturally spawning Central Valley spring-run stocks to develop broodstock at the SCARF.

Eggs and juveniles collected from the FRFH and, potentially, wild stocks would be reared at the SCARF to maturity and spawned. For captive spawning, staff would carefully select mating pairs to maximize population diversity in accordance with procedures defined in the HGMP. The goal of the SCARF is to spawn 150 to 450 females per year, resulting in collection of approximately 375,000 to 1,125,000 eggs.

Once spawned, fertilized eggs would be moved to the incubation room within the hatchery building where they would be maintained in one of several types of incubation systems (e.g., vertical trays, deep matrix, or moist air incubators). The vertical tray and deep matrix incubators would receive a constant flow of cold water (typically in the range of 45°–55° Fahrenheit [F] [7.2°-12.8° Celsius [C]]). Once the fish are hatched and reach a sufficient stage of development, they would be transferred to holding tanks in the fry production area, also within the hatchery building, for feeding and monitoring. Once the fry reach sufficient size, they would be moved to the outdoor smolt production area.

All hatchery juveniles would have their adipose fin clipped and be coded-wire tagged once they reached the minimum size for tagging. Any wild-captured broodstock would also be adipose fin-clipped and coded-wire tagged once brought into the SCARF.[2] All broodstock would also be genotyped for parental-based tagging

[2] Here and elsewhere where marking and tagging are described, alternative technologies for marking and tagging fish may be employed, as allowed by permit conditions.

and tagged with Passive Integrated Transponder (PIT) tags for tracking and identification in the SCARF. Release of fish to the Restoration Area is described in Section 2.4.4, "Reintroduction."

At times, the SCARF may need to dispose of excess or diseased fish. The SCARF would dispose of salmon carcasses in two ways. First, some carcasses arising from hatchery mortalities would be frozen and generally disposed of through the hatchery solid waste disposal system, and ultimately at municipal disposal facilities. Second, carcasses derived from mortalities that have undergone adequate depuration (i.e., disinfection of pathogens) may be used to provide nutrient loading in streams. The SJRRP would investigate the nutrient status of the river system to determine if the current level of nutrient inputs from urban and agricultural sources warrants the need for additional nutrient loading.

Water Use and Management

Water demand for SCARF aquaculture operations would range from approximately 2-15 cfs (Table 2-2), although it may be as high as 20 cfs. Water flowing through the facility and discharging to the San Joaquin River is considered a non-consumptive use (although some water would be lost to evaporation and infiltration during the treatment process in settling ponds). Water demand would peak during the spring-run Chinook outmigration periods during which time the flow from smolt production tanks (via side-release drains) to the volitional release channel would increase substantially (Table 2-2). Water from circular tank side drains would supply the volitional release channel, allowing juveniles to be released directly into the secondary channel of San Joaquin River (Figure 2-3).

Return flow from the hatchery building and bottom waste-removal drains from circular tanks (approximately 15–40% of total volume) would be directed via gravity flow to microscreen drum filters for initial treatment. Upon exiting the filters, the water would enter two settling ponds (Figure 2-3). From the two settling ponds (Figure 2-3), effluent from the bottom drains would either be routed to the SJFH settling ponds (Figure 2-4), or discharged through a 24-inch pipe into the secondary channel of San Joaquin River. This second option would only be pursued if the quality of the treated effluent was within limits established by Regional Water Quality Control Board permit conditions. Water from circular tank side drains (approximately 60–85% of total volume) would discharge directly to the river secondary channel via the volitional release and drainage channels without pre-treatment from the microscreen drum filters (note that it is not necessary to send water discharged from the side drains through the drum filters because this water would not contain a large volume of suspended solids).

Table 2-2. Estimated Monthly Flow Rates for the Fully Operational SCARF

Month	Total Inflow to SCARF	Discharge at Main Return Outfall[1]	Discharge at Volitional Release Channel
	(cfs)[2]		
January	2.8	2.6	0.2
February	3.3	3.1	0.2
March	8.4	4.9	3.5
April	11.7	5.6	6.1
May	14.9	6.2	8.7
June	2.2	1.5	0.7
July	2.2	1.5	0.7
August	2.2	1.5	0.7
September	2.6	1.5	0.7
October	2.8	1.9	0.7
November	2.8	2.1	0.7
December	2.8	2.1	0.7

[1] Main return outfall to the San Joaquin River may occur at the terminus of either the SCARF settling ponds or the SJFH settling ponds, depending on the extent of treatment necessary.
[2] Assumes losses due to infiltration and evaporation are negligible.

Chemical Use and Storage

Various chemicals and therapeutics would be stored on-site to manage fish disease. All chemicals and therapeutics would be stored in a designated chemical storage area in the hatchery building and in accordance with CDFW and the manufacturer's safety and security protocols. This would include use of appropriate containers, secondary containment as appropriate, and BMPs. An Emergency Evacuation Plan for the SCARF would include measures to ensure the safety of chemicals and therapeutics in the event of a flood. For example, chemicals and therapeutics might be moved to a raised area (loft) in the hatchery building to secure them if a flood is imminent.

Treatment methods prescribed by fish pathologists for disease outbreaks and treatment protocols would be carried out by SCARF staff. Depending on the cause of an outbreak, treatment methods may vary. Chemical treatments for external pathogens might include the use of salt (NaCl), potassium permanganate ($KMnO_4$), formalin, or hydrogen peroxide. Bacterial infections could be treated with the use of oxytetracycline, florfenicol, or other approved antibiotics. All treatment would follow CDFW pathology guidance. All SCARF fish would be monitored by CDFW pathologists and certified prior to release. Return flows from the SCARF would be monitored to verify compliance with all permit conditions (e.g., National Pollution Discharge Elimination System [NPDES], or General Order for Aquaculture Facilities).

Maintenance

The SCARF would maintain a biosecurity program to (1) reduce the risk that pathogens will be introduced to the facility, (2) reduce the risk that pathogens will spread throughout the facility, and (3) reduce conditions that can increase susceptibility to infection and disease. Details of the biosecurity program are provided in the HGMP (Börk and Adelizi 2010). Aspects of the biosecurity program related to facilities maintenance include:

- Storing and using feed according to manufacturer recommendations to avoid fish health problems related to mycotoxins and rancidity.
- Cleaning and disinfecting all equipment and nets in an iodine-based disinfectant (or appropriate alternative) prior to use, and designating separate cleaning instruments to each rearing tank.
- Flushing with prophylactic salt administered to salmon on a weekly basis throughout the duration of captive broodstock holding.
- Maintaining fish below a maximum density index (12.5 pounds per cubic foot per inch) and maintaining flushing rates at a minimum of one turnover per hour to reduce stress and disease potential.
- Administering feed carefully to avoid uneaten feed accumulating at the bottom of the rearing tanks.
- Minimizing foot traffic and entryways, and maintaining a disinfectant foot bath at each entryway.
- Disinfecting off-site transport tanks and equipment prior to use with an iodophore to prevent disease transmission. Similarly, all surgically related equipment (i.e., needles for egg harvest, tissue collection utensils) used for broodstock spawning will be disinfected in alcohol or iodophore before use.
- Treating all new fish entering the facility with a prophylactic, if needed, as directed by a fisheries pathologist.
- Maintaining tank rotational water velocities at speeds that allow self-cleaning to minimize need for brushing tanks.
- Using automatic feeders to limit human contact.
- Minimizing traffic in fish-rearing areas.
- Providing sufficient cover for shade and predator avoidance, to restrict disease transfer.
- Removing dead or moribund fish promptly from each rearing tank and conducting necropsies. Moribund fish will be humanely euthanized immediately after removal from rearing tank.
- Monitoring fish daily for behavior and physical abnormalities. Fish exhibiting abnormal behavior will be screened for pathogens. Sick fish will be promptly examined by the CDFW Fish Health Lab.
- Maintaining separation of equipment and staff from the existing SJFH.
- Maintaining separate access routes to the facility from the existing SJFH.

- Housing fish in a secured structure to prevent predation and movement of fish associated with predation.

Aquatic Invasive Species Monitoring and Management

As required under CDFW's adopted Hatchery and Stocking Program EIR/EIS (ICF Jones & Stokes 2010), the SCARF would be required to develop and implement a Hazard Analysis and Critical Control Point Plan (HACCP). The HACCP would include methods to prevent the introduction of Aquatic Invasive Species (AIS) into the SCARF, and operational practices that prevent the spread of AIS within and outside of the facility, should prevention efforts fail. In addition, the SCARF would be operated in accordance with protocols for monitoring of AIS in all CDFW hatcheries. The current version of CDFW's AIS monitoring protocol for hatcheries is provided in Appendix F, *Best Management Practices for Aquatic Invasive Species*. The protocol identifies AIS species of concern, identification methods, monitoring guidelines, and reporting requirements.

Personnel & Visitation

Once constructed, the SCARF would employ four full-time and two part-time workers. Two of the full-time employees would live in state-provided housing on-site or nearby in Friant. Other employees are anticipated to live within one hour's travel time from the SCARF.

The SCARF would not be open to the public, but public outreach activities would be anticipated. The SCARF would also be visited by SJRRP staff on a regular basis.

Operations Timeline

As part of ongoing CDFW operations, spring-run donor stock from the FRFH are being segregated and transported to the Silverado Fisheries Base for quarantine. Beginning in spring 2013, the fish were moved to the Interim Facility site to establish a broodstock (see "Broodstock Collection" in Section 2.4.4, "Reintroduction"). In 2014, some two-year-old (2012 brood year) females might be available for spawning at the Interim Facility. Offspring would be reintroduced to the Restoration Area no earlier than 2015, provided that all necessary permits have been issued to the SJRRP. Adults could begin returning from these releases as early as 2016.

CDFW seeks to achieve targets consistent with statewide stock management needs and, consistent with its authorities, resources, and broader regional resource strategies, to assist the Settling Parties in achieving population targets and timelines identified by the SJRRP. The SJRRP seeks to achieve the first full-scale, large collection of eggs to produce broodstock at the SCARF in 2015. Under this proposal, the first full-scale releases of fish produced by the SCARF (i.e., conservation stock) would occur in 2018, with the first potential large returns occurring in 2021.

December 31, 2019, would mark the conclusion of the "Reintroduction Phase," as identified in the SJRRP Technical Advisory Committee[3] (TAC) recommendations (Reclamation and DWR 2011). Following the TAC recommendations, the SJRRP's return target for 2019 is 500 fish from wild stock. If returns do not meet this target in 2019 or any year thereafter, the TAC, in consultation with the Implementing Agencies, will review monitoring data and assess restoration strategies to identify refinements in management actions to improve returns.

January 1, 2020 would mark the beginning of the "Interim Phase" identified in the TAC recommendations, which establish a target minimum population size of 500 wild fish returning annually throughout the Interim Phase, ending December 31, 2024. TAC recommendations establish a 5-year running average target of 2,500 fish (including the 500 wild fish mentioned above) during the Interim Phase. The FMP population objectives discussed above in Section 2.4.1 include the following: "Ten years following reintroduction, less than 15% of the Chinook salmon population should be of hatchery origin" (SJRRP 2010a). The Settlement Agreement seeks to achieve the Restoration Goal, which includes naturally-reproducing and self-sustaining populations of salmon by December 31, 2025. If the population does not meet these targets, the TAC and Implementing Agencies would review monitoring data and restoration strategies and efforts to recommend refinements in management actions. Under the Settlement Agreement, the SCARF should be phased out by 2025, unless required for years with abnormally low flows insufficient to support the salmon population. SCARF (hatchery) use in the post-2025 period would be considered as an adaptive management measure, and the need for such operations would be assessed annually by the SJRRP. Spring-run reintroduction goals would seek to achieve population targets as described in the TAC spring-run recommendations which are shown in Table 2-3.

Table 2-3. TAC Spring-Run Recommendations

Milestone Year	Milestone Name	Period	Minimum Threshold	5-year Running Average Target
2019	Reintroduction	Jan 2012 – Dec 2019	variable	variable
2024	Interim Population	Jan 2020 – Dec 2024	500	2,500
2040	Growth Population	Jan 2025 – Dec 2040	500	2500 – 30,000+

2.4.4 Salmon Reintroduction

Salmon reintroduction strategies would be adaptively managed to address shifting environmental conditions and complexities arising from long-term reintroduction efforts of both fall- and spring-run Chinook. Some complexities may include changes in abundance of source populations, regulatory obligations, flow

[3] The TAC is comprised of six voting members selected by and representing FWUA and NRDC. Voting members of the TAC assist in advising the Restoration Administrator (RA) regarding areas outlined in the Settlement Agreement. There are two nonvoting members of the TAC representing the state (DWR and CDFW) and three federal agency liaisons (Reclamation, NMFS, USFWS) to the RA and TAC to ensure coordination and information sharing with the Implementing Agencies.

conditions/constraints, fish stocking and other fisheries management strategies, recreation, and passage/habitat conditions within the Restoration Area. Salmon reintroduction would be accomplished by: (1) implementing a series of reintroduction actions designed to meet established targets in a manner that accounts for the current conditions in the system and the best available science; (2) utilizing reintroduction practices that minimize risk to donor stock and San Joaquin River tributary populations, given their necessity and essential role in the reintroduction process; and (3) implementing reintroduction in an adaptive manner where the initial reintroduction activities will support ongoing research, inform future actions, and increase efficiency and success of future reintroduction and recovery efforts.

CDFW anticipates that with successful implementation of the SJRRP, fall- and spring-run Chinook will both exist in the San Joaquin River. Moreover, when the Proposed Project is complemented by channel improvement actions, the SJRRP anticipates achieving a milestone at which released Chinook salmon (fall- and spring-run) can complete their life cycle and contribute to the viability of future populations without human assistance.

In support of the goals of the SJRRP, CDFW intends to employ a blended strategy for fish reintroduction that utilizes both fish raised at the SCARF and the potential for translocation of eggs, juveniles, and adults from hatcheries or wild populations. Consistent with the Settlement Agreement and existing SJRRP planning and research, the Proposed Project includes greater specificity and allocates greater resources for the reintroduction of spring-run (Börk and Adelizi 2010). However, the Proposed Project also includes actions that will enhance fall-run reintroduction. The following sections detail the spring- and fall-run reintroduction actions being considered under the Proposed Project.

Spring-run Reintroduction

The SJRRP analyzed each of the three remaining spring-run Chinook salmon lineages in the Central Valley and found that each has biological characteristics that might be favorable for a successful reintroduction project, and each also has unfavorable characteristics (SJRRP 2010b). Spring-run Chinook salmon vary in a number of important traits like distinctive use of diverse aquatic habitats, timing of spawning migration and breeding, and natal fidelity. There is likely substantial potential for evolution of traits to occur as a result of the strong, novel selective pressures being placed on the fish in the upper San Joaquin River. The SJRRP determined that reintroduction from multiple stocks should be pursued as an adaptive management program. Genetic evaluation and other methods would be used to evaluate the relative fitness and success of fish from the different stocks at various life stages following the reintroduction. The multi-stock approach would include all available Central Valley spring-run Chinook salmon stocks, including the Feather River stock. There has been much debate on the use of Feather River fish for the reintroduction efforts. Spring-run Chinook salmon from the Feather River are introgressed with fall-run Chinook salmon, and are “clustered” with fall-run Chinook salmon in population clustering analyses (refer to Section 4.0 of SJRRP 2010b). However, the Feather River spring-run Chinook salmon stock retains valuable genetic and phenotypic diversity worth conserving (refer to Section 4.0 and 7.1 of SJRRP 2010b).

Broodstock Collection

Spring-run Chinook salmon would be collected as eggs or juveniles from donor stock to establish a successful broodstock at the SCARF. Consistent with FMP population goals for genetic diversity, collections of donor stock are intended to capture phenotypic and genotypic (i.e., physical and genetic) diversity of the source populations, in order to produce an experimental population with the capability of naturally reproducing in the San Joaquin River while also minimizing impacts to wild source stocks. As part of its ongoing operations, CDFW has been collecting spring-run eggs and juveniles from the FRFH to establish broodstock at the Interim Facility.

Although Feather River spring-run Chinook returning to the FRFH are initially being used to establish SCARF broodstock, the long-term goal is to collect from multiple source stocks to maximize genetic diversity and fitness of the experimental population. Since hatchery fish have been shown to be less fit in natural environments than wild fish, ultimately, CDFW and the Implementing Agencies may seek to diversify broodstock by collecting eggs and/or juveniles from naturally-spawning Central Valley spring-run stocks, if these stocks can support collection for this purpose. Because wild source stocks of spring-run are themselves federally listed as threatened, before collections may occur, the Implementing Agencies agreed to develop collection criteria intended to avoid or minimize potential impacts to the donor populations.

Broodstock collection of naturally spawning Central Valley spring-run stocks would be conducted by CDFW in collaboration with the Implementing Agencies, such as USFWS. Because the Restoration Goal identified in the Settlement is to establish a naturally reproducing, self-sustaining population of Chinook salmon in the San Joaquin River, collections from donor streams is only intended to occur as needed to achieve recommended population goals for spring- and fall-run Chinook salmon (TAC 2007, 2008). Similarly, the SCARF's intended function is to augment the reintroduced population(s) only until identified population goals are met. The SCARF would have the capability to conduct reintroductions simultaneously using multiple sources of stock, adaptively managed to accommodate broodstock availability and to adapt to new information on reintroduction successes (Börk and Adelizi 2010). A description of broodstock collection methodologies is included below.

Feather River Fish Hatchery Stock

The FRFH main facility is located on the Feather River in the town of Oroville, California (Figure 2-1). A separate Annex facility is located downstream of the main facility adjacent to the Thermalito Afterbay and State Route (SR) 99. Spring-run Chinook salmon are spawned artificially at the FRFH and also spawn naturally in the Feather River during late September to late October (Reynolds et al. 1993; Yoshiyama et al. 2001). Under the Proposed Project, CDFW would continue to collect eggs and/or juveniles available from the FRFH. The FRFH has a finite capacity to spawn, incubate fertilized eggs, and rear juveniles, but that capacity is far beyond that which is actually used in any given year. The hatchery limits the number of spring-run Chinook it produces annually to 2.5 million smolts, which equates to 3 million fertilized eggs, in order to, among other things, limit the degree of hatchery influence on the wild spring-run population (Cavallo et al. 2012). Typically, more spring-run Chinook enter the facility to spawn than what the FRFH requires to meet its production goal. Under the Proposed Project, CDFW would artificially spawn selected fish and segregate and incubate eggs from resulting crosses for SCARF broodstock. No eggs would be moved from FRFH for the SCARF unless FRFH production goals were met. The FRFH would not change its production levels as a result of the Proposed Project; removal of eggs or juveniles from FHFH for the Proposed Project would occur only after the FRFH has met its annual production goal of 3 million fertilized eggs. In addition, the number of eggs or juveniles collected annually would depend on the rearing capacity at the Interim Facility and the proposed SCARF.

Currently, broodstock collection from the FRFH is authorized by Permit 14868, pursuant to section 10(a)(1)(A) of the ESA (NMFS 2012), and CDFW's determination pursuant to Fish and Game Code section 2080.3 for a 5-year period. Under the Proposed Project, CDFW may continue to collect broodstock from the FRFH for the life of the SCARF, provided that all required regulatory requirements are met.

Per Permit 14868 and its accompanying biological opinion, in the first 3 years of collection (2012–2014) up to 560 eyed eggs or juveniles may be collected annually, and up to 2,760 eyed eggs or juveniles may be collected annually in years 4 and 5 (2015 and 2016, respectively) for development of SCARF broodstock. The draft FRFH HGMP protocols (Cavallo et al. 2012) are being followed for the collection, fertilization, and incubation of eggs, and rearing of juveniles at the FRFH. The permit requires collection of eggs at the eyed stage. The eggs and juveniles are trucked, using BMPs, from the FRFH to a quarantine facility at either the Silverado Fisheries Base near Yountville, CA, or the Center for Aquatic Biology and Aquaculture (CABA) in Davis, CA (Figure 2-1). These activities are estimated to be seasonal, likely spanning from early fall to late spring of each year. For purposes of this impact analysis, the frequency of delivery trips from the FRFH to the quarantine facilities is assumed to be a maximum 4 times per week, but would likely not exceed 20 trips per year. The frequency of delivery trips from the quarantine facility to SCARF is also assumed to be a maximum of 4 times per week, but would likely not exceed 10 trips per year. The BMPs for collection and transport of eggs and juveniles are provided in Appendix E, *Best Management Practices for Collection and Transport of Salmonid Eggs and Juveniles*.

Eggs or juveniles transported to the quarantine facility remain for a minimum of 30 days. After the eggs hatch, 60 fish are selected for pathology purposes. After pathology clearance, juveniles are trucked from the quarantine facility to the SCARF to establish broodstock, or the Interim Facility if the SCARF is not yet fully operational. In the event that neither the Interim Facility nor SCARF is functional, broodstock may be returned to the Feather River consistent with stock management practices.

Wild Stocks

As part of the Proposed Project, and consistent with collection criteria, CDFW may collect eggs and/or juveniles from wild, naturally spawning Central Valley spring-run stocks to increase the genetic diversity of the broodstock and conservation stock. Wild sources for broodstock collection may include spring-run Chinook populations on Butte, Deer, and Mill Creeks, along with opportunistic collection of other spring-running Chinook from the Stanislaus, Mokelumne, Feather, and Yuba Rivers, and Battle and Clear Creeks (Figure 2-1).

Broodstock collection from wild stocks would include collection of juveniles and possibly extraction of fertilized eggs from redds. Juvenile collection would be performed through stream seining, fyke nets (bag-shaped nets held open by hoops), electrofishing, and/or use of rotary screw traps (RSTs). Redd extraction methods may include redd pumping, which uses a small, portable, backpack-mounted water pump, or hand excavation. Following collection, eggs or juveniles would be transported to a quarantine facility and held for a minimum of 30 days. From the quarantine facility they would be transferred to the SCARF for captive rearing to establish broodstock.

Ultimately, the feasibility of broodstock collections from wild stocks would depend on the status of Central Valley spring-run Chinook salmon, the condition and status of the San Joaquin River channel improvements, and status and success of the SCARF. The wild stock collections would require an amendment to Permit 14868 or a subsequent ESA section 10(a)(1)(A) permit issued by NMFS. Because further details regarding the collection from wild stocks are not known at this time, these actions are evaluated at a program level in this DEIR (see Chapter 3, *Introduction to the Environmental Analysis*, Table 3-2).

Conservation Stock Release

Direct Release

The SCARF smolt production tanks would have concrete channels that connect their side drains directly to the secondary channel of the San Joaquin River (Figure 2-3). When flow conditions are appropriate in the Restoration Area, fish would be allowed to enter the release channels on their own volition and move into the river. The releases would mimic natural seasonal time and age patterns for migration of spring-run Chinook. If monitoring determines that the volitional releases are not adequate, fish may be taken from culture tanks and moved directly to the river.

Off-Site Release

In most cases, fish would be released at the SCARF site. Additional locations may be necessary based on the condition of the river and the results of the migration and predation monitoring being conducted as part of the SJRRP. Off-site release would only be done when necessary, because shortening the time juveniles spend in the upper reaches corresponds to a reduction in San Joaquin River water exposure for imprinting purposes. Less time for imprinting may lead to increased instances of straying to other streams. However, releases further downstream may be necessary to increase the survival rate of outmigrating juveniles where barriers or obstacles (physical and environmental) may exist. Examples of additional potential release sites, all of which are within the Restoration Area, are presented in Table 2-4.

Translocation

During the first 5 years of spring-run Chinook translocation, which may begin in 2014, up to 80,000 eyed eggs or up to 54,400 juveniles would be collected annually from the FRFH for direct or indirect release into San Joaquin River. This operation is assumed to generate delivery trips at a frequency of once or twice per week on a yearly basis. Spring-run Chinook translocation would not begin before the adoption of the 10(j) experimental population designation and associated 4(d) rules. This activity would require either an amendment to the existing Permit 14868 or additional ESA section 10(a)(1)(A) permit(s) from NMFS. As of the end of August 2013, USFWS has a permit application pending. The FRFH must first meet its target of 3 million fertilized eggs before CDFW or other Implementing Agencies could receive eggs or fish for translocation. The anticipated methods for translocation of eggs, juveniles, and adults are described below.

Eggs

Spring-run eggs for translocation would be selected in accordance with provisions specified in a pending ESA section 10(a)(1)(A) permit. Theoretically, eggs could be directly or indirectly released (placed) in the Restoration Area. However, NMFS has indicated that, as a condition of the ESA section 10(a)(1)(A) permits, all donor stock and conservation stock released must be adipose fin-clipped and coded-wire tagged prior to release. However, if approved by NMFS, eggs may be directly transferred to the river as part of the Proposed Project.

Indirect release of eggs would involve the use of streamside or instream incubators. Streamside incubators may include utilizing vertical tray incubators, deep matrix incubators or small chambers or tubes set in 5-gallon buckets placed adjacent to the river. A small volume of stream flow is diverted, by gravity feed, to flow through the streamside incubator to maintain appropriate incubation conditions. The incubators allow eggs to hatch and fry to emerge. The fry can be easily captured for further rearing to a size suitable for marking and tagging.

Table 2-4. Potential Release Sites for Conservation Stock Reintroduction

Potential Release Site	Latitude (DMS)	Longitude (DMS)	River Mile	SJRRP Reach
Lost Lake Park	36°58’14.16”N	119°44’21.19”W	264-265	1A
Ball Ranch Access Point	36°56’38.09”N	119°44’18.74”W	262-263	1A
Willow Unit, San Joaquin Ecological Reserve	36°55’48.92”N	119°45’2.27”W	260-261	1A
Fort Washington Access Point	36°52’34.97”N	119°47’14.28”W	255-256	1A
Vulcan Access Point	36°54’33.52”N	119°46’20.93”W	257-259	1A
Sycamore Island	36°51’18.94”N	119°50’13.34”W	251-252	1A
Scout Island	36°51’31.47”N	119°50’20.98”W	250-251	1A
Milburn Unit	36°51’22.68”N	119°52’46.24”W	247-248	1A
SR 99 Bridge	36°50’35.05”N	119°55’55.42”W	243-244	1A/1B
Bifurcation Structure Access Point	36°46’26.48”N	120°17’4.08”W	215-217	2A/2B
Mendota Pool Access Point	36°47’34.23”N	120°22’18.88”W	204-205	2B/3
Sack Dam	36°58’55.80”N	120°30’3.67”W	182-183	3/4A
Firebaugh (bridge)	36°51’30.00”N	120°26’56.00”W	195-196	3
San Luis Wildlife Area	37°14’10.00”N	120°48’53.00”W	141-145	4B2
SR 165 Bridge	37°17’43.31”N	120°51’4.25”W	132-133	5
SR 140 Bridge	37°18’36.00”N	120°55’50.00”W	124-125	5
Hills Ferry Barrier	37°20’50.84”N	120°58’32.84”W	118-119	5

Notes: DMS = degrees-minutes-seconds, SR = State Route

In the future, if there were no marking/tagging requirements, fry could be allowed to move into the river at their own volition. In this case, instream incubators may include eggs contained in wire or plastic boxes placed directly in the stream gravel of the San Joaquin River. Incubators would be buried in the streambed in a likely spawning area with appropriate water depth, velocity, and substrate, and low sedimentation. The incubation chamber would be buried in the stream gravel and fry would emerge and swim through the stream gravel.

If marking/tagging were required, all fry produced from instream egg chambers and streamside incubators would be transported to an area with suitable flow and water temperatures, where they would be held in holding pens for a period of time. Once fish are sufficient size for marking/tagging, they can be marked/tagged and released.

Juveniles

Juveniles for translocation would be selected following a Fish Health Assessment and approval from the State Fish Health Lab. Juveniles would be moved from the FRFH to the Restoration Area most commonly in a 500-gallon transport tank.

Appropriate BMPs would be employed during transport, as USFWS has specified in its Permit 14868 application; these BMPs are provided in Appendix E, *Best Management Practices for Collection and Transport of Salmonid Eggs and Juveniles*. It is estimated that it would require between 3 to 6 trips to transport the juveniles; the number of trips would depend on the equipment used and the size and availability of the fish. Consistent with Permit 14868, it is anticipated that 60 juveniles would need to be set aside for pathology testing prior to translocation. If those juveniles are tested positive for certain pathogens, the fish collected for translocation would not be released into the San Joaquin River.

Before release, all fish would be externally marked (adipose fin-clipped or other visually detectable mark) and coded-wire tagged. Juveniles may be placed in temporary holding pens for imprinting, acclimation, and growth before release into the San Joaquin River. Holding pens may consist of aluminum mesh boxes suspended between pontoons and anchored to the bank or available structures by using rope or cable. Juveniles would be held at accepted densities for salmonids and fed daily using automated feeders. Release sites would be selected to provide appropriate water depth, velocity, substrate, and cover characteristics to promote juvenile growth and survival. Release sites for translocated fish would include the locations listed in Table 2-4 and potentially other suitable locations in the Restoration Area. In the event of outmigration barriers or insufficient river flow, juveniles may be moved to the nearest suitable downstream locations to allow outmigration to the ocean.

Adults

Spring-run adult translocation has been eliminated from SJRRP near-term strategies, but future opportunistic adult collections may be considered from source streams where it is determined that impacts to existing populations would be minimized and translocation would be feasible. However, adult Chinook salmon already in the San Joaquin River that encounter barriers restricting passage may be trapped and hauled to upstream locations (see *Trap and Haul*, below). Barriers may be structural (i.e., dams, weirs, canals, etc.) or non-structural (i.e., insufficient flow, high stream temperatures, etc.), and would likely be temporary – occurring only until SJRRP actions remove or modify the barriers or, in the case of insufficient flow, during drier water year types. Translocation would allow migrating adults entering the San Joaquin River to reach suitable spawning habitat to spawn naturally. Alternatively, the SJRRP may harvest eggs and milt from adults for artificial streamside spawning and rearing juveniles for eventual release in the San Joaquin River.

Fall-Run Chinook Reintroduction

Due in large part to the potential for volitional colonization of fall-run in the Restoration Area, the Proposed Project provides greater specificity and allocates greater resources (e.g., the SCARF) to the reintroduction of spring-run. However, the Restoration Goal is to restore and maintain fish populations in "good condition," including naturally-reproducing and self-sustaining populations of salmon and other fish, a goal that encompasses fall-run as well. The Settlement Agreement also calls for the Restoration Administrator to provide the SJRRP (through the Secretary of the U.S. Department of Interior) with recommendations designed to reintroduce spring- and fall-run Chinook salmon consistent with the Settlement Agreement, and these recommendations are to be used in planning and decision-making to achieve the Restoration Goal.

The SJRRP TAC prepared recommendations for the SJRRP Restoration Administrator for the reintroduction of spring- and fall-run Chinook salmon (TAC 2007, 2008). Specifically, the TAC recommended that introductions of fall-run to the upper San Joaquin River would be made by selective removal of the HFB and allowing natural immigration of adults from existing populations on the San Joaquin River basin. This recommendation for volitional introduction of fall-run stocks was adopted in the SJRRP FMP (SJRRP 2010a), and the FMP is incorporated into the SJRRP PEIS/R, which was completed in 2012 (Reclamation and DWR 2012). The SJRRP also completed the *Reintroduction Strategy for Spring Run Chinook Salmon* in 2011 (SJRRP 2011), which states in Section 8.1.4, "In the event that the abundance of spring-run Chinook salmon to the San Joaquin River does not reach sustainable levels after several generations of reintroduction efforts, SJRRP efforts may shift to establishing viable fall-run Chinook salmon populations". Consequently, strategies currently under consideration for fall-run focus on management of volitional introduction within the Restoration Area. Restoration of the river would, presumably, contribute to the overall health of the San Joaquin basin, whereby fall-run Chinook salmon would volitionally repopulate the main stem of the San Joaquin River. If there is a need for the SJRRP to shift the emphasis to fall-run populations, the *Reintroduction Strategy for Spring-run Chinook Salmon* suggests that more active reintroduction strategies would be considered, as described below. Because many details regarding these active strategies are not known at this time, these actions are evaluated at a program level in this DEIR (see Chapter 3, *Introduction to the Environmental Analysis*, Table 3-2).

Broodstock Collection and Production

The proposed SCARF is intended to fulfill spring-run reintroduction goals, but may also be considered for supporting fall-run reintroduction. As part of its ongoing activities, CDFW has been operating the Interim Facility using fall-run broodstock to evaluate and refine hatchery methods. CDFW will consider expanding these operations for purposes of fall-run reintroduction should it be determined feasible and if necessary resources are available to pursue this action. If it is determined that meeting the fall-run reintroduction goals of the Settlement Agreement requires a more robust fall-run program than currently proposed, SCARF production would consider stock selection strategies and operational criteria to maximize population viability similar to those outlined for spring-run production at the SCARF and consistent with the HSRG recommendations.

Augmenting SCARF and/or Interim Facility operations with fall-run activities may also provide the benefit of experimental opportunities that would aid in adaptively managing SJRRP reintroduction strategies and supplementing a natural spawning fall-run population, if it is deemed necessary.

The SJRRP, including but not limited to CDFW, may consider using strays available from other fall-run populations for development of a fall-run broodstock program. Broodstock operations would follow guidelines similar to those proposed for use in spring-run operations at the SCARF. Broodstock development would seek to be consistent with population goals, such as TAC fall-run recommendations, which seek to (1) establish a naturally-reproducing and self-sustaining population of fall-run Chinook Salmon that is specifically adapted for conditions in the upper San Joaquin River; (2) establish a fall-run Chinook salmon population that is genetically diverse so that it is not subject to the genetic problems of small populations such as founder effects and inbreeding and; (3) establish a fall-run Chinook salmon population that is demographically diverse in any given year, so returning adults represent more than two age classes (TAC 2008).

Spawning of a certain number of fall-run Chinook salmon adults voluntarily entering the San Joaquin River and captured in the trap and haul effort (further described below) would assist with juvenile production. This would require removal of eggs from each female adult, spawning with available males, and using the fertilized eggs for the reintroduction. Generally, remote site egg takes involve capturing pre-spawn adults in the river and holding them in a pen until ripe and ready to spawn. Fish would need to be held in areas with favorable water quality conditions (i.e., temperature and dissolved oxygen). Excessive handling may significantly increase holding mortality. More detail is described in Reclamation and DWR (2012).

Translocation

Coded-wire tags (CWT) are used at the Merced River Hatchery (MRH) and Mokelumne River Fish Hatchery (MRFH) to determine fish origin, and preference for spawning at these hatcheries is given to in-basin fish in order to maintain the genetic separation of the populations. The SJRRP may consider using fish identified by CWT as tributary out-of-basin strays for reproduction in the Restoration Area assuming that they may possess similar genetic and phenotypic traits to fall-run fish that would volitionally populate the San Joaquin River. Trapping and hauling adults returning to other rivers and transporting them to the San Joaquin River would be generally inconsistent with statewide population management goals seeking to minimize straying and reliance upon stocks of local origin for production. However, under specific circumstances when adults can be identified as strays from San Joaquin tributary streams, CDFW may explore feasible methods for artificially spawning them, and translocating their progeny to the Restoration Area to opportunistically seed fall-run stocks in the San Joaquin River.

Fertilized fall-run Chinook salmon eggs, taken from adults as described above, may be transferred for direct translocation to Reach 1 via artificial redds or instream egg chambers and streamside incubators. Eggs would be transported to an area with suitable flow and water temperatures, where they would be held for a short period to assess their condition. Eggs may also be used for experiments to assess egg and emergent fry survival in different sections of Reach 1 to reflect different in-river conditions.

The SJRRP would potentially consider MRFH and MRH for fall-run reintroduction. The HSRG had recommended that MRFH and MRH (as well as hatcheries statewide) discontinue transporting and releasing juveniles to areas outside of the river of origin and near or downstream of the confluence of the stream of origin. Specifically, the HSRG recommended that juvenile fish should be released at the hatcheries, or if not possible, as far upstream in the stream of origin from their confluence to maximize juvenile imprinting, reducing adult straying and increasing the number of adult fish returning to their hatchery of origin (Pascual and Quinn 1994, Van der Haegen and Doty 1995). CDFW intends to implement these practices whenever possible.

Reintroduction Experiments

Separate from the potential development of fall-run broodstock operations, the CDFW proposes to continue fall-run reintroduction experiments by rearing fall-run using in-river cage pens held below Friant Dam. Current capacity is estimated to be between 50,000 and 60,000 juveniles. These fish will be used for developing survival estimates, telemetry studies, habitat use assessments, etc., which will further adaptive management strategies that will aid in managing the long-term success of both spring- and fall-run populations. An undetermined number of these fish may survive to escapement and contribute to the fall-run population goals by returning to the system, and by doing so presumably possess phenotypic characteristics that would be adapted to survival in the San Joaquin River. All of these fish are being carefully monitored to determine origin and evaluate contributions to the Restoration Goal.

Both long-term volitional strategies and near-term fall-run reintroduction goals would seek to achieve population targets as described in the TAC fall-run recommendations which are shown in Table 2-5.

Table 2-5. TAC Fall-Run Recommendations

Milestone Year	Period	Minimum Threshold	5-year Running Average Target
2019	Jan 2012 – Dec 2019	Variable	Variable
2024	Jan 2020 – Dec 2024	500	2,500
2040	Jan 2025 – Dec 2040	500	2,500 – 10,000
2041 +	Jan 2041 +	500	5,000 – 15,000

The USFWS' 10(a)1(A) permit application for Permit 14868 provides guidance for survival at different life stages and anticipated returns for reintroduction. These survival estimates are summarized in Table 2-6.

Table 2-6. Wild Chinook Salmon Survival Rate Estimates

Life Stage	Percent Survival
Egg Survival to Emergence[1]	Average 33% (Range 13-50%)
Fry to Smolt[2]	3%
Smolt to Adult[2]	2.5% (Stanislaus River)
	0.09% (Merced River)
	1.3% Average (Stanislaus and Merced Rivers)

[1] Results of egg survival studies conducted in Reach 1 of the Restoration Area (SJRRP 2012).
[2] From Appendix B, Table 2 in the USFWS 10(A)(1)(a) Permit Application (USFWS 2011)

Using the above survival estimates, the TAC-recommended minimum threshold of 500 spawning adults would result in 135 returning adults, assuming a 50:50 sex ratio, fecundity of 4,200, and average egg survival and smolt to adult survival. Achieving the minimum threshold of 500 adults will be challenging, but pursuing a blended strategy for reintroduction and completing channel improvements and full restoration flows would provide the greatest opportunity for achieving the stated population goals.

Resource limitations and as yet unidentified technical feasibility limitations may hinder the success of the proposed fall-run reintroduction strategies. However, as CDFW assists with implementation of the proposed experimental actions and adaptive management strategies guide SJRRP actions, new opportunities may exist that would fulfill the fall-run reintroduction goals. Any such activities, which cannot be reasonably identified or evaluated at this time without speculation, and with impacts beyond those evaluated in this DEIR, would be evaluated in a future CEQA document as required under CEQA.

2.4.5 Salmon Management

Implementation of the SJRRP would restore flows and improve habitat and fish passage to make the Restoration Area accessible to salmon once again. Careful management of spring- and fall-run reintroduced stocks, including their interaction with existing tributary populations, is necessary. As discussed above, fall-run adults will be allowed to volitionally stray from existing populations in tributaries to the San Joaquin River, contributing to population growth in the Restoration Area. There are no such local populations of spring-run Chinook salmon to provide for volitional reintroduction.

Several issues complicate the concurrent management of spring- and fall-run Chinook salmon populations in the Restoration Area. Salmon management would acknowledge and respond to these complications with an integrated, adaptive approach to spring- and fall-run restoration and population management. Historically, spring- and fall-run populations in Central Valley rivers, including the San Joaquin River, were maintained by isolation through temporal and spatial differences in their run timing and spawning locations (Moyle 2002). Spring-run salmon entered the San Joaquin River in the spring and early summer, and moved far upstream to access tributary headwater reaches for holding during the summer and spawning in the fall. In contrast, fall-run salmon entered the river beginning in the early fall, but did not move as far upstream, generally spawning in main stem locations. Construction of Friant Dam blocked the spawning runs of both spring- and fall-run salmon, and channel dewatering and degraded water quality eventually led to extirpation of both runs. Flow management and habitat restoration are intended to eliminate dewatering and improve water quality within the Restoration Area, but Friant Dam still blocks upstream migration of spring-run salmon to their historical spawning reaches, relegating the spring-run to lower river reaches typically used by fall-run fish. Due to temporal overlap between the spring- and fall-run spawning periods, these two runs are vulnerable to spawning interference and genetic interactions in the form of introgression (Tomalty et al. 2012). Physically separating the two runs using temporary weirs may be appropriate to minimize reproductive interference. Management actions seeking to separate spring- and fall-run populations would also consider habitat quality and availability, reduction of competition between runs, and potential effects on existing tributary populations.

An additional complication is that spring- and fall-run adults and juveniles migrate during different times of the year and would therefore be subject to different flow and passage conditions, and habitat availability and quality. Consequently, potential passage impediments, migration pathways, and habitat suitability may need to be monitored and managed independently for each run, and potential management actions to improve conditions for one run may not benefit the other in the same way. For example, prior to completion of fish passage improvement projects, during very dry years, or due to other unforeseen circumstances, it may be necessary to trap and haul spring- and/or fall-run adults or juveniles past physical or environmental barriers to aid their migration. The necessity for trap and haul would be dependent on the environmental and passage conditions at the time of migration, and therefore may differ between runs.

Other management actions, such as gaging and improving on restoration and reintroduction success through research and monitoring, as well as enhancing recreational fishing management in the Restoration Area, are discussed below in Section 2.4.6, *Fisheries Research and Monitoring*, and Section 2.4.7, *Recreation*.

Fish Segregation Weirs and Migration Barriers

As described above, with successful San Joaquin River channel improvements and reintroduction of spring-run Chinook salmon in the Restoration Area, there would be the potential for overlap of spring- and fall-run Chinook salmon spawning. Overlap of spawning could result in hybridization and redd superimposition (i.e., later runs constructing redds over earlier redds), which may lead to reduced survival from physical disturbance and decreased genetic fitness or crushing/smothering of eggs. This may be addressed by segregating salmon runs; however, it is unknown at this time if salmon run segregation could be achieved through management of flows. Therefore, under the Proposed Project, CDFW, in coordination with Implementing Agencies, may remove, repurpose, or construct instream barriers to segregate Chinook salmon runs in the Restoration Area. Weirs may also be constructed to block access of salmonids to certain areas, and any new fish passage structures (e.g., Sack Dam fish ladder, Mendota Pool Bypass) may also be closed to serve as a separation weir. Because many details regarding the weirs are not known at this time, these actions are generally evaluated at a program level in this DEIR (see Chapter 3, *Introduction to the Environmental Analysi*s, Table 3-2). Preliminary details are provided below.

Hills Ferry Barrier

The Hills Ferry Barrier (HFB) is an existing seasonal weir located approximately 850 feet upstream of the San Joaquin River's confluence of the Merced River (Figure 2-1). It is currently used to redirect up-migrating adult salmonids during the fall, including fall-run Chinook salmon, into suitable spawning habitat in the Merced River. It impedes passage into the San Joaquin River above the confluence with the Merced River, where habitat and water quality are currently unsuitable for these fish. The HFB is operated every year from mid-September to mid-December.

Under the SJRRP, restoration actions would be taken such that habitat in the San Joaquin River upstream of the HFB would be adequate to allow passage. At that point, the HFB may no longer be operated or be removed to allow fall-run Chinook into the Restoration Area or reoperated to serve as a control structure to segregate up-migrating spring- and fall-run Chinook salmon. Such reoperation would involve using the weir only during certain key seasons to minimize hybridization and other interactions between spring- and fall-run Chinook salmon. The segregation would reduce adverse interactions between spring- and fall-run Chinook salmon, such as hybridization and redd superimposition. The HFB may also be moved downstream towards the confluence with the Merced River to reduce overtopping and bank erosion that occurs at the current location due to mobile sand substrate. The barrier may also be improved to accommodate SJRRP restoration flows. These modifications may involve constructing a permanent concrete sill to stabilize erosion and provide a solid barrier foundation with suitable anchoring points. In addition, methods for removal of invasive water hyacinth (*Eichhornia crassipes*) may be incorporated in the barrier's future design, as well as features for monitoring fish passage through the facility. The HFB may also be used for monitoring of fish populations.

Reach 1A Separation Weir

A structure similar to the HFB may be constructed in Reach 1A of the San Joaquin River (near the location where Hwy 41 crosses the river, Figure 2-1), just downstream of where most of the spring-run spawning is expected to occur. The necessity for and exact location, design, and operation of the Reach 1A Separation Weir have not yet been defined, but it would generally serve to minimize hybridization between runs and redd superimposition. Once spring- and fall-run Chinook salmon are established in the Restoration Area and the quantity and quality of spawning habitat available to the salmon runs are better understood, an assessment of the necessity for the weir, and if necessary, a suitable location for the weir would be made.

Weirs at Salt and Mud Sloughs and Other False Migration Pathways

Salt and Mud sloughs are tributaries of the San Joaquin River in Merced County. Both sloughs drain lands west of the San Joaquin River. They also receive subsurface agricultural drainage from irrigated agricultural lands to the south and west in Merced and Fresno Counties. Historically, farmers in the Grasslands area of the western San Joaquin Valley have discharged subsurface agricultural drainwater through wetland channels to the San Joaquin River. This drainage contains elevated concentrations of selenium, salt, boron, and other trace elements that are harmful to wildlife.

Each year, some percentage of fish are able to make it past the HFB and are then unable to access suitable spawning habitat due to poor habitat conditions (e.g., insufficient flow) and barriers that restrict fish passage. Fish that do migrate past the barrier are frequently entrained in Mud and Salt Sloughs, which typically have greater flow than the main stem SJR during the fall salmon migration period. These fish do not contribute to the fall-run Chinook salmon escapement numbers, and may therefore be considered “lost” to the tributary populations.

Pursuant to the Stipulation of Settlement in NRDC vs. Rodgers, et al., the SJRRP must evaluate the need to construct seasonal barriers to prevent adult anadromous fish from entering false migration pathways in the area of Salt and Mud sloughs (Appendix A of Reclamation and DWR 2012). Structures similar to those described for the HFB and Reach 1A Separation Weir may be constructed near the entrance to Salt and Mud sloughs in Reach 5 (Figure 1-1) and may be constructed at various other locations as deemed necessary in the future. The exact location, design, and operation of these weirs have not yet been defined, but they would serve to prevent migrating salmonids from entering these areas. An assessment of the necessity for the weirs, and if necessary, identification of suitable locations for the weir(s) would be made as part of the Proposed Project.

Anti-Biofouling Measures

Consistent with current practice at the HFB, CDFW will manage the accumulation of plants, and debris in the vicinity of the segregation or barrier weir(s). The control methods include manual removal of plant material accumulated behind the weir. The weirs will be checked, and maintenance performed, at a minimum frequency of once per day (or as needed) when the weir(s) are in place.

Trap and Haul

Currently, fish passage barriers restrict fish migration throughout the Restoration Area. Certain reintroduction actions would occur prior to the elimination of all passage barriers and would require some level of trapping and hauling of adult and, potentially, juvenile, salmon. Adult Chinook entering the San Joaquin River volitionally may need to be moved upstream past instream barriers or unsuitable habitat due to environmental conditions to suitable spawning areas. If feasible, juveniles may also need to be moved downstream past instream barriers or unsuitable habitat due to environmental conditions to facilitate successful outmigration through a trap and haul program. CDFW has been working on developing salmon trap and haul protocols and strategies using fall-run Chinook adults, to ensure once spring-run are trapped and hauled, they are being handled and transported properly and protected to the maximum extent practicable.

Trap and haul efforts may use additional temporary barriers with a fish trap. Fyke nets may also be installed in various locations upstream of the HFB and below Mendota Pool Dam. Staff would remove Chinook salmon from the traps and move them in transport tanks above any migration barriers to locations below Friant Dam to either release them in Reach 1 to spawn naturally or, if they are in too poor condition to be successfully moved, spawn them artificially using streamside facilities. Some of the trapped adults that are released in Reach 1 would be tagged with acoustic transmitters and tracked and monitored to monitor movements, behavior, survival, fecundity, disease, and gamete viability. Eggs obtained via streamside spawning would be incubated until hatching, reared to fry, and then translocated to instream cage-rearing pens for acclimation and imprinting. After juveniles are reared to a size suitable for tagging and release, they would be released at one of the locations specified in Table 2-4 or upstream of the locations in Table 2-7.

Adult trap and haul efforts would involve daily trips to the trap locations at several locations in the lower San Joaquin River. From past experience with fall-run pilot trap and haul efforts, typically only one vehicle trip per day was made with two trips per day occurring when traps caught more Chinook salmon than expected. However, when trap and haul becomes a management activity for reintroduction efforts, several trips per day may become necessary.

CDFW and the SJRRP are also considering juvenile trap and haul activities to aid outmigration of in-river fry and smolts prior to channel improvement actions that would allow unimpaired passage. The exact details of juvenile trap and haul are currently unknown, but may include trapping juveniles in RSTs used in juvenile Chinook salmon monitoring activities, or by using juvenile traps (e.g., specialized fyke nets, seines, minnow traps) at multiple locations throughout the Restoration Area. Captured juveniles would then be transported in a suitable transport tank to either a downstream release location specified in Table 2-4 or to a upstream holding pen located near the base of Friant Dam until sufficient numbers of juveniles are acquired; at which point juveniles may then be transported to a downstream release location specified in Table 2-4.

2.4.6 Fisheries Research and Monitoring

Chinook salmon habitat requirements are specific to their life stages. These varied habitat types are expected to be present in the Restoration Area following channel improvements, increased flows, and other measures being undertaken by the SJRRP. Reintroduction requires scientific research studies, in coordination with the SJRRP, to assess the quantity and condition of available habitat, impediments to fish migration and survival, success of reintroduction efforts, and observation of fish responses to conditions in the Restoration Area. Under the Proposed Project, CDFW would conduct additional research studies and monitoring programs related to Chinook salmon in the Restoration Area. The following sections provide details of the studies and monitoring approaches.

Research

Under the Proposed Project, CDFW would conduct research in the Restoration Area related to Chinook salmon habitat, genetics, and survival. Many of these studies have already been initiated as part of CDFW's ongoing operations within the Restoration Area and coordination with other SJRRP Implementing Agencies. They are considered part of the Proposed Project because of the context they provide to reintroduction, fish management, and other principal actions of the Proposed Project, and because the studies' results may influence the adaptive management of the reintroduction efforts. The studies include laboratory-based activities that could be conducted at the SCARF, as well as field-based activities in the Restoration Area. Laboratory activities may involve collection of genetic samples from Chinook salmon in the Restoration Area. Activities that would be conducted within the San Joaquin River may include the studies described below.

Habitat Studies:

- **Juvenile Floodplain Habitat Evaluation and Restoration Needs:** The purpose of the juvenile rearing habitat study is to define appropriate rearing habitat, evaluate the presence and value of shallow habitat for food production for fish, and to provide validation to increase confidence in two-dimensional hydraulic simulation and mapping of juvenile rearing habitat.
- **Egg Survival, Spawning Habitat Suitability:** The goal of these studies is to determine egg survival under existing spawning conditions and relate

survival to environmental parameters. Specific studies (e.g., gravel permeability, hyporheic water quality) would assess limiting factors that are important to egg incubation, such as spawning gravel size, water quality, stream flow, water temperature, and gravel quality and quantity.

Predator Assessment: This study involves boat electrofishing, trammel/gill netting, and target angling of predatory fishes located in abandoned mine (gravel) pits in the San Joaquin River. Stomach contents (gastric lavage) of captured predatory fishes would be collected to estimate juvenile predation rates. Further, individuals captured would be identified, weighed, measured, and tagged with an external tag (e.g., numbered floy tag) providing individual identification and allowing for migration of predatory fishes to be examined using mark-recapture methods.

Fish Community Assessment: This study involves monitoring and assessment of fish communities within the five reaches of the Restoration Area. Previous studies focused on establishing a baseline of fish assemblages, not abundance. Future studies would focus on chronological analysis of the temporal and spatial distribution, abundance, and diversity of fish species. Information obtained from these studies can be used to adaptively manage future efforts for more effective management.

Acoustic Telemetry Study: This study characterizes the movement of juvenile Chinook salmon to assess survival in the Restoration Area. The study involves releasing small groups of juvenile Chinook salmon into the Restoration Area, a subset of which are acoustically tagged. Stationary telemetry receivers placed throughout the passable portions of the Restoration Area track movement of juveniles passing receivers. Mobile tracking may also be conducted to determine habitat use between stationary receivers. Adults trapped and hauled above instream barriers may also be acoustically tagged and tracked using telemetry to monitor spawning success and determine spawning habitat preference.

Chinook Salmon Egg Survival: This study investigates whether placement of eggs directly into the river is a feasible strategy for reintroduction, as well as provide information on spawning habitat quality for salmon spawning naturally in the San Joaquin River. The study also allows a comparison of hatching success of eggs from direct translocation versus eggs hatched at the SCARF. Eyed eggs from the SCARF and eggs from source populations are placed in egg tubes and buried at varied depths in artificial redds built in Reach 1 of the San Joaquin River. A control group may be incubated in the SCARF. Results are obtained by accessing egg survival and fry health at emergence.

Structural and Non-structural Passage Impediments Study: This study addresses potential passage issues facing adult Chinook salmon within the Restoration Area. Adult passage may be impeded by structural impediments such as dams, weirs, canals, etc.; and non-structural components of the river channel, including critically low riffle depths, temperature barriers, and false migration pathways such as agricultural drains and tributaries to the river. Evaluation of these passage impediments will help inform reintroduction management and monitoring decisions. After the eventual release of restoration flows through the restoration area, this study may be accomplished by tagging adults and juveniles and monitoring their movements using cameras, DIDSON™, or by visual observation at known potential passage impediments. Monitoring fish movement using these techniques may also indicate future impediments or passage issues.

Evaluation of Source Stock Populations: These studies may include using adult escapement surveys or rotary screw traps in identified donor streams to collect data for input into an annual donor stock assessment. This may include conducting assessments of collection and transportation methods of each life stage from potential donor streams, juvenile and adult tagging and genetic tissue collection, and associated pathology testing.

Monitoring

Various monitoring activities would be conducted to assess the effectiveness of the Proposed Project and other SJRRP activities. Instream monitoring would include targeted surveys to assess numbers, conditions, and behavior of both adult and juvenile salmon, and specific field measurements to determine habitat conditions in the Project Area. The monitoring program would include static sites or additional sites as needed for collecting biological data and tissue samples (e.g., fin clip or scale samples) to allow genetic identification of individuals and their biological status (e.g., growth, weight, condition factor) for both outmigrating juvenile and returning adult Chinook salmon.

Specific parameters that would be monitored and monitoring methods include:

Adult Chinook Salmon Monitoring: Monitoring of adult Chinook salmon returns would be performed through the use of underwater cameras (e.g., Vaki Riverwatcher Fish Counters®), DIDSON (Dual-frequency Identification Sonar) technology, trapping and marking, tracking using acoustic telemetry, redd and carcass surveys, and snorkel surveys. Specific parameters to be measured would include numbers of fish, migration timing, age and sex composition of each run, fish size at return, physical characteristics (i.e., length, weight, condition factor, identifying tags or marks), locations and habitat quality of holding pools, spawn timing and locations, spawning behavior and success, fecundity, and egg size.

Embryo Survival and Juvenile Chinook Salmon Monitoring: Monitoring of hatching success and juvenile rearing and outmigration in the Project Area would be performed using emergence traps, RSTs, underwater cameras, trawls, fish tracking equipment (e.g., PIT and acoustic tags and receivers), and snorkel surveys. Parameters to be measured would include numbers of fish, fry emergence timing, juvenile growth rates and survival, rearing densities, habitat utilization, size, life stage, and timing at outmigration.

RSTs would be used within the San Joaquin River to assess juvenile Chinook salmon (1) abundance and survival, through mark recapture of river-reared fall-run juveniles in comparison to unmarked naturally spawned juveniles; (2) outmigration timing and size; and (3) trap capture efficiency using marked and released juvenile fall-run of various developmental stages.

RSTs would be located throughout the Restoration Area at up to locations within the river. Table 2-7 outlines the current locations. However, in the future, as Restoration flows are released and juveniles are allowed to move downstream, CDFW may adjust the monitoring activity to include locations in Reaches 3, 4, and 5. Specific monitoring and possible transport activities would occur on a daily basis. RSTs would be installed by crews using hand tools, and positioned to catch the maximum amount of instream flow and outmigrating juveniles. RSTs would be anchored into place using structures and trees on the riverbank or by using steel t-posts anchored in the riverbed. If RSTs are placed in areas with low stream gradients and water velocities are not sufficient to turn the trap cone, then guidance panels may be used to direct more of the stream flow towards the RST, thereby providing the necessary power to turn the trap cone. Guidance panels may be composed of corrugated metal hardware fence panels.

All non-emergency work would be conducted between sunrise and sunset. Flagging will be used on all cables that anchor RSTs to the riverbank, make cables visible to boaters and wildlife. Similarly, RSTs will be marked with brightly colored flagging and solar- or battery-powered flashing lights to alert boaters. Signage and/or buoys will be placed in the river channel upstream and downstream of each trap to instruct boaters on how to safely avoid or navigate past the RSTs. Metal or plastic signs not greater than 2 feet by 3 feet by 1/2-inch thick will be attached to buoys and floated in the center of the channel.

Data collection of trapped fish would occur at each of the RST locations and once processed, trapped juveniles will then be (1) transported downstream around in-river barriers until channel improvements allow for natural outmigration; (2) released back into the San Joaquin River below the RST; or (3) transported to holding pens upstream, below Friant Dam, to be re-release for continued testing of RST efficiency.

Table 2-7. Proposed Rotary Screw Trap Monitoring Locations

Potential Release Location	Latitude (DMS)	Longitude (DMS)	River Mile	SJRRP Reach
SR 99 Bridge	36°50’35.05”N	119°55’55.42”W	243-244	1A/1B
Gravelly Ford	36°47'54.08"N	120° 9'40.55"W	229	1B/2A
Bifurcation Structure Access Point	36°46’26.48”N	120°17’4.08”W	215-217	2A/2B
Downstream San Mateo	36°46'55.56"N	120°18'46.31"W	212	2B

Notes: DMS = degrees-minutes-seconds, SR = State Route

Habitat Monitoring: Activities include monitoring of location, extent, and quality of habitat for egg and embryo incubation, juvenile rearing and migration, and adult migration, holding and spawning. Parameters measured include stream depth and velocity, temperature, water quality, substrate composition, gravel permeability, and distance to cover. Habitat conditions and food availability in the Restoration Area are measured using bioassessments such as Benthic Macroinvertebrate Index (BMI) and/or Surface Water Ambient Monitoring Protocol (SWAMP), incidence of disease in the natural environment, and health of other fish species.

Temperature Monitoring: This monitoring activity assesses the potentially limiting factor of unsuitable water temperatures that may occur during egg incubation, juvenile rearing, or juvenile and adult migration, and establish a long-term data set of stream temperatures for the Restoration Area. Temperature needs to be evaluated to identify potential thermal barriers and identify potential warm-water sources, such as backwater areas, side channels, wide/shallow areas, gravel pits associated with mining, areas lacking riparian shading, tributaries, and Friant Dam releases. Temperature monitoring and associated studies evaluate the effect of new flow schedules anticipated by the SJRRP on stream temperatures, inform decisions regarding methods for Chinook salmon reintroduction that could reduce thermal impacts, and assist the SJRRP in making recommendations on specific actions relating to adaptive management of the SJRRP.

Water Quality/Bioassessments: Water quality is monitored in the context of biological thresholds established from the literature. Benthic macro-invertebrate (BMI) bioassessment study objectives establish measures for estimating the effect of restoration flows and other SJRRP actions on ecological integrity and stream condition, as indicated by changes in BMI assemblages in the Restoration Area.

2.4.7 Recreation

CDFW seeks to enhance fishing opportunities in the San Joaquin River corridor and manage existing recreational fishing in the San Joaquin River. Actions may include: enhancing off-channel ponds (i.e., ponds or abandoned gravel mining pits without river connectivity) for recreational fishing, providing access to and facilities for additional fishing opportunities in or near the Restoration Area, stocking trout for recreational fishing in off-channel ponds near the San Joaquin River, changing stocking practices in the San Joaquin River below Friant Dam to protect reintroduced Chinook salmon, increasing enforcement of fishing regulations in the Restoration Area, and/or increasing monitoring of recreational activities within the Restoration Area. Measures would be taken as appropriate (e.g., access or activity restrictions) to help ensure that these enhancements do not unintentionally lead to poaching or other impacts to the reintroduced fish or other species of concern in the main stem of San Joaquin River.

CDFW is currently assessing potential locations for enhancing recreational angling opportunities in off-channel ponds adjacent to the San Joaquin River between SR 99 and Friant Dam. Ponds would be chosen for enhancement based on aquatic habitat conditions, land ownership, access, and proximity to existing fishing pressure. Habitat, water quality, public access, and/or facilities would be improved, based on the needs of each pond. Depending on pond characteristics, CDFW would also routinely or periodically stock catchable-size rainbow trout from the SJFH to transition from stocking trout in the San Joaquin River. The allotment for the San Joaquin River below Friant is currently 18,000-20,000 pounds of trout, or approximately 36,000-40,000 trout, annually. CDFW intends to continue that level of stocking, but would limit stocking to ponds without connectivity to the San Joaquin River. Because many details regarding the recreational fishing enhancements are not known at this time, these actions are generally evaluated at a program level in this DEIR (see Chapter 3, *Introduction to the Environmental Analysis*, Table 3-2).

2.5 Permits and Approvals

The permits and regulatory compliance requirements for the Proposed Project are described in line with the corresponding permitting agency in Table 2-8.

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Table 2-8. Applicable Permit and Regulatory Requirements

Regulatory Agency	Law/Regulation	Purpose	Relevant Activities	Permit/Authorization Type
USACE – Sacramento District	CWA Section 404	Regulates placement of dredge and fill materials into waters of the United States.	SCARF construction and on-site operation (as it relates to ESA compliance)	Individual or Nationwide Permits
			Construction of segregation barriers	
			Instream monitoring and research	
Central Valley Regional Water Quality Control Board	CWA Section 401	Water quality certification for placement of dredge and fill materials into waters of the United States.	SCARF construction and on-site operation (as it relates to ESA compliance)	401 Water Quality Certification is required for federal permits, such as CWA Section 404 permits
			Construction of segregation barriers	
			Instream monitoring and research	
	CWA Section 402	NPDES program, which regulates discharges of pollutants.	SCARF construction	NPDES General Construction Permit
			Construction of segregation barriers	
			SCARF return water discharges	NPDES General Permit for Aquaculture Facilities
	Porter-Cologne Water Quality Control Act	Regulates discharges of materials to land and protection of beneficial uses of waters of the State.	SCARF construction	Waste Discharge Requirements (WDRs)
			Construction of segregation barriers	
			Instream monitoring and research	
CDFW – Central Region	F&G Code Section 1602	Applies to activities that will substantially modify a river, steam or lake. The Agreement includes reasonable conditions necessary to protect those resources.	SCARF construction	Streambed Alteration Agreement
			Instream monitoring and research	
			Construction of segregation barriers	
	CESA (F&G Code Section 2080.3, 2080.4 and 2081)	Incidental take authorization	All Project Activities	CESA compliance will be completed as directed by CDFW.

Table 2-8. Applicable Permit and Regulatory Requirements

Regulatory Agency	Law/Regulation	Purpose	Relevant Activities	Permit/Authorization Type
	F&G Code Section 3503, 3513, 3800, and other sections and subsections	Protection of birds	All Project Activities	CDFW must comply with the requirements of these regulations
USFWS/NMFS	ESA/Magnuson-Stevens Fishery Conservation and Management Act	USACE must consult with USFWS and NMFS if threatened or endangered species may be affected by the project.	SCARF construction and on-site operation	ESA section 7 Consultation
			Construction of segregation barriers	
			Instream monitoring and research	
			Broodstock collection	ESA section 10(a)(1)(A) permit
			Fish reintroduction	ESA section 10J/4d rule, HGMP approval
State Historic Preservation Officer	NHPA Section 106	USACE must consult with State Historic Preservation Officer if historic properties or prehistoric archaeological sites may be affected by the project.	SCARF construction	To be conducted in conjunction with USACE Section 404 compliance
			Construction of segregation barriers	
Central Valley Flood Protection Board	California Water Code and Title 23 of the California Code of Regulations	Oversees any work to be done in a regulated stream, designated floodway, and/or on any federal flood control project levee slopes to include the area 10 feet landward of the landside levee toe.	SCARF construction	Encroachment Permit
			Construction of segregation barriers	
California State Lands Commission	Public Trust Easement	Review of projects that encroach on the Public Trust Easement.	SCARF facilities located within State Lands	Lease of State Lands
			Fish segregation barriers (if permanent)	
SJVAPCD	SJVAPCD Rule 9510	Review of project emissions that may affect regional air quality.	All Project Activities	Indirect Source Review

Table 2-8. Applicable Permit and Regulatory Requirements

Regulatory Agency	Law/Regulation	Purpose	Relevant Activities	Permit/Authorization Type
State Water Resources Control Board	California Water Code	Administers water rights in the state.	SCARF process water supply	Change in Place and/or Purpose of Use

Notes: CDFW = California Department of Fish and Wildlife, CESA = California Endangered Species Act, CWA = Clean Water Act, ESA = Endangered Species Act, F&G Code = Fish and Game Code, HGMP = Hatchery Genetic Management Plan, NHPA = National Historic Preservation Act, NMFS = National Marine Fisheries Service, NPDES = National Pollutant Discharge Elimination System, SJVAPCD = San Joaquin Valley Air Pollution Control District, USACE = U.S. Army Corps of Engineers, USFWS = U.S. Fish and Wildlife Service

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Chapter 3
INTRODUCTION TO THE ENVIRONMENTAL ANALYSIS

3.0 Overview

Chapters 4 through 17 of this DEIR describe the environmental resources and potential environmental impacts of the Proposed Project. Each chapter describes the existing setting and background information for the resource topics to help the reader understand the conditions that could be affected by the Project. In addition, each chapter includes a discussion of the criteria used in determining the significance levels of the Project's environmental impacts. Finally, each chapter recommends mitigation measures to reduce, where possible, the adverse effects of significant impacts. Table 3-1, at the end of this chapter, provides a summary of the various resource topics and the components of the Proposed Project to which they apply and environmental analysis is included.

3.1 Significance of Environmental Impacts

According to CEQA, an EIR should define the threshold of significance and explain the criteria used to determine whether an impact is above or below that threshold. Significance criteria are identified for each environmental resource topic to determine whether implementation of the project would result in a significant environmental impact when evaluated against the baseline conditions as described in the environmental setting. The significance criteria vary depending on the environmental resource topic. In general, effects can be either significant (above threshold) or less than significant (below threshold). In some cases, a significant impact will be identified as significant and unavoidable if no feasible mitigation measure(s) is/are available to reduce the impact to a less-than-significant level. If a project is subsequently adopted despite identified significant impacts that would result from the project, CEQA requires the lead agency to prepare and adopt a statement of overriding considerations describing the social, economic, and other reasons for moving forward with the project despite its significant impact(s).

3.2 Format of Impact Titles

Impact titles are formatted to summarize information about the impact, as follows:

> **Impact TOPIC-ACTIVITY-#: Impact Title (Relevant Significance Criteria, Level of Analysis, Impact Conclusion)**

Details regarding the terminology used above are as follows:

- **TOPIC:** an abbreviation of the resource topic to which the impact applies (e.g., AES for aesthetics). Using this, the reader can determine the impact's resource topic by reading the impact title.
- **ACTIVITY:** an abbreviation of the project action to which the impact applies (e.g., CONSTRUCT for construction of the SCARF). Using this, the reader can determine the project action associated with the impact by reading the impact title.
- **#:** impacts are sequentially numbered
- **Impact Title:** provides a brief text description of the impact. Using this, the reader can determine the specific issue that the impact discussion is addressing.
- **Relevant Significance Criteria:** lists the significance criteria applicable to the impact. All significance criteria presented in the methodology section of each chapter have a letter associated with them, and so the letters presented here correspond to those provided in the methodology section. In this way, the reader can clearly relate the impact to its relevant criteria.
- **Level of Analysis:** identifies whether the analysis is at a project or program level, or both (see Section 3.3 below).
- **Impact Conclusion:** identifies the level of impact, with the five possibilities being No Impact, Less than Significant, Less than Significant with Mitigation, Significant and Unavoidable, or Beneficial. Using this, the reader can determine the impact's significance by reading the impact title.

3.3 Level of Analysis: Project versus Program

This DEIR contains two levels of analyses: project-level and program-level. The project-level analysis is performed to the extent possible where details of proposed individual actions have been identified, and/or the actions are intended to be implemented without the need for further CEQA evaluation. This DEIR also includes broader, program-level analysis of certain proposed actions for which sufficient details have not yet been identified to allow for a project-level analysis. Table 3-2, at the end of this chapter, summarizes, in general, the level of analysis provided in this DEIR for the various proposed actions. The level of analysis for each individual impact is further specified in the impact title. For impact discussions that address multiple project components, some of which are being evaluated programmatically and others at a project level, the impact title identifies that this analysis is both programmatic and project-level, and the impact discussion concludes by specifying which components are evaluated at which level of analysis.

The DEIR identifies mitigation measures, where feasible, for significant impacts. For those aspects of the project evaluated programmatically, and for which specifics regarding the mitigation measures cannot be developed at this time, the mitigation measures identify performance standards to which the future measures would be required to adhere. Mitigation measures for the programmatic components also include a set of Conservation Measures, contained in Appendix I, to address potential impacts on biological resources.

Once further details have been identified for the actions evaluated programmatically in this DEIR, and prior to implementing those actions or taking steps that commit CDFW to implementing the actions, CDFW would evaluate these actions to determine what, if any, additional analysis pursuant to CEQA may be required. The extent of environmental review for future actions will depend on a number of factors, including the extent to which the programmatic analysis, mitigation measures, and performance standards have anticipated and accounted for the project-specific impacts of the future action, and whether new or more significant impacts are possible compared to those disclosed in this DEIR.

In summary, this DEIR provides broad direction for a wide range of possible future actions while allowing the opportunity for flexibility to respond to changing needs and conditions. Future project-level CEQA documents may incorporate the findings of this DEIR by reference through "tiering," or incorporating by reference general discussions from the DEIR. It is anticipated that later documents will focus solely on issues specific to the later project. An EIR can be used in this way to simplify the task of preparing environmental documents for later parts of a program.

3.4 Baseline Conditions

Under CEQA, the environmental setting or “baseline” serves as a gauge to assess changes to existing physical conditions that will occur as a result of a proposed project. Per CEQA Guidelines (Cal. Code Regs., tit. 14, § 15125), for purposes of an EIR, the environmental setting is normally the existing physical conditions in and around the vicinity of the proposed project as those conditions exist at the time the Notice of Preparation (NOP) is published.

Note that certain activities that are a part of the Proposed Project are already carried out on an ongoing basis. As such, these activities are considered a part of the baseline conditions, and the impact analysis in this DEIR instead focuses on the increment of change that would result from the Proposed Project. For instance, the Interim Facility is already operational; to the extent that the Proposed Project involves activities that are already being carried out at the Interim Facility, these activities are considered to be part of baseline conditions, and the impact analysis focuses on the impacts of any new or changed activities in the context of these baseline conditions.

3.5 Sections Eliminated from Further Analysis

Four CEQA checklist resource topics have been eliminated from further analysis based on the nature and scope of the Proposed Project activities. A brief summary and description of these resource topics are below.

3.5.1 Agricultural Resources

While the SJRRP, as a whole, would involve activities that would affect agriculture—direct conversion or inundation of agricultural land, reduced agricultural water deliveries, as well as other types of effects—the Proposed Project does not include any of these activities.

Specifically, while some farmland, agricultural land, and designated forest lands may be located near the project area, the lands immediately adjacent to the SCARF are developed for residential and recreational uses. The site is zoned for use as a fish hatchery, is not designated as Farmland, and neither the project site nor surrounding lands are actively used for agriculture. Other project facilities and activities are not anticipated to affect agriculture in any way.

Overall, the Proposed Project would not alter land use designations or farmland/timberland classifications at either the local or state level. Furthermore, the Proposed Project would not create pressure for future land conversions. No Prime Farmland, Unique Farmland, or Farmland of Statewide Importance, forest lands, or lands under a Williamson Act contract would be converted by, or conflict with, the Proposed Project. There would be no impact.

A further discussion of the potential effects of the larger SJRRP on agriculture is given in the cumulative impact analysis contained in Chapter 18 of the DEIR.

3.5.2 Mineral Resources

The community of Friant is characterized by geologic formations consisting of alluvial sand, silt, and gravel mixtures and bedrock consisting of sandstone or granite. Aggregate products (sand and gravel) are mined south of Lost Lake Park outside of the boundaries of the Community of Friant. Areas within Lost Lake Park and the adjacent agricultural land have been mined in the past and are currently depleted of reserves by mining (County of Fresno 2011).

None of the mines described above are located on the SCARF site, and there are no known proposals to mine at the site.

While abandoned gravel mining pits may be enhanced for recreational fishing purposes as part of the Proposed Project, no active mines would be affected and the enhancements would not necessarily preclude future extraction of aggregate resources at the enhancement sites.

Therefore, although mines or mineral resource areas are located in the vicinity of the project site, the Proposed Project would not involve any activities that could directly or indirectly affect mineral production. There would be no impact.

3.5.3 Population and Housing

A project would have an effect on population and housing if it induces growth directly (through the construction of new housing or increasing population) or indirectly (by increasing employment opportunities or eliminating existing constraints on development).

The Proposed Project would involve the construction of two new single-family residences and one road extension. The housing and road would support the SCARF's operation. The SCARF would employ six people for its operations. Construction activities would require temporary workers for the 11-month construction period. Although the number of construction workers would be at the discretion of the construction contractor, the number is not anticipated to be substantial (i.e., less than 50). It would be speculative to assume that the permanent employees or construction workers would relocate to the area from outside of Fresno County. Therefore, the Proposed Project would not involve new development or infrastructure installation that could directly or indirectly induce substantial population growth in the area. As such, any impacts would be less than significant.

Furthermore, there are no houses currently on the project site. As such, the Proposed Project would not displace any existing housing units or persons. As shown in Figures 2-1 and 2-2, East Belcher Avenue, which is an existing access road to the west of the project site, would be paved and extended, and two single-family residences would be constructed. No construction would take place within the neighborhoods adjacent to the existing SJFH property. Construction equipment would access the site from East Belcher Avenue. There would be construction for underground utilities in front of the staff residences at the existing Hatchery; however, this construction would be temporary and would not displace the residents. There would be no impact.

3.5.4 Public Services

The Proposed Project would not induce substantial population growth as discussed in "Population and Housing" above. Therefore, the Proposed Project would not require the California Department of Forestry and Fire Protection to construct or expand fire stations, hire additional staff, or purchase additional equipment. Furthermore, the Proposed Project would not remove any existing fire protection facilities or substantially increase the demand for fire protection. Therefore, impacts related to fire protection would be less than significant.

In addition, the Proposed Project would not substantially affect traffic patterns or quantities on local roads such that police response times would be affected. Furthermore, the Proposed Project would not remove any existing police protection facilities or substantially increase the demand for police protection. Therefore, impacts related to police protection would be less than significant.

Finally, as noted in "Population and Housing" above, the Proposed Project would not involve new development or infrastructure installation that could directly induce substantial population growth in the area. As such, the Proposed Project would not substantially increase the demand for schools or result in accelerated deterioration of them. Furthermore, the Proposed Project would not remove any existing school facilities. Therefore, impacts related to schools would be less than significant.

Finally, the Proposed Project would not remove any existing park facilities; it also would not result in population growth resulting in increased use of, or demand for, parks. Therefore, impacts related to parks or park facilities would be less than significant.

It bears noting that the future San Joaquin Hatchery Public Access and Trail would be located in close proximity to the SCARF facility. The potential for the Proposed Project to affect that facility is discussed in Chapter 15, "Recreation."

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Table 3-1: Potential Impacts by Resource Topic and Proposed Project Components

Resource Topic	Project Component					
	SCARF Construction	SCARF Operations	Fish Reintroduction	Fisheries Management	Fisheries Research and Monitoring	Recreation Management
Aesthetics	✓	✓	✓	✓	✓	
Air Quality	✓	✓	✓	✓	✓	✓
Biological Resources - Fisheries	✓	✓	✓	✓	✓	✓
Biological Resources - Vegetation and Wildlife	✓	✓	✓	✓	✓	✓
Cultural Resources	✓			✓		✓
Geology, Soils, and Seismicity	✓	✓		✓	✓	✓
Greenhouse Gas Emissions	✓	✓	✓	✓	✓	✓
Hazards and Hazard Materials	✓	✓	✓	✓	✓	✓
Hydrology and Water Quality	✓	✓	✓	✓	✓	✓
Land Use and Planning	✓	✓		✓		✓
Noise	✓	✓	✓	✓	✓	✓
Recreation	✓	✓	✓	✓	✓	✓
Transportation and Traffic	✓	✓	✓	✓	✓	✓
Utilities and Service Systems	✓	✓	✓	✓		✓

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Table 3-2: General Level of Analysis for Individual Proposed Project Components

Project Component	Sub-Component	Level of CEQA Analysis Conducted in this DEIR
SCARF Construction	All	Project Level
SCARF On-Site Operations	All	Project Level
Salmon Reintroduction	Wild spring-run collection and all (non-FRFH) fall-run collection	Program Level
	Direct translocation of fish	Project Level
	Release of fish from SCARF site	Project Level
	Other aspects of fish reintroduction (including off-site release)	Project Level
Salmon Management	Reoperation of existing Hills Ferry Barrier	Project Level
	Construction, reconstruction, and operation of new or reconstructed fish barriers	Program Level
	Trap and haul and related actions	Project level
Fisheries Research and Monitoring	All	Project Level
Recreation	All	Program Level

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Chapter 4
AESTHETICS

4.1 Overview

This chapter describes the existing visual and aesthetic resources within the potentially affected area and pertinent local, state, and federal plans and policies regarding the protection of visual and scenic resources. The potential impacts on scenic resources, public views of scenic vistas, visual character of the potentially affected area, and nighttime views from construction and operation of the Proposed Project are evaluated and mitigation proposed to address the impacts found to be significant.

Aesthetics refers to visual resources and the quality of what can be seen or overall visual perception of the environment, and may include such characteristics as building scale and mass, design character, and landscaping. Visual impacts are analyzed through an examination of views and/or viewsheds. Views refer to visual access and obstruction of prominent visual features, including both specific visual landmarks and panoramic vistas. Viewsheds refer to the visual qualities of a geographic area. The geographic area is defined by the horizon, topography, and other natural features that give an area visual boundary and context. Viewshed impacts are typically characterized by the loss and/or obstruction of existing scenic vistas or other major views in the area of the site that are available to the general public. Sensitive viewers are individuals or groups who are particularly affected by changes to the aesthetics of the surrounding area. View analysis is based upon relative visibility with regard to viewing location and proposed on-site development.

4.2 Regulatory Setting

4.2.1 Federal Laws, Regulations, and Policies

National Scenic Byways Program

The National Scenic Byways Program was established under the Intermodal Surface Transportation Efficiency Act of 1991 and reauthorized in 1998 under the Transportation Equity Act for the 21st Century. Under the program, the U.S. Secretary of Transportation recognizes certain roads as National Scenic Byways or All-American Roads based on their archaeological, cultural, historic, natural, recreational, and scenic qualities. There are 150 such designated byways in 46 states. The Federal Highway Administration promotes the collection as America's Byways®. This voluntary, grassroots program supports outstanding roadways and provides resources to help manage the intrinsic qualities within the broader Byway corridor to be treasured and shared.

The National Scenic Byways (NSB) Program highlights three roads within the Sierra Nevada Range: the Lassen Scenic Byway along SR 36 is one of the most scenic drives in California; the Feather River Scenic Byway begins in the Sacramento Valley at SR 99 and proceeds on SR 70 into the forested uplands; and in the heart of the high county, the Yuba-Donner Scenic Byway circles SRs 89, 49, and 20 and Interstate (I-) 80, offering scenic vistas combined with Gold Rush history. The NSB Program also highlights four roads within the San Joaquin Valley: I-5 in the Central Valley parallels the Delta-Mendota Canal and the California Aqueduct; I-580 offers panoramic views of the San Joaquin Valley to the east and Coast Range to the west; the Sierra Heritage Scenic Byway (SR 168) begins in the town of Clovis and proceeds into the Sierra Nevada Range; and Pacheco Road (SR 152) ends at its junction with I-5.

In the project area, Mill Creek is crossed by the Lassen Scenic Byway (SR 36). This segment of SR 36 is also part of the 500-mile Volcanic Legacy Scenic Byway, an All-American Road that connects Crater Lake National Park in Oregon to Lava Beds National Monument, Mount Shasta, and Lassen Volcanic National Park in California. None of the designated National scenic roads are near the Restoration Area or the SCARF site.

National Wild and Scenic Rivers Act

The National Wild and Scenic Rivers Act of 1968 was created to protect certain rivers that "possess outstandingly remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural or other similar values," preserve them in a free-flowing condition, and protect the rivers and their immediate environments for the enjoyment of present and future generations (Public Law 90-542; 16 United States Code [USC] 1271 *et seq*.). The National Wild and Scenic Rivers Act is notable for safeguarding the special character of these rivers, while also recognizing the potential for their appropriate use and development. It encourages river management that crosses political boundaries and promotes public participation in developing goals for river protection.

Rivers are classified as "wild," "scenic," or "recreational" based on the level of existing development when designated. Designated segments need not include the entire river and may include tributaries. To accomplish a balance between dam and other construction with permanent protection, the Act prohibits federal support for actions such as dam construction or other instream activities that would harm the river's free-flowing condition, water quality, or outstanding resource values.

In the Potentially Affected Area, the Lower American River is a designated National Recreational River. The 23-mile segment of the river is located between its confluence with the Sacramento River and Nimbus Dam. No designated National Scenic Rivers are located in or immediately adjacent to the Project Area, Restoration Area, or SCARF site.

4.2.2 State Laws, Regulations, and Policies

California Scenic Highway Program

California's Scenic Highway Program was created by the State Legislature in 1963 and is administered by the California Department of Transportation (Caltrans). The goal of the program is to preserve and protect scenic highway corridors from changes that would diminish the aesthetic value of the adjacent land (California Streets and Highways Code § 260 *et seq*.). A scenic corridor is the land generally adjacent to and visible from the highway, and is identified using a motorist's line of vision (Caltrans 2008).

To gain an official scenic designation, a city or county must nominate the highway and identify and define the scenic corridor. The local nominating agency must also adopt ordinances, zoning, and/or planning policies to preserve the scenic quality of the corridor, or document that the regulations or policies already exist. These ordinances and/or policies make up the Corridor Protection Program (Caltrans 2008).

Numerous official designated State Scenic Highways are located in the Potentially Affected Area, including I-5/I-580 on the west side of the San Joaquin Valley, SR 152 from I-5 over Pacheco Pass, SR 160 through the Delta, and I-680 in the San Francisco Bay Area. The Restoration Area would potentially be within the viewshed of two of the scenic byways (I-5/I-580 Westside Freeway and SR 152 over Pacheco Pass) along the San Joaquin River, with a minimum distance of 9 miles from the river. All others are in the larger Potentially Affected Area, but neither the Restoration Area nor the SCARF site are within their viewshed. No officially designated State Scenic Highways are located in or immediately adjacent to the Restoration Area or SCARF site.

California Wild and Scenic Rivers Act

The Wild and Scenic Rivers Act of 1972, as amended, was created to preserve designated rivers possessing extraordinary scenic, recreation, fishery, or wildlife values (Pub. Resources Code, § 5093.50 *et seq*.). The Wild and Scenic Rivers Act provides that rivers be preserved in their free-flowing state, together with their immediate environments to the first line of permanent riparian vegetation. "River" is defined as "the water, bed, and shoreline of rivers, streams, channels, lakes, bays, estuaries, marshes, wetlands, and lagoons, up to the first line of permanently established riparian vegetation." Rivers or segments included with the system are classified as "wild," "scenic," or "recreational" based on the level of existing development when designated. With a few specified exceptions, no dam, reservoir, diversion, or other water impoundment facility may be constructed on any river segment in the system.

In the Potentially Affected Area, the Lower American River is a California-designated Recreational river. The 23-mile segment of the river is located between its confluence with the Sacramento River and Nimbus Dam. None of the streams in the Project Area, Restoration Area, or SCARF site are state-designated wild or scenic rivers. A "non-formal designation" with protection against construction of new dams, reservoirs, diversions, or other water impoundment facilities was provided Mill Creek and Deer Creek in 1995. This recognition was made in response to studies mandated by the state legislature that determined Mill and Deer Creeks "possess extraordinary resources in that they support one of the few remaining viable populations of wild spring-run Chinook salmon in the Sacramento–San Joaquin River system. One essential component of the resources provided by these creeks is their exceptional water quality" (Pub. Resources Code, § 5093.70).

San Joaquin River Conservancy Act

The San Joaquin River Conservancy Act (Conservancy Act) (Pub. Resources Code, § 32500-32520) "declares that the San Joaquin River, its broad corridors, and its prominent bluffs constitute a unique and important environmental, cultural, scientific, agricultural, educational, recreational, scenic, flood water conveyance, and wildlife resource that should be preserved for the enjoyment of, and appreciation by, present and future generations." The Conservancy Act also established the San Joaquin River Conservancy (SJRC) to acquire and manage public lands within the San Joaquin River Parkway.

4.2.3 Local Laws, Regulations, and Policies

County General Plans

The Fresno County 2000 General Plan (County of Fresno 2012), the Madera County General Plan (Madera County 1995), and the Merced County Year 2000 General Plan (Merced County 2000) primarily address visual issues through policies on land use. Open Space-Conservation policies address proper management or preservation of lands with high aesthetic value, including maintaining stream corridors in natural condition, preserving regional parks or other open spaces as areas of natural scenic beauty, and maintaining local scenic values along designated State Scenic Highways.

In recognizing that the conservation and protection of scenic qualities along roadways is an important goal, the Open Space and Conservation Element of the Fresno County 2000 General Plan also provides the following policy for County-designated scenic roadways, two of which are near the project area (County of Fresno 2012):

- *Policy OS-L.1 Scenic Roadway System:* The County designates a system of scenic roadways that includes landscaped drives, scenic drives, and scenic highways.
    - *Fresno County Designated Scenic Drives:* Scenic drives are rural roads traversing land with outstanding natural scenic qualities and connecting with scenic highways. County designated scenic drives include Millerton Road.
    - *Fresno County Designated Scenic Highways:* Scenic highways that traverse land with unique or outstanding scenic quality or provide access to regionally significant scenic and recreational areas. County-designated scenic highways include the segment of Friant Road from the City of Fresno to Lost Lake Road.

In addition, the following policies of the Open Space and Conservation Element of the Fresno County 2000 General Plan pertain directly to visual character in general and preservation of features in the San Joaquin River Parkway, where the project is located, specifically (County of Fresno 2012):

- *Policy OS-H.12 San Joaquin River Parkway Master Plan:* The County shall support the policies of the San Joaquin River Parkway Master Plan to protect the San Joaquin River as an aquatic habitat, recreational amenity, aesthetic resource, and water source.
- *Policy OS-I.6 Trail Development Corridor*: The County shall coordinate development of its Recreational Trail Master Plan with the San Joaquin River Conservancy concerning the proposed multi-purpose trail between State Route 99 and Friant Dam in the San Joaquin River Parkway.

Friant Community Plan

The Friant Community Plan identifies goals and policies designed to guide land use planning, expand the community's recreational resources and community services, while conserving environmental resources and natural habitat (County of Fresno 2011). The Community Plan governs development within the Community of Friant. Friant is Fresno County's "Gateway to Recreation" and is adjacent to such recreational opportunities as the San Joaquin River, Millerton Lake State Recreation Area, and Table Mountain Casino. The Community Plan Area includes the Lost Lake Recreation Area. The Plan identifies miles of trails and bikeways to facilitate access to recreational opportunities in the region.

The goals and policies of the Environmental Resources Management Element are aimed at protecting and preserving water resources, biological resources, scenic resources, and cultural resources, while emphasizing sustainable development practices. Under Goal 5, the following policy is designed to preserve and protect scenic resources in rural Friant:

- *Policy 5.4*: Protect "dark skies" by ensuring light and glare is minimized by using low-level lighting.

San Joaquin River Parkway Master Plan

The *San Joaquin River Parkway Master Plan* (SJRC 2000) is a conceptual, long-range planning document intended to help preserve, enhance, and provide for enjoyment of the natural landscape of the San Joaquin River corridor. As proposed in 1992, the parkway would include the San Joaquin River and approximately 5,900 acres on both sides of the river between Friant Dam and the SR 99 crossing, as well as the existing 17-acre Skaggs Bridge Park at the SR 145 crossing. Approximately 1,900 acres of the parkway would be located in Madera County and 4,000 acres in Fresno County.

Portions of the proposed parkway are managed for recreational or natural resource protection, conservation, and educational purposes, although other parts are privately owned and used for other purposes. Approximately 4,650 of the 5,900 acres are private land. Specific goals, objectives, and policies are included in the Natural Resource Element and Recreational Element that promote preservation, restoration, and enhancement of visual resources through the preservation and enhancement of natural areas and the sensitive design of recreation areas and trails.

4.3 Environmental Setting

4.3.1 Potentially Affected Area

The Potentially Affected Area is located in California's Central Valley and the Sierra Nevada foothills and mountains (Figure 2-1). The Sacramento River watershed drains the northern Central Valley while the San Joaquin River watershed drains the southern portion of the Valley. The two rivers and their tributary waters join at their lowest elevations in the Sacramento–San Joaquin Delta (Delta). From the Delta, the waters flow westward into San Francisco Bay and the Pacific Ocean. Predominant vegetation ranges from mixed evergreen forests in the mountain areas, through montane hardwood, blue oak woodlands, and mixed chaparral in the middle elevations, to grasslands or agriculture in the lower elevations in the Valley.

Land use on the Valley floor is dominated by agriculture and urbanized areas. Urbanization is predominant in the San Francisco Bay area. The foothills and mountains include land that has traditionally been used mainly for grazing, mining, and timber production**.** Rural residential development is an increasing part of the foothill and mountain landscape, although many foothill and mountain areas are grazing lands, publicly held open space managed by federal, state, or local agencies, or otherwise rural and agricultural in nature.

Major roadways that transect the Central Valley from north to south include SR 99 and I-5. In the Sacramento River watershed, SR 299, SR 50, and I-80 connect the Valley floor with the Sierra Nevada foothills and mountains. SR 4, SR 26, SR 108, and SR 140 are among the major roadways connecting the lowland valley to the uplands in the San Joaquin River watershed.

4.3.2 Project Area

The majority of the Project Area is located in California's Central Valley and the Sierra Nevada foothills and mountains; the Silverado Fisheries Base is located in Napa Valley (Figure 2-1). In the north, Mill, Deer and Butte creeks flow southwesterly approximately 60, 48, and 90 miles, respectively, from their mountainous headwaters in eastern Tehama and Butte Counties to the confluence with the Sacramento River. Vegetation along the watersheds changes from evergreen forested uplands to blue oak woodland, with some mixed chaparral at mid elevations, then grasslands and agriculture on the Valley floor. Land use in the watersheds includes timber production, livestock grazing, and recreation, with agriculture and development on the Valley floor. The lower reaches of Deer and Mill Creeks have a few water diversions while Butte Creek supports multiple diversions for hydroelectric power in its upper watershed and a complex system of water supply diversions, canals, and levees in its watershed. The portions of the watersheds with relatively inaccessible, steep-sided, narrow canyons are undeveloped, with publicly held open space managed by federal or state agencies in the mid- and higher elevation lands. Because the water comes from melting glaciated slopes on Mount Lassen, the visual quality of Mill Creek is characterized as having a "milky" appearance through the spring and mid-summer period (Heiman and Knecht 2010:110–119, 125–130).

The Lower Feather River downstream of the Oroville Dam and the Feather River Fish Hatchery is almost entirely confined by a system of levees as it flows southward for approximately 60 miles to its confluence with the Sacramento River. Riparian vegetation lines much of the river corridor as it passes the expanding urban centers of Oroville, Yuba City, and Marysville through the agricultural lands of the Sacramento Valley. Land use in the watershed, other than agricultural cropland and orchards, includes timber production and rural outdoor recreation on public and private lands (Heiman and Knecht 2010:139–144).

The five-acre Center for Aquatic Biology and Aquaculture in Davis is located approximately 14 miles west of the Sacramento River in the midst of agricultural fields in southern Yolo County. The facility contains an array of four artificial streams, aluminum buildings and tanks, and paved areas at the end of a rural two-lane road. To the west near Yountville and the Rector Reservoir in southern Napa County and approximately 27 miles north of San Francisco Bay, the Silverado Fisheries Base is accessed from the Silverado Trail, a two-lane rural road. Mature trees screen the facility's buildings and holding tanks from the access road and surrounding Napa Valley agriculture.

The Restoration Area is located in the San Joaquin Valley, the southern portion of California's Central Valley (Figure 2-1). Approximately 153 miles long, the San Joaquin River Restoration Area extends from Friant Dam to the confluence of the Merced River. It includes an extensive flood-control bypass system with a series of dams, bifurcation structures, flood channels, levees, and portions of the main river channel. At the southern end of the Restoration Area, the concrete immobility of Friant Dam dominates the northeasterly view toward the Sierra Nevada foothills and mountains from the existing San Joaquin Fish Hatchery (SJFH), from the residential and commercial developments in the rural community of Friant below the dam, and from nearby agricultural lands and parkland. Downstream of Friant Dam, the San Joaquin River is best characterized as a sandy, meandering channel that flows northwesterly towards its confluence with the Merced River, the northern (downstream) limit of the Restoration Area. Land use alongside the river corridor in the Restoration Area between Reaches 1 and 5 (see Figure 1-1) is dominated by agriculture and open space, with some disturbance of the natural viewscape by gravel mining operations, golf courses, bridge crossings, diversion structures, canals, levees, and urban development at Fresno and Firebaugh. Until the implementation of the restoration flows under the SJRRP, sections of the San Joaquin River in the Restoration Area were dry most of the year except during periods of agricultural or flood flows. Riparian vegetation of varying thickness and extent lines much of the river corridor. Approaching the Merced River at the north end of Reach 5, views are broader as the San Joaquin River floodplain widens with uninterrupted expanses of natural habitat, particularly within the San Luis National Wildlife Refuge, and as the number of artificial structures that would otherwise intrude on the viewscape is limited.

4.3.3 SCARF Site

The SCARF site is located in the San Joaquin Valley in the rural community of Friant, approximately 17 miles north of downtown Fresno, among the rolling hills of the lowest Sierra Nevada foothills. Friant Dam is approximately 1.1 miles upstream of the SCARF site, and agricultural lands and open space are across the river to the west. Nearby North Friant Road is a two-lane commercial thoroughfare for the community of Friant. East of Friant, Millerton Road is a two-lane rural roadway traversing the rolling hills between North Friant Road and Auberry Road. Several extensive residential, mixed-use, and open space developments are currently under construction in the vicinity, including Friant Ranch just east of North Friant Road. Immediate surrounding land uses include single-family residences, parkland, and the SJFH. The SCARF site is bounded by the San Joaquin River to the north and west, Lost Lake Park to the southwest, residential development to the southeast, and the SJFH to the northeast (Figure 2-2). Access to the site is from North Friant Road via East Belcher Avenue, currently a narrow dirt road.

Visual Character of the SCARF Site

Developed land in the immediate project area includes ponds that are part of the SJFH, structures associated with the Interim Facility, and worm farm operations. Undeveloped land in the immediate project area includes riparian forest associated with the San Joaquin River, emergent wetlands formed in non-operational hatchery ponds, and annual grassland. The rural setting of the SCARF site makes it easy to view dark skies and starry nights (County of Fresno 2011).

Scenic Drives and Highways

The SCARF site would not be visible from the Friant Road segment that is designated by Fresno County as a scenic highway. Direct views of the SCARF site from Millerton Road, which has been designated by Fresno County as a scenic drive, are obscured by intervening topography, vegetation, and/or distance as the roadway climbs the foothills east of Friant.

San Joaquin River Parkway

The SCARF site, as well as the SJFH and structures associated with the Interim Facility, lies within the boundaries of the San Joaquin River Parkway. As shown on parkway Master Plan maps, the parkway in this area includes land on both sides of the river (SJRC 2000). Activities that take place within the parkway should be considered for their impact on its aesthetic resources and with the goals of the Parkway Master Plan "to preserve, protect and restore the natural resource values of the river corridor and to provide public use of the river without adverse effects on these resources" (SJRC 2000:8).

Viewer Groups

The SCARF site is visible from streets in the Waldby neighborhood located on the bluff to the southeast of the SCARF site, and from the SJFH to the north. Portions of the SCARF site are also visible from streets and residences located on the hills east of Friant Road (Figure

2-2). The site would be visible from the planned San Joaquin Hatchery Public Access and Trail Project, which would traverse through the SCARF site and may be completed prior to the Proposed Project (Figure 2-3). Dense riparian vegetation coverage generally blocks the view of the SCARF site from recreational users of the San Joaquin River. Portions of the SCARF site may be partially visible by recreational users on the river during the winter months when the deciduous trees lining the riparian corridor are barren of leaves.

Lost Lake Recreation Area is immediately southwest of the SCARF site. The SJFH, Interim Facility structures, and proposed SCARF site are not directly visible by Lost Lake Recreation Area recreationists from the existing network of roads and trails or camping and picnic areas. Direct views are obscured by intervening topography, vegetation, and/or distance.

Five key views of the SCARF site were identified during the inventory of existing conditions: View 1 from the SJFH and the SCARF site looking northeast (Figure 4-1); View 2 from Parker Avenue near its intersection with Village Lane east of North Friant Road (Figure 4-2); View 3 from the intersection of North Waldby Avenue and Granite Avenue in the Waldby neighborhood (Figure 4-3); View 4 from the intersection of Granite Avenue and Granite Circle in the Waldby neighborhood (Figure 4-4); and View 5 from the west bank of the San Joaquin River toward the SCARF site (Figure 4-5). Figure 4-6 shows the location of the five key viewpoints. Photographs of the key views were taken during site visits on April 24, 2012, and February 25, 2013.

<u>View 1: Existing SJFH and SCARF Site</u>

View 1 is at the southern extent of the SJFH and SCARF site looking northeast. Prominent visual features at this location are the vegetation along the San Joaquin River corridor frontward of Friant Dam and the adjacent rolling hills, with distant views of the Sierra Nevada mountains. Portions of the proposed SCARF site and the SJFH settling ponds are viewed in the foreground. At a slightly higher elevation to the east, the worm farm building and the dirt access road (East Belcher Avenue) to the SCARF site are at approximately the same elevation as the SJFH buildings, which are obscured by the intervening vegetation. A vegetated pond is in the immediate foreground view. To the south outside the frame (behind the photographer) is Lost Lake Park, which is at a lower elevation than the intervening hills from which View 1 was photographed (Figure 4-1).

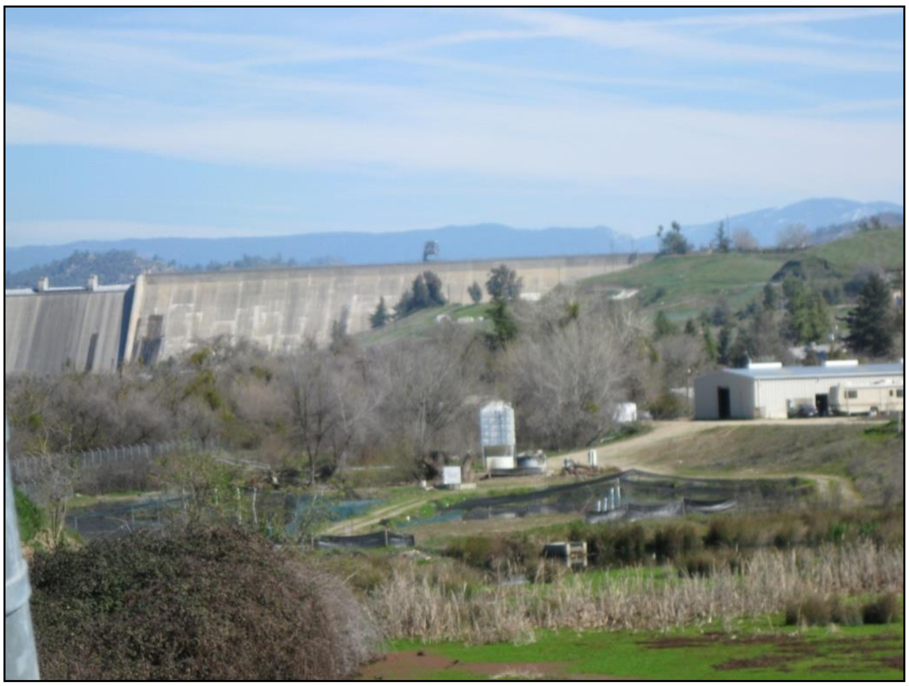

Figure 4-1. Looking northeast toward the SJFH and SCARF site, San Joaquin River corridor, Friant Dam, rolling hills, and mountains (View 1).

View 2: Parker Avenue near Village Lane

View 2 is from Parker Avenue near its intersection with Village Lane east of North Friant Road below the Parker Avenue and Millerton Lake Village neighborhoods. Visual features at this location are a limited view of the SJFH facilities west of Friant Road, distant views of agricultural land use capped by a row of eucalyptus trees, and far distant rolling foothills. Sensitive viewers identified for this view include Parker Avenue and Millerton Lake Village neighborhood residents and motorists traveling the public and private neighborhood roadways. Vegetation provides a screen of a view of SJFH structures from the residences and roadways and limits visibility of the planned facilities at the SCARF site (Figure 4-2).

Figure 4-2. Looking toward SCARF site from neighborhood east of North Friant Road, showing existing vegetation screen (View 2).

View 3: North Waldby Avenue and Granite Avenue

View 3 is at the intersection of North Waldby Avenue and Granite Avenue in the Waldby neighborhood southeast of the SCARF site. This location shows the view of the rooflines of the existing, fenced SJFH buildings at a lower elevation and more distant views of agricultural land use and rolling foothills past the riparian corridor. There is a grassy field in the immediate foreground with a steep drop-off along the bluff between the SJFH and the Waldby neighborhood. Sensitive viewers identified for this view include residents and motorists traveling the Waldby neighborhood roads. Topography and vegetation provide a partial screen of the existing structures from the roadways and residences and limit visibility of the planned facilities (Figure 4-3).

Figure 4-3. Existing visual conditions from Waldby neighborhood at North Waldby Avenue/Granite Avenue intersection, showing rooftops of SJFH and rolling hills (View 3).

<u>View 4: Granite Avenue and Granite Circle</u>

View 4 is at the intersection of Granite Avenue and Granite Circle in the Waldby neighborhood southeast of the SCARF site. This location shows the view of the Interim Facility and dirt access road (East Belcher Avenue) to the SCARF site, vegetation along the San Joaquin River corridor west of the fence, and distant views of agricultural land use on the rolling hills. Sensitive viewers identified for this view include residents and motorists traveling the Waldby neighborhood roads. The steep drop-off along the bluff between the SCARF site and the Waldby neighborhood is less discernible from View 4 than shown for the SJFH in View 3. Topography and vegetation provide a partial screen of the existing structures from the roadways and residences and limit visibility of the planned facilities. During the summer months, the view from the residences, all of which are at a higher elevation than the SCARF site, would be of a meandering line of green riparian vegetation framed by the distant scenic rolling hills (Figure 4-4).

Figure 4-4. Existing visual conditions from Waldby neighborhood at Granite Avenue/Granite Circle intersection, showing Interim Facility, vegetation along San Joaquin River corridor, and rolling hills (View 4).

View 5: San Joaquin River Riparian Corridor

View 5 is from the west bank of the San Joaquin River toward the SCARF site. Sensitive viewers identified for this view are San Joaquin River Parkway recreationists, such as anglers, boaters, and hikers. From the level of the water or standing on the river bank, dense riparian vegetation provides a complete screen of the SJFH structures and planned facilities area (Figure 4-5).

Figure 4-5. Looking east toward SCARF site, showing riparian vegetation within San Joaquin River corridor (View 5).

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Prepared by:

Horizon WATER and ENVIRONMENT

Prepared for:
California Department of Fish and Wildlife
California Department of General Services

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Imagery Source: Bing Maps

Figure 4-6: Location of Five Key Viewpoints

SCARF and Related Management Actions Project
Draft Environmental Impact Report

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4.4 Impact Analysis

4.4.1 Methodology

The visual impact analysis evaluates the visual changes that would occur from implementing the Proposed Project using the standards of quality, consistency, and symmetry typically used for a visual assessment. This assessment is also based on a review of maps, site photographs, and aerial photographs. Analysis of the impacts on existing visual resources from implementing the Proposed Project is based on evaluation of the extent and implications of the visual changes, considering the following factors:

- Specific changes in the visual composition, character, and specifically valued qualities of the affected environment;
- Visual context of the affected environment;
- Extent to which the affected environment contains places or features that have been designated in plans and policies for protection or special consideration; and
- Number of viewers, their activities, and the extent to which these activities are related to the aesthetic qualities affected by actions that would be taken under the Proposed Project.

The visual impacts were compared against the thresholds of significance discussed below. An assessment of visual quality is subjective, and reasonable disagreement can occur as to whether alterations in the visual character of the potentially affected area would be adverse or beneficial. For this analysis, a conservative approach was taken, and the potential for substantial change to the visual character of the study area is generally considered a significant impact.

Note that the Lower American River, a National- and California-designated Recreational River located in the Sacramento River watershed in the Potentially Affected Area, is potentially accessible to salmon released under the Proposed Project. This potentially beneficial outcome would have no potential impact on Aesthetics. There would not be any potential impacts to Aesthetics from the fish conservation stock reintroduction and fishing regulations elements of the Proposed Project, and so those elements will not be further discussed.

Potential impacts on scenic vistas and existing visual character from SCARF operations are grouped together for this specific element. There would not be any potential impacts on scenic resources from operation of the SCARF facility, so this element will not be further discussed. Because the specific locations, designs, and other characteristics of the proposed recreational enhancements have not yet been identified, an impact analysis of their aesthetic effects was not possible and is not included in this chapter.

4.4.2 Criteria for Determining Significance

Based on Appendix G of the CEQA Guidelines and professional expertise, it was determined that the Proposed Project would result in a significant impact on aesthetics if it would:

A. Have a substantial adverse effect on a scenic vista;

B. Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway;

C. Substantially degrade the existing visual character or quality of the site and its surroundings; or

D. Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area.

4.4.3 Environmental Impacts

Table 3-1 in Chapter 3, *Introduction to the Environmental Analysis,* identifies components of the Proposed Project with the potential to result in impacts on Aesthetics.

SCARF Construction

Impact AES-CONSTRUCT-1: Adverse Effects on Scenic Vistas from the SCARF Construction (Significance Criterion A, Project Level, Less than Significant)

The SCARF site is visible from nearby residences in the Waldby neighborhood. Views of the SCARF site from the Millerton Lake Village and Parker Avenue residences and roadways on the bluffs east of North Friant Road are obscured by intervening vegetation and by landscaping in the Waldby neighborhood. The design of the SCARF facility would be similar to the existing SJFH, which contains four single-story buildings, residences, paved roadway and parking areas, an aeration tower, fish tanks, and settling and sludge ponds. The proposed facilities would include several single-story buildings of character, height, and square footage similar to the SJFH. The height of the aeration assembly and low-elevation fish tanks also would be compatible with the average height of the surrounding buildings. Dense riparian vegetation coverage blocks the view of the SCARF site from recreational users of the San Joaquin River. Topographic relief generally blocks much of the views of the site from the Lost Lake Park.

Temporary Effects

The construction activities of the Proposed Project would involve the use of heavy equipment, including cranes, bulldozers, graders, scrapers and trucks, and would be visible to nearby residences, particularly residences on the bluff immediately south of the site in the Waldby neighborhood and in the SJFH. Construction activities would diminish the quality of views of the San Joaquin River corridor. However, these impacts would be temporary, lasting only for the construction period of approximately one year. Therefore, these impacts are considered less than significant. Note that directional signage and nighttime security lighting would also be visible elements. The impacts from lighting are addressed below under Impact AES-CONSTRUCT-4.

Long-term Effects

The Proposed Project would alter the views of the San Joaquin River riparian corridor from public roadways in the Waldby neighborhood; however, the alterations would be similar to those of the adjacent SJFH, which is already visible from some of the homes in the Waldby neighborhood. This impact is considered less than significant.

Impact AES-CONSTRUCT-2: Damage to Scenic Resources along a Scenic Corridor, Including, but Not Limited to, Trees, Rock Outcroppings, and Historic Buildings within a State Scenic Highway (Significance Criterion B, Project Level, Less than Significant)

The Proposed Project would not be visible from portions of Friant Road that are designated by Fresno County as a scenic highway. The Proposed Project would remove some riparian vegetation along the San Joaquin River for construction of an effluent outfall and/or volitional release channel, as well as potentially remove some mature trees for construction of site facilities. Table 4-1 lists the size of trees (DBH), and whether or not they are native or non-native.

Table 4-1. Characteristics of Trees on the SCARF Site

Native/Non-Native	DBH[1]		
	4-8 Inches	8-12 Inches	Greater than 12 inches
Native	14	11	26
Non-Native	7	6	11

[1] Measured according to U.S. Department of Forestry protocol (USDF 2007)

The amount of vegetation removed would not be sufficient to result in a significant impact on the scenic quality of the San Joaquin River Parkway. This impact is considered less than significant.

Impact AES-CONSTRUCT-3: Changes to Existing Visual Character or Quality from SCARF Construction (Significance Criterion C, Project Level, Less than Significant with Mitigation)

Temporary Effects

Construction could result in temporary visual disturbances associated with the presence of construction crews and heavy equipment, including cranes, bulldozers, graders, scrapers, and trucks. However, the disturbance would be limited to nearby residences, would be of limited duration and scale, and is therefore considered less than significant. Note that directional signage and nighttime security lighting would also be visible elements. The impacts from lighting during construction are addressed below under AES-CONSTRUCT-4.

Long-term Effects

The design of the Proposed Project would be similar in character to the existing SJFH and surrounding area. Visual changes would include two small residences, a hatchery building, a utility building, fish tanks, and ponds. Most viewers are expected to consider the changes to be similar to the existing visual quality and character of the site; however, some individual viewers could potentially consider this impact to be significant. Implementation of **Mitigation Measures AES-CONSTRUCT-3a, -3b, and -3c** would ensure that this impact is less than significant, and the visual character of the community would be preserved.

Mitigation Measure AES-CONSTRUCT-3a: Materials and Colors Used in Construction of SCARF Facilities Shall be Compatible with the Surrounding Built and Natural Environments.
DGS, CDFW or the construction contractor shall select materials and colors of the facilities to be compatible with the surrounding developed and natural environments.

Mitigation Measure AES-CONSTRUCT-3b: Landscaping of SCARF Facilities Shall Consist of Native Vegetation.
CDFW or the construction contractor shall use native plants for landscaping in a manner consistent with Mitigation Measure BIO-TER-CONSTRUCT-10a (Minimize Area of Disturbance of Riparian Habitat) and with Mitigation Measure BIO-TER-CONSTRUCT-10b (Develop and Implement Revegetation Plan for Riparian Habitat and Sensitive Natural Communities Disturbed by Construction).

Mitigation Measure AES-CONSTRUCT-3c: Pipelines and Utilities Serving SCARF Facilities Shall be Installed Underground.
DGS, CDFW or the construction contractor shall install pipelines and utilities underground, to the extent feasible.

Impact AES-CONSTRUCT-4: New Sources of Light or Glare from the SCARF Construction (Significance Criterion D, Project Level, Less than Significant with Mitigation)

During construction of the Proposed Project, security lighting may be used, which could create a potentially significant impact.

The Friant Community Plan (County of Fresno 2011) contains goals and policies to encourage the protection of dark nighttime skies through the use of low-intensity lighting. Methods to help reduce impacts would include incorporation of reflectors and/or shielding, low-wattage bulbs, or other similar measures that would minimize the effects of light on the characteristic dark skies of the community. Similarly, lights should be thematic, decorative, and emit minimal spillover. Implementation of **Mitigation Measure AES-CONSTRUCT-4** would reduce this impact to a less-than-significant level.

Mitigation Measure AES-CONSTRUCT-4: Exterior Construction Security Lighting Shall Be Hooded and Directed Downward.

CDFW shall ensure that exterior construction security lighting is hooded and directed downward toward the SCARF, and away from adjacent properties.

SCARF Operations

Impact AES-OP-1: Adverse Effects on Scenic Vistas and Visual Character from SCARF Operations (Significance Criteria A and C, Project Level, Less than Significant with Mitigation)

During operation, the SCARF facilities would be visible from nearby residences, though the design and new structures would be of similar character and height to the existing SJFH. Intervening vegetation and landscaping in the Waldby neighborhood would continue to obscure views of the SCARF facilities from the Millerton Lake Village and Parker Avenue residences and roadways on the bluffs east of North Friant Road. Dense riparian vegetation coverage would continue to block the view of the SCARF facilities from recreational users of the San Joaquin River. Topographic relief would generally block much of the views of the facility from Lost Lake Park.

<u>Temporary Effects</u>

The SCARF facilities during operation would be visible for a short period of time to recreational users of the San Joaquin Hatchery Public Access and Trail as they approach, enter, and exit the facility. The new facility would approximately double the existing hatchery footprint, and it is anticipated the SCARF structures would attract attention and contribute to the viewscape. However, the new structures would negatively affect trail user experience intermittently, estimated at approximately 30 minutes or less per episode as the users of the trail cross the facility. In addition, the new structures would be of similar character and height to existing facilities and consistent with the surrounding environment. Therefore, these impacts are considered less than significant.

<u>Long-term Effects</u>

The SCARF facilities during operation would alter the views of the San Joaquin River riparian corridor from public roadways and residences in the Waldby neighborhood. Although the alterations would be similar to those of the adjacent existing SJFH that is already visible from some of the homes, the new facility would approximately double the existing hatchery footprint. Most viewers are expected to consider the changes to be similar to the existing visual quality and character of the site; however, some individual viewers could potentially consider this impact to be significant. Implementation of **Mitigation Measures AES-CONSTRUCT-3a, -3b, and -3c** would ensure that this impact is less than significant, and the scenic vista of the San Joaquin River riparian corridor and visual character of the Waldby community would be preserved.

Impact AES-OP-2: New Sources of Light or Glare from the SCARF Operations (Significance Criterion D, Project Level, Less than Significant with Mitigation)

Operations of the new SCARF facilities would use exterior lighting fixtures, as well as metallic features, which could reflect lighting or the sun and create sources of glare. The lighting and glare could create a long-term, potentially significant impact that may interfere with the viewing of dark nighttime skies by residents of Friant. The Friant Community Plan (County of Fresno 2011) contains goals and policies to encourage the protection of dark nighttime skies through the use of low intensity lighting. Implementation of **Mitigation Measures AES-OP-2a and -2b** would reduce this impact to a less-than-significant level.

Mitigation Measure AES-OP-2a: Permanent Exterior Lighting Shall Be Designed to Protect the Darkness of Nighttime Skies.
CDFW shall ensure that permanent lighting utilizes lights that are low wattage, or incorporates appropriate shielding, and that lighting is directed away from sensitive uses and adjacent properties.

Mitigation Measure AES-OP-2b: SCARF Structures Shall Be Constructed to Avoid Surface Glare.
To reduce glare, CDFW shall ensure that all structures are painted with non-glare surfacing or constructed of materials that do not produce glare.

Fish Reintroduction

Impact AES-REINTRO-1: Adverse Effects on Scenic Vistas from Fish Reintroduction (Significance Criterion A, Project/Program Level, Less than Significant)

The broodstock collection areas would be visible by recreationists along Butte, Deer, and Mill Creeks; the Lower Feather River; and adjacent public lands. The direct translocation release sites in the Restoration Area would be visible by recreational users in the San Joaquin River corridor. The potential release sites (Table 2-3) are generally located away from residences, and release equipment (seines, screw traps, fyke nets, etc.) would be obscured by distance, topography, and/or vegetation and not anticipated to be directly visible to residents along the river corridor. The equipment used for the translocation activities would not be easily visible to motorists along public roads because their views would be brief; may be obscured by distance, topography and/or vegetation; and would be generally consistent with the visual character of the area.

Temporary Effects

The activities associated with broodstock collection for the Proposed Project would involve the use of equipment and be visible to recreationists along Butte, Deer, and Mill Creeks, the Lower Feather River, and adjacent public lands. The activities associated with the release sites along the Restoration Area would involve the use of equipment and be visible to recreationists along the San Joaquin River and adjacent public lands. Collection and release activities would diminish the quality of views of the state-recognized unique fishery resources, Mill and Deer Creeks, Butte Creek, the Lower Feather River, and the San Joaquin River corridor. However, these impacts would be temporary and thus are considered less than significant.

Long-term Effects

Fish reintroduction would not significantly alter the quality of the views of the state-recognized unique fishery resources or Deer and Mill Creeks, or the views of the scenic landscape along Butte Creek, the Lower Feather River, or the San Joaquin River riparian corridor.

The impact analysis and significance conclusion above is considered project-level for all aspects of fish reintroduction, with the exception of wild broodstock collection, for which it is programmatic. For further discussion of the approach to the project and programmatic analysis in this document, please see Chapter 3, *Introduction to the Environmental Analysis*.

Impact AES-REINTRO-2: Damage to Scenic Resources along a Scenic Corridor, Including, but Not Limited to, Trees, Rock Outcroppings, and Historic Buildings within a State Scenic Highway (Significance Criterion B, Project/Program Level, Less than Significant)

The broodstock collection areas and direct translocation release sites would not damage Mill Creek or Deer Creek, non-formally designated extraordinary fishery resources protected by California's Wild and Scenic Rivers Act. The broodstock collection areas and direct translocation release sites would not be visible from state-designated scenic highways, from portions of Friant Road that are designated by Fresno County as a scenic highway, or from Millerton Road, a Fresno County-designated scenic drive. Impacts would therefore be less than significant.

The impact analysis and significance conclusion above is considered project-level for all aspects of fish reintroduction, with the exception of wild broodstock collection, for which it is programmatic. For further discussion of the approach to the project and programmatic analysis in this document, please see Chapter 3, *Introduction to the Environmental Analysis*.

Impact AES-REINTRO-3: Changes to Existing Visual Character or Quality from Fish Reintroduction (Significance Criterion C, Project/Program Level, Less than Significant)

Temporary Effects

Collection of wild broodstock on Butte, Deer, and Mill Creeks and the Lower Feather River could temporarily reduce the aesthetic qualities of views in the project area by introducing equipment and work crews into the viewshed of recreationists along the streams and adjacent public lands. Equipment may include small, portable, back-mounted water pumps or shovels for redd extraction. The presence of the crews and equipment and potential collection-related turbidity generation could temporarily degrade the existing visual character or exceptional water quality of the unique fishery resources, Deer and Mill Creeks, or the existing visual character of Butte Creek and the Lower Feather River. However, the disturbance would be of limited duration and scale and is therefore considered less than significant.

Direct translocation could temporarily reduce the aesthetic qualities of views within the San Joaquin River riparian corridor by introducing equipment and work crews into the viewshed of recreationists along the river and adjacent public lands. Equipment may include aluminum mesh, temporary holding pens for juveniles, and streamside or instream incubators for indirect release of eggs. The temporary streamside incubators would be placed in 5-gallon buckets placed adjacent to the river. Instream incubators would be buried in the streambed and not be visible. The presence of the crews and equipment could temporarily degrade the existing visual character of the area. However, the disturbance would be of limited duration and scale and is therefore considered less than significant.

Long-term Effects

Fish reintroduction would not change the existing visual character or exceptional water quality of the state-recognized unique fishery resources, Deer and Mill Creeks, or the existing visual character or visual quality along Butte Creek, the Lower Feather River, or the San Joaquin River riparian corridor.

The impact analysis and significance conclusion above is considered project-level for all aspects of fish reintroduction, with the exception of wild broodstock collection, for which it is programmatic. For further discussion of the approach to the project and programmatic analysis in this document, please see Chapter 3, *Introduction to the Environmental Analysis*.

Impact AES-REINTRO-4: New Sources of Light or Glare from Fish Reintroduction (Significance Criterion D, Project/Program Level, No Impact)

The broodstock collection areas and direct translocation release sites would not introduce new sources or light or glare. There would be no impact.

The impact analysis and significance conclusion above is considered project-level for all aspects of fish reintroduction, with the exception of wild broodstock collection, for which it is programmatic. For further discussion of the approach to the project and programmatic analysis in this document, please see Chapter 3, *Introduction to the Environmental Analysis*.

Fisheries Management

Impact AES-MANAGEMENT-1: Adverse Effects on Scenic Vistas from Fisheries Management (Significance Criterion A, Project/Program Level, Less than Significant)

The fish segregation weirs, instream traps and/or streamside rearing equipment that may be removed, modified, improved or constructed in the Restoration Area would be visible by recreational users in the San Joaquin River corridor. The existing, seasonal HFB, near the confluence of the Merced and San Joaquin Rivers, may be removed, moved, or modified; modifications to the HFB may involve constructing a permanent concrete sill. A separation weir similar to the HFB may be placed near the downstream end of Reach 1A of the San Joaquin River. The existing HFB is not visible by residents or motorists along nearby public roads (Hills Ferry Road and River Road) because of the distance, topography, and/or vegetation. Similarly, modification of the HFB by constructing a permanent concrete sill would not be visible by residents or motorists. A structure at Reach 1A similar to the existing HFB would not be easily visible by residents, golfers, or motorists along public roads because their views would be obscured by intervening distance, topography, and/or vegetation; would be brief while driving; and would be generally consistent with the visual character of the area along the San Joaquin River corridor. The same would apply to barriers at Salt and Mud Slough and various other barrier locations as deemed necessary in the future.

Temporary Effects

The construction, modification, or removal activities associated with management of fish segregation weirs, traps and streamside rearing equipment for the Proposed Project would involve the use of equipment and be visible to recreational users of the San Joaquin River. These fish management activities would diminish the quality of views of the San Joaquin River corridor within the Restoration Area. However, these impacts would be temporary, and thus are considered less than significant.

Long-term Effects

Management of fish segregation weirs, including the HFB and similar structures, would not substantially alter the quality of the views of the San Joaquin River riparian corridor. This impact would be less than significant.

The impact analysis and significance conclusion above is considered project-level for trap and haul activities, and programmatic for the fish segregation weirs. For further discussion of the approach to the project and programmatic analysis in this document, please see Chapter 3, *Introduction to the Environmental Analysis*.

Impact AES-MANAGEMENT-2: Damage to Scenic Resources along a Scenic Corridor, Including, but Not Limited to, Trees, Rock Outcroppings, and Historic Buildings within a State Scenic Highway (Significance Criterion B, Project/Program Level, No Impact)

The fish segregation weirs, instream traps, and streamside rearing equipment in the Restoration Area would not be visible from state-designated scenic highways, from portions of Friant Road that are designated by Fresno County as a Scenic Highway, or from Millerton Road, a Fresno County-designated Scenic Drive. There would be no impact.

The impact analysis and significance conclusion above is considered project-level for trap and haul activities, and programmatic for the fish segregation weirs. For further discussion of the approach to the project and programmatic analysis in this document, please see Chapter 3, *Introduction to the Environmental Analysis*.

Impact AES-MANAGEMENT-3: Changes to Existing Visual Character or Quality from Fisheries Management (Significance Criterion C, Project/Program Level, Less than Significant)

Temporary Effects

The construction, modification, or removal activities associated with management of fish segregation weirs, instream traps, and streamside rearing equipment in the Restoration Area could temporarily reduce the aesthetic qualities of views within the San Joaquin River riparian corridor by introducing equipment and work crews into the viewshed of recreationists along the river and adjacent public lands. The presence of the crews and equipment could temporarily degrade the existing visual character of the area. However, the disturbance would be of limited duration and scale, and thus is considered less than significant.

<u>Long-term Effects</u>

Management of fish segregation weirs and other equipment, including the HFB and similar structures, would not substantially change the existing visual character or visual quality along the San Joaquin River riparian corridor. Impacts would be less than significant.

The impact analysis and significance conclusion above is considered project-level for trap and haul activities, and programmatic for the fish segregation weirs. For further discussion of the approach to the project and programmatic analysis in this document, please see Chapter 3, *Introduction to the Environmental Analysis*.

Impact AES-MANAGEMENT-4: New Sources of Light or Glare from Fisheries Management (Significance Criterion D, Project/Program Level, No Impact)

Management of fish segregation weirs, instream traps and streamside rearing equipment would not introduce new sources of light or glare. There would be no impact.

The impact analysis and significance conclusion above is considered project-level for trap and haul activities, and programmatic for the fish segregation weirs. For further discussion of the approach to the project and programmatic analysis in this document, please see Chapter 3, *Introduction to the Environmental Analysis*.

Fisheries Research and Monitoring

Impact AES-MONITORING-1: Adverse Effects on Scenic Vistas from Fisheries Research and Monitoring (Significance Criterion A, Project Level, Less than Significant)

The fish monitoring sites in the Restoration Area would be visible by recreational users in the San Joaquin River corridor. The equipment used for the monitoring activities (for example, rotary screw traps, trap weirs, a variety of nets - gill, trammel, hoop and trap, electrofishing equipment, seines, markings to alert boaters, and jet and propeller motor boats) would not be easily visible by residents or motorists along public roads because their views may be obscured by intervening distance, topography, and/or vegetation; would be brief while driving; and would be generally consistent with the visual character of the area.

<u>Temporary Effects</u>

The activities associated with monitoring along the Restoration Area for the Proposed Project would involve the use of equipment and be visible to recreationists along the San Joaquin River and adjacent public lands. Monitoring activities may diminish the quality of views of the San Joaquin River corridor. However, these impacts would be temporary and are thus considered less than significant.

Long-term Effects

Fish research activities and monitoring equipment would not substantially alter the quality of the views of the San Joaquin River riparian corridor. Impacts would be less than significant.

Impact AES-MONITORING-2: Damage to Scenic Resources along a Scenic Corridor, Including, but Not Limited to, Trees, Rock Outcroppings, and Historic Buildings within a State Scenic Highway (Significance Criterion B, Project Level, No Impact)

The fish monitoring equipment in the Restoration Area would not be visible from state-designated Scenic Highways, from portions of Friant Road that are designated by Fresno County as a Scenic Highway, or from Millerton Road, a Fresno County-designated Scenic Drive. There would be no impact.

Impact AES-MONITORING-3: Changes to Existing Visual Character or Quality from Fisheries Research and Monitoring (Significance Criterion C, Project Level, Less than Significant)

Temporary Effects

The placement of fish monitoring equipment in the Restoration Area could temporarily reduce the aesthetic qualities of views within the San Joaquin River riparian corridor by introducing equipment and work crews into the viewshed of recreationists along the river and adjacent public lands. The presence of the crews and equipment could temporarily degrade the existing visual character of the area. However, the disturbance would be of limited duration and scale, and is therefore considered less than significant.

Long-term Effects

The placement of fish monitoring equipment and monitoring activities would not substantially change the existing visual character or visual quality along the San Joaquin River riparian corridor. Impacts would be less than significant.

Impact AES-MONITORING-4: New Sources of Light or Glare from Fisheries Research and Monitoring (Significance Criterion D, Project Level, No Impact)

The placement of fish monitoring equipment and monitoring activities would not introduce new sources or light or glare. There would be no impact.

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Chapter 5
AIR QUALITY

5.1 Overview

This chapter evaluates the Proposed Project's air quality impacts. The chapter first describes the air quality regulatory and environmental settings and then evaluates the project's air quality impacts. The impact evaluation begins by describing the air quality significance criteria and the methodology used to evaluate significance, and then presents the impact evaluation. Mitigation measures are identified for impacts that are determined to be significant.

Air quality is described for a specific location as the concentration of various pollutants in the atmosphere. Air quality conditions at a particular location are a function of the type and amount of air pollutants emitted into the atmosphere, the size and topography of the regional air basin, and the prevailing meteorological conditions.

5.2 Regulatory Setting

5.2.1 Federal Laws, Regulations, and Policies

Clean Air Act

The federal 1970 Clean Air Act (CAA) authorized the establishment of national health-based air quality standards and also set deadlines for their attainment. The EPA has established and continues to update the National Ambient Air Quality Standards (NAAQS) for the following specific criteria air pollutants: ozone (O_3), carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), lead (Pb), inhalable particulate matter 10 micrometers in diameter or smaller (PM_{10}), and fine particulate matter 2.5 micrometers in diameter or smaller ($PM_{2.5}$). The federal Clean Air Act Amendments of 1990 (1990 CAA) made major changes in deadlines for attaining NAAQS and in the actions required of areas of the nation that exceeded these standards, also known as non-attainment areas. Under the CAA, state and local agencies in areas that exceed the NAAQS are required to develop state implementation plans (SIPs) to show how they will achieve the NAAQS for ozone by specific dates (42 USC 7409, 7411). The U.S. Environmental Protection Agency (EPA) is responsible for enforcing the NAAQS primarily through reviewing SIPs prepared by each state.

Federal and state ambient air quality standards established acceptable limits for several different pollutants, expressed in maximum allowable concentrations generally defined in units of parts per million (ppm) or in micrograms per cubic meter ($\mu g/m^3$). Generally, these standards have been set to protect public health. A summary of state and federal ambient air quality standards is shown in Table 5-1.

Table 5-1. Ambient Air Quality Standards

Pollutant	Averaging Time	California Standards (Concentration) [1]	National Standards (Concentration) [2,3]
Ozone	8 hours	0.070 ppm ($137 \mu g/m^3$)	0.075 ppm
	1 hour	0.09 ppm ($180 \mu g/m^3$)	—
Carbon monoxide	8 hours	9.0 ppm ($10 mg/m^3$)	9.0 ppm ($10 mg/m^3$)
	1 hour	20 ppm ($23 mg/m^3$)	35 ppm ($40 mg/m^3$)
Nitrogen dioxide	1 hour	0.18 ppm ($339 \mu g/m^3$)	0.100 ppm *(see table note 4)*
	Annual arithmetic mean	0.030 ppm ($57 \mu g/m^3$)	0.053 ppm ($100 \mu g/m^3$)
Sulfur dioxide	24 hours	0.04 ppm ($105 \mu g/m^3$)	—
	1 hour	0.25 ppm ($655 \mu g/m^3$)	0.075 ppm ($196 \mu g/m^3$)
Particulate matter (PM_{10})	Annual arithmetic mean	$20 \mu g/m^3$	—
	24 hours	$50 \mu g/m^3$	$150 \mu g/m^3$
Particulate matter - fine ($PM_{2.5}$)	Annual arithmetic mean	$12 \mu g/m^3$	$12 \mu g/m^3$
	24 hours	—	$35 \mu g/m^3$ *(see table note 5)*
Sulfates	24 Hour	$25 \mu g/m^3$	—
Lead *(see table note 6)*	30-day average	$1.5 \mu g/m^3$	—
	Calendar quarter	—	$1.5 \mu g/m^3$
	Rolling 3 month Average *(see table note 7)*	—	$0.15 \mu g/m^3$
Hydrogen sulfide	1 hour	0.03 ppm ($42 \mu g/m^3$)	—
Vinyl chloride (chloroethene)	24 hours	0.010 ppm ($26 \mu g/m^3$)	—
Visibility-reducing particles	8 hours (10:00 to 18:00 PST)	See table note 8	—

Table 5-1. Ambient Air Quality Standards

Notes: A=Attainment N=Nonattainment U=Unclassified, CARB = California Air Resources Board, CO = carbon monoxide, mg/m^3 = milligrams per cubic meter, EPA = U.S. Environmental Protection Agency, NAAQS = National Ambient Air Quality Standards, $PM_{2.5}$ = fine particulate matter 2.5 micrometers in diameter or smaller, PM_{10} = inhalable particulate matter 10 micrometers in diameter or smaller, ppm = parts per million, µg/m^3 = micrograms per cubic meter

1. California standards for ozone, carbon monoxide (except Lake Tahoe), sulfur dioxide (1-hour and 24-hour), nitrogen dioxide, suspended particulate matter - PM_{10}, and visibility-reducing particles are values not to be exceeded. The standards for sulfates, Lake Tahoe carbon monoxide, lead, hydrogen sulfide, and vinyl chloride are not to be equaled or exceeded. If the standard is for a 1-hour, 8-hour, or 24-hour average (i.e., all standards except for lead and the PM_{10} annual standard), then some measurements may be excluded. In particular, measurements are excluded that CARB determines would occur less than once per year on average. The Lake Tahoe carbon monoxide standard is 6.0 ppm, a level one-half the national standard and two-thirds the state standard.
2. National standards shown are the "primary standards" designed to protect public health. National standards other than for ozone, particulates, and those based on annual averages are not to be exceeded more than once a year. The 1-hour ozone standard is attained if, during the most recent 3-year period, the average number of days per year with maximum hourly concentrations above the standard is equal to or less than 1. The 8-hour ozone standard is attained when the 3-year average of the 4th highest daily concentrations is 0.075 ppm (75 ppb) or less. The 24-hour PM_{10} standard is attained when the 3-year average of the 99th percentile of monitored concentrations is less than 150 µg/m^3. The 24-hour $PM_{2.5}$ standard is attained when the 3-year average of 98th percentiles is less than 35 µg/m^3. Except for the national particulate standards, annual standards are met if the annual average falls below the standard at every site. The national annual particulate standard for PM_{10} is met if the 3-year average falls below the standard at every site. The annual $PM_{2.5}$ standard is met if the 3-year average of annual averages spatially averaged across officially designed clusters of sites falls below the standard.
3. National air quality standards are set by EPA at levels determined to be protective of public health with an adequate margin of safety.
4. To attain this standard, the 3-year average of the 98th percentile of the daily maximum 1-hour average at each monitor within an area must not exceed 0.100 ppm (effective January 22, 2010).
5. EPA lowered the 24-hour $PM_{2.5}$ standard from 65 µg/m^3 to 35 µg/m^3 in 2006.
6. CARB has identified lead and vinyl chloride as toxic air contaminants with no threshold level of exposure below which no adverse health effects are determined.
7. National lead standard, rolling 3-month average: final rule signed October 15, 2008. Final designations effective December 31, 2011.
8. On December 14, 2012, the EPA revised the NAAQS for $PM_{2.5}$ to 12.0 micrograms per cubic meter. The existing standards for PM_{10} were retained.

Source: CARB 2012a, SJVAPCD 2012a, EPA 2012a

5.2.2 State Laws, Regulations, and Policies

California Clean Air Act, California Air Resources Board, and State Standards

The California Clean Air Act (CCAA) establishes an air quality management process that generally parallels the federal process. However, the CCAA focuses on attainment of the California Ambient Air Quality Standards (CAAQS) that, for certain criteria air pollutants and averaging periods, are more stringent than the comparable NAAQS. The CCAA also requires attainment status designations with respect to the CAAQS. The CAAQS also include standards for sulfates, hydrogen sulfide, and visibility. The California Air Resources Board (CARB) is the oversight agency responsible for regulating statewide air quality, including preparing and enforcing the federally required SIP.

The CCAA has substantially increased the authority and responsibilities of the local air pollution control districts (APCDs). The CCAA requires that each air district in the state prepare an air quality attainment plan (AQAP) if air quality within the district violates CAAQS for ozone, CO, SO_2, $PM_{2.5}$, or NO_2. Such plans must describe strategies for and progress toward attaining the CAAQS for each criteria air pollutant for which the air district is in non-attainment. These plans must be updated every 3 years. In some cases, the local

APCD combines the strategies for attainment of both federal and state standards into one AQAP document. State ambient air quality standards are shown in Table 5-1.

5.2.3 Local Laws, Regulations, and Policies

San Joaquin Valley Air Pollution Control District

Local APCDs are responsible for granting permits for construction and operation of new sources of air pollution. In addition, local APCDs establish rules and regulations for limiting pollution emissions. The SCARF site is within the jurisdiction of the SJVAPCD. The SJVAPCD publication, *Guide for Assessing and Mitigating Air Quality Impacts* (GAMAQI), is an advisory document that provides lead agencies, consultants, and project applicants with uniform procedures for addressing air quality in environmental documents (SJVAPCD 2002). The GAMAQI was used in preparing this air quality section. SJVAPCD is in the process of updating the GAMAQI, which currently does not have significance thresholds for construction emissions. However, the current practice at SJVAPCD is to apply the following operational emissions thresholds to construction emissions (10 tons per year of nitrogen oxide [NO_X], 10 tons per year of volatile organic compounds [VOCs], 15 tons per year of PM_{10} and $PM_{2.5}$ (Siong pers. comm.). The SJVAPCD's draft updated GAMAQI uses these same thresholds for NO_x, VOCs, PM_{10}, and $PM_{2.5}$, but also includes thresholds for CO (100 tons per year) and SO_x (27 tons per year) (SJVAPCD, 2012a). The current GAMAQI guidance also requires the implementation of effective and comprehensive control measures for construction-related PM_{10} emissions. SJVAPCD rules and regulations also include Regulation VIII, which requires the use of dust control measures to limit PM_{10} emissions during construction.

Table 5-2 summarizes the status of SJVAPCD AQAPs. The SJVAPCD prepares and submits AQAPs in compliance with the requirements set forth in the federal CAA and the CCAA. AQAPs contain strategies to reduce ozone precursors (i.e., VOCs and NO_X), PM_{10}, and $PM_{2.5}$ from stationary, area, and mobile sources. In addition to its AQAPs, SJVAPCD has issued Rule 4102, which states the following (SJVAPCD 2013a):

> A person shall not discharge from any source whatsoever such quantities of air contaminants or other materials which cause injury, detriment, nuisance or annoyance to any considerable number of persons or to the public or which endanger the comfort, repose, health or safety of any such person or the public or which cause or have a natural tendency to cause injury or damage to business or property.

Table 5-2. San Joaquin Valley Air Pollution Control District Air Quality Plans

Plan Title	Date	Status
Extreme Ozone Attainment Demonstration Plan, San Joaquin Valley Air Basin Plan Demonstrating Attainment of Federal 1-hour Ozone Standards [1]	October 2004, adopted March 2010	Adopted by SJVAPCD and CARB in October 2004. Submitted to EPA in November 2004. On August 21, 2008, SJVAPCD adopted clarifications for the 2004 Extreme Ozone Attainment Demonstration Plan for 1-hour ozone. On March 8, 2010, the EPA approved San Joaquin Valley's 2004 Extreme Ozone Attainment Plan for 1-hour ozone. However, due to litigation, the EPA withdrew its approval. The SJVAPCD anticipates submitting a revised plan by June 2013.
Draft Staff Report, 8-hour Ozone Reasonably Available Control Technology (RACT) – SIP Analysis	April 2006	Adopted by SJVAPCD on August 17, 2006.
8-Hour Ozone Attainment Demonstration Plan for the San Joaquin Valley	April 2007	Adopted by SJVAPCD in April 2007. Adopted by CARB in June 2007.
2010 Ozone Mid-Course Review	June 2010	The EPA's lowering of $PM_{2.5}$, NAAQS, and 8-hour ozone standards require new $PM_{2.5}$ and ozone plans. This review lays the groundwork for that effort. Because of updated information, SJVAPCD expects the EPA to require an 8-hour ozone plan in 2015.
2004 Revision to the California SIP for Carbon Monoxide Updated Maintenance Plan for Federal Planning Areas	July 2004	Adopted by CARB in July 2004.
2007 PM_{10} Maintenance Plan and Request for Redesignation	September 2008	Adopted by SJVAPCD on September 20, 2007. Approved by CARB in October 2007. Approved by the EPA in September 2008.
$PM_{2.5}$ Plan	December 2012	EPA revised the 24-hour average $PM_{2.5}$ standard to 35 micrograms per cubic meter in October 2006. The EPA designated the San Joaquin Valley in non-attainment of the 2006 $PM_{2.5}$ standard in 2009, effective from December 14, 2009. The SJVAPCD's attainment plan was submitted through CARB to EPA in December 2012.

Notes: CARB = California Air Resources Board, EPA = U.S. Environmental Protection Agency, NAAQS = National Ambient Air Quality Standards, $PM_{2.5}$ = fine particulate matter 2.5 micrometers in diameter or smaller, PM_{10} = inhalable particulate matter 10 micrometers in diameter or smaller, SIP = state implementation plan, SJVAPCD = San Joaquin Valley Air Pollution Control District

[1] Effective June 15, 2005, EPA revoked the national 1-hour ozone ambient air quality standard, including associated designations and classifications.

Sources: CARB 2011; SJVAPCD 2013b, 2013c, 2013d

5.3 Environmental Setting

5.3.1 Potentially Affected Area

As described in the impact analysis, potential air quality impacts are related to construction or operational sources of air quality emissions (e.g., truck or vehicle emissions, construction equipment, or stationary emission sources such as diesel generators). Emissions resulting from the Proposed Project would only occur in the Project Area, the SCARF site, the San Joaquin Valley Air Basin (SJVAB), the Sacramento Valley Air Basin, and to a limited extent, the San Francisco Bay Air Basin. Migration of salmon to other areas would not involve any air quality emission sources or other impact mechanisms. Therefore, the potentially affected area for the purposes of air quality is limited to the Project Area, the SCARF site, and the other identified air basins, which are described in detail below.

5.3.2 Project Area

As described in Section 2.3, the Project Area includes areas in which physical actions that are part of the Proposed Project would take place. The Project Area lies within portions of the Sacramento Valley Air Basin, the SJVAB, and the San Francisco Bay Air Basin. The Sacramento Valley Air Basin includes Shasta, Tehama, Glenn, Butte, Yuba, Colusa, Sutter, Placer, Yolo, East Solano, and Sacramento Counties; however, the Project Area does not include Glenn, Colusa, or Placer Counties. The SJVAB is discussed in greater detail in Section 5.3.3, "SCARF Site," below. The portion of the Project Area located in the San Francisco Bay Air Basin consists of a northern section of that basin, in Napa County.

Air districts with jurisdiction in the Sacramento Valley Air Basin and the project area include Shasta County Air Quality Management District (AQMD), Tehama County APCD, Butte County AQMD, Feather River AQMD, Yolo-Solano AQMD, and the Sacramento Metropolitan AQMD. The Bay Area AQMD has jurisdiction over nine counties, including Napa County, which is within the Project Area.

5.3.3 SCARF Site

The SCARF site is located in Fresno County, which lies within the SJVAB. The SJVAB also includes San Joaquin County, Stanislaus County, Madera County, Kings County, Tulare County, and a portion of Kern County. The SJVAB is bounded on three sides by mountain ranges: the Sierra Nevada to the east, the Coast Ranges to the west, and the Tehachapi Mountains to the south. The SJVAB is open to the north to the Sacramento Valley. The San Joaquin Valley is approximately 250 miles long and averages approximately 35 miles in width. The mountains surrounding the SJVAB restrict air movement through and out of the basin; as a result, they impede the dispersion of pollutants from the basin.

Fresno County is designated as a federal and state nonattainment area for ozone and $PM_{2.5}$, as a state non-attainment area for PM_{10}, and as a state and federal attainment area for all other pollutants. The entire SJVAB, which includes Fresno County, was reclassified by the

EPA from PM_{10} non-attainment to attainment on September 25, 2008. Table 5-3 shows the county's federal and state attainment status by pollutant.

Table 5-3. Air Quality Pollutant Attainment Status for Fresno County

Pollutant	Attainment Status	
	Federal	State
Ozone – 1 hour	No federal standard	Severe non-attainment
Ozone – 8 hour	Non-attainment	Non-attainment
PM_{10}	Attainment	Non-attainment
$PM_{2.5}$	Non-attainment	Non-attainment
CO	Attainment	Attainment
NO_2	Attainment	Attainment
SO_2	Attainment	Attainment
Pb	Attainment	Attainment
All others	Attainment/unclassified	Attainment/unclassified

Notes: CO = carbon monoxide, $PM_{2.5}$ = fine particulate matter 2.5 micrometers in diameter or smaller, PM_{10} = inhalable particulate matter 10 micrometers in diameter or smaller, NO_2 = nitrogen dioxide, Pb = lead, SO_2 = sulfur dioxide

Sources: CARB 2012b; EPA 2012b

5.4 Impact Analysis

5.4.1 Methodology

As required by SJVAPCD, the California Emissions Estimator Model (CALEEMOD) was used to quantify criteria pollutant emissions from SCARF construction and operation activities. In addition, CARB's OFFROAD 2007 (CARB 2007) was used to estimate emissions associated with boat operations. These emissions were then compared to the SJVAPCD's thresholds to determine the significance of potential impacts on air quality.

For other operational impacts associated with the Proposed Project and occurring in the Project Area, impact significance was determined qualitatively by considering the project emission sources and duration, and/or by applying the SJVAPCD's Small Project Analysis Level (SJVAPCD 2012b) trip generation rates. The SJVAPCD has established thresholds of significance for criteria pollutant emissions, which are based on SJVAPCD New Source Review offset requirements for stationary sources. Using project type and size, the SJVAPCD has estimated emissions and determined a size below which it is reasonable to conclude that a project would not exceed applicable thresholds of significance for criteria pollutants. Section 5.4.2, "Criteria for Determining Significance," provides these thresholds below.

In the interest of streamlining CEQA requirements, projects that fit the descriptions and project sizes identified in the Small Project Analysis Level guidance, provided below in Section 5.4.2, are considered to have a less-than-significant impact on air quality. Consequently, criteria pollutant emissions do not need to be quantified for projects that meet SJVAPCD's definition of a small project.

For toxic air contaminants (TACs) and odors associated with all of the project components, impacts were evaluated qualitatively using SJVAPCD's GAMAQI guidance (SJVAPCD 2002). A draft updated GAMAQI was prepared in May 2012. However, since the more recent version has not been adopted, the 2002 version was used for this analysis. The odor impact evaluation for SCARF construction and operation was conducted qualitatively based primarily on whether the existing hatchery operation had elicited any odor or nuisance complaints from SJVAPCD in the past 5 years. In addition, other pertinent information regarding TAC and odor sources (i.e., frequency of emissions, type of sources) and the proximity to sensitive receptors was considered.

Operation-related air quality impacts of the Proposed Project's programmatic elements within the SJVAB and emission impacts occurring in other air basins were evaluated qualitatively by considering the Proposed Project's potential sources of criteria pollutant, TAC, or odor emissions; proximity to sensitive receptors; and frequency and duration of emissions.

5.4.2 Criteria for Determining Significance

According to Appendix G of the CEQA Guidelines and SJVAPCD guidance, a significant impact would occur with respect to air quality if the Proposed Project would:

A. Conflict with or obstruct implementation of the applicable air quality plan.

B. Violate any air quality standard established by EPA or CARB, or contribute substantially to an existing or projected air quality violation, in comparison to the SJVAPCD thresholds below.

C. Expose sensitive receptors to substantial air pollutant concentrations.

D. Create objectionable odors affecting a substantial number of people.

GAMAQI Thresholds

The SJVAPCD has developed quantifiable significance thresholds to implement the above standards. The 2002 SJVAPCD GAMAQI listed quantifiable thresholds for operational ROG and NO_X only, but, it makes reference to SJVAPCD stationary source offset requirements. The Draft 2012 GAMAQI reiterates the use of stationary source requirements as a threshold and specifically lists out the values. SJVAPCD states that a significant impact would occur if implementation of the Proposed Project would result in emissions that exceed the following SJVAPCD thresholds:

- NO_X: 10 tons per year
- Reactive organic gas (ROG): 10 tons per year

- PM_{10} or $PM_{2.5}$: 15 tons per year
- CO: 100 tons per year
- SO_X: 27 tons per year

These thresholds are applied separately to construction and operations emissions, even if there is overlap in these emissions. Informal guidance provided by SJVAPCD established the thresholds listed above (Barber pers. comm.). Therefore, for this analysis, a comparison of project emissions to the 15 tons per year for PM_{10} and $PM_{2.5}$ and to the 10 tons-per-year thresholds for NO_X and ROG serves as a surrogate for evaluating whether the Proposed Project would violate ambient air quality standards.

According to the SJVAPCD's guidance, operational and construction emissions are considered to be a less-than-significant impact if fugitive dust (PM_{10} and $PM_{2.5}$) emissions are below the significance level listed above. In addition, SJVAPCD Regulation VIII requires all projects that involve earthmoving or travel on unpaved roads to implement fugitive dust control measures; implementation of the control measures will constitute sufficient measures to reduce PM_{10} and $PM_{2.5}$ impacts to a level considered less than significant.

Quantitative TAC thresholds of significance identified in the GAMAQI include:

- Probability of contracting cancer for the Maximally Exposed Individual (MEI) exceeds 10 in one million.
- Ground-level concentrations of non-carcinogenic TACs would result in a Hazard Index greater than 1 for the MEI.

However, since location or emission source details regarding many of the Proposed Project's elements are not available at this time, a qualitative analysis was performed to determine the impact significance of potential TAC emissions. For SCARF construction and operation, health risks from TACs were evaluated by identifying the Project's potential to generate TAC emissions and by determining whether sensitive receptors could be affected by those emissions.

To determine whether the Project is consistent with existing air quality plans, the analysis examines whether the Project is consistent with relevant general or specific plans upon which the air plans are based.

Small Project Analysis Level

As described in Section 5.4.1, "Methodology," SJVAPCD has established screening levels based on project types (land uses) and sizes (square footage, housing units, etc.). Projects below these sizes are considered to have emissions below the numeric thresholds of significance for the criteria pollutants. The Proposed Project is categorized as General Light Industrial Land Use. Projects that fit or are below the following criteria would result in less-than-significant impacts:

- Industrial Land Uses: result in vehicle trips of 1,506 trips/day;

- General Light Industry Land Uses: construct 510,000 ft^2.

5.4.3 Environmental Impacts

All elements of the Proposed Project have the potential to result in impacts on air quality. Table 3-1 in Chapter 3, *Introduction to the Environmental Analysis,* identifies these components, and each is discussed below.

SCARF Construction

Impact AQ-CONSTRUCT-1: Potential for SCARF Construction to Conflict with or Obstruct Implementation of the SJVAPCD Air Quality Plan (Significance Criterion A, Project Level, Less than Significant)

The SCARF site is located in Fresno County, in the SJVAB, which is currently designated as a non-attainment area for federal and state ozone and $PM_{2.5}$ standards, and state PM_{10} standards. SJVAPCD has developed AQAPs and prepares associated triennial updates. AQAPs present comprehensive strategies to reduce ROGs, NO_X, PM_{10}, and $PM_{2.5}$ emissions from stationary, area, mobile, and indirect sources. ROG and NO_X are the principal precursor pollutants that cause the formation of ozone, the non-attainment pollutant commonly known as smog. Strategies in the AQAPs include the adoption of rules and regulations; enhancement of CEQA participation; implementation of a new and modified indirect source review program; adoption of local air quality plans; and stationary, mobile, and indirect-source control measures.

The Proposed Project would result in construction of the SCARF and associated improvements (approximately 8,200 ft^2). The Proposed Project would lead to land uses that are consistent with those anticipated in the *Fresno County General Plan* (see discussion herein, Chapter 13, *Land Use and Planning*, Section 13.2.2, *Local Laws, Regulations, and Policies*) and the SJVAPCD AQAP for the property for long-range air quality planning, and would not facilitate further growth. Specific air quality impacts related to criteria pollutants are discussed in Impact AQ-CONSTRUCT-2 and Impact AQ-CONSTRUCT-3, below. The project includes relevant mitigation requirements that are contained within the SJVAPCD AQAP and would comply with SJVAPCD regulations. Therefore, the Proposed Project would not conflict with or obstruct the SJVAPCD AQAPs, and the impact would be less than significant.

Impact AQ-CONSTRUCT-2: Potential for SCARF Construction to Violate ROG, NO_x, PM_{10}, $PM_{2.5}$, CO, or SO_x Significance Thresholds and Contribute Substantially to an Existing or Projected Air Quality Violation (Significance Criterion B, Project Level, Less than Significant)

Construction emissions are described as “short term” or temporary in duration. Grading would generate fugitive dust, including PM_{10} and $PM_{2.5}$. Fugitive dust emissions are primarily associated with site preparation. They vary as a function of such parameters as soil silt content, soil moisture, wind speed, acreage of disturbance area, and miles traveled by construction vehicles on- and off-site. Operation of diesel-engine construction equipment on-site, hauling of exported and imported soils and materials to and from the site, and construction crew traffic would generate emissions of ROG, NO_X, CO, sulfur oxides (SO_X), PM_{10}, and $PM_{2.5}$.

Construction activities are anticipated to begin in early 2015 and be completed in early 2016. Site preparation for the new structures would include clearing and grubbing, import of fill, and placement of fill and compaction. Table 5-4 shows the SCARF's estimated construction emissions. Project construction would not exceed the NO_X, ROG, or PM_{10}, $PM_{2.5}$, CO, or SO_x thresholds established by SJVAPCD.

Table 5-4. SCARF Construction Emissions of Criteria Pollutants (tons per year)

Construction Activity	NO_x	ROG	CO	SO_x	PM_{10} (total)	$PM_{2.5}$ (total)
2015 emissions	8.03	1.13	5.43	0.01	2.02	0.78
2016 emissions	0.02	0.02	0.02	0	0	0
SJVAPCD threshold	10	10	100	27	15	15
Exceed threshold?	No	No	No	No	No	No

Notes: CO = carbon monoxide, NO_x = nitrogen oxides, $PM_{2.5}$ = fine particulate matter 2.5 micrometers in diameter or smaller, PM_{10} = inhalable particulate matter 10 micrometers in diameter or smaller, ROG = reactive organic gas, SJVAPCD = San Joaquin Valley Air Pollution Control District, SO_x = sulfur oxides

Source: Appendix G, *Air Quality Emission Estimates*, of this DEIR

The Proposed Project would implement SJVAPCD Regulation VIII, which is a regulation that SJVAPCD has enacted to ensure fugitive dust emissions would be at a level that is considered less than significant. Table 5-5 provides conservative emission estimates because these emissions do not consider SJVAPCD Regulation VIII. SJVAPCD Regulation VIII requires the following:

- All disturbed areas, including storage piles, which are not being actively used for construction purposes, will be effectively stabilized of dust emissions, using water or a chemical stabilizer/suppressant, or by covering with a tarp or other suitable cover or a vegetative ground cover.
- All on-site unpaved roads and off-site unpaved access roads will be effectively stabilized of dust emissions by using water or a chemical stabilizer/suppressant.
- All land-clearing, grubbing, scraping, excavation, leveling, grading, cut-and-fill, and demolition activities will be effectively controlled for fugitive dust emissions by applications of water or by presoaking.
- With the demolition of buildings up to six stories in height, all exterior surfaces of the building will be wetted during demolition.
- When materials are transported off-site, all material will be covered or effectively wetted to limit visible dust emissions, and at least 6 inches of freeboard space from the top of the container will be maintained.
- All construction-related operations will limit or expeditiously remove the accumulation of mud or dirt from adjacent public streets at the end of each workday. Note that the use of dry rotary brushes is expressly prohibited except

where preceded or accompanied by sufficient wetting to limit the visible dust emissions. The use of blower devices is expressly forbidden.

- Following the addition of materials to, or the removal of materials from, the surface of outdoor storage piles, the piles will be effectively stabilized of fugitive dust emissions through treatment with sufficient water or a chemical stabilizer/suppressant.
- Dirt tracked out will be immediately removed when it extends 50 or more feet from the site, and will also be removed at the end of each workday.
- Any site with 150 or more vehicle trips per day will prevent carryout and track out.

Because SCARF construction would not exceed any SJVAPCD thresholds and would implement SJVAPCD Regulation VIII, construction particulate air quality impacts would be less than significant.

Impact AQ-CONSTRUCT-3: Potential for SCARF Construction to Expose Sensitive Receptors to Substantial Pollutant Concentrations (Significance Criterion C, Project Level, Less than Significant)

The closest sensitive receptors to the SCARF site are residences located approximately 50 to 75 feet from the site. The pollutants of concern that would affect sensitive receptors would be particulates, specifically PM_{10} and $PM_{2.5}$ contained in fugitive dust, and diesel particulate matter (DPM) from construction equipment. The control of particulates and fugitive dust is discussed above in response to Significance Criterion B and SJVAPCD Regulation VIII, which would be implemented during construction activities to minimize exposure to fugitive dust. The construction period for the SCARF, which is approximately 11 months, would not involve the use of substantial quantities of construction equipment and thus would not emit any substantial quantities of DPM. DPM exposure of less than a year from construction equipment is generally not quantified as cancer potency factors are based on life-time exposure and there is considerable uncertainty in trying to evaluate the cancer risk from projects that will only last a small fraction of a lifetime (OEHHA 2012). Thus, the Proposed Project would not pose long-term or significant health risks to nearby residents and workers in the vicinity of the SCARF site. The impact on sensitive receptors from fugitive dust and other pollutants would be less than significant.

Impact AQ-CONSTRUCT-4: Potential for SCARF Construction to Create Objectionable Odors Affecting a Substantial Number of People (Significance Criterion D, Project Level, Less than Significant)

Construction activities for the Proposed Project would not result in the generation of permanent or long-term objectionable odors. Odors associated with the intermittent operation of diesel-powered equipment and with paint and coatings might be detected by nearby sensitive receptors, but these odors would be of short duration and would not affect a substantial number of people. Therefore, this impact would be less than significant.

SCARF Operations

Impact AQ-OP-1: Potential for Operation of the SCARF to Conflict with or Obstruct Implementation of the SJVAPCD's Air Quality Plans and Result in an Increase in ROG, NO_x, PM_{10}, $PM_{2.5}$, CO, and SO_X Emissions that Exceed SJVAPCD Significance Thresholds (Significance Criteria A and B, Project Level, Less than Significant)

Operation of the SCARF would generate employee vehicle and truck trips that would emit criteria pollutants and potentially contribute to the existing ozone and PM impairments in the SJVAB. Approximately 16 daily employee vehicle trips would be generated by the four full-time and two part-time workers, including the two employees living on-site or in Friant. In addition, the SCARF would require truck deliveries twice a month for hatchery-related supplies, such as fish food, chemicals, and therapeutics as well as miscellaneous travel for SCARF operations, meetings, and training estimated by CDFW to be less than two trips per day. Truck trips associated with reintroduction of fish is addressed below under Fish Reintroduction. These limited truck and employee trips would not be expected to conflict with or obstruct implementation of the SJVAPCD's air quality plans. In addition, as shown in Table 5-5, operation of the SCARF (in combination with the operations of other project components) would result in ROG, NO_x, PM_{10}, $PM_{2.5}$, CO, and SOx emissions that are substantially less than the SJVAPCD's significance thresholds. Therefore, this impact would be less than significant.

Table 5-5. Operational Emissions of Criteria Pollutants (tons per year)

Operation Activity	NO_x	ROG	CO	SO_x	PM_{10} (total)	$PM_{2.5}$ (total)
SCARF Operation	0.11	0.06	0.22	0	0.04	0.01
Fish Reintroduction	0.029	0.02	0.17	0	0.05	0.01
Fisheries Management	0.15	0.04	0.14	0	0.04	0
Fisheries Research and Monitoring	0.37	2.02	4.32	0	0.40	0.37
Recreational Management	0.01	0	0.01	0	0	0
Total Operational Emissions	*0.66*	*2.14*	*4.86*	*0*	*0.53*	*0.39*
SJVAPCD Threshold	10	10	100	27	15	15
Exceed Threshold?	No	No	No	No	No	No

Notes: CO = carbon monoxide, N/A = Not applicable, NO_X = nitrogen oxides, $PM_{2.5}$ = fine particulate matter 2.5 micrometers in diameter or smaller, PM_{10} = inhalable particulate matter 10 micrometers in diameter or smaller, ROG = reactive organic gas, SJVAPCD = San Joaquin Valley Air Pollution Control District, SO_X = sulfur oxides

Source: CALEEMOD 2011.1.1 and OFFROAD 2007 were used to calculate emission estimates. See Appendix G, *Air Quality Emission Estimates*, of this DEIR for methodology. Also, see Appendix G for detailed emission calculations. Emissions shown are for 2016, the first year of SCARF project operations.

Impact AQ-OP-2: Potential for SCARF Operations to Expose Sensitive Receptors to Substantial Pollutant Concentrations (Significance Criterion C, Project Level, Less than Significant)

The closest sensitive receptors to the SCARF site are residences located approximately 50 to 75 feet from the site. Diesel particulate matter from truck exhaust represents the only source of TACs from SCARF operations. The primary TAC from diesel trucks is DPM. The

Project would involve a small number of diesel truck trips that would either originate or terminate at the SCARF facility. Because of the small number of trips, and because CARB regulations limit diesel truck idling to 5 minutes or less, the Proposed Project would not expose nearby residents to significant health risks during project operation. In addition, as shown in Table 5-6, truck and vehicle trips associated with SCARF operational activities would not generate particulate emissions in significant quantities. Thus, the Proposed Project would not pose significant health risks to nearby residents and workers in the SCARF vicinity. The impact on sensitive receptors from particulates would be less than significant.

Impact AQ-OP-3: Potential for SCARF Operations to Create Objectionable Odors Affecting a Substantial Number of People (Significance Criterion D, Project Level, Less than Significant with Mitigation)

There have been no recorded, confirmed odor complaints related to the existing SJFH or Interim Facility in the past 6 years (January 2006 through August 2012) (Hockett pers. comm.). Operation of the SCARF would generally involve activities similar to those currently under way at the SJFH and Interim Facility and would not be expected to create any objectionable odors affecting a substantial number of people.

However, the SCARF operations may generate objectionable odors through the potential disposal of excess fish into streams to provide an energy source and nutrients to the riverine environment. Details of the potential disposal locations, methods, or quantities of fish that could be disposed of in streams and the proximity of sensitive receptors to the disposal locations are not available at this time. Odors associated with the decaying fish may be detected by nearby sensitive receptors. Therefore, these fish disposal activities could generate potentially significant objectionable odors. Implementation of Mitigation Measure AQ-OP-3 and compliance with SJVAPCD Rule 4102 regarding nuisance, would reduce this impact to less than significant.

Mitigation Measure AQ-OP-3: Fish Disposal Limitations.
CDFW will implement at least one of the following measures to minimize the likelihood of potential odors from fish disposal activities affecting a substantial number of sensitive receptors:

- Limit fish disposal locations to areas that are at least 1,000 feet from any potential sensitive receptors, including terrestrial recreationists such as hikers.
- Implement disposal methods that ensure that fish carcasses are weighed down and disposed of within a stream channel instead of on a stream bank.

Fish Reintroduction

Impact AQ-REINTRO-1: Potential for Fish Reintroduction Activities to Conflict with or Obstruct Implementation of the Applicable Air Districts' Air Quality Plans; Increase ROG, NO_x, PM_{10}, $PM_{2.5}$, CO, and SO_X Emissions such that They Exceed the Applicable Air Districts' Significance Thresholds; or Expose Sensitive Receptors to Substantial

Pollutant Concentrations (Significance Criteria A, B, and C, Project/Program Level, Less than Significant)

Fish reintroduction would consist entirely of operational activities and, consequently, construction emissions are not evaluated for this project component.

Fish reintroduction would primarily consist of mobile source trips. The fish reintroduction activities would require truck and vehicle trips for the collection, transport, and/or release of Chinook salmon (eggs, juveniles, or adults). These truck and vehicle trips could originate in or pass through the SJVAB, the Sacramento Valley Air Basin, and/or the San Francisco Bay Area Air Basin, and thus could be required to comply with the regulations of the multiple air districts overseeing these air basins. These activities are estimated to be seasonal, likely spanning 5 months per year during the fall and 5 months during the spring. The frequency of delivery trips from the FRFH to the quarantine facilities is assumed to be 4 times per week, and the frequency of delivery trips from the quarantine facility to SCARF is also assumed to be 4 times per week. The emissions from these truck trips is shown in Table 5-6 illustrating that (in combination with the operations of other project components) the ROG, NO_x, PM_{10}, $PM_{2.5}$, CO, and SO_X emissions that are substantially less than the SJVAPCD's significance thresholds, which are also lower than or equal to the significance thresholds adopted by other air districts that vehicles may pass through. Therefore, emissions would not be expected to be substantial or to exceed the applicable significance thresholds set by relevant air districts.

Furthermore, the SJVAPCD's Small Project Analysis Level guidance states that general industrial activities generating less than 1,506 trips per day are assumed to have a less-than-significant impact on air quality, and criteria pollutant emissions associated with these activities would not need to be quantified. The Proposed Project's activities, including reintroduction activities, would result in a fraction of this truck trip significance threshold and resulting emissions shown in Table 5-6 confirming that the activities are a fraction of the emissions significance threshold. These limited daily truck trips and emissions would not be expected to conflict with or obstruct implementation of the local air districts' air quality plans or increase criteria pollutant emissions above significant thresholds.

Diesel particulate matter from truck exhaust represents the primary health risk from fish reintroduction activities. The vehicles typically utilized for fish transport are light heavy-duty trucks which may be gasoline or diesel fueled. As described above, the Fish Reintroduction component of the Proposed Project would involve a small number of diesel truck trips. Given the small number of trips, and the fact that CARB regulations limit diesel truck idling to 5 minutes or less, the Project would not expose any nearby residents or other sensitive receptors to significant health risks during project operation.

Air emissions associated with fish reintroduction would be relatively minor. Emissions estimates provide an upper bound level of trips that would still be classified less than significant according to SJVAPCD screening procedures. Impacts are therefore considered less than significant.

The impact analysis and significance conclusion above is considered project-level for all aspects of fish reintroduction, with the exception of wild broodstock collection, for which it is programmatic. For further discussion of the approach to the project and programmatic analysis in this document, please see Chapter 3, *Introduction to the Environmental Analysis*.

Impact AQ-REINTRO-2: Potential for Fish Reintroduction Activities to Create Objectionable Odors Affecting a Substantial Number of People (Significance Criterion D, Project/Program Level, Less than Significant)

Fish reintroduction activities would not result in the generation of permanent or long-term objectionable odors. Odors associated with the intermittent operation of diesel-powered equipment might be detected by nearby sensitive receptors, but these odors would be of short duration and would not affect a substantial number of people. CDFW is not aware of odor complaints related to fish reintroduction activities conducted under other reintroduction programs. Therefore, this impact would be less than significant.

The impact analysis and significance conclusion above is considered project-level for all aspects of fish reintroduction, with the exception of wild broodstock collection, for which it is programmatic. For further discussion of the approach to the project and programmatic analysis in this document, please see Chapter 3, *Introduction to the Environmental Analysis*.

Fisheries Management

Impact AQ-MANAGEMENT-1: Potential for Construction of Fish Segregation Weirs to Conflict with or Obstruct Implementation of the SJVAPCD's Air Quality Plans; Exceed SJVAPCD ROG, NO_x, PM_{10}, $PM_{2.5}$, CO, and SO_X Significance Thresholds; or Expose Sensitive Receptors to Substantial Pollutant Concentrations (Significance Criteria A, B, and C, Program Level, Less than Significant with Mitigation)

Construction of the fish segregation weirs would potentially generate ROG, NO_x, PM_{10}, $PM_{2.5}$, CO, and SO_X emissions from land disturbance and/or exhaust from construction equipment, including haul or equipment trucks, and worker commutes. Specific project-level data about the amount, use, and locations of this equipment are not available at this time. In addition, specific project-level data about the construction periods in the case of the Reach 1A Separation Weir and weirs at Salt and Mud Sloughs and various other locations and the location of sensitive receptors in relationship to these sites are not available, because the sites have not been precisely defined. Thus, these activities are conservatively assumed to have the potential to conflict with or obstruct implementation of the SJVAPCD's air quality plans; to exceed thresholds established by the SJVAPCD (10 tons per year for ROG and NO_x, 15 tons per year for PM_{10} and $PM_{2.5}$, 100 tons per year for CO, and 27 tons per year for SO_X); and to expose sensitive receptors to substantial pollutant concentrations. Consequently, this impact is considered potentially significant.

Implementation of Mitigation Measure AQ-MANAGEMENT-1 would reduce construction air emissions to levels below SJVAPCD's construction significance thresholds. Therefore, with implementation of Mitigation Measure AQ-MANAGEMENT-1, construction of fish segregation weirs would result in a less-than-significant impact.

Mitigation Measure AQ-MANAGEMENT-1. Prepare Project-Level Quantitative Analysis of Construction Related Air Quality Emissions, and Implement Measures to Cap Emissions.

As future individual project components are further defined to a level that construction emissions can be estimated, and prior to implementing that component or taking actions that commit CDFW to implementing that component, CDFW will prepare a complete, quantitative project-level air quality analysis for that component.

The quantitative construction air quality analyses will be based on the types, locations, numbers, and operations of equipment to be used; the amount and distance of material to be transported; and worker trips required. In addition, the analysis will be based on the projected quantity and frequency of vehicle and/or truck trips, and other activities that generate emissions. The analysis will determine whether the combined emissions of the quantified components' construction activities exceed the SJVAPCD's construction air quality thresholds (see the SJVAPCD thresholds presented in Tables 5-5). In addition, the analysis will evaluate whether the combined emissions from all project components constitute a significant health risk from diesel fueled equipment.

If the analysis determines that construction emissions exceed the air quality significance thresholds, then CDFW will identify and implement appropriate mitigation. As a performance standard, the mitigation shall be sufficient to reduce construction emissions so that the Proposed Project's emissions are below the applicable significance thresholds. Examples of appropriate mitigation may include, but not be limited to, SJVAPCD Regulation VIII, alternative fueled equipment, phasing of material hauling trips, use of chemical additives or after-market devices to reduce emissions on existing equipment, use of electrically powered equipment, reduction in total equipment hours, use of newer equipment models, adopting a vehicle idling policy requiring all vehicles to adhere to a 5 minute idling policy, and sourcing of material from local sources. Actual emissions efficiency for off-road equipment and motor vehicles will be at least as efficient as the most recent CARB fleet average for off-road equipment and motor vehicles for the current calendar year.

In the event that the mitigation strategies (either those listed above or others developed to achieve the performance standard) are calculated to be insufficient to reduce construction emissions levels below significance thresholds, then CDFW will enter into a Voluntary Emission Reduction Agreement (VERA) with SJVAPCD. A VERA is a contractual agreement in which the project proponent agrees to mitigate project specific emissions by providing funds for the SJVAPCD's Emission Reduction Incentive Program (ERIP). The funds are disbursed by ERIP in the form of grants for projects that achieve emission reductions. Types of emission reduction projects that have been funded in the past include electrification of stationary internal combustion engines (e.g., agricultural irrigation pumps), replacing old heavy-duty trucks with new, cleaner, more efficient heavy-duty trucks, and replacement of old farm tractors. The VERA will be used to offset the project's increase in emissions so that the Proposed Project would have no increase in construction emissions above the significance threshold.

Similarly, if the air quality analysis indicates that the activities pose a significant health risk, then CDFW will identify mitigation measures, which, as a performance standard, will ensure health risks are at a less-than-significant level. Examples of appropriate mitigation may include, but not be limited to, use of alternative fueled equipment, use of aftermarket control devices such as diesel particulate filters, use of electrical equipment where possible, or reduction in number of hours of equipment use with a minimum reduction in diesel particulate matter of 85% compared to a Tier 2 engine or equivalent to 100 trucks per day based on CARB's Air Quality and Land Use Handbook.

Impact AQ-MANAGEMENT-2: Potential for Operation of the Fish Segregation Weirs or Trap and Haul Efforts to Conflict with or Obstruct Implementation of the SJVAPCD's Air Quality Plans; Increase ROG, NO_x, PM_{10}, $PM_{2.5}$, CO, and SO_X Emissions such that They Exceed SJVAPCD Significance Thresholds; or Expose Sensitive Receptors to Substantial Pollutant Concentrations (Significance Criteria A, B, and C, Project/Program Level, Less than Significant)

Operation of the weir(s) may involve infrequent truck or vehicle trips by SCARF employees to perform minor maintenance or operation activities on the weir(s), such as minor patchwork or temporary removal of portions of the weir (barriers). These activities would average less than two vehicle trips daily and would occur seasonally. In addition, trap and haul efforts would involve up to two vehicle trips daily. The emissions from these vehicle trips are shown in Table 5-6, illustrating that (in combination with the operations of other project components) the ROG, NO_x, PM_{10}, $PM_{2.5}$, CO, and SO_x emissions would be substantially less than the SJVAPCD's significance thresholds. It is not anticipated that any stationary emission sources (e.g., diesel generators) would be required to operate the weirs. Vehicle or truck trips for maintenance and operation would be infrequent, minimal, and substantially less than the 1,506 trips per day industrial activity significance threshold identified in the SJVAPCD's Small Project Analysis Level guidance. Therefore, unless trips exceed 1,506 trips per day the project would not result in emissions above the significant thresholds. In combination with other components of the Proposed Project, these limited truck/vehicle trips and emissions associated with operation of the fish segregation weirs as shown in Table 5-6 would not be expected to conflict with or obstruct implementation of the local air districts' air quality plans or to increase criteria pollutant emissions above significant thresholds, or to cause potential health risks.

Diesel particulate matter from truck exhaust represents the primary health risk from the fish segregation weirs' operation. The vehicles typically utilized for fish transport are light heavy duty trucks which may be gasoline or diesel fueled. Given the small number of trips and the fact that CARB regulations limit diesel truck idling to 5 minutes or less, the Proposed Project would not expose any nearby residents or other sensitive receptors to significant health risks during project operation.

Air emissions associated with operational fisheries management activities would be relatively minor, and the air emissions have been estimated for a reasonable case and provide an upper bound level of trips that would still be classified less than significant according to SJVAPCD screening procedures. Impacts are therefore considered less than significant.

The impact analysis and significance conclusion above is considered project-level for trap and haul activities and the operation of HFB, and programmatic for all of the other fish segregation weirs. For further discussion of the approach to the project and programmatic analysis in this document, please see Chapter 3, *Introduction to the Environmental Analysis*.

Impact AQ-MANAGEMENT-3: Potential for Fish Segregation Weir Construction or Operation or Trap and Haul Efforts to Create Objectionable Odors Affecting a Substantial Number of People (Significance Criterion D, Project/Program Level, Less than Significant)

Construction activities for the proposed fish segregation weirs would not result in the generation of permanent or long-term objectionable odors. The odors associated with the intermittent operation of diesel-powered equipment (e.g., associated with weir operation) may be detected by nearby sensitive receptors. These odors would be of short duration and would be unlikely to affect a substantial number of people, given that the weir operation would be located on or adjacent to lightly populated areas along the San Joaquin River. This impact is considered less than significant.

The impact analysis and significance conclusion above is considered project-level for trap and haul activities and HFB, and programmatic for the construction and operation of other fish segregation weirs. For further discussion of the approach to the project and programmatic analysis in this document, please see Chapter 3, *Introduction to the Environmental Analysis*.

Fisheries Research and Monitoring

Impact AQ-MONITORING-1: Potential for Fisheries Research and Monitoring Activities to Conflict with or Obstruct Implementation of the SJVAPCD's Air Quality Plans; Increase ROG, NO_x, PM_{10}, $PM_{2.5}$, CO, and SO_X Emissions such that They Exceed SJVAPCD Significance Thresholds; or Expose Sensitive Receptors to Substantial Pollutant Concentrations (Significance Criteria A, B, and C, Project Level, Less than Significant)

Fisheries research and monitoring is not expected to involve construction activities and therefore, construction emissions are not evaluated for this project component.

The Proposed Project's fisheries research and monitoring activities would require truck and vehicle trips and would potentially require the use of watercraft for the various research and monitoring activities located along the San Joaquin River and within the SJVAPCD's jurisdiction. These research and monitoring activities are not expected to require any permanent stationary emission sources (e.g., diesel generators). Although the exact quantity of vehicle trips and watercraft use is unknown, for the management of fish segregation weirs, it can reasonably be assumed that these activities would average less than four vehicle trips daily and 4752 hours of annual boat use. The emissions from these vehicle trips and boat use is shown in Table 5-6, illustrating that (in combination with the operations of other project components) the ROG, NO_x, PM_{10}, $PM_{2.5}$, CO, and SO_X emissions would be substantially less than the SJVAPCD's significance thresholds. Emissions from the truck or vehicle trips and from watercraft would not be substantial nor exceed SJVAPCD significance thresholds.

Furthermore, the SJVAPCD's Small Project Analysis Level guidance indicates that industrial activities generating less than 1,506 trips per day would have a less-than-significant impact on air quality, and criteria pollutant emissions associated with these activities would not need to be quantified. The Proposed Project's research and monitoring activities would result in a fraction of this truck trip significance threshold. The limited daily truck trips and watercraft usage, and their resulting emissions as shown in Table 5-6, are not expected to conflict with or obstruct implementation of the local air districts' air quality plans or to increase criteria pollutant emissions above significant thresholds.

Diesel particulate matter from truck exhaust represents the primary health risk from the fisheries research and monitoring activities. The vehicles typically utilized for fish transport are light heavy duty trucks which may be gasoline or diesel fueled. The watercraft typically is gasoline fueled. Given the small number of trips, and the fact that CARB regulations limit diesel truck idling to 5 minutes or less, the Proposed Project would not expose any nearby residents or other sensitive receptors to significant health risks during project operation. Therefore, this impact would be less than significant.

Air emissions associated with fisheries research and monitoring activities would be relatively minor, and the air emissions have been estimated for a reasonable case and provide an upper bound level of trips that would still be classified less than significant according to SJVAPCD screening procedures. Impacts are therefore considered less than significant.

Recreation Management

Impact AQ-RECREATION-1: Potential for Construction Activities Related to Enhancing Recreational Fishing Opportunities to Conflict with or Obstruct Implementation of SJVAPCD's Air Quality Plans; Exceed the SJVAPCD's ROG, NO_x, PM_{10}, $PM_{2.5}$, CO, and SO_x Significance Thresholds; or Expose Sensitive Receptors to Substantial Pollutant Concentrations (Significance Criteria A, B, and C, Program Level, Less than Significant with Mitigation)

Enhancement of recreational fishing opportunities on the San Joaquin River may require construction activities that would potentially generate ROG, NO_x, and PM_{10} emissions from land disturbance and/or exhaust from construction equipment, including haul or equipment trucks, and from worker commutes. Specific project-level data about the amount, use, and locations of this equipment are not available at this time. In addition, specific project-level data about the construction periods and location of sensitive receptors to the enhancement sites are not available. Thus, these activities would have the potential to conflict with or obstruct implementation of air quality plans; to exceed thresholds established by the SJVAPCD (10 tons per year for ROG and NO_x, 15 tons per year for PM_{10} and $PM_{2.5}$, 100 tons per year for CO, 27 tons per year for SO_X); and to expose sensitive receptors to substantial pollutant concentrations.

Although air emissions associated with recreation management would likely be relatively minor, they cannot be estimated because information needed to accurately estimate the emissions has not yet been defined. In the absence of specific details, the impacts of recreation management are conservatively assumed to be potentially significant.

Implementation of **Mitigation Measure AQ-MANAGEMENT-1** would reduce construction and operational air emissions to levels below SJVAPCD's significance thresholds. Therefore, with implementation of **Mitigation Measure AQ-MANAGEMENT-1**, recreation management would result in a less-than-significant impact.

Impact AQ-RECREATION-2: Potential for Operational Activities Related to Enhancing Recreational Fishing Opportunities to Conflict with or Obstruct Implementation of SJVAPCD's Air Quality Plans; Exceed the SJVAPCD's ROG, NO_x, PM_{10}, $PM_{2.5}$, CO, and SO_x Significance Thresholds; or Expose Sensitive Receptors to Substantial Pollutant Concentrations (Significance Criteria A, B, and C, Program Level, Less than Significant)

Enhancement of recreational fishing opportunities on the San Joaquin River may result in increased recreation-related or maintenance and enforcement vehicle trips to or within the SJVAB and would potentially require the use of watercraft. Although the exact quantity of vehicle trips and watercraft use is unknown for the recreational activities, recreation management activities associated with stocking and other enhancements would average less than one vehicle trip daily.

This analysis does not include emissions associated with any changes in recreational user vehicle trips. It is because it is unclear the extent to which vehicle trips and watercraft use associated with recreational visitors would be new activities in the global sense, considering the existing recreational activities that would cease as a result of the Proposed Project. Recreational visitors may choose alternative locations that are closer or further from their current destinations, and it would be speculative to try to determine the extent to which these trips would be different from baseline conditions. Since the criteria pollutants of most concern, ozone precursors, have an impact on the regional air quality rather than the local environment, it is unlikely that there would be a net increase regionally in emissions due to the displacement of use.

The emissions from the recreation management operational vehicle trips is shown in Table 5-6, illustrating that (in combination with the operations of other project components) the ROG, NO_x, PM_{10}, $PM_{2.5}$, CO, and SO_X emissions would be substantially less than the SJVAPCD's significance thresholds.

Diesel particulate matter from truck exhaust represents the primary health risk from the recreation management's operational activities. Although vehicle trips may increase as a result of operation of the recreation management activities, truck trips required for the operation would be minimal (an average of less than one daily). Given the small number of trips, and the fact that CARB regulations limit diesel truck idling to 5 minutes or less, the recreational enhancement activities would not expose any nearby residents or other sensitive receptors to significant health risks during project operation.

Air emissions associated with recreation management activities would be relatively minor, and the air emissions have been estimated for a reasonable case and provide an upper bound level of trips that would still be classified less than significant according to SJVAPCD screening procedures. Impacts are therefore considered less than significant.

Impact AQ-RECREATION-3: Recreation Management Construction Activities Could Create Objectionable Odors Affecting a Substantial Number of People (Significance Criterion D, Program Level, Less than Significant)

Construction activities for recreation management would not result in the generation of permanent or long-term objectionable odors. The odors associated with operational activities (e.g., diesel emissions from vehicle trips to and from recreational fishing sites) may be detected by nearby sensitive receptors. These odors would be of short duration and would be unlikely to affect a substantial number of people, given that the recreational fishing sites would be located on or adjacent to lightly populated areas along the San Joaquin River. This impact is considered less than significant.

Chapter 6
BIOLOGICAL RESOURCES – FISHERIES

6.1 Overview

This chapter discusses the potential for the Proposed Project to affect fisheries and fish habitat. Specifically, this chapter: (1) discusses federal, state, and local regulations relevant to the fisheries resources that may be affected by the Proposed Project; (2) describes the existing environmental setting in the Potentially Affected Area; (3) identifies special-status fish species potentially affected by the Proposed Project; (4) proposes mitigation measures to offset potentially significant impacts; and (5) makes findings regarding the residual significance of the Proposed Project's impacts on fisheries resources.

Scientific (Latin) names for fish species with the potential to occur in the Restoration Area are provided in Table 6-1. Scientific names for species that do not occur in the Restoration Area are provided in parentheses the first time the species is mentioned.

The following appendices support this chapter:

- Appendix E: Best Management Practices for Collection and Transport of Salmonid Eggs and Juveniles
- Appendix F: Aquatic Invasive Species Monitoring and Decontamination Protocols
- Appendix H: Supporting Documentation Related to Biological Resources – Fisheries
- Appendix I: CDFW's Conservation Measures for Biological Resources that May Be Affected by Program-level Actions

6.2 Regulatory Setting

This section describes federal, state, and local regulations, laws, permits, and policies that are relevant to protection of fisheries and fish habitat within the Project Area.

6.2.1 Federal Laws, Regulations, and Policies

Clean Water Act — Section 404

The Clean Water Act (CWA) is the primary federal law that protects the quality of the nation's surface waters, including lakes, rivers, and coastal wetlands. CWA section 404 regulates the discharge of dredged and fill materials into waters of the United States (waters of the U.S.), which include all navigable waters, their tributaries, and some isolated waters, as well as some wetlands adjacent to the aforementioned waters (33 C.F.R. § 328.3). Areas typically not considered to be jurisdictional waters include non-tidal drainage and irrigation ditches excavated on dry land, artificially irrigated areas, artificial lakes or ponds used for irrigation or stock watering, small artificial water bodies such as swimming pools, and water-filled depressions (33 C.F.R. Part 328). Areas meeting the regulatory definition of waters of the U.S. are subject to the jurisdiction of the U.S. Army Corps of Engineers (USACE) under provisions of CWA section 404. Construction activities involving placement of fill into jurisdictional waters of the U.S. are regulated by the USACE through permit requirements. No USACE permit is effective in the absence of state water quality certification pursuant to section 401 of the CWA. CWA section 401 is described further in Chapter 12, *Hydrology, Geomorphology, and Water Quality.*

Rivers and Harbors Act — Section 10

Section 10 of the Rivers and Harbors Act (RHA) (33 U.S.C. § 401 et seq.) requires authorization from USACE for construction of any structure over, in, or under navigable waters of the U.S. The navigable length of the San Joaquin River currently includes 236 miles of the river from Sycamore Road (located 7 miles downstream from State Route [SR] 99 in Fresno County) to San Francisco Bay.

Endangered Species Act

The ESA (16 U.S.C. § 1531–1544) provides for conservation of species that are endangered or threatened throughout all or a significant portion of their range, as well as the protection of habitats on which they depend. USFWS and NMFS share responsibility for implementing the ESA. In general, USFWS manages land and freshwater species, whereas NMFS manages marine and anadromous species. As defined by section 3 of the ESA, "endangered" refers to species that are "in danger of extinction within the foreseeable future throughout all or a significant portion of its range," whereas "threatened" refers to "those animals and plants likely to become endangered within the foreseeable future throughout all or a significant portion of their ranges."

Central Valley spring-run Chinook salmon, including all naturally spawned populations of spring-run Chinook salmon in the Sacramento River and its tributaries in California, including the Feather River, as well as the FRFH spring-run Chinook program, is a threatened species under the ESA. Fall-run Chinook salmon is not listed by the ESA, although it is considered a candidate species for future listing (64 Fed. Reg. 50393).

Endangered Species Act Section 9

Under the ESA, it is illegal for any person, private entity, or government agency to take endangered species without federal authorization. Take of most threatened species is similarly prohibited. *Take* is defined to mean harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in such conduct (16 U.SC. § 1532(19). *Harm* is defined to mean an act that actually kills or injures fish or wildlife (50 C.F.R. § 17.3). Take may include significant habitat modification or degradation that actually kills or injures fish or wildlife by significantly impairing essential behavioral patterns, including breeding, spawning, rearing, migrating, feeding, or sheltering. The incidental take of listed species can be authorized under section 7 or section 10 of the ESA.

Endangered Species Act Section 7

ESA section 7 requires federal agencies to consult with USFWS or NMFS, or both, before performing any action (e.g., funding a program or issuing a permit) to ensure that federal actions do not jeopardize the continued existence of a species or destroy or adversely modify critical habitat. Authorization to take an endangered or threatened species can be obtained through section 7 consultation. The USFWS and/or NMFS may issue a Biological Opinion (BO) with an incidental take statement to the federal agency issuing a permit or approval for a proposed project. The federal consulting agency then incorporates the BO and incidental take statement into any authorization or permits.

Endangered Species Act Sections 4(d) and 10(j)

Section 4(d) of the ESA allows the Secretary of Commerce discretion to promulgate protective regulations for threatened species. The 4(d) rules take the place of normal protections of the ESA and may either increase or decrease the ESA's normal protections. A 4(d) rule must be "necessary and advisable to provide for the conservation of such species." A 4(d) rule is a regulation, and must be created through the federal rule-making process.

In 2005, NMFS amended the 4(d) protective regulations for the threatened salmonid Evolutionarily Significant Units (ESUs) (including Central Valley spring-run Chinook salmon) to exclude hatchery fish marked by a clipped adipose fin from the ESA take prohibition, and simplified existing 4(d) protective regulations, so the same set of limits apply to all West Coast threatened salmonid ESUs (70 Fed. Reg., 37160).

Section 10(j) of the ESA provides for the designation of specific populations of listed species as "experimental populations." Under section 10(j), reintroduced populations of endangered or threatened species established outside the current range but within the species' historical range may be designated, by regulation, as an experimental population. In the case of anadromous fish species, the regulation is authorized by the Secretary of Commerce, and is prepared through federal rule-making procedures. Section 10(j) allows flexibility in managing an experimental population as a threatened species, regardless of its designation elsewhere in its range (16 U.S.C., § 1539(j)). In addition, experimental populations are classified as either "essential" or "nonessential." Experimental populations considered to be "essential" are those required for the continued existence of the species and are treated as a threatened species. Experimental populations considered "nonessential" are also treated as a threatened species, but if the species is located outside a National Wildlife Refuge or a National Park, it is treated as a species proposed for listing for the purposes of section 7. Because an experimental population is treated as threatened, ESA section 4(d) may be applied to develop take exemptions for the reintroduced population. Therefore, special 4(d) provisions can allow the experimental population to be managed with greater flexibility with regard to incidental take and regulated take, lessening potential ESA regulatory impacts of the reintroduction.

Congress enacted the San Joaquin River Restoration Settlement Act to implement the Settlement Agreement in NRDC v. Rodgers 2006. That law required NMFS to reintroduce spring-run Chinook pursuant to a 10(j) designation, and also required NMFS to issue a 4(d) rule exempting take, such that the reintroduction will not impose more than *de minimus*: impacts to water supply reductions, additional storage releases, or bypass flows on unwilling third parties due to such reintroduction. Third parties are defined as entities receiving or delivering water, pursuant to legal state and federal water rights and includes Central Valley Project (CVP) contractors outside of the Friant Division of the CVP and the State Water Project. Furthermore, the implementation of the Settlement Agreement and the reintroduction of Central Valley spring-run Chinook salmon pursuant to the Settlement Agreement, shall not result in the involuntary reduction in contract water allocations to Central Valley Project (CVP) long-term contractors, other than Friant Division long-term contractors.

In January 2013, NMFS published a proposed rule to designate the establishment of Central Valley spring-run Chinook salmon in the Restoration Area as a nonessential experimental population under section 10(j) (78 Fed. Reg., 3381-3389). NMFS also proposed to establish new take provisions under section 4(d) for the experimental population area, which will exempt incidental take of spring-run Chinook salmon in the Restoration Area that is caused by an otherwise lawful activity; take for scientific research or enhancement purposes will be allowed, providing that it is permitted. In the San Joaquin River tributaries downstream of its confluence with the Merced River, including the Merced, Tuolumne, and Stanislaus Rivers, and at the State Water Project (SWP) and CVP facilities in the Sacramento-San Joaquin Delta, take by third parties, as defined above, of spring-run Chinook originating from the San Joaquin River would be exempted by the 4(d) rule to meet the requirements of the Settlement Act. In the San Joaquin River tributaries and the Delta, take prohibitions and exemptions from the existing 4(d) rule for spring-run Chinook would otherwise continue to apply (NMFS 2012). The comment period for the proposed rule closed on March 4, 2013 (78 Fed. Reg., 3381). The final version of the rule package is pending.

Endangered Species Act Section 10(a)(1)(A)

An ESA section 10(a)(1)(A) permit is required for the intentional take of a listed species for scientific purposes or to enhance the propagation or survival of the affected species. For anadromous fish species, these permits are issued by NMFS as an administrative action, not by regulation. On October 11, 2012, NMFS issued a 10(a)(1)(A) enhancement of species permit (Broodstock Permit) to USFWS which authorizes take of Central Valley spring-run Chinook salmon from the FRFH for scientific research and enhancement activities to establish broodstock methodologies, and to allow collection of eggs and/or juveniles from the FRFH to initiate studies associated with the SJRRP. The permit, and an associated Biological Opinion, describe the collection, transport and rearing of eggs and juveniles, low-level of intentional lethal take annually for pathogen analysis, and set forth a series of special conditions. On December 18, 2012, CDFW issued a concurrence pursuant to Cal. Fish

& Game Code section 2080.3(a)(3) that the 10(a)(1)(A) permit will further the conservation of Central Valley spring-run Chinook salmon (CDFG 2012a). The SJRRP anticipates obtaining additional section 10(a)(1)(A) permits in the future.

Endangered Species Act Critical Habitat

When a species is proposed for listing as endangered or threatened under the ESA, USFWS or NMFS must consider whether there are areas of habitat that are essential to the species' conservation. Those areas may be proposed for designation as "critical habitat." Under section 7, all federal agencies must ensure that any actions they authorize, fund, or carry out are not likely to jeopardize the continued existence of a listed species or destroy or adversely modify its designated critical habitat. These requirements apply only to federal agency actions, and only to habitat that has been designated. Critical habitat requirements do not apply to citizens engaged in activities on private land that do not involve a federal agency. For experimental populations designated pursuant to section 10(j), critical habitat may be designated for "essential" experimental populations, but may not be designated for "nonessential" experimental populations.

Magnuson-Stevens Fishery Conservation and Management Act

The Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) of 1976 is the primary act governing federal management of fisheries in federal waters, from the 3-nautical-mile state territorial sea limit to the outer limit of the U.S. Exclusive Economic Zone. It establishes exclusive U.S. management authority over all fishing within the Exclusive Economic Zone, all anadromous fish throughout their migratory range except when in a foreign nation's waters, and all fish on the continental shelf. The Magnuson-Stevens Act establishes eight Regional Fishery Management Councils responsible for the preparation of fishery management plans to achieve the optimum yield from U.S. fisheries in their regions. The act also requires federal agencies to consult with NMFS on actions that could damage Essential Fish Habitat (EFH). EFH includes those habitats that support the different life stages of each managed species. A single species may use many different habitats throughout its life to support breeding, spawning, nursery, feeding, and protection functions. EFH can consist of both the water column and the underlying surface (e.g., streambed) of a particular area. The San Joaquin River in the Restoration Area is designated EFH for Chinook salmon.

Executive Orders

Several Executive Orders (EOs) have been issued providing direction to federal agencies regarding invasive species, floodplain management, and protection of wetlands, as discussed below.

EO 13112: Invasive Species

EO 13112 directs all federal agencies to prevent and control introductions of invasive non-native species in a cost-effective and environmentally sound manner to minimize their economic, ecological, and human health impacts. As directed by this EO, a national invasive species management plan guides federal actions to prevent, control, and minimize invasive species and their impacts (NISC 2008). To support implementation of this plan, USACE has recently released a memorandum describing the *U.S. Army Corps of Engineers Invasive Species Policy* (USACE 2009). This policy includes addressing invasive species effects in impact analysis for civil works projects.

EO 11988: Floodplain Management

EO 11988 requires federal agencies to provide leadership and take action to (1) avoid development in the base (100-year) floodplain; (2) reduce the hazards and risk associated with floods; (3) minimize the effect of floods on human safety, health, and welfare; and (4) restore and preserve the natural and beneficial values of the base floodplain.

EO 11990: Protection of Wetlands

EO 11990 directs federal agencies to provide leadership and take action to minimize the destruction, loss, or degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands in implementing civil works.

6.2.2 State Laws, Regulations, and Policies

California Environmental Quality Act—Sections 15065 and 15380

Title 14, section 15065 of the California Code of Regulations (CEQA Guidelines) requires that a lead agency shall determine whether a project may have a significant effect on the environment and require an EIR to be prepared for the project if there is substantial evidence, in light of the whole record, that the project has the potential to substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, and/or substantially reduce the number or restrict the range of an endangered, rare or threatened species.

Title 14, section 15380 of the California Code of Regulations defines the terms "species", "endangered", "rare", and "threatened" as they pertain to CEQA. Section 15380 also provides a greater level of consideration for state-listed or federally-listed species, and for any species that can be shown to meet the criteria for listing, but which has not yet been listed. The criteria for considering a species endangered, rare, or threatened under CEQA are as follows:

- When its survival and reproduction in the wild are in immediate jeopardy from one or more causes, including loss of habitat, change in habitat, overexploitation, predation, competition, disease, or other factors; or
- Although not presently threatened with extinction, the species is existing in such small numbers throughout all or a significant portion of its range that it may become endangered if its environment worsens; or

- The species is likely to become endangered within the foreseeable future throughout all or a significant portion of its range and may be considered "threatened" as defined in the ESA.

Species that meet the criteria listed above are often considered Species of Special Concern by CDFW. "Species of Special Concern" is an administrative designation and carries no formal legal status. Generally, Species of Special Concern should be included in an analysis of project impacts if they can be shown to meet the criteria of sensitivity outlined in section 15380 of the CEQA Guidelines. That said, some older lists of Species of Special Concern were not developed using criteria relevant to CEQA, and the information used in generating those lists is out of date. Therefore, the current circumstances of each unlisted Species of Special Concern must be considered in the context of section 15380 criteria and not automatically assumed to be rare, threatened or endangered.

California Fish and Game Commission

The California Constitution establishes the California Fish and Game Commission (Commission) (California Constitution Article 4, § 20). The Fish and Game Code delegates the power to the Commission to regulate the taking or possession of birds, mammals, fish, amphibian and reptiles (Fish & G. Code, § 200). The Commission has adopted regulations setting forth the manner and method of the take of certain fish and wildlife in the California Code of Regulations, Title 14. Likewise, the Commission has exclusive statutory authority under the Fish and Game Code to designate species as endangered or threatened under the California Endangered Species Act (CESA) (Fish & G. Code, § 2070). Under the Commission's general regulatory powers function, it establishes seasons, bag limits, and methods of take for game animals and sport fish (i.e., hunting and fishing regulations).

California Fish and Game Code—Species Protection

The Fish and Game Code establishes CDFW (Fish & G. Code, § 700) and states that the fish and wildlife resources of the state are held in trust for the people of the state by and through CDFW (Fish & G. Code, § 711.7, subd. (a)). Fish and Game Code section 1802 states that CDFW has jurisdiction over the conservation, protection, and management of fish, wildlife, native plants, and habitat necessary for biologically sustainable populations of those species. All licenses, permits, tag reservations, and other entitlements for the take of fish and game authorized by the Fish and Game Code are prepared and issued by CDFW (Fish & G. Code, § 1050, subd. (a)). Provisions of the Fish and Game Code establish special protection to certain enumerated species, such as section 5515, which lists fully protected fish species.

California Fish and Game Code—California Endangered Species Act

CESA (Fish & G. Code, § 2050 et seq.) is intended to conserve, protect, restore, and enhance species designated as endangered or threatened, and their habitat (Fish & G. Code, § 2052). The Commission has exclusive statutory authority to designate species as endangered or threatened under CESA (California Constitution, article IV, § 20, subd. (b); Fish & G. Code, §

2070). Animal species designated as endangered or threatened under CESA are listed in California Code of Regulations, Title 14, section 670.5. Plant species designated as endangered or threatened under CESA, or designated as a rare plant species under the California Native Plant Protection Act (Fish & G. Code, § 1900 et seq.), are listed in California Code of Regulations, Title 14, section 670.2. Spring-run Chinook salmon of the Sacramento River drainage is listed as a threatened species under CESA; fall-run Chinook salmon is not listed under CESA.

CESA directs all state agencies, boards, and commissions to seek to conserve endangered and threatened species, and to utilize their authority in furtherance of that policy (Fish & G. Code, § 2055). For purposes of CESA, "conserve," "conserving," and "conservation" mean to implement all methods and procedures necessary to increase the abundance of any endangered or threatened species to levels at which the protections provided by CESA are no longer necessary. These methods and procedures include, but are not limited to, all activities associated with scientific resources management, such as research; census; law enforcement; habitat acquisition; restoration and maintenance; propagation; live trapping; and transplantation; and, in the extraordinary case where population pressures within a given ecosystem cannot be otherwise relieved, may include regulated taking (Fish & G. Code, § 2061). CESA emphasizes that state agencies should not approve projects as proposed that would jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of habitat essential to the continued existence of those species, if there are reasonable and prudent alternatives available consistent with conserving the species or its habitat that would prevent jeopardy (Fish & G. Code, § 2053).

Species designated as endangered or threatened under CESA, and species designated as candidates for listing or delisting under CESA, are subject to what is commonly known as CESA's “take” prohibition. In general, this prohibition provides that no person shall import into the state, or export out of the state, or take, possess, purchase, or sell within the state (or attempt to do any of those acts), any species, or any part or product thereof, designated by the Commission as protected under CESA, except as otherwise provided by law (Fish & G. Code, §§ 2080, 2085; see also Cal. Code Regs., Tit. 14, § 783.1). “Take” is defined specifically in the Fish and Game Code to mean “hunt, pursue, catch, capture, or kill,” or an attempt to do any such act; violations of CESA's take prohibition are criminal misdemeanors under state law (Fish & G. Code, §§ 86, 12000; see also *Department of Fish and Game v. Anderson-Cottonwood Irrigation District* (1992) 8 Cal. App. 4th 1554). Unlike the ESA, CESA applies the take prohibitions to species under petition for listing (candidates) in addition to listed species. Section 2081 of the Fish and Game Code expressly allows CDFW to authorize, by permit, the incidental take of endangered, threatened, and candidate species if all of certain conditions are met.

California Fish and Game Code—Sections 2080.2 through 2080.4

Where an entity has received federal authorization to incidentally take a federally listed species, through ESA section 7 or section 10, CESA authorizes CDFW to issue a consistency determination to provide authorization for that incidental take under CESA, if the federal authorization is consistent with CESA (Fish & G. Code, § 2080.1). In 2010, the California Legislature passed Senate Bill (SB) 1349, which provides that a person who obtains a federal ESA section 10(a)(1)(A) permit that authorizes the take of spring-run Chinook salmon, in order to establish or maintain an experimental population in the San Joaquin River pursuant to ESA and the Settlement Act, requires no further authorization or approval under CESA for that person to take the species as identified in the permit if the Director finds that the permit will further the conservation of the species. SB 1349 requires notification to CDFW and compliance with the federal permit, among other requirements. SB 1349 also established a mechanism for CDFW to issue a determination concurring with the federal 10(j) designation and 4(d) rule, if the Director finds that the federal regulations will further the conservation of spring-run Chinook salmon. SB 1349 added sections 2080.2, 2080.3 and 2080.4 to the Fish and Game Code, which list these requirements in their entirety.

California Fish and Game Code—Lake or Streambed Alteration

Fish and Game Code section 1602 states that "an entity may not substantially divert or obstruct the natural flow of, or substantially change or use any material from the bed, channel, or bank of, any river, stream, or lake" unless CDFW receives written notification regarding the activity and the entity pays the applicable fee. If CDFW determines that the activity may substantially adversely affect an existing fish or wildlife resource, CDFW issues an agreement to the entity that includes reasonable measures necessary to protect the resource.

6.2.3 Local Laws, Regulations and Policies

San Joaquin River Parkway Master Plan

See Chapter 13, *Land Use and Planning*, for a discussion of this plan.

6.3 Environmental Setting

With respect to fisheries, the potential effects of the Proposed Project encompass portions of the San Joaquin River watershed downstream of Friant Dam, the Sacramento-San Joaquin Delta and San Francisco Bay, and the range of Central Valley Chinook salmon in the Pacific Ocean. Due to the potential for fish to stray to other riverine systems besides the San Joaquin River, the Sacramento River and its tributaries are also considered as part of the Potentially Affected Area (Figure 2-1). The primary area of focus in this chapter is the SCARF site and the Restoration Area (i.e., the San Joaquin River between Friant Dam and the Merced River, Figure 1-1). However, some activities associated with the Proposed Project (e.g., collection, quarantine and transport of donor stock) would occur outside the Restoration Area.

6.3.1 Potentially Affected Area

San Francisco Bay and the Pacific Ocean

The San Francisco Bay and Pacific Ocean provide essential habitat for fish and other aquatic species. Anadromous fish such as salmon, steelhead, and sturgeon, many of which are special-status species, spend part of their lives in the Pacific Ocean and must pass through the San Francisco Bay during outmigration as juveniles and during spawning periods as adults. Habitat quality in the San Francisco Bay is influenced by tributary inflows, runoff from agricultural and industrial activities, invasive species, and other factors. The range of Central Valley salmonids in the Pacific Ocean extends approximately from Point Conception, California, north to the U.S.-Canada border (Figure 2-1).

Sacramento River from Shasta Dam to the Sacramento-San Joaquin Delta

The Sacramento River downstream from Shasta Dam to the Delta receives inflow from several rivers and small creeks that support important anadromous and resident fish populations. These rivers and creeks include potential broodstock collection sites in the Feather and Yuba rivers; and Mill, Deer, Butte, Battle, and Clear creeks. The environmental setting for potential broodstock collection streams is further described in Section 6.3.3.

Sacramento-San Joaquin Delta

The Delta is a network of islands and channels at the confluence of the Sacramento and San Joaquin rivers. The Delta comprises an area of approximately 750,000 acres, receives runoff from a watershed that includes more than 40% of California's land area, and accounts for approximately 42% of the State's annual runoff (Reclamation and DWR 2012). Tributaries that directly discharge into the Delta include the Sacramento, San Joaquin, Mokelumne, Cosumnes, and Calaveras rivers. The Delta supplies water for most of California's agricultural production and many urban and industrial communities across the State.

In the Delta, the CVP's Jones and SWP's Banks pumping plants move water from the Delta to a system of canals and reservoirs for agriculture, municipal and industrial (M&I), and environmental uses in the San Joaquin Valley; the San Francisco Bay Area (Bay Area); and portions of Southern California. Surface water resources in the Delta are influenced by the interaction of tributary inflows; tides; Delta hydrodynamics; regulatory requirements; and water management actions, such as reservoir releases, in-Delta diversions, and transfers.

The Delta also provides habitat for numerous plant, animal, and fish species, including several threatened or endangered species. The Delta serves as a migration path for all Central Valley anadromous species returning to their natal rivers to spawn; adult Chinook salmon move through the Delta during most months of the year.

San Joaquin River from Merced River to the Sacramento-San Joaquin Delta

The San Joaquin River downstream from the Merced River confluence to the Delta receives inflow from several large rivers, including the Merced, Tuolumne, and Stanislaus. These rivers flow west out of the Sierra Nevada Mountains to the San Joaquin River. The Merced, Tuolumne, and Stanislaus rivers each support anadromous fisheries, including fall-run Chinook salmon. The Merced River flows west out of the Sierra Nevada to its confluence with the San Joaquin River at the downstream end of Reach 5 of the Restoration Area (see Figure 1-1, and reach description in Section 6.3.2). During high-flow events, a portion of Merced River flow is conveyed to the San Joaquin River through Merced Slough. The Tuolumne River flows approximately 150 miles to the San Joaquin River and hosts anadromous and other fisheries. The Stanislaus River flows into the San Joaquin River just upstream from Vernalis. Several smaller streams join the San Joaquin River downstream of the Stanislaus River confluence.

Management of salmon populations in the Merced, Tuolumne and Stanislaus rivers is an ongoing, intricate process. CDFW has operated a hatchery program on the Merced River to supplement natural production of fall-run Chinook salmon for more than 30 years. The MRH is a CDFW facility funded by DWR and partially by the Merced Irrigation District as required by the Delta Pumping Plant Fish Protection Agreement (Four Pumps Agreement). Operations are focused on production of fall-run Chinook salmon to enhance the commercial and recreational salmon fishery in the state and contribute to ongoing monitoring experiments that fulfill significant data needs for managing salmon stocks in the San Joaquin/Delta system. Entities on the Merced, Tuolumne, and Stanislaus rivers have also implemented focused efforts for habitat improvements and water management actions to aid in restoring and maintaining healthy Chinook salmon populations on these rivers. These efforts have included channel and habitat restoration projects similar to those proposed for the SJRRP and water management activities which collectively represent millions of dollars of investment and closely coordinated programs between State, federal and local entities. Nevertheless, Merced River fall-run Chinook salmon (salmon) have been identified as being at a high risk of extinction (Mesick 2010) and Merced River salmon populations are well below Central Valley Project Improvement Act (CVPIA) production goals (AFRP 2013).

Fresno Slough/James Bypass

Fresno Slough, also referred to as the James Bypass, conveys flood flows in high-water years from the Kings River system in the Tulare Basin to the Mendota Pool and into the San Joaquin River. These flows are regulated by Pine Flat Dam. In non-high-water years, such waters remain in the Tulare Basin.

Other Bypasses and Tributaries

Several bypasses and tributaries are located within the Restoration Area, but are described in this location to avoid confusion with the reach-by-reach description of the Restoration Area provided in Section 6.3.2, below.

Chowchilla Bypass and Tributaries

The Chowchilla Bypass Bifurcation Structure at the head of Reach 2B regulates the flow split between the San Joaquin River and the Chowchilla Bypass (Figure 1-1). Operation of the structure is based on flows in the San Joaquin River, flows from the Kings River system via Fresno Slough, water demands in Mendota Pool, and seasonality. Tributaries to the Chowchilla Bypass include the Fresno River and Berenda Slough. The Chowchilla Bypass extends to the confluence of Ash Slough, which marks the beginning of the Eastside Bypass.

Eastside Bypass, Mariposa Bypass, and Tributaries

The Eastside Bypass extends from the confluence of Ash Slough and the Chowchilla Bypass to the confluence with the San Joaquin River at the head of Reach 5 (Figure 1-1). It is subdivided into three reaches. Eastside Bypass Reach 1 extends from Ash Slough to the Sand Slough Bypass confluence, and receives flows from the Chowchilla River. Eastside Bypass Reach 2 extends from the Sand Slough Bypass confluence to the head of the Mariposa Bypass. Eastside Bypass Reach 3 extends from the head of the Mariposa Bypass to the head of Reach 5, and receives flows from Deadman, Owens, and Bear creeks. Eastside Bypass Reach 3 downstream from the confluence of Bear Creek to its confluence with Reach 5 is alternatively known as Bear Creek. The Mariposa Bypass extends from the Mariposa Bypass Bifurcation Structure to the head of Reach 4B2. A drop structure is located near the downstream end of the Mariposa Bypass, which dissipates energy from flows before they enter the main stem San Joaquin River.

6.3.2 Restoration Area

The Restoration Area is a 153-mile-long reach of the San Joaquin River beginning at Friant Dam and extending downstream to the confluence with the Merced River (Figure 1-1). Aquatic habitat conditions vary spatially and temporally throughout the five river reaches and the flood bypasses in the Restoration Area because of differences in habitat availability and connectivity, water quantity and quality, channel morphology, and species present. Throughout the Restoration Area, physical barriers, reaches with poor water quality or no surface flow, and the presence of false migration pathways have reduced habitat connectivity for anadromous and resident fishes (Börk and Adelizi 2010).

Table 6-1 provides a list of fish species with the potential to occur in the Restoration Area. More detailed information for special-status species is provided in Section 6.4. The reaches of the Restoration Area are described below.

Table 6-1. Fish Species with the Potential to Occur in the Restoration Area[a]

Common Name[b]	Scientific Name	Native/Non-native	Life History
American shad	*Alosa sapidissima*	Non-native	Anadromous
Bigscale logperch	*Percina macrolepida*	Non-native	Resident
Black bullhead	*Ameiurus melas*	Non-native	Resident
Black crappie	*Pomoxis nigromaculatus*	Non-native	Resident
Bluegill sunfish	*Lepomis macrochirus*	Non-native	Resident
Brown bullhead	*Ameiurus nebulosus*	Non-native	Resident
California roach[c]	*Hesperoleucus symmetricus*	Native	Resident
Channel catfish	*Ictalurus punctatus*	Non-native	Resident
Chinook salmon	*Oncorhynchus tshawytscha*	Native	Anadromous
Common carp	*Cyrinus carpio*	Non-native	Resident
Fathead minnow	*Pimephales promelas*	Non-native	Resident
Golden shiner	*Notemigonus crysoleucas*	Non-native	Resident
Goldfish	*Carassius auratus*	Non-native	Resident
Green sturgeon	*Acipenser medirostris*	Native	Anadromous
Green sunfish	*Lepomis cyanellus*	Non-native	Resident
Hardhead	*Mylopharodon conocephalus*	Native	Resident
Hitch	*Lavinia exilicauda*	Native	Resident
Inland silverside	*Menidia beryllina*	Non-native	Resident
Kern brook lamprey	*Lampetra hubbsi*	Native	Resident
Kokanee	*Oncorhynchus nerka*	Non-native	Resident
Largemouth bass	*Micropterus salmoides*	Non-native	Resident
Pacific lamprey	*Lampetra tridentata*	Native	Anadromous
Prickly sculpin	*Cottus asper*	Native	Resident
Pumpkinseed	*Lepomis gibbosus*	Non-native	Resident
Rainbow trout	*Oncorhynchus mykiss*	Native	Resident
Red shiner	*Cyprinella lutrensis*	Non-native	Resident
Redear sunfish	*Lepomis microlophus*	Non-native	Resident
Redeye bass	*Micropterus coosae*	Non-native	Resident
Riffle sculpin	*Cottus gulosus*	Native	Resident

Table 6-1. Fish Species with the Potential to Occur in the Restoration Area[a]

Common Name[b]	Scientific Name	Native/Non-native	Life History
River lamprey	*Lampetra ayresi*	Native	Anadromous
Sacramento perch	*Archoplites interruptus*	Native	Resident
Sacramento pikeminnow	*Ptychocheilus grandis*	Native	Resident
Sacramento splittail	*Pogonichthys macrolepidotus*	Native	Migratory
Sacramento sucker	*Catostomus occidentalis*	Native	Resident
Sacramento blackfish	*Orthodon microlepidotus*	Native	Resident
Shimofuri goby	*Tridentiger bifasciatus*	Non-native	Resident
Smallmouth bass	*Micropterus dolomieu*	Non-native	Resident
Speckled dace[d]	*Rhinichthys osculus*	Native	Resident
Spotted bass	*Micropterus punctulatus*	Non-native	Resident
Steelhead	*Oncorhynchus mykiss*	Native	Anadromous
Striped bass	*Morone saxatilis*	Non-native	Anadromous
Threadfin shad	*Dorosoma petenense*	Non-native	Resident
Threespine stickleback	*Gasterosteus aculeatus*	Native	Resident
Tule perch[e]	*Hysterocarpus traskii*	Native	Resident
Warmouth	*Lepomis gulosus*	Non-native	Resident
Western brook lamprey	*Lampetra richardsoni*	Native	Resident
Western mosquitofish	*Gambusia affinis*	Non-native	Resident
White catfish	*Ameiurus catus*	Non-native	Resident
White crappie	*Pomoxis annularis*	Non-native	Resident
White sturgeon	*Acipenser transmontanus*	Native	Anadromous

[a] Sources: Moyle 2002, HDR Inc. et al. 2002, Santos et al. in review, NMFS 2012
[b] Common and scientific names follow the Integrated Taxonomic Information System (http://www.itis.gov/).
[c] California roach in the San Joaquin River is considered by some investigators to be an undescribed subspecies sometimes referred to as the San Joaquin roach.
[d] Speckled dace in the western San Joaquin drainage is considered by some investigators to be an undescribed subspecies sometimes referred to as the Sacramento speckled dace.
[e] Some investigators consider tule perch in the Sacramento-San Joaquin system to be a subspecies known as *H. t. traskii*.

Reach 1

Reach 1 begins at Friant Dam and continues approximately 37 miles downstream to Gravelly Ford. Reclamation makes releases from Friant Dam to maintain continuous flows past Gravelly Ford, providing deliveries to riparian water rights holders in Reach 1 under "holding contracts." The reach is divided into two subreaches, 1A and 1B. Reach 1A extends from Friant Dam to SR 99. Reach 1B continues from SR 99 to Gravelly Ford. Reach 1 is the principal area identified for future salmon spawning, but has been extensively mined for instream gravel. Reach 1A has limited sediment supply, which limits the quantity, quality, and future maintenance of spawning and rearing habitat for several fish species, including Chinook salmon and steelhead.

Reach 2

Reach 2 begins at Gravelly Ford and extends approximately 24 miles downstream to the Mendota Pool, continuing along the boundary between Fresno and Madera counties. This reach is a meandering, low-gradient channel. Reach 2 is subdivided at the Chowchilla Bypass Bifurcation Structure into two subreaches. Both Reaches 2A and 2B were dry in most months prior to Restoration Flows. Reach 2A is subject to extensive seepage losses. Reach 2B is a sandy channel with limited conveyance capacity. All of these factors severely reduce habitat quality for juvenile and adult salmonids and other special-status species.

Reach 3

Reach 3 begins at Mendota Dam and extends approximately 23 miles downstream to Sack Dam. Both dams are currently partial or complete barriers to fish passage. Reach 3 conveys flows of up to 800 cfs from the Mendota Pool for diversion to the Arroyo Canal at Sack Dam, maintaining year-round flow in a meandering channel with a sandy bed. Flood flows from the Kings River are conveyed to Reach 3 via Fresno Slough and Mendota Dam. This reach continues the boundary between Fresno and Madera counties. The sandy channel meanders through a predominantly agricultural area, and diversion structures are common in this reach. Flows from sloughs and small tributaries may potentially create false migration pathways that cause delay or missed migration cues in adult salmonids and other special-status fish species. Diversion structures may lead to entrainment of juvenile life stages of special-status fish species, and agricultural outflows can degrade water quality, leading to detrimental effects on fish and other aquatic organisms.

Reach 4

Reach 4 is approximately 46 miles long and is subdivided into three distinct subreaches. Reach 4A begins at Sack Dam and extends to the Sand Slough Control Structure. This subreach is dry in most months except under flood conditions, limiting its accessibility for fish and other aquatic organisms. Reach 4B1 begins at the Sand Slough Control Structure and continues to the confluence of the San Joaquin River and the Mariposa Bypass. All flows reaching the Sand Slough Control Structure are diverted to the flood bypass system via the Sand Slough Bypass, leaving Reach 4B1 perennially dry for more than 40 years, with the exception of agricultural return and extreme flood flows. Reach 4B2 begins at the confluence of the Mariposa Bypass, where flood flows in the bypass system rejoin the main stem San Joaquin River. Reach 4B2 extends to the confluence of the Eastside Bypass. Similar to Reach 3, flows from sloughs and small tributaries (e.g., Mud Slough, Bear Creek) may potentially cause delay or missed migration cues for adult salmonids and other special-status fish species. Flow structures such as Sand Slough and East Side Bypass control structures may impede adult passage for salmonids and other special-status fish species. Diversion structures may lead to entrainment of juvenile life stages of special-status fish species, and agricultural outflows can degrade water quality, leading to detrimental effects on fish and other aquatic organisms.

Reach 5

Reach 5 extends approximately 18 miles from the confluence of the Eastside Bypass downstream to the Merced River confluence. This reach receives flows from Mud and Salt sloughs, which are channels that run through both agricultural and wildlife managements areas. Portions of this reach may serve as habitat for special-status fish species and other aquatic organisms.

The HFB is located near the downstream end of Reach 5, approximately 800 feet upstream from the confluence of the San Joaquin and Merced rivers and 3.4 miles east of Newman, California. Although it is intended as a barrier to deter anadromous fish species, the barrier is not 100% effective and only operated during a portion of the year (typically mid-September to mid-December). Adult Chinook salmon and the Kern brook lamprey, both special-status species, have been observed upstream of the barrier (Webb and Workman pers. comm.; for additional information regarding special-status species, see Section 6.4).

6.3.3 Broodstock Collection Sites

Spring-run broodstock may be collected from the FRFH and possibly from Butte, Deer, and Mill creeks. Additional opportunistic collection may be conducted in the Stanislaus, Mokelumne, Feather and Yuba rivers, and Battle and Clear creeks. Fall-run Chinook may be sourced from the San Joaquin Basin where fall-run currently exist and acquisition would not result in adverse impacts to the source populations; however, specific locations have not been identified at this time and therefore are not discussed in detail. General descriptions of the hydrology and geomorphology of each of the broodstock collection areas are provided in Chapter 12, *Hydrology, Geomorphology, and Water Quality*. This section provides descriptions of the fish species and aquatic habitat in potential broodstock collection areas.

Sacramento River Basin

Feather River Fish Hatchery

The FRFH was opened in 1967 to compensate for upstream habitat loss associated with the construction of Oroville Dam. The facility is located approximately 66 miles upstream of the mouth of the Feather River and is operated by CDFW. The FRFH's juvenile production goal is to release 2.5 million smolts annually. Hatchery and natural-origin Feather River spring-run Chinook salmon were listed as "threatened" as part of the Central Valley spring-run Chinook ESU under the ESA in 2005. The FRFH also propagates fall-run Chinook salmon and Central Valley steelhead; the latter is listed as a federally threatened species (California HSRG 2012).

The Fish Barrier Dam at River Mile (RM) 66 is the limit to upstream fish migration on the Feather River, and is located about 0.5 miles below Thermalito Diversion Dam and immediately upstream of the FRFH. The 91-foot-high concrete Fish Barrier Dam releases water to maintain fish habitat in the reach downstream to the Thermalito Afterbay Outlet. The hatchery ladder is open during May and June to collect phenotypic returning adult spring-run Chinook salmon for broodstock. Fish arriving into the hatchery via the ladder are tagged, a tissue sample is collected, and all tagged spring-run are released back to the Feather River to mature. The ladder is reopened in September to allow adult fish entry for artificial spawning. All tagged spring-run in the FRFH after September 15 may be used for hatchery broodstock. All adults in excess of those needed for artificial spawning are euthanized and no live adults are transported to or from the FRFH. Only adults trapped and tagged during the spring broodstock collection period are selected as spring-run Chinook salmon broodstock. All FRFH spring-run Chinook juveniles are released into the Feather River. Juveniles are typically transported to downstream release sites and released during April or May.

Feather River

The Feather River drains a 6,000-square-mile watershed; it is the largest tributary of the Sacramento River. The main stem Feather River is 71 miles long, flowing from Lake Oroville to its confluence with the Sacramento River near the town of Verona. The river has been heavily impacted by mining, agricultural diversions, and the construction of dams for hydroelectric power generation. As mentioned above, the Fish Barrier Dam at RM 66 is the limit to upstream fish migration on the Feather River, and is located about 0.5 miles below Thermalito Diversion Dam and immediately upstream of the FRFH.

The Feather River watershed supports a variety of native and non-native fish species, including federally and state listed special-status species. Special-status fish include Central Valley fall-, late-fall-, and spring-run Chinook salmon, Central Valley steelhead, green sturgeon, hardhead, and Sacramento splittail. Other common fish species include American shad, Sacramento pikeminnow, catfish, carp, and six species of bass. The lower Feather River has three runs of Chinook salmon, fall-run, late-fall-run, and spring-run. Adult fall-run typically return to the river to spawn during September through December, with a peak from mid-October through early December (Table 6-2). Late-fall-run return to the river between October and April and most spawning occurs from January to April. Spring-run enter the Feather River from March through June and spawn the following autumn (Painter et al. 1977). Fry from fall- and spring-run salmon races emerge from spawning gravels as early as November (Painter et al. 1977; DWR unpublished data) and generally rear in the river for at least several weeks. Out-migration occurs from December to June, with a typical peak during the February through April period. The vast majority of these fish out-migrate as fry (DWR, unpublished data), suggesting that rearing habitat is limiting or that conditions later in the season are less suitable. Salmon spawning habitat is present in the low flow channel, which extends from the Fish Barrier Dam (RM 66) to Thermalito Afterbay Outlet (RM 59), and a lower reach from Thermalito Afterbay Outlet to Honcut Creek (RM 44). There is little or no spawning habitat available in the Feather River below Honcut Creek.

Table 6-2. Life Stage Timing and Distribution of Special-Status Fish Species in the San Joaquin River Potentially Affected by the Proposed Project [a,b]

Species/ Life Stage	Distribution	Month Present											
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Central Valley Fall-Run Chinook Salmon													
Adult migration	Pacific Ocean, Bay/Delta, & San Joaquin River (SJR) & tributaries												
Adult spawning	SJR & tributaries												
Juvenile emergence	SJR & tributaries												
Juvenile residency	SJR & tributaries									Yearlings only			
Juvenile outmigration	SJR & tributaries, Bay/Delta, & Pacific Ocean												
Central Valley Late-Fall-Run Chinook Salmon[c]													
Adult migration	Pacific Ocean, Bay/Delta, & SJR & tributaries												
Adult spawning	SJR & tributaries												
Juvenile emergence & movement	SJR & tributaries												
Juvenile residency	SJR & tributaries										Yearlings only		
Juvenile outmigration	SJR & tributaries, Bay/Delta, & Pacific Ocean												
Central Valley Spring-Run Chinook Salmon[c]													
Adult migration and holding	Pacific Ocean, Bay/Delta, & SJR & tributaries												
Adult spawning	SJR & tributaries												

Table 6-2. Life Stage Timing and Distribution of Special-Status Fish Species in the San Joaquin River Potentially Affected by the Proposed Project [a,b]

Species/ Life Stage	Distribution	Month Present											
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Juvenile emergence	SJR & tributaries												
Juvenile residency	SJR & tributaries					Yearlings only							
Juvenile outmigration	SJR & tributaries, Bay/Delta, & Pacific Ocean												
Central Valley Steelhead[e]													
Adult migration	Pacific Ocean, Bay/Delta, & SJR and tributaries												
Adult spawning	SJR & tributaries												
Juvenile emergence	SJR & tributaries												
Juvenile rearing	SJR & tributaries							Yearlings only					
Juvenile emigration	SJR & tributaries, Bay/Delta, & Pacific Ocean												
Sacramento Splittail													
Adult spawning migration	Bay/Delta & San Joaquin Valley floor wetlands												
Adult spawning	San Joaquin Valley floor wetlands												
Juvenile outmigration	San Joaquin Valley floor wetlands & Bay/Delta												
Green Sturgeon													
Adult spawning migration	Pacific Ocean, Bay/Delta, & SJR												
Adult spawning	SJR												
Juvenile rearing (includes 1- to 2-yr-olds)	SJR & Bay/Delta												
Juvenile outmigration	SJR, Bay/Delta, & Pacific Ocean												

Table 6-2. Life Stage Timing and Distribution of Special-Status Fish Species in the San Joaquin River Potentially Affected by the Proposed Project [a,b]

Species/ Life Stage	Distribution	Month Present											
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Hardhead													
Adult spawning	SJR & tributaries (low to mid-elevation)												
Juvenile rearing	SJR & tributaries (low to mid-elevation)												
Kern Brook Lamprey													
Adult spawning	SJR & tributaries (mid-elevation)												
Ammocoete rearing	SJR & tributaries (mid-elevation)												
River Lamprey													
Adult spawning migration	Pacific Ocean, Bay/Delta, and SJR & tributaries												
Adult spawning	SJR & tributaries												
Ammocoete rearing (3-5 years)	SJR & tributaries												
Adult outmigration	SJR & tributaries, Bay/Delta, & Pacific Ocean												
San Joaquin Roach													
Adult spawning	SJR & tributaries (low to mid-elevation)												
Juvenile rearing	SJR & tributaries (low to mid-elevation)												

Notes: SJR = San Joaquin River

[a] Data from Moyle (2002) unless indicated otherwise.

[b] Code: Light gray, present; dark gray, peak.

[c] Based on populations from the Sacramento River basin.

[d] Data from J.E. Merz, Cramer Fish Sciences, personal communication.

[e] Data from NMFS (2009).

Most natural steelhead spawning occurs in the low-flow channel. According to a redd survey conducted in 2003, spawning begins in late December, peaks in late January, and ends by late March. A total of 75 steelhead redds were observed, 48% of which were in the upper mile of the river between Table Mountain Bicycle Bridge and Lower Auditorium Riffle (Kindopp and Kurth 2003).

Green sturgeon have been observed holding in the Feather River from the fish barrier pool downstream to the mouth of Bear Creek, and eggs have been collected on egg mats during June at the same locations (DWR, unpublished data).

Sacramento splittail have been observed in the lower Feather River (Moyle et al. 2004). Upstream migration typically occurs during winter and early spring, with spawning occurring on flooded vegetation within lower river reaches from late February through May. Juveniles have been observed from January through May, primarily in the lower reaches of the river.

Hardhead occur in the lower Feather River (Mills et al. 2004). Upstream migration of adults typically occurs during spring, with spawning most likely during March through June. Hardhead are usually found in clear, deep streams with a slow but present flow. Most hardhead spawn in the spring around April-May, though spawning may take place as late as August. Upon hatching, young larval hardhead remain under vegetative cover along stream or lake margins. As the juveniles grow, they may move to deeper water or be swept downstream to larger rivers (Moyle 2002).

Yuba River

The Yuba River is located in Yuba and Nevada counties and is a major tributary to the Feather River. The river drains a 1,339-square-mile watershed, with headwaters at the confluence of the North and Middle Yuba rivers. The Lower Yuba River, between Englebright Dam and the Feather River confluence, is accessible to anadromous fish. Extensive mining operations, urban development, and water impoundment and diversion have degraded much of the instream habitat in the lower Yuba River.

Several native fish species are present in the Yuba River including hitch, Pacific lamprey, riffle sculpin, Sacramento blackfish, Sacramento pikeminnow, Sacramento sucker, speckled dace, tule perch, and white sturgeon (HDR, Inc. and SWRI 2007). Non-native species include American shad, catfish, carp, and six species of bass. Special-status species include fall-, late-fall-, and spring-run Chinook, steelhead, green sturgeon, and hardhead.

Spring-, fall-, and late-fall-run Chinook are known to be present in the Yuba River, although the presence of juvenile Chinook on the Yuba River is assumed primarily based on Feather River rotary screw trap data. However, juvenile Chinook have been observed near Daguerre Dam in May and June (CFS, unpublished data). Steelhead adults and juveniles are also known to be present in small numbers in the Yuba River. Little monitoring has been conducted for steelhead in the Yuba River, but it has been reported that steelhead typically move downstream as young-of-the-year (YOY) in the lower Yuba River (YCWA 2007).

Information on the distribution of green sturgeon in the Feather and Yuba rivers is limited; however, juvenile green sturgeon have been occasionally captured in the Feather River rotary screw traps (HDR, Inc. and SWRI 2007), and adult green sturgeon have also been observed on the Yuba River during high flow years from mid-May to early June (CFS, unpublished data).

Hardhead occur in the lower Feather River (Mills et al. 2004), so this fish may be present in the Yuba River as well. Upstream migrations of adults typically occur during spring, with spawning most likely during March through June.

Butte Creek

The Butte Creek watershed is approximately 150 square miles and is located in the northeast portion of Butte County. The headwaters of Butte Creek are in Lassen National Forest. Butte Creek enters the main stem Sacramento River at two locations: the Butte Slough outfall gates and the downstream end of the Sutter Bypass near the confluence of the Feather River with the Sacramento River. When flows are greater than 21,000 cfs at Wilkins Slough in the Sacramento River, part of the Sacramento River flows into lower Butte Creek and the Sutter Bypass through the Tisdale Weir (Hill and Weber 1999). Moulton and Colusa weirs are upstream of Tisdale Weir and are staged to spill when the flow at Ord Bend reaches 45,000 cfs and 65,000 cfs, respectively (Ward et al. 2004). The capacity of the Sacramento River channel downstream of the Tisdale Weir at Wilkins Slough is 30,000 cfs. These weirs have a combined capacity to pass 133,000 cfs into the Sutter Bypass (Department of the Army 1975). The Centerville Head Dam is the upstream limit to anadromy.

Four special-status fish species or ESUs occur in Butte Creek: Central Valley steelhead, spring-run Chinook salmon, fall-/late-fall-run Chinook salmon, and the Sacramento splittail. Upper Butte Creek has been designated as critical habitat for Central Valley steelhead (64 Fed. Reg. 5740 (February 5, 1999)).

Butte Creek supports one of the largest runs of spring-run Chinook salmon in the Central Valley (Campbell and Moyle 1992; Yoshiyama et al. 1998). The spring-run Chinook population in Butte Creek is considered to be genetically and phenologically distinct from other populations of spring-run Chinook occurring in California (Lindley et al. 2004). The upstream spawning migrations of spring-run Chinook salmon in Butte Creek occur from February through June. Adults over-summer in deep pools in the upper canyon reaches of Butte Creek and re-distribute downstream to spawn. The lower-most spawning reach on Butte Creek is at the Parrott-Phelan Diversion Dam (McReynolds, pers. comm.). Outmigration of juveniles occurs from November through June.

Steelhead and fall-run Chinook are present throughout Butte Creek, and may spawn in the upper reaches; juvenile outmigrants have been collected in Butte Creek in CDFW screw traps (Hill and Weber 1999). However, many reaches within Butte Creek lack sufficient spawning gravel and have unsuitably high water temperatures for these species (Butte Creek Watershed Conservancy 2000).

Juvenile Sacramento splittail have been collected in the Butte Creek drainage (Butte Creek Watershed Conservancy 2000). Reaches in Butte Creek with extensive areas of flooded vegetation provide potential spawning habitat during high flows in winter and spring.

Deer Creek

Deer Creek originates on the west slope of Mount Lassen and ultimately flows into the Sacramento River near Vina, California. The watershed encompasses approximately 227 square miles and ranges in elevation from approximately 300 to 7,800 feet above mean sea level (MacWilliams et al. 2004). During floods, Deer Creek regularly overflows its banks and inundates adjacent floodplains, providing water and nutrients to adjacent riparian zones.

The spring-run Chinook population in Deer Creek is closely related to the population in Mill Creek, and these two populations are genetically and phenologically distinct from other populations of spring-run Chinook occurring in California (Lindley et al. 2004). Spring-run Chinook salmon migrate up Deer Creek from mid-February through mid-July and aggregate in the upper reaches through the summer and spawn in fall. Fall-run Chinook also spawn in the upper reaches, which contain suitable spawning gravel habitat (USFWS 1999). Habitat quality is reduced in the lower reaches of Deer Creek because this area has been more heavily impacted by anthropogenic forces such as grazing and water diversion. Resident native species occurring in Deer Creek are rainbow trout, hardhead, California roach, riffle sculpin, speckled dace, tule perch, Sacramento pikeminnow, and Sacramento sucker (Alley and Li 1977). Exotic species known to occur in the lower reaches of Deer Creek are brown trout, bluegill, carp, white catfish, large- and smallmouth bass, and green sunfish; they are typically found near the confluence (USFWS 1999).

Hardhead may be present in Deer Creek, and are usually found in clear, deep streams with a slow but present flow. Most hardhead spawn in the spring around April-May, though spawning may take place as late as August. Juvenile Sacramento splittail may also be present in the lower reaches of Deer Creek in areas where flooded vegetation provides potential spawning habitat during high flows in winter and spring.

Mill Creek

Mill Creek drains a 130-square-mile watershed flowing southwest from the slopes of Mount Lassen to the confluence with the Sacramento River at Los Molinos, California (Kondolf et al. 2001). The watershed is composed primarily of public and private forest and rangelands. Flow on Mill Creek is confined by impermeable bedrock substrate for much of its extent; therefore, spawning gravel and redds are subject to frequent scour and deposition (Gangmark and Bakkala 1960). However, due to its steep topography, the upper reaches of Mill Creek are also relatively inaccessible to humans, a condition that has reduced the extent of anthropogenic degradation.

Anadromous special-status fish species in Mill Creek include spring-, fall-, and late-fall-run Chinook salmon, Central Valley steelhead, and Sacramento splittail. As mentioned above, the spring-run Chinook population in Mill Creek is closely related to the Deer Creek population.

Native fish in Mill Creek include riffle sculpin, Sacramento sucker, Sacramento pikeminnow, hardhead, and California roach (USFWS 2000).

Spring-run Chinook and steelhead spawning habitat is available in the middle upper reaches. Fall-run Chinook have been observed spawning primarily in the lower reaches; however, much of the substrate in lower reaches of Mill Creek is either coarser than typically suitable for spawning salmonids or contains excessive amounts of fine sediment. The lower reaches of Mill Creek also may provide rearing habitat for juvenile Chinook (Kondolf et al. 2001) and potential spawning and rearing habitat for Sacramento splittail.

Battle Creek

Battle Creek is located in northern Tehama and southern Shasta counties in California. Battle Creek begins in Lassen National Park and enters the Sacramento River east of the town of Cottonwood, California (Brown and Newton 2002). Battle Creek is comprised of the North Fork Battle Creek (approx. 29.5 miles in length from head waters to confluence), the South Fork Battle Creek (approx. 15.2 miles in length from headwaters to confluence), the main stem Battle Creek (16.6 miles from the confluence of the north and south forks to the Sacramento River), and other smaller tributaries. It has the highest base flow (i.e., dry-season flow) of any tributary to the Sacramento River between the Feather River and Keswick Dam (Ward and Kier 1999).

Native fish species present in Battle Creek include Sacramento pikeminnow, Sacramento sucker, California roach, riffle sculpin, three-spined stickleback, and tule perch. Non-native fish species include brown trout, smallmouth bass, green sunfish, and golden shiner. Special-status species include spring-, winter-, and fall-run Chinook salmon, steelhead, hardhead, and river lamprey (Jones and Stokes 2005). Sacramento splittail was historically found in this stream, but has not been observed in recent surveys (Moyle et al. 2004).

A spring-run Chinook adult monitoring survey conducted in 2001 observed approximately 68% of adults holding in the South Fork reach, no adults holding in the North Fork, and 32% holding in the main stem of Battle Creek. The majority of redds were observed in the North and South Forks. Rotary screw trap data indicate that both winter- and spring-run juveniles are produced in Battle Creek (CH2M Hill 2001). The number of winter-run Chinook salmon in Battle Creek is unknown but, if they do occur, they are scarce. In recent years, few steelhead have been observed in Battle Creek, with estimates of between 100-300 wild-spawning adults (Brown and Newton 2002). The majority of adult steelhead in Battle Creek are thought to originate from the Coleman National Fish Hatchery (Jones and Stokes 2005).

Accessibility of holding and spawning habitat for salmonids in Battle Creek is limited primarily by streamflow, which has been reduced due to power generation in reaches downstream of Keswick Diversion Dam and South Diversion Dam. Jones and Stokes (2005) estimated total suitable spawning habitat in Battle Creek at 166,000 square feet. However, large-scale projects are being implemented to restore spawning habitat in the creek (Reclamation 2013a). Battle Creek is characterized primarily by alternating pools and riffles with boulders and other instream complexity, providing potential rearing habitat for salmonid juveniles and hardhead. The lower reaches provide potential habitat for Sacramento splittail.

Clear Creek

Clear Creek is the first major tributary of the Sacramento River downstream of Shasta Dam, with a drainage area of approximately 238 square miles. Clear Creek's headwaters are in the Trinity Mountains. From there, it flows south and then east to its confluence with the Sacramento River in Redding, California. Flows are controlled and upstream fish migration is impeded by the Whiskeytown Dam at RM 18. The area downstream of Whiskeytown Dam, known as Lower Clear Creek, was subject to extensive degradation due to gold mining from the late 1800s to the early 1900s. A second dam, Saeltzer Dam, blocked fish passage above RM 6 until it was removed in 2001. In addition to the removal of this impassable barrier, recent restoration efforts on Lower Clear Creek also have enhanced salmonid spawning and rearing habitat by increasing streamflow, increasing the amount of spawning gravel, and restoring riparian and floodplain habitat (McBain and Trush et al. 2000).

Clear Creek supports several native species, including California roach, speckled dace, riffle sculpin, Sacramento sucker, Sacramento pikeminnow, threespine stickleback, Pacific lamprey, and white crappie (Earley et al. 2010). Non-native species include bluegill, green sunfish, golden shiner, and spotted bass. Special-status species include fall-, late-fall-, and spring-run Chinook, steelhead, and hardhead (Earley et al. 2010). Although Sacramento splittail has not been observed in Clear Creek, habitat conditions in the lower reaches near the confluence are conducive to its presence during high flows.

Rotary screw traps on Clear Creek have recovered spring-, fall-, and late-fall-run Chinook and steelhead juveniles (Earley et al. 2010). An extensive study of Chinook abundance and distribution was conducted on Clear Creek by USFWS from 2001 to 2007; methods included adult sampling using a weir, snorkel, and carcass surveys, and monitoring habitat conditions (substrate, temperature, stream velocity) (Giovannetti and Brown 2008). This study found that the creek contains habitat for all life stages of Chinook and steelhead, from Whiskeytown Dam downstream to the confluence, due to extensive gravel augmentation and flow management specifically designed to be protective of these fisheries resources.

Hardhead are occasionally captured in the Clear Creek rotary screw traps (Earley et al. 2010). Upstream migration of adults typically occurs during spring, with spawning occurring primarily during March through June. Sacramento splittail upstream migration typically occurs during winter and early spring, with spawning occurring on flooded vegetation within lower river reaches from late February through May. Juveniles may be present from January through May, primarily in the lower reaches of the river.

Mokelumne and Stanislaus Rivers

Mokelumne River

Camanche Reservoir is the lowest non-passable structure to migratory fish in the system and is located at RM 63. Since the early 1990s, extensive amounts of washed, floodplain gravel have been placed within the river, primarily at the base of Camanche Dam, to restore and enhance spawning habitat for Chinook salmon and steelhead. At RM 39, Lake Lodi is seasonally inundated by Woodbridge Dam, which provides an extensive fish passage facility. Between these two impoundments, Chinook salmon, steelhead, Sacramento splittail, and hardhead occur. Chinook salmon and steelhead populations are supplemented by fish production at the MRFH located at the base of Camanche Dam. Delta smelt and longfin smelt have been occasionally observed in the Delta forks of the lower Mokelumne River downstream of where broodstock collection would occur.

Chinook salmon within the lower Mokelumne River primarily demonstrate a fall-run life history, with most adults passing Woodbridge Dam between late September and late December. The majority of spawning typically occurs from October through early January within the 10-mile reach between Camanche Dam (RM 63) and Clements (RM 54) (Bilski et al. 2010). Mokelumne River fall-run Chinook salmon fry emerge from late December through April. Juvenile rearing and outmigration past Woodbridge Dam occur from January into early July in most years. A small number of adult Chinook salmon (<200) also migrate upstream past Woodbridge Dam from March through August in some years. Most of these adults hold in a single pool at the base of Camanche Dam and are blocked off by a seasonally installed fish guidance weir adjacent to the hatchery. These salmon appear to spawn from early October through December, but exact timing is obscured due to overlap of spawning from the small number of fall-run Chinook salmon and steelhead that make it past the barrier. Recovery of coded-wire tags during carcass surveys above the barrier has demonstrated that a portion of these fish are FRFH spring-run strays. Broodstock collection activities would focus on opportunistic collection of these spring-run type fish.

The Mokelumne River is considered part of the North Valley Floor Critical Habitat for Central Valley steelhead (70 FR 52488 52627, September 2, 2005). However, Mokelumne River steelhead are not considered part of the ESU because they were derived from out-of-ESU broodstock. Steelhead typically migrate upstream past Woodbridge Dam from October through February. Spawning occurs primarily in the 10-mile reach of river below Camanche Dam from December through March. Fry emergence occurs from February through April. Juvenile steelhead may rear within the lower Mokelumne River from several months to more than 2 years, with outmigration occurring primarily from December through June of each year.

Sacramento splittail have been sporadically observed in fish community surveys upstream of Woodbridge Dam. Upstream migration typically occurs during winter and early spring, with spawning occurring on flooded vegetation within lower river reaches from late February through May. Juveniles have been observed from January through May, primarily in the lower reaches of the river.

Hardhead have been occasionally observed in Mokelumne River fish community surveys. Upstream migrations of adults typically occur during spring, with spawning most likely during March through June. Hardhead minnows are usually found in clear deep streams with a slow but present flow. Most hardhead spawn in the spring (April and May), though spawning may take place as late as August. Upon hatching, young larval hardhead remain under vegetative cover along stream or lake margins. As the juveniles grow, they may move to deeper water or be swept downstream to larger rivers.

Stanislaus River

The base of Goodwin Dam (RM 58.4) is the uppermost extent of anadromous salmonid spawning habitat, with relatively few fish spawning below the city of Oakdale (Carl Mesick Consultants 2002). Numerous native and non-native fish species occur in the Stanislaus River below Goodwin Dam (CFS 2009). Common resident native species include Sacramento sucker, prickly sculpin, and Sacramento pikeminnow. Common non-native species include western mosquitofish, bluegill, and several bass species. Special-status fishes located within the salmonid spawning reach include Chinook salmon, steelhead, hardhead (Brown 2000), and possibly Sacramento splittail in favorable (wet) years (Moyle 2002).

Chinook salmon within the lower Stanislaus River primarily demonstrate a fall-run life history, with most adults immigrating upstream into the river between late September and late December (CFS 2009). The majority of spawning typically occurs from October through December. Stanislaus River Chinook salmon fry emerge from December through April. Juvenile rearing and outmigration past the rotary screw trap at Caswell State Park (RM 8.6) occur from January into early July in most years (Watry et al. 2007). While spring-run Chinook salmon are considered functionally extinct in the Stanislaus River, small numbers of adults have been observed holding in the Stanislaus River in June and July (SRFG 2004). In addition, recent studies have demonstrated the spring-run life history phenotype returning to the Stanislaus River in 2007, but further study is required to demonstrate whether these fish originated in the Stanislaus River or are out-of-basin strays (Anderson et al. 2007). Due to the paucity of spring-run in the Stanislaus River, little information is available regarding specific migration patterns and life history timing. However, we can assume similar migratory and spawning behavior as described for the Mokelumne River. In the summer of 2000, fisheries researchers documented spring-run adults holding in the gravel-poor pools of Goodwin Canyon (Kennedy and Cannon 2002). Habitat that meets potential holding requirements for spring-run Chinook extends from the Goodwin Canyon to approximately RM 45 (CFS 2009).

Adult steelhead in the Sacramento-San Joaquin river system migrate from July through March, with peaks in September and February that generally correlate to high flow events (Hallock et al. 1961, in SRFG 2004), although this has not been clearly documented for the Stanislaus River. During 3 years of weir monitoring, spawned out steelhead kelts (females) were observed as early as December 27 and as late as March 18, suggesting that spawning extends from at least late December through mid-March. Although no steelhead spawning surveys have been conducted in the Stanislaus River, it is believed that steelhead spawning primarily takes place between Goodwin Dam and Orange Blossom Bridge (SRFG 2004). Newly emerged rainbow trout/steelhead fry are typically observed in the Oakdale rotary screw trap from March through May, and have been captured as early as January 24. Similarly, young rainbow trout/steelhead have been observed during snorkel surveys conducted by the Fisheries Foundation of California beginning in April (Kennedy and

Cannon 2002). Juvenile steelhead migrate to the ocean during the spring snowmelt period primarily as 2-year-old fish. They typically out-migrate as smolts from November through July, with the peak occurring from November through February (CFS, unpublished data).

Sacramento splittail have been sporadically observed in rotary screw trap surveys (CFS 2009). Upstream migration typically occurs during winter and early spring with spawning occurring in flooded vegetation within lower river reaches from late February through May. Juveniles have been observed from January through May, primarily in the lower reaches of the river (Moyle 2002).

Hardhead have been observed in rotary screw trap surveys (CFS 2009). Upstream migrations of adults typically occur during spring with spawning most likely during March through June. Hardhead minnows are usually found in clear deep streams with a slow but present flow. Most hardhead spawn in the spring around April-May, though spawning may take place as late as August. Upon hatching, young larval hardhead remain under vegetative cover along stream or lake margins. As the juveniles grow, they may move to deeper water or be swept downstream to larger rivers.

6.3.4 CDFW Anadromous Fish Hatcheries

CDFW operates 10 salmon and steelhead hatcheries statewide (Table 6-3). Eight of these 10 facilities (the Iron Gate, Trinity River, Warm Springs, FRFH, Nimbus, Mokelumne River [MRFH], and Merced River [MRH] Hatcheries and the Coyote Valley Fish Facility) were constructed below dams on major rivers as mitigation for loss of access to anadromous fish habitat upstream of the dams. The Thermalito Annex, which is not located below a dam, supports the mitigation and enhancement programs that include Chinook salmon and Coho salmon (*Oncorhynchus kisutch*) for the FRFH. The Mad River Hatchery, which is also not below a dam, is designed to enhance steelhead populations along the north coast of California. The Mad River Hatchery was originally constructed to maintain and enhance Chinook and Coho salmon and steelhead on California's north coast. The Coyote Valley Fish Facility supports the Warm Springs Hatchery steelhead mitigation program. Since 2001, the Warm Springs Hatchery also has been supporting a conservation program aimed at re-establishing Coho salmon runs in the Russian River watershed through a captive broodstock program. Most hatcheries produce fish for harvest primarily to mitigate for past habitat loss (rather than for conservation of at-risk populations) and were not designed to consider their programs' effects on naturally spawning populations.

Table 6-3. Existing CDFW Salmon and Steelhead Hatcheries

Hatchery	Location	Species			Purpose
		Chinook Salmon	Coho Salmon	Steelhead Trout	
Coyote Valley Fish Facility	East Fork Russian River		X	X	Mitigation
Feather River	Feather River	X		X	Mitigation/ Enhancement
Iron Gate	Klamath River	X	X	X	Mitigation
Mad River	Mad River			X	Enhancement/ Trout
Merced River	Merced River	X			Mitigation/ Enhancement
Mokelumne River	Mokelumne River	X		X	Mitigation/ Enhancement
Nimbus	American River	X		X	Mitigation
Thermalito Annex	Feather River	X		X	Mitigation/ Enhancement
Trinity River	Trinity River	X	X	X	Mitigation
Warm Springs	Dry Creek (tributary to Russian River)		X	X	Mitigation/ Conservation

In recent years, the scientific community has developed a greater appreciation for the fact that wild salmon stocks are threatened not only by the impacts of water management practices and serious loss and degradation of habitat, but also by the influence of hatchery broodstock, which has tended to decrease genetic fitness and population recoveries statewide (Levin et al. 2001, Araki et al. 2007, Israel et al. 2011). The U.S. Congress established and funded a hatchery review process recognizing that, while hatcheries have a necessary role to play in meeting harvest and conservation goals for Pacific salmonids, the hatchery systems were in need of comprehensive reform. The hatchery review concluded that genetic resources were at risk and many hatchery programs were contributing to those risks (HSRG 2012).

As a result of the federal effort, a scientific review of hatchery programs in California led to the formation of the California Hatchery Scientific Review Project. In turn, the California Hatchery Scientific Review Project led to the formation of the California Hatchery Scientific Review Group (HSRG) to evaluate hatchery systems for compliance with science-based recommendations. The HSRG provided recommendations for recovery and conservation of naturally spawning salmon and steelhead populations and support sustainable fisheries with little or no deleterious consequence to natural populations. The findings of the HSRG were completed in June 2012 (HSRG 2012). The HSRG made numerous recommendations for California hatcheries including improved practices for broodstock management, production goals, release strategies (discussed below in “Fish Reintroduction”), fish health, and monitoring, evaluation and measures to improve hatchery program performance, fish stocks and impacts of hatchery programs on natural populations, local environments, and other aquatic species.

The recommendations generally seek to ameliorate statewide hatchery practices that have exacerbated increased straying rates and hybridization of salmon stocks. Unlike other hatcheries that are operated for production rather than conservation purposes, spring-run operations at the SCARF would be operated under the HGMP, which considered the HSRG recommendations during its development. For example, genetic selection for diversity, broodstock development, imprinting efforts, and other practices would maintain genetic diversity of the reintroduced population and reduce the potential for reintroduced spring-run to stray into non-natal streams when returning to spawn. As conceived and designed, the SCARF will be used for conservation purposes, rather than fish production, to fulfill the goal of achieving a naturally reproducing and self-sustaining spring-run population. The SCARF includes design features such as volitional release channels that would allow fish to be released from the hatchery directly to the river without the need for transport in effort to maximize imprinting and thereby reduce straying. The impact analysis considers this approach when evaluating potential impacts.

6.3.5 SCARF Site

The proposed SCARF site is located in Reach 1A of the Restoration Area, immediately west of the SJFH. The site is adjacent to a secondary channel of the San Joaquin River, which often has low or no flow and contains dense stands of aquatic submerged and emergent vegetation. Although special-status fish species are unlikely to be present in this channel during the majority of the year, during high flows it may provide limited habitat for juvenile salmonids and other native fish species, including Sacramento splittail, lamprey, and roach.

Several artificial ponds are present on the site (see Chapter 7, *Biological Resources - Vegetation and Wildlife,* Section 7.3.4), which provide habitat for non-native, warm water species, including mosquitofish, large- and smallmouth bass, green sunfish, and bluegill and native prickly sculpin.

6.4 Special-Status Species

6.4.1 Methodology and Project Assumptions

For the purposes of this EIR, a special-status fish species refers to those species that meet one or more of the following criteria:

- Species that are listed or proposed for listing as threatened or endangered under the ESA (50 CFR 17.11 for listed animals, and various notices in the Federal Register for proposed species);
- Species that are candidates for possible future listing as threatened or endangered under ESA (76 FR 66370, October 26, 2011);
- Species that are listed or proposed for listing by the State of California as threatened or endangered under CESA (14 CCR 670.5); and

- Species that meet the definitions of rare or endangered under CEQA (CEQA Guidelines, §15380).

Identification of Special-status Species

Background information on special-status fish species with potential to occur in the Project Area was compiled through a review of the following resources:

- List of Federal Endangered and Threatened Species that Occur in or May Be Affected by Projects in Fresno County (USFWS 2012).
- California Natural Diversity Database (CNDDB) Database Query for the nine U.S. Geological Survey (USGS) 7.5 minute quadrangles surrounding the SCARF site, which are Academy, Clovis, Friant, Fresno North, Lanes Bridge, Little Table Mountain, Millerton Lake East, Millerton Lake West, and Round Mountain (CNDDB 2012).
- CNDDB tables for the Restoration Area from the SJRRP Draft EIS/EIR (Reclamation and DWR 2012)
- CNDDB query for a 500-foot buffer around the broodstock collection streams.
- San Joaquin River Restoration Study Background Report (FWUA and NRDC 2002)
- Fish Species of Special Concern in California, Second Edition (Moyle et al. 1995)
- Inland Fishes of California; revised and expanded (Moyle 2002)

Table 6-4 lists special-status fish species known to occur in the vicinity of the SCARF site, Restoration Area, and broodstock collection streams. The potential for special-status fish species to occur in the vicinity of these areas was evaluated according to the following criteria:

- **None:** indicates that the area contains a complete lack of suitable habitat, the local range for the species is restricted, and/or the species is extirpated in this region.
- **Not Expected:** indicates situations where suitable habitat or key habitat elements may be present, but may be of poor quality or isolated from the nearest extant occurrences. Habitat suitability refers to factors such as elevation, soil chemistry and type, vegetation communities, microhabitats, and degraded/ significantly altered habitats.
- **Possible:** indicates the presence of suitable habitat or key habitat elements that potentially support the species.
- **Present:** indicates the target species was either observed directly or its presence was confirmed by diagnostic signs (i.e., tracks, scat, burrows, carcasses, castings, prey remains) during field investigations or in previous studies in the area.

General descriptions of the life history for special-status fish species with the potential to occur in the Project Area are provided in Appendix H, *Supporting Documentation Related to*

Biological Resources – Fisheries. Table 6-2 above, under Section 6.3.3, *Broodstock Collection Sites*, provides a summary of the life stage timing and distribution of special-status fish species in the San Joaquin River that would potentially be affected by the Proposed Project.

Table 6-4. Special-Status Fish Species Known to Occur in the Vicinity of the Project Area

Scientific Name	Common Name	Federal Listing Status*	State Listing Status*	General Habitat	Micro Habitat	Potential to Occur at the SCARF site	Potential to Occur in the Restoration Area	Potential to Occur at Broodstock Collection Sites
Oncorhynchus mykiss	Steelhead - Central Valley ESU	FT	None	Spawn and rear in the Sacramento & San Joaquin rivers and tributaries.	Require beds of loose, silt-free, coarse gravel for spawning. Require instream cover, cool water & high dissolved oxygen.	**Possible**: Suitable habitat is present in the San Joaquin River, but several migratory barriers and periodic desiccation of the channel reduce the likelihood of the species' presence in the vicinity of the SCARF site.	**Possible**: Suitable habitat is present in the San Joaquin River, but several migratory barriers and periodic desiccation of the channel reduce the likelihood of the species' presence in the Restoration Area.	**Present**: Steelhead occur in most major tributaries to the Sacramento and San Joaquin rivers, including several of the proposed broodstock collection areas.
Oncorhynchus tshawytscha	Chinook salmon - Central Valley fall- and late fall-run ESU	FC	SSC	Populations spawn in the Sacramento & San Joaquin rivers and tributaries.	Require beds of loose, silt-free, coarse gravel for spawning. Also need cover, cool water & high dissolved oxygen.	**Present:** Adults were translocated to Reach 1A of the San Joaquin River in 2012, and a juvenile was observed in a CDFW fish survey (Hatler pers. comm.).	**Present:** Adults were translocated to Reach 1A of the San Joaquin River in 2012, and a juvenile was observed in a CDFW fish survey (Hatler pers. comm.).	**Present:** fall-run Chinook occur in most major tributaries to the Sacramento and San Joaquin rivers, including several of the proposed broodstock collection areas.
Oncorhynchus tshawytscha	Chinook salmon - Central Valley spring-run ESU	FT	SE	Upper Sacramento River and Trinity River, Sacramento-San Joaquin Delta	Require beds of loose, silt-free, coarse gravel for spawning. Instream cover, cool water & sufficient dissolved oxygen.	**Possible:** With restoration of flows in the river, species may volitionally recolonize Reach 1A in the vicinity of the SCARF site.	**Possible:** With restoration of flows in the river, species may volitionally recolonize the Restoration Area	**Present:** spring-run Chinook occur in several major tributaries to the Sacramento River, including several of the proposed broodstock collection areas.
Pogonichthys macrolepidotus	Sacramento splittail	None	SSC	Sloughs, lakes, rivers of the Central Valley. From Redding and Oroville to Salt Slough	Shallow brackish tidal sloughs.	**Not Expected:** Low flow conditions prevent migration to the SCARF site, except during exceptionally wet years.	**Not Expected:** Low flow conditions prevent migration to the Restoration Area, except during exceptionally wet years.	**Present:** Sacramento splittail occur in the lower reaches of many major tributaries to the Sacramento and San Joaquin rivers, including several of the proposed broodstock collection areas.
Acipenser medirostris	Green Sturgeon - southern DPS	FT	SSC	CA waterways south of Eel River, including Sacramento and San Joaquin Rivers and tributaries.	Spawn in deep pools of freshwater streams. Adults occupy estuaries, bays and oceanic waters.	**Not Expected:** Migratory barriers and inadequate spawning and rearing habitat prevent species from occurring at the SCARF site.	**Possible:** Green sturgeon have been reported in the lower reaches of the San Joaquin River.	**Present:** Green sturgeon are found in the Yuba and Feather rivers.
Lampetra hubbsi	Kern Brook lamprey	None	SSC	Lower reaches of Merced, Kaweah, Kings, and San Joaquin Rivers. Also the Kings River above Pine Flat Reservoir and San Joaquin River above Millerton Reservoir.	Adults occur in silty backwaters of large rivers near foothills. Ammocoetes burrow into fine substrates in the margins of runs or pools. Preferred depth ranges from 1 to 3.6 feet.	**Possible:** Lamprey have been collected in CDFW fish surveys in the Restoration Area (CDFW and USFWS, unpublished data).	**Present:** Lamprey have been collected in CDFW fish surveys in the Restoration Area (CDFW and USFWS, unpublished data).	**Present:** Lamprey have been collected in CDFW fish surveys in some of the broodstock collection areas.
Lampetra ayresi	River lamprey	SC	SSC	Sacramento and San Joaquin Rivers to San Francisco Estuary.	Clean gravel riffles from permanent streams. Ammocoetes are found burrowed into sandy backwaters or steam edges.	**Possible**: Lamprey have been collected in CDFW fish surveys in the Restoration Area (CDFW, unpublished data).	**Possible**: Lamprey have been collected in CDFW fish surveys in the Restoration Area (CDFW, unpublished data).	**Present**: Lamprey have been collected in CDFW fish surveys in some of the broodstock collection areas.

Table 6-4. Special-Status Fish Species Known to Occur in the Vicinity of the Project Area

Scientific Name	Common Name	Federal Listing Status*	State Listing Status*	General Habitat	Micro Habitat	Potential to Occur at the SCARF site	Potential to Occur in the Restoration Area	Potential to Occur at Broodstock Collection Sites
Lavinia symmetricus	San Joaquin roach	None	SSC	Sacramento and San Joaquin drainages and tributaries to the San Francisco estuary (Moyle, 2002)	Mid-elevation streams and lower reaches of coastal streams. Tolerant to high temperature (86-95°F [30-35°C]), low oxygen waters (1-2ppm). Also thrive in cold, aerated "trout" streams (Moyle, 2002).	**Not Expected:** No suitable habitat for this species occurs at the SCARF site.	**Possible:** This species may occur in the Restoration Area during times of high flow.	**Not expected:** The broodstock collection areas are outside of this species' range.
Mylopharodon conocephalus	Hardhead	None	SSC	Mid- to low-elevation tributary streams within the Sacramento-San Joaquin drainage. Seasonally in Suisun Bay, Carquinez Strait & San Pablo Bay.	Cold water, deep pools. Seldom found in areas where salinity exceeds 10 ppt. Most often occur in waters with salinity < 2ppt. Generally absent in areas where centrarchids are present.	**Not Expected:** Species is known to occur in the main stem San Joaquin River between Redinger and Kerkhoff reservoirs, but is absent from valley reaches (Moyle 2002). Aquatic habitat in the project area is unsuitable for this species due to water temperature and the presence of centrarchids.	**Not Expected:** Species is known to occur in the main stem San Joaquin River between Redinger and Kerkhoff reservoirs, but is absent from valley reaches (Moyle 2002). Aquatic habitat in the project area is unsuitable for this species due to water temperature and the presence of centrarchids.	**Present:** Several of the broodstock collection areas are in this species' known range.
Gila bicolor snyderi	Owens tui chub	FE	SE	Endemic to the Owens River Basin in a variety of habitats.	Needs clear, clean water, adequate cover, and aquatic vegetation.	**None**: SCARF site is not within species range.	**None**: Restoration Area is not within species range.	**None**: Broodstock collection areas are not within species range.
Hypomesus transpacificus	Delta smelt	FT	SE	Sacramento-San Joaquin Delta. Seasonally in Suisun Bay, Carquinez Strait and San Pablo Bay.	Seldom found at salinities > 10 ppt. Most often at salinities < 2ppt.	**None**: SCARF site is not within species range.	**None**: Restoration Area is not within species range.	**None**: Broodstock collection areas are not within species range.
Oncorhynchus clarki henshawi	Lahontan cutthroat trout	FT	None	Historically in all accessible cold waters of the Lahontan Basin in a wide variety of water temperatures and conditions.	Cannot tolerate presence of other salmonids. Requires gravel riffles in streams for spawning.	**None**: SCARF site is not within species range.	**None**: Restoration Area is not within species range.	**None**: Broodstock collection areas are not within species range.
Oncorhynchus clarki seleniris	Paiute cutthroat trout	FT	None	Cool, well-oxygenated waters.	Cannot tolerate presence of other salmonids. Requires gravel riffles in streams for spawning.	**None**: SCARF site is not within species range.	**None**: Restoration Area is not within species range.	**None**: Broodstock collection areas are not within species range.

List of Abbreviations for Federal and State Species Status follow below:
FC = Federal candidate for listing
FE = Federal endangered
FT = Federal threatened
SSC = State species of special concern
SE = State endangered
SSC = State species of special concern
ST = State threatened

6.5 Impact Analysis

6.5.1 Analysis Approach

Impacts on existing biological resources were evaluated by comparing the quantity and quality of habitats present in the locations of Proposed Project activities under baseline conditions against anticipated conditions after implementation of the activities. For this evaluation, impacts on special-status species were assessed based on the potential for the species or their habitat to be disturbed during implementation of the Proposed Project.

The Proposed Project may affect fisheries resources through the direct or indirect disturbance, modification, or destruction of habitat such that it results in death, injury, or harassment of individuals or populations of fish species, or impedes or prevents the dispersal of individuals or populations of special-status species.

Specifics regarding the scope and approach to the analysis of the various Proposed Project components are described below.

SCARF Construction

Construction of the SCARF volitional release channel and return flow outfall would occur near and within a secondary channel of the San Joaquin River (Figure 2-3). Disused aquaculture ponds currently exist in the project footprint, but these ponds do not support special-status species. Other construction associated with SCARF (i.e., the hatchery and utility building, staff residences) would occur off-channel. Accordingly, the analysis of the construction-related impacts of the SCARF focuses on the potential impacts of instream and near-stream construction activities, and outlines mitigation measures to avoid or minimize potentially significant impacts on fish and aquatic habitat.

Construction activities near or in water can cause a range of short- and long-term effects on fish and aquatic resources. Short-term effects associated with construction-related activities are typically limited to the immediate disturbance area and duration of construction. Short-term, construction-related effects may include:

- increased turbidity, sedimentation, and erosion;
- hazardous spills;
- habitat alteration;
- alteration in behavior of special-status fish species; and
- physical injury to fish.

Long-term effects are those that result in adverse changes to habitat variables that reduce the suitability of fish habitat over a longer time period. In the analysis of SCARF construction, only short-term effects specifically related to construction activities are addressed; long-term effects of the presence and operation of the hatchery are discussed in the SCARF operations section.

Overall, potential effects on fish and aquatic resources resulting from construction activities were qualitatively assessed by identifying key effect mechanisms, including the proximity to the San Joaquin River, and evaluating the likelihood of those effects to harm fish or aquatic resources. Effects assessments rely on an understanding of potential effect mechanisms, general construction activities and timing, and a detailed understanding of species habitat use and life history characteristics. The potential effect mechanisms associated with construction activities that are evaluated as part of this effects assessment are described within the individual impact discussions.

SCARF Operations

Impacts to fisheries associated with SCARF operations may include both physical effects of operations and ecological effects associated with rearing and return flow discharges. The evaluation of SCARF operations addresses the potential impacts on fish health and aquatic habitat within the affected area. Whenever possible, impact significance was evaluated using current state and federal recommendations, published accounts, and available grey literature (e.g., reports produced by government agencies or academic institutions that are not published commercially). In some cases, significance was qualitatively assessed by applying available information to a specific SCARF operations impact. Additional information regarding the framework within which the SCARF would be operated as a conservation facility, rather than a fish production facility, is provided in the discussion above in Section 6.3.4, *CDFW Anadromous Fish Hatcheries*.

Fish Reintroduction

Potential impacts to fisheries associated with fish reintroduction include both genetic and ecological components. The Proposed Project would employ a blended strategy for fish reintroduction that utilizes both fish raised at the SCARF and the potential for direct translocation of eggs, juveniles, and adults from hatcheries or naturally spawning populations (SJRRP 2011). Translocation of adult spring-run Chinook salmon from source streams would only occur opportunistically where impacts to existing populations would be minimized and translocation would be feasible. Impacts related to fish reintroduction are qualitatively assessed for all likely reintroduction scenarios, based on best available scientific knowledge.

Fisheries Management

Impacts associated with fishery management are associated with proposed fish segregation weirs to separate fall- and spring-run Chinook salmon, addressing false migration pathways such as Salt and Mud sloughs, trap and haul operations, and actions affecting preexisting Chinook management activities in the San Joaquin basin. Impacts associated with the presence and operation of the weirs and trap and haul operations are qualitatively evaluated using information from previous studies.

Fisheries Research and Monitoring

The reintroduction of spring-run and fall-run Chinook salmon into the Restoration Area would require CDFW to conduct scientific studies (research and monitoring) to assess the quality and quantity of available habitat, impediments to fish migration and survival, genetic diversity and fitness of returning salmon, and monitoring reintroduction success and responses to conditions in the Restoration Area. These studies have been evaluated qualitatively by using the best available scientific information.

Recreation Management

Most impacts on fish populations related to SJRRP recreation management are expected to be beneficial; for example, increasing enforcement, education, monitoring, and fines associated with the anticipated restrictions in fishing access to be adopted by the Commission in the Restoration Area are all expected to prevent accidental or intentional harvesting (poaching) of salmon. The majority of these actions would be under the discretion of agencies other than CDFW. For instance, it is Commission policy that domesticated fish species will not be stocked in salmon waters, where, in the opinion of CDFW, they may adversely affect native salmon populations by competing with, preying upon, or hybridizing with them (California Fish and Game Commission 2008). While fishing for other fish species would likely continue (including potential natural production of resident and anadromous *O. mykiss*), this analysis assumes that the opportunity to fish for stocked trout in the river main stem would eventually end. Indirect negative impacts on the introduced salmon could occur if reducing access to fishing in general led to increases in populations of fish known to be predators of juvenile salmonids, such as striped bass and centrarchids. On the other hand, improved river flows would be implemented by the SJRRP to benefit salmon introduction; higher flows are likely to increase boating activities by providing additional locations where boaters can use their watercraft. All of the above actions would be taken by entities other than CDFW, and so are not considered as part of the impact analysis of the Proposed Project. Instead, this impact analysis focuses on the recreational enhancements proposed by CDFW under the Proposed Project.

Specifically, although stocking fish in off-channel ponds could benefit in-river populations by reducing fishing pressure in the river, this management action may have unintended negative consequences on in-river populations, such as spread of disease between stocked and fish and in-river populations. Potential negative impacts are evaluated qualitatively by using available scientific information.

Conservation Measures for Biological Resources that May Be Affected by Program-level Actions

CDFW has developed conservation measures for biological resources to avoid and minimize impacts on special-status species that may result from the program-level Proposed Project activities. The Conservation Measures are provided in Appendix I, *CDFW's Conservation Measures for Biological Resources That May Be Affected by Program-level Actions*. The Conservation Measures are intended to be applied as mitigation for components of the Proposed Project that have been developed to and evaluated at the programmatic level of detail, such as wild broodstock collection, aspects of fisheries management, and recreation enhancements. These Conservation Measures address the range of possible species that could be present at the various potential sites for these actions and identify appropriate mitigation approaches depending upon actual site conditions.

6.5.2 Criteria for Determining Significance

The significance criteria used to evaluate impacts on fisheries are based on and incorporate the mandatory findings of significance, as listed in Section 15065 of the State CEQA Guidelines (Title 14, Chapter 3 of the CCR); and criteria contained in Appendix G, *Environmental Checklist Form*, of the CEQA Guidelines. The criteria have been applied to all determinations of effect for each impact mechanism discussed in following pages.

The Proposed Project would have a significant effect on fisheries resources if it would:

A. Cause the substantial loss of the population of a federally- or state-listed, proposed, or candidate species, either through direct or indirect loss, as a result of modification of the habitat of such a species resulting in increased mortality or decreased reproductive success;

B. Cause the substantial loss or long-term degradation of any environmentally sensitive habitat for fish species;

C. Substantially interfere with the movement of any resident or migratory fish species, which may increase mortality or reduce reproductive success; or

D. Cause a substantial change in distribution or abundance of fish species.

6.5.3 Environmental Impacts

Table 3-1 in Chapter 3, *Introduction to the Environmental Analysis,* identifies components of the Proposed Project with the potential to result in impacts on fisheries, and Table 3-2 identifies the general level of analysis (Project or Program) for each component. Each impact is discussed in further detail in the section below.

SCARF Construction

Impact FISH-CONSTRUCT-1: Sedimentation and Turbidity in the San Joaquin River from Construction-related Erosion, Which Could Adversely Impact Fish and Their Habitat (Significance Criteria A and B, Project Level, Less than Significant with Mitigation)

Ground-disturbing activities, such as grading, excavation, and vegetation removal can result in exposed soils susceptible to erosion. SCARF construction has the potential to erode soil and increase sedimentation and turbidity in the San Joaquin River adjacent to, and downstream of the site. Construction-related increases in sedimentation and turbidity above the background level could potentially affect fish species and their habitat by reducing egg and juvenile survival, interfering with feeding activities, causing breakdown of social organization, and reducing primary and secondary productivity. The magnitude of potential effects on fish would depend on the timing and extent of sediment loading and flow in the river before, during, and immediately following construction.

High, chronic levels of suspended sediment can have detrimental effects on salmonid survival, growth, and health (Sigler et al. 1984; Servizi and Martens 1992; Newcombe and Jensen 1996; ICF International 2012). Berg and Northcote (1985) observed changes in social and foraging behavior and increased gill flaring (an indicator of stress) in juvenile Coho salmon at moderate turbidity (30-60 nephelometric turbidity units [NTU]). In this study, behavior returned to normal quickly after turbidity was reduced to lower levels (0-20 NTU). In addition to direct behavioral and physical effects on fish, increased sedimentation can alter downstream substrate conditions, as suspended sediment settles and increases the proportion of fine particles in the system. Adult salmonids require coarse substrate (gravel and small cobbles) to construct redds, and deposition of fine substrate may reduce egg and alevin survival and lead to decreased production of the macroinvertebrate prey of juvenile salmonids (Wu 2000; Chapman 1988; Phillips et al. 1975; Colas et al. 2013).

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

The impacts of sedimentation and turbidity from SCARF construction on fish species are considered potentially significant. The Proposed Project would include preparation and implementation of a Stormwater Pollution Prevention Plan (SWPPP) in compliance with the State Water Resources Control Board's General Permit for Discharges of Storm Water Associated with Construction Activity (See Chapter 9, *Geology, Soils, and Seismicity*). The amount of sediment generated by construction would be minimized by mitigation measures that specify construction best management practices (BMPs) (**Mitigation Measure GEO-CONSTRUCT-1a**) and minimization of erosion (**Mitigation Measure GEO-CONSTRUCT-3**). With these measures in place, impacts to fish species and their habitat would be less than significant.

Impact FISH-CONSTRUCT-2: Risk of Release of Construction-related Hazardous Materials, Chemicals, and Waste to the San Joaquin River, Potentially Harming Fish (Significance Criteria A and B, Project Level, Less than Significant with Mitigation)

The release of hazardous substances into waterways during construction can impair water quality and harm fish, prey resources, and habitats (NMFS 2006). Petroleum products tend to form oily films on the water surface that can reduce dissolved oxygen (DO) concentrations to levels that are stressful or fatal to fish (NMFS 2006). Acute effects of exposure to toxic substances may include physiological stress or direct mortality of fish and other aquatic organisms (NMFS and USFWS 1998). If chemicals remain in the system, they may have long-term adverse effects on river ecosystems (ICF International 2012).

During SCARF construction, sources of hazardous materials are associated with the construction equipment, such as fuels, lubricating oil, grease, and/or hydraulic fluid. Materials associated with this equipment could harm aquatic organisms and habitats, either due to a direct spill into the river during instream construction or due to spills occurring on land being washed into the river by storm runoff, thereby resulting in a potentially significant impact. However, with implementation of a SWPPP and **Mitigation Measure GEO-CONSTRUCT-1a** during construction (See Chapter 9, *Geology, Soils, and Seismicity*), the risk for release of hazardous materials would be less than significant.

Impact FISH-CONSTRUCT-3: Alterations of Riparian or Instream Fish Habitat from SCARF Construction (Significance Criterion B, Project Level, Less than Significant with Mitigation)

Riparian and aquatic vegetation may be lost as a result of construction of SCARF structures in or near the secondary channel. Streambank and instream vegetation are an important part of the river ecosystem. Riparian vegetation provides: shade that buffers water temperature; roots that decreases soil erosion; cover from predators; and/or high water velocity refuge in the main channel (Murphy and Meehan 1991; McCormick and Harrison 2011; Wootton 2012). Streambank vegetation may also provide allochthonous (i.e., derived from outside the system) nutrient inputs such as terrestrial invertebrates and leaf litter, which provides food for fish either directly or indirectly by increasing production of detritivorous aquatic invertebrates (Allan et al. 2003; Kawaguchi et al. 2003; Baxter et al. 2005). Loss of riparian vegetation may result in increased water temperatures, reduced instream habitat availability, increased predation, and reduced prey availability (DeVore et al. 1980; Fischer et al. 2010).

The majority of the Proposed Project would be constructed on disturbed or previously developed land. However, SCARF construction activities related to the volitional release channel and return flow outfall would temporarily disturb approximately 11,000 square feet of riparian habitat, and would result in a permanent loss of approximately 5,000 square feet of riparian habitat. This is considered a significant impact on fish habitat. Implementation of **Mitigation Measures BIO-CONSTRUCT-11a and 11b** (See Chapter 7, *Biological Resources – Wildlife and Vegetation*), by ensuring avoidance or, where avoidance is not possible, replacement of significant riparian vegetation, would reduce this impact to a level that is less than significant.

Impact FISH-CONSTRUCT-4: Alter the Behavior or Cause Physical Harm to Special-Status Fish Species during Construction (Significance Criteria A, C, and D, Project Level, Less than Significant with Mitigation)

Table 6-4 lists special-status fish species with the potential to occur in the vicinity of the SCARF site. It is unlikely that special-status fishes would be present in the area disturbed by

SCARF construction; however, instream and streambank activities associated with SCARF construction could directly impact special-status fishes such as Kern brook lamprey ammoecetes (juveniles) and juvenile salmonids if they are present in the secondary channel during construction. Construction-related impacts could potentially include loss of individuals, decreased foraging success, and increased predation risk.

Installation of the volitional release channel would involve instream construction activities that would cause a temporary alteration in conditions in the San Joaquin River side channel and potentially affect fish and aquatic resources. These effects include noise and hydrostatic pressure waves associated with equipment during instream construction (ICF International 2012). These pressure waves may have adverse physiological effects on fish, including damage to internal organs, over relatively long distances (Washington et al. 1992).

Downstream migratory barriers are currently in places that reduce the likelihood of special-status fish species to occur at the SCARF site. However, these barriers are porous and are not operated over the entire year and special-status fishes, including fall-run Chinook salmon and Kern brook lamprey, are known to occur in Reach 1A (CDFW, unpublished data). Although the project footprint in waters is limited, the temporary impact of instream construction may be significant if adult Kern brook lamprey or fall-run Chinook juveniles are present in the secondary channel. Implementation of **Mitigation Measures FISH-CONSTRUCT-4a and -4b** would reduce the impact of instream construction to a less than significant level by capturing and relocating special status fish species outside the work area before construction begins and maintaining their exclusion from the area during construction.

Mitigation Measure FISH-CONSTRUCT-4a: Relocate Special-Status Fish Species Outside of the Work Area.

Prior to commencing instream construction, a barrier will be constructed around the affected area and qualified fisheries biologists shall survey the exclosure by making a minimum of three passes by electrofishing, using protocols developed by NMFS (2000). All fish captured, including special-status species, will be placed into a suitable holding container of cool, aerated stream water and then relocated to a suitable location near the construction area. Construction in the side channel will occur when it is dry or has low flow to the extent feasible; water in the work area will be diverted using coffer dams or similar structures.

Mitigation Measure FISH-CONSTRUCT-4b: Monitor and Maintain Fish Exclosure.

The fish exclusion structure will remain in place during all instream construction activities and will be monitored daily during instream construction to ensure that it is effectively excluding fish. If the fisheries biologist determines that the exclosure has been compromised, instream construction will be stopped until the biologist has repeated Mitigation Measure FISH-CONSTRUCT-4a and the exclosure has been repaired and is deemed effective.

SCARF Operations

Impact FISH-OP-1: Alterations to Water Quality in the San Joaquin River due to Return Flows from the SCARF (Significance Criteria A and B, Project Level, Less than Significant)

Downstream water quality can be degraded as a result of discharge from aquaculture facilities (Hinshaw 1973; Selong and Helfrich 1998; Kendra 1991; Simões et al. 2008; Sindilariu et al. 2009). These impacts may include:

- increased water temperature,
- decreased dissolved oxygen,
- changes in water chemistry (pH and salinity),
- increased nutrient inputs, and
- increased suspended solids.

Water discharged from the SCARF may contain solid fish food and metabolic waste, soluble metabolites, algae, parasites and disease microorganisms, drugs, and other chemicals, all of which have the potential to alter instream water quality. Many changes in water quality parameters associated with these inputs have the potential to degrade aquatic habitat quality for salmonids and other taxa that are sensitive to water quality impairments, such as macroinvertebrates (Camargo 1992; Sindilariu 2007). Impaired water quality has also been associated with increased risk of fish diseases due to stress (Svobodová et al. 1993). The specific effects of each of the potential changes in water quality parameters on fish and aquatic habitats are discussed below.

Water temperature

Sensitivity of salmonids to water temperature can depend on species, population, and life stage. Early life stages are generally thought to tolerate narrower temperature ranges and be more sensitive to temperature fluctuations. Leitritz and Lewis (1980) suggest that water temperatures ranging from 45-64.9°F (7.2 to 18.3°C) are acceptable for incubating and rearing juvenile salmonids. Various studies report optimal temperatures for growth of Chinook and steelhead trout as 59-68°F (15-20°C) (Garling and Masterson 1985; Brett et al. 1982, Marine 1997; McCullough et al. 2001). However, a more recent study found that Chinook salmon embryos can withstand temperatures that reach 61.7°F (16.5°C) for brief periods, only if temperatures decline after spawning (Geist et al. 2006).

Water temperatures in the San Joaquin River at Friant Bridge near the proposed SCARF outfall range from 42.8 to 60.8°F (6 to 16°C), and temperatures in the summer months are relatively stable, averaging around 51.8 to 53.6°F (11 to 12°C) (CDFW Temperature Monitoring Data, unpublished data). Water for SCARF operations would be supplied from Millerton Reservoir, and the temperature range would be comparable to that received by the SJFH, which ranges from 42.1 to 57.9°F (5.6-14.4°C) (Börk and Adelizi 2010). As water travels through the SCARF and treatment system, exposure to sunlight and higher ambient air temperatures would warm water; however, temperatures would remain lower than the ambient river temperatures. Water temperature increases from the SCARF operations would likely be comparable to those measured at SJFH (Table 6-6), which shows that increases in temperature would be minor and not exceed San Joaquin River Basin Plan standards (See Chapter 12, *Hydrology, Geomorphology, and Water Quality*), which are protective of beneficial uses including cold water habitat. This impact is considered less than significant.

Table 6-5. San Joaquin Fish Hatchery Temperature Monitoring Data

Date	Hatchery Influent	Hatchery Effluent	Influent/Effluent Change	Adjacent River	Temperature Increase from Hatchery
	Degrees Celsius (°C)				
12/2/2010	11.4	11.2	-0.2	10.8	0.4
7/1/2011	12.4	13.0	0.6	12.2	0.8
8/8/2011	13.9	13.5	-0.4	13.4	0.1
1/9/2012	9.5	9.5	0.0	8.6	0.9
7/9/2012	12.5	12.3	-0.2	12.1	0.2
8/1/2012	12.4	11.9	-0.5	11.7	0.2
Average	12.0	11.9	-0.1	11.5	0.4

Source: Water Quality Monitoring Program, San Joaquin Hatchery, Fresno County, NPDES # CA 4812

Dissolved Oxygen

DO concentrations may be reduced downstream of hatcheries relative to ambient conditions due to metabolic activity by fish or increased biological oxygen demand (BOD) by aerobic heterotrophic organisms as a result of biostimulation from nutrient outputs from the hatchery (Boaventura et al. 1997; Maillard et al. 2005; Viadero et al. 2005; Sindilariu 2007). Salmonids prefer DO concentrations of 10 to 11 mg/L, and some species show signs of stress when DO is lower than 7.8 mg/L (Leitritz and Lewis 1980). In addition to direct effects on fish, lower DO concentrations may cause shifts in benthic macroinvertebrate assemblages, excluding sensitive macroinvertebrate taxa (e.g., ephemeropterans, plecopterans, trichopterans) and replacing them with assemblages dominated by species that are tolerant of low DO concentrations (e.g., leeches, midges, dipterans, mollusks) (Camargo et al. 2011).

DO concentrations in late July at Crow's Landing (near the HFB in the San Joaquin River) ranged from 6.7 to 17.9 mg/L, and data from the USGS stream gage below Friant Dam (USGS gage no. 11251000) indicates that DO concentrations declined to 6.3 mg/L or lower for one or more days each year during 2010-2012. Typical decreases in DO as a result of trout hatchery outflows range from 1.26 to 3.2 mg/L (Sindilariu 2007). DO values below 5 mg/L can be stressful or fatal to many fish, including salmonids; if depressed DO resulting from SCARF discharges would dip below this level, impacts would be considered significant.

Water entering the SCARF would pass through a 24-foot-high aeration tower that would increase DO concentrations. Water used in the SCARF would have a short residence time (typically 1 hour or less), and would be monitored by SCARF staff to follow the minimum DO standards set by the HGMP of 70% of oxygen saturation at a given temperature (typically 7.0 to 8.2 mg/L) (Börk and Adelizi 2010). In addition, BOD in SCARF discharges, which may decrease DO levels in the San Joaquin River, would be reduced through the primary filtration system, microscreen drum filters, and settling ponds. Therefore, it is unlikely that return flow from the SCARF would substantially decrease DO concentrations in the San Joaquin River relative to baseline conditions. As a result, this impact is considered less than significant.

Salinity and pH

Discharge from hatcheries has the potential to cause changes in salinity (or roughly equivalent changes in total dissolved solids concentration[1]) and pH, as these discharges may contain waste products and undigested feed that can alter water chemistry. According to McKee and Wolf (1963), limiting concentrations of dissolved solids for freshwater fish are not definitively known, but may range from 5,000 to 10,000 mg/L (salinities of roughly 5 to 10 Practical Salinity Units [PSU]), depending upon species and prior acclimation. Although typically occurring in freshwater habitats (salinity, <0.5 PSU), Sacramento suckers were captured in tidal creeks and sloughs draining into south San Francisco Bay at salinities of approximately 2 PSU, and common carp, at salinities of 2 to 6 PSU (Saiki and Mejia 2009). According to Moyle (2002), bluegill prefer freshwater (<1 to 2 PSU), but occur in the San Francisco estuary at salinities up to 5 PSU, with 12 PSU being lethal. By comparison, redear sunfish can live in marshes with seasonal salinities of 5 to 12 PSU, and can tolerate salinities up to 20 PSU, making them one of the most euryhaline sunfishes (Moyle 2002). Inland silversides are commonly found at 10 to 15 PSU, and can survive salinities >33 PSU (Moyle 2002). Some euryhaline inland fish species (e.g., western mosquitofish) can even tolerate hypersaline conditions as high as 58 PSU, although they mostly occur where salinities are less than 25 PSU (Chervinski 1983; Moyle 2002). Chinook salmon, steelhead, white sturgeon, and green sturgeon are anadromous species that spawn in freshwater, but typically reside as adults in brackish or saline water, including the Pacific Ocean. Salinity also can affect other freshwater organisms; in one study, toxic dissolved solids thresholds for stream invertebrates ranged between 2,000 mg/L (2.0 PSU) and 13,000 mg/L (13.0 PSU) (Benbow and Merritt 2004).

The San Joaquin River Basin Plan (CVRWQCB 2011) states that the salinity (measured by electrical conductivity) shall not exceed 150 micromhos/cm. Reclamation has measured the salinity of the San Joaquin River at Lost Lake Park (which is adjacent to the SCARF site) approximately monthly from September 2009 as part of the SJRRP. As of March 2013, the average salinity measured was 70 micromhos/cm (Reclamation 2013b). All salinity measurements were within the San Joaquin River Basin Plan goals, with the exception of one measurement in July 2010 of 308 micromhos/cm. Aside from this value, the ambient salinity of the San Joaquin River in the vicinity of the SCARF site is generally well below levels that would cause a detrimental effect to aquatic life.

[1] Total dissolved solids is a measure of combined content of all non-filterable inorganic and organic substances contained in suspended form. Salinity comprises some of the ions measured in total dissolved solids.

CDFW assessed changes to salinity due to hatchery outflows throughout California and found that, at most, salinity levels increased by 0.032 PSU (32 mg/L) (ICF Jones and Stokes 2010). This is well below the levels that would impact most aquatic plants and animals, including special-status fish species, and is well below the relevant water quality objective of 150 micromhos/cm (equivalent to approximately 96 mg/L). As a result, this impact is considered less than significant.

Nutrient Inputs

Excessive nutrient inputs can degrade water quality for fish and aquatic invertebrates, which can alter food webs and cause shifts in aquatic assemblages. Elevated nutrient concentrations (primarily nitrogen and phosphorus) may increase primary productivity, which can have cascading positive effects on grazing invertebrates and fish and their predators. However, excessive nutrient inputs may also result in harmful or invasive algal blooms or may cause a shift towards dominance by heterotrophic bacteria and fungi that suppresses primary production, resulting in a decrease in DO concentration as well as affecting other water quality parameters (Loch et al. 1996; Sindilariu 2007). Increases in nitrate concentrations to 10 mg/L might also lead to nitrite and ammonia toxicity in fish and invertebrates (Camargo et al. 2005).

Several studies (Kelly 1993; Fries and Bowles 2002; Sindilariu 2007) suggest that the hatchery influence on downstream nutrient levels is generally minimal, while another study (Kendra 1991) found increases in downstream nutrient levels that violated water quality standards. The Regional Water Quality Control Board (RWQCB) has established water quality objectives designed to limit nutrient inputs into rivers, and the EPA has issued criteria for recommended nutrient levels to support healthy aquatic assemblages. In a recent evaluation of environmental impacts of hatcheries in California, CDFW used these agencies' target objectives to evaluate the effect of hatcheries on downstream nutrient levels (ICF Jones and Stokes 2010). Based on an analysis of nitrate, total nitrogen, orthophosphate, total phosphorus, and ammonium released from California's hatcheries into waters of the State, CDFW concluded that nutrient discharges from hatcheries would not cause significant impacts on water quality (ICF Jones and Stokes 2010). The discharges from the SCARF are expected to be consistent with this finding, resulting in a less than significant impact.

Total Suspended Solids

Suspended solids may decrease water clarity, limiting visibility for fish and other aquatic organisms and reducing photosynthetic activity. Total suspended solids (TSS) greater than 80 mg/L can adversely affect the health of freshwater fishes, and turbidity levels between 10 and 25 NTU have been associated with deleterious effects in fish (Summerfelt 1999; ICF Jones and Stokes 2010). Total suspended solid concentrations of 18 to 35 mg/L have been associated with reduced fish feeding and abundance.

High levels of suspended solids also can alter aquatic communities by causing increased production of heterotrophic bacteria in the sediment, which have been shown to reduce egg and fry survival and lead to fin rot and gill damage (Bisson and Bilby 1982; Summerfelt

1999; Sindilariu 2007). As suspended solids settle, they may further reduce benthic habitat quality for fish and aquatic invertebrates by increasing the amount of fine material and settling into interstitial spaces in gravel. This can cause entombment of emerging salmonid fry and lead to a reduction in habitat for aquatic invertebrates by reducing habitat complexity.

SCARF operations would result in an accumulation of organic solids from uneaten feed and biological waste in cultured fish rearing tanks and settling ponds. High water flows, fish activity, and facility cleaning operations can disturb and re-suspend settled solids into the water column.

The circular tanks planned for SCARF rapidly remove uneaten feed and biological waste that accumulates at the center of the tank through bottom drains by centrifugal force. The shortened residence time of uneaten feed and waste preserves the integrity of the solid waste resulting in reduced TSS. Unlike most California hatcheries, the return flow from the tank bottom drains and hatchery building would pass through drum filters to remove solids. This would greatly reduce the volume of solids discharged by SCARF operations. Water would exit the drum filters and move into a series of settling ponds, which would further precipitate solids suspended in the return flow. Water from rearing tank side drains (which contains few solid waste products) would be discharged directly into settling ponds (no pretreatment with drum filters) or into the volitional release channel. Chinook salmon raised in the SCARF require low levels of TSS in hatchery water, as high levels would be detrimental to the fish. SCARF employees would monitor the levels of TSS and turbidity regularly to ensure that high levels of these constituents would not harm Chinook salmon. Finally, the SCARF will be operated in compliance with NPDES requirements. Compliance with NPDES requirements and maintaining low levels of TSS and turbidity for Chinook salmon health within the hatchery will ensure that the impact to water quality is less than significant.

Conclusion

In summary, water discharged from the SCARF would be subject to compliance with NPDES requirements, Sacramento and San Joaquin River Basin Plan limitations, and regular monitoring of water quality within SCARF for fish health (See Chapter 12, *Hydrology, Geomorphology, and Water Quality*). These measures are protective of beneficial uses of the San Joaquin River, including cold and warm freshwater habitats. Therefore, impacts to water quality associated with discharges from the SCARF are considered less than significant.

Impact FISH-OP-2: Release of Chemicals and Pharmaceuticals Associated with Aquaculture into the San Joaquin River (Significance Criteria A and B, Project Level, Less than Significant)

Common chemicals and pharmaceuticals released by hatcheries include copper sulfate, hydrogen peroxide, and potassium permanganate (ICF Jones and Stokes 2010). Since both hydrogen peroxide and potassium permanganate have short half-lives, they are expected to degrade rapidly after being discharged into the river. Moreover, these chemicals are typically used intermittently and for short duration; therefore, the acute risk to aquatic organisms as a result of hydrogen peroxide and potassium permanganate would be transient (Schmidt et al. 2006). In contrast, copper sulfate has the potential to have adverse effects on downstream biological resources. This chemical is potentially toxic to aquatic invertebrates, fish, amphibians, and naturally occurring algae and macrophytes at the levels necessary to control algal outbreaks (Dorzab and Arkoh 2005, Horne and Dunson 1995). However, copper quickly binds to particulate matter and settles out, and free copper ions are rarely present in the water column (Alabaster and Lloyd 1980, ICF Jones and Stokes 2010).

The SCARF would be operated under an NPDES permit and a RWQCB Order that specifies discharge parameters for cold water concentrated aquatic animal production (CAAP) facilities. As described in Chapter 12, *Hydrology, Geomorphology, and Water Quality*, the NPDES CAAP permit authorizes the discharges for these aquaculture chemicals and drugs to surface waters in accordance with label directions, effluent limitations, Best Management Practice requirements, Monitoring and Reporting Requirements and other conditions listed in the RWCQB Order. According to the NPDES permit, copper sulfate, hydrogen peroxide, and potassium permanganate, when administered at recommended levels, are not discharged at levels that have reasonable potential to affect water quality objectives set in the San Joaquin River Basin Plan, which includes water quality objectives that are protective of freshwater fish habitat. Compliance with the NPDES requirements would ensure the impact to water quality from effluent containing aquaculture chemicals and drugs is reduced to a less than significant level.

Impact FISH-OP-3: Accidental or Otherwise Unauthorized Releases of Hatchery Fish due to Major Flood Events, Natural Disasters (e.g., Earthquakes), or Human Disturbance (e.g., Vandalism) (Significance Criteria A, B, and D, Project Level, Less than Significant)

Inadvertent release of SCARF fish is possible due to flooding, vandalism, or catastrophic natural or manmade disaster. Flooding is a particular concern, since the site is subject to flooding and a severe flood event in 1997 at the adjacent SJFH caused an unintended release of fish.

If SCARF fish are released before they have been screened for disease using the protocol described in the HGMP (Börk and Adelizi 2010), they could spread disease to wild fish. However, as described below in Impact FISH-OP-4, little evidence exists to suggest that hatchery-raised fish spread pathogens to wild populations (ICF Jones and Stokes 2010); indeed, wild fish are generally considered more resistant to pathogens than hatchery fish (Brannon et al. 2004; NMFS 2004). Before entering the SCARF, all fish will be quarantined and must pass a fish health assessment. The SCARF will regularly monitor for and limit risk for disease in fish by following the biosecurity measures described in the HGMP and outlined in Chapter 2, *Project Description* and in Impact FISH-OP-4. Therefore, the risk of spreading disease due to unintentional release of fish is expected to be less than significant.

The unintentional release of large numbers of hatchery fish could have other ecological consequences, including alteration of predator-prey dynamics and competition with wild Chinook salmon or other native fish for limited resources. The ecological impact mechanisms would be analogous to those associated with releasing hatchery fish (see Impacts FISH-REINTRO-5 and FISH-REINTRO-6). However, because the number of fish released cannot be controlled during an unintentional release, impacts associated with high fish densities (i.e., attracting predators, competition for limited resources) may be more severe if greater numbers of fish are released than would be under managed reintroductions. These impacts would likely be short-lived; if the SCARF fish exceeded the carrying capacity of the Restoration Area, they would experience density-dependent mortality due to competition with conspecifics (i.e., members of the same species) or predator aggregations; alternately, they would migrate out of the system. Consequently, the impact is considered less than significant.

If SCARF fish are released unintentionally before they are tagged as hatchery fish (adipose fin clip, coded-wire tag, etc.), this would limit the ability of the SCARF to monitor survival and straying of hatchery fish. Egg and fry production would occur in the hatchery building, which will be a fully enclosed concrete structure approximately 180 feet from the secondary channel to the San Joaquin River (Figure 2-3). It is unlikely that eggs and fry would escape from this building during a catastrophic flooding event, given the types of equipment and conditions in which they would be raised. Smolt production would occur outdoors in circular culture tanks. These tanks would be designed specifically to withstand full immersion during flooding and would be covered with domes, netting or other material to prevent escape (Börk and Adelizi 2010). In addition, the entire facility will be raised by 5 feet in elevation on a large concrete pad. The new tanks will be about 3.5 feet above the height of this pad, which will further decrease the probability of flooding (Adelizi, pers. comm.). With these design standards in place, the likelihood of unintentional release due to flooding is expected to be low.

Unintentional release due to vandalism is also unlikely. Plans for the SCARF include residences, which may be located either on the property or immediately adjacent to it, enabling staff to monitor the security of the facility. If the SCARF becomes operational before the residences are constructed or if staff is housed offsite but nearby, then SJFH staff would be available to respond to alarms sounded at the SCARF. Therefore, hatchery staff will generally be present at the facility. In addition, a 6-foot high chain link fence with three strands of barbed wire will be built around the perimeter of the SCARF to deter trespassers (see Chapter 2, *Project Description*).

A catastrophic natural or manmade disaster would have potential for unintentional release, for instance, due to a loss of structural integrity of hatchery facilities during an earthquake. However, the potential for this circumstance is so low (see Impact GEO-CONSTRUCT-5 in Chapter 9, *Geology, Soils, and Seismicity*) that it is considered less than significant.

In summary, the impact of unintentional release on fisheries resources due to flooding, earthquakes, vandalism, or other means is expected to be less than significant due to (1) the low probability of unintentional release, (2) the low risk of disease spread due to biosecurity measures that would be in place at the hatchery, and (3) the temporary nature of the ecological effects on the system. If catastrophic loss of fish does occur, the SCARF may need to request an ESA section 10(a)(1)(A) permit amendment to acquire additional broodstock. However, that activity is not evaluated as part of the Proposed Project since it is unlikely and speculative.

Impact FISH-OP-4: Spread of Fish Pathogens from SCARF-produced Fish into Wild Fish Populations in the San Joaquin River (Significance Criteria A and B, Project Level, Less than Significant)

Bacteria, viruses, and parasites can be spread between fish via direct contact or through contaminated water. Due to increased physical stress in the hatchery setting, hatchery fish are more susceptible to pathogens. Moreover, communicable diseases are more readily transmitted due to close proximity of the fish. If juveniles are transported from a different hatchery or are collected from a different basin, novel pathogens from the source population may be inadvertently spread to San Joaquin fish populations (McKibben and Pascho 1999). Some common pathogens in hatchery fish are known to persist for several days in the water column, including infectious pancreatic necrosis (IPN), viral hemorrhagic septicemia (VHS), and infectious hematopoietic necrosis virus (IHNV) (Bullock and Stuckey 1977; Leong 1980; McAllister 1996).

Wild fish are more resistant to pathogens than their hatchery conspecifics, and little evidence exists suggesting that hatchery fish spread pathogens to wild populations (Brannon et al. 2004, NMFS 2004). In a recent evaluation of the environmental impact of hatcheries in California, CDFW identified no evidence of disease transmission between hatchery and wild fish (ICF Jones and Associates 2010).

The SCARF would maintain a comprehensive biosecurity program, conducting routine diagnostic examinations and health inspections of hatchery fish and eggs. Before entering the SCARF, all fish will be quarantined and must pass a fish health assessment. Pathogen monitoring would include tests for bacteria, viruses, fungi, protozoa, other parasites, and non-infectious diseases in accordance with the HGMP (Börk and Adelizi 2010). Diagnostic procedures for pathogen detection will follow American Fisheries Society professional standards (Thoesen 2007).

More specific aspects of the biosecurity program related to facilities maintenance are described in Chapter 2, *Project Description* (see Section 2.4.3, Maintenance).

With implementation of these protocols, impacts associated with the propagation and spread of fish pathogens through SCARF discharges are expected to be less than significant.

Impact FISH-OP-5: Inadvertent Propagation or Spread of Invasive or Nuisance Species (Significance Criteria A and B, Project Level, Less than Significant)

Hatchery facilities provide suitable habitat for various forms of aquatic invasive species (AIS). Invertebrate AIS that can affect or be affected by hatchery operations include: New Zealand mud snail (*Potamopyrgus antipodarum)* (NZMS), quagga mussel (*Dreissena rostriformis bugensis*), zebra mussel (*Dreissena polymorpha*), crayfish (*Procambarus clarkia),* Asian overbite clam (*Corbula amurensis)*, and the channeled apple snail (*Pomacea canaliculata*).

NZMS, quagga mussel, and zebra mussel are of particular concern because they colonize hard surfaces within hatcheries and may clog water intake structures, aeration devices, pipes, and screens. Once established within hatcheries, these species may be released downstream with hatchery return flow discharges and in transport water associated with fish releases. These species demonstrate the potential for AIS to affect hatchery operations, and the potential for hatchery operations to spread them (CDFG 2010). These three species are also known to dramatically alter aquatic communities in which they establish themselves (Arango et al. 2009; Alonzo and Castro-Diez 2012). Both quagga and zebra mussels are filter feeders, capable of removing substantial amounts of phytoplankton and suspended particulate matter from the water. This can cause cascading effects in the aquatic food web. NZMS colonies also disrupt the base of the food chain by competing with other bottom dwelling invertebrates (small aquatic insects) for algal food sources (Richards et al. 2001; Riley et al. 2008). Because NZMS are rarely consumed by fish and may be resistant to digestion, dominance of this species in benthic invertebrate assemblages can reduce fish prey abundance (Benson 2006).

In addition to aquatic invertebrates, several potential AIS plants exist whose spread can be accelerated by hatchery and aquaculture activities, including Eurasian water milfoil (*Myriophyllum spicatum*), parrot feather milfoil (*Myriophyllum aquaticum*), water hyacinth (*Eichhornia crassipes), Egeria densa*, and didymo (*Didymosphenia geminata*). These plants have the potential to dramatically increase or decrease the physical structure of the aquatic habitat, out-compete native plants, and obstruct passage for fish or aquatic invertebrates.

CDFW hatcheries attempt to minimize the spread of AIS by monitoring and sampling to determine whether they are present in a hatchery and, if present, by releasing hatchery fish only in waters where these invasive species are already found. Sampling is conducted on a quarterly basis at hatchery intake structures, raceway head boxes, settling ponds, and any other areas of concern. If suspect or questionable snails or mussels are found, specimens are sent to the regional invasive species scientist for identification (CDFG 2010).

While NZMS are rarely consumed by fish (Benson 2006), they have been documented to pass through the digestive tract of rainbow trout alive, if they remain in the gut for less than 24 hours (Bruce et al. 2005). It can be assumed that NZMS can survive the digestive tract of other salmonids, including Chinook salmon. The HGMP requires that juveniles transported from other hatcheries to the SCARF are quarantined for a minimum of two weeks prior to entering the SCARF; any NZMS present in the digestive tract would pass through during this time. However, if NZMS is present at the SCARF, there is a risk that released fish will serve as a vector for NZMS via their digestive tract if they have consumed the snail.

Aquatic invasive species have the potential to negatively impact fish and other aquatic resources. However, the SCARF would be required to develop and implement an HACCP. The HACCP would include methods to prevent the introduction of AIS into the SCARF, and operational practices that prevent the spread of AIS within and outside of the facility should prevention efforts fail. In addition, the SCARF would be operated in accordance with protocols for monitoring of AIS in all CDFW hatcheries (CDFW 2013; Appendix F, *Aquatic Invasive Species Monitoring and Decontamination Protocols*). This protocol describes AIS species of concern, identification methods, monitoring guidelines, and reporting requirements. Furthermore, all equipment, including personal wading gear, used to transport fish to and from the SCARF, would be decontaminated according to the CDFW AIS

Decontamination Protocol (Appendix F), which specifies decontamination options, including: scrubbing equipment and keeping it dry for at least 48 hours to desiccate AIS; cleaning and soaking equipment in 140°F (60°C) water for at least 5 minutes; or freezing equipment for at least 8 hours at 32°F (0°C) or colder (Appendix F). With these measures in place, the potential for spread of AIS would be less than significant.

Impact FISH-OP-6: Adverse Effects of Hatchery Operation on Aquatic Food Webs (Significance Criteria A, B, and D, Project Level, Less than Significant)

Complex interactions exist between various trophic levels (e.g., plants, herbivores, carnivores) within the aquatic environment. For example, nutrient inputs can cause algal growth through biostimulation, which can influence water quality and food resources for invertebrate assemblages, causing a shift in the composition of these communities (Stevens et al. 2002). Changes in the structure of benthic invertebrate assemblages may have indirect effects on other aquatic species. Macroinvertebrates play an important role in the stream environment through their interactions with primary producers and by serving as prey for consumers higher in the food chain, such as fish, birds, and bats (Fukui et al. 2006; Epanchin 2009). In addition, complex feedback loops can exist between fish and invertebrate populations (Moyle 1999; Power 1990).

SCARF operations may affect aquatic food webs via the introduction of invasive species and via reintroduction of spring-run Chinook, which is both a potential predator and prey in this system. As described in Impact FISH-OP-5, the SCARF would implement protocols to monitor AIS. With the AIS monitoring in place, the potential risk of invasive species dissemination through SCARF discharges would be less than significant. The potential impacts to the aquatic food web from reintroduction of spring-run Chinook are discussed in Impacts FISH-REINTRO-5 and FISH-REINTRO-6.

Fish Reintroduction

Impact FISH-REINTRO-1: Disturbance to Suitable Spawning and Rearing Habitat, Damage to Existing Redds, and Overharvest of Eggs and Juveniles during Broodstock Collection (Significance Criteria A, B, and C, Program Level, Significant and Unavoidable)

The SCARF's production of juveniles would play a central role in restoring a spring-run Chinook salmon population in the San Joaquin River, as mandated by the Settlement Agreement. Establishing broodstock for the SCARF would require collection of eggs and juveniles primarily from the FRFH, which is already occurring as part of CDFW's ongoing management activities. This DEIR also evaluates at a programmatic level the use of naturally spawning spring-run stock comprised of a large number of unrelated individuals from drainages in the Sacramento basin (e.g., Feather, Yuba, Deer, Mill, Butte, Battle, and Clear creeks) and San Joaquin basin (e.g., Stanislaus and Mokelumne rivers).

In salmonid populations, the egg life stage contains the largest number of individuals and highest natural mortality rate in the wild. Therefore, if collection methods can achieve a high survival rate of collected eggs, then eggs offer the potential for the greatest number of fish obtained with the least effect on the donor stock. To achieve genetic diversity (and minimize the number of siblings) within the founding population on the San Joaquin River, collection of a relatively smaller number of eggs from multiple redds is more desirable than a relatively larger number of eggs from one or only a handful of redds (Reclamation and DWR 2012). The process of collecting eggs from a redd has the potential to negatively impact the survival of eggs remaining in the redd. Live spawned eggs can be harvested by hand-digging or by redd pumping (Reclamation and DWR 2012). These collections are usually made at the eyed stage when eggs are less sensitive. Nevertheless, some level of disturbance of spawning habitat and potential loss or injury of unharvested eggs are unavoidable impacts of collecting eggs from natural redds.

Alternatively, collection of juveniles from donor stocks does offer some advantages over the use of eggs. Use of juveniles increases genetic diversity per collection event. Juveniles from donor stocks are the progeny of many mating pairs in the population, and therefore it may reduce the potential of siblings being collected due to intermixing of juveniles prior to collection. This approach allows early selection pressure to occur in the wild rather than in the Conservation Facility, as opposed to the selection for hatchery conditions (domestication selection) that occurs with egg collections (Bork and Adelizi 2010).

A second advantage of using juveniles over eggs is that existing sampling activities in donor streams provide opportunities to collect juveniles without increasing habitat disturbance. Selecting a method for collecting juveniles in rivers depends on requirements for number of samples, target fish size, timing and duration of the sampling period, habitat conditions, funding availability, capture efficiencies of gear, holding duration and location, and acceptable lethal impacts to fish (see Table 3.2 in Reclamation and DWR 2012). Some collection techniques that generally result in low juvenile mortalities include seining, screw traps, Fyke nets, and electrofishing. However, when used improperly or indiscriminately, all of these techniques can result in injury and mortality to target and non-target fish. Whichever method is used, the fish collected would be tagged and a tissue sample collected (e.g., fin clip). Some level of disturbance to juvenile rearing habitat during collection is an unavoidable impact. Impacts can be minimized by using stationary Fyke nets and rotary screw traps instead of seining, which requires active wading within the stream. For a description of potential direct impacts and associated mitigation measures related to disturbance caused by collection activities, see Impact FISH-MONITORING-2.

Collection of broodstock has potential for significant impacts on naturally spawning populations. Prior to collection, CDFW would be required to obtain an ESA section 10(a)(1)(A) permit from NMFS (or as a sub-grantee to USFWS), which would include conditions designed to be protective of spring-run Chinook salmon and non-target species, including take totals and monitoring criteria for broodstock collection from naturally spawning spring-run Chinook donor stock populations. When implementing broodstock collection, CDFW would adhere to all ESA section 10(a)(1)(A) permit conditions for collection of eggs and juveniles from naturally spawning donor stocks.

The following provides an example approach and explains criteria and performance standards that could be applied in determining appropriate take totals; however, the final approach for establishing these totals would be developed in after conferring with USFWS and NMFS:

1) *Stream-specific estimates of viable population size*

Information regarding historic and current adult population size of potential spring-run Chinook donor stock populations is available in the SJRRP Stock Selection Strategy (SJRRP 2010). The Viable Salmonid Population (VSP) concepts outlined in McElhany et al. (2000) could be used to determine stream-specific minimum population sizes. Available information about abundance, growth rate, effective population size, genetic diversity and structure, and environmental factors could be incorporated into stream-specific take threshold determinations (Lindley et al. 2004, Waples et al. 2004, Baerwald et al. 2011). Population viability analyses have already been conducted and effective population size has been calculated for Butte, Mill, and Deer creeks (Lindley et al. 2007).

After minimum population size is determined for a specific stream, the total amount of take for that stream could be determined on an annual basis based on adult escapement numbers. Collection may only be allowed after a given stream attains its pre-defined minimum population size threshold. Additional information from rotary screw traps, weirs, hatchery escapement estimates, and other monitoring activities may also warranted to account for stochastic environmental events and adaptively managed broodstock collection activities.

2) *Lifestage-specific survival probability*

The relative impact of collection of different life stages should be weighted by the probability of survival to reproduction. A numerical value could be assigned to each life stage, where earlier life stages would receive lower values than subsequent stages due to their lower probability of survival. Life stages to be targeted for broodstock collection could then be determined based on the take level allowed from a particular stream in a particular year (determined annually by adult escapement, as described above).

For example, if year- and stream-specific take is defined as T_n, the total number of eggs, fry, and smolts (N_E, N_F, and N_S, respectively) to be taken for a specific season could be adaptively determined based on the following formula:

$$T_n \geq (P_{EA} * N_E) + (P_{FA} * N_F) + (P_{SA} * N_S),$$

where P_{EA} is the probability that an egg will survive to adulthood, P_{FA} is the probability that a fry will survive to adulthood, and P_{SA} is the probability that a smolt will survive to adulthood. Total take for that year (i.e., the right side of the formula) would be limited to a value at or below T_n.

Life stage-specific survival estimates for Chinook salmon are available in Quinn (2005); however, stream-specific environmental conditions should also be considered if possible when determining these life stage-specific survival estimates (Williams 2010).

To address these impacts, CDFW would implement **Mitigation Measure FISH-REINTRO-1**, using a methodology such as the one described above. This mitigation measure will allow CDFW to address these impacts and develop take totals. However, because sufficient details or specific take totals do not currently exist, specific mitigation measures or performance standards cannot be identified at this time. CEQA requires that specific mitigation and/or performance standards be provided to avoid improper mitigation deferral. It is the intent of CDFW to not have significant adverse impacts on donor stock populations. However, because full compliance with CEQA's standards for mitigation is not possible at this time, CDFW is conservatively finding this impact as significant and unavoidable. Future, more detailed analysis will be conducted as necessary through tiered CEQA documentation prior to broodstock collection from naturally spawning spring-run donor stock.

Mitigation Measure FISH-REINTRO-1: Determine Stream-specific Take Totals. CDFW will confer with USFWS and NMFS to determine stream-specific take totals that incorporate estimates of viable population size, life stage-specific survival, and the maintenance of genetic diversity of the donor stock populations. These take totals will be incorporated as specific permit conditions in a ESA section 10(a)(1)(A) permit, which must be issued prior to broodstock collection. At a minimum, the selected threshold(s) shall ensure that the adverse effects of broodstock collection will not be substantial in the context of the overall population of each spring-run donor stock.

Impact FISH-REINTRO-2: Spread of AIS from Contaminated Equipment Used for Collection of Eggs or Juveniles of Naturally Spawning Chinook Salmon (Significance Criteria A and B, Project Level, Less than Significant)

Aquatic invasive species such as the NZMS, quagga and zebra mussels, and didymo are present in portions of California, with NZMS (USDA 2012) and didymo (CISR 2013) already established in several Central Valley rivers. Infestations by these species and other AIS can cause considerable ecological and economic damage in rivers inhabited by Chinook salmon (see Impact FISH-OP-6).

Aquatic invasive species have the potential to negatively impact fish and other aquatic resources. Collection of eggs or juveniles of naturally spawning Chinook salmon may result in unintentional spread of AIS into uninfested Central Valley rivers through inadvertent contamination of equipment including, but not limited to, wading equipment, dive equipment, sampling equipment (e.g., water quality probes, nets, substrate samplers), and watercraft that were previously used in infested waters. However, with implementation of the AIS Decontamination Protocol (Appendix F, *Aquatic Invasive Species Monitoring and Decontamination Protocols*), which includes measures for decontamination of equipment, these impacts would be less than significant.

Impact FISH-REINTRO-3: Reductions in Fitness or Population Viability of Naturally Spawning Chinook Salmon due to Straying of Conservation Stock (Significance Criterion A, Project Level, Less than Significant)

The high degree of fidelity with which Chinook salmon return to their natal stream to spawn has been demonstrated in a number of studies (e.g., Quinn and Fresh 1984; McIsaac and Quinn 1988). Returning to a natal stream may have evolved as a method of ensuring adequate incubation and rearing habitat. It also provides a mechanism for reproductive isolation and local adaptation. Conversely, returning to a stream other than that of one's origin is important in colonizing new areas and responding to unfavorable or perturbed conditions at the natal stream (Quinn 1993). Homing ability is believed to be driven primarily by olfactory response to chemical characteristics of natal waters (Brannon et al. 1984) and may also be genetically influenced (McIsaac and Quinn 1988). Imprinting appears to occur when fish undergo smoltification and outmigration (Dittman et al. 1996).

Adult salmon may "stray", or migrate into non-natal streams to spawn, for a variety of reasons. Judging from radio-tracking data, some fish do not migrate directly to their natal stream, although the natal stream may be their final destination (Berman and Quinn 1991). Upstream migration is characterized by a certain amount of exploratory movement into non-natal streams, which can complicate the assessment of straying if the so-called "stray" is detected through capture in a sampling program before it has a chance to spawn on its own. However, it is clear that some salmon spawn in rivers other than their natal stream (Quinn et al. 1991). Nevertheless, as a rough estimate, 80 to 100% of Chinook salmon may home to natal streams, as has been shown for some hatcheries on the lower Columbia River (Pascual et al. 1995).

Straying of adult spring-run Chinook salmon propagated at the SCARF into the Sacramento River basin is potentially problematic primarily due to concerns related to the genetic integrity of the naturally spawning spring-run populations. These concerns stem from potential loss of genetic diversity and structure of naturally spawning populations and the possibility that hatchery conditions could lead to selection for traits that reduce fitness under natural conditions. Propagation of fish at the SCARF has the potential to unintentionally change the genetic composition of wild populations and subsequently contribute to reduced survival in natural environments if conservation stock stray into the Sacramento River basin and spawn with wild spring-run stocks. Additionally, conservation stock may stray into other tributaries of the San Joaquin River basin and interbreed with fall-run Chinook, which may interfere with existing wild and hatchery management actions and reduce genetic fitness of these fall-run populations. This is a particular concern for supplementation or conservation hatcheries because the objective of these hatcheries is to increase natural production (Mobrand et al. 2005). Several studies indicate that introgression rates resulting from hatchery strays as low as 5 to 15% are sufficient to depress fitness of natural origin stocks (Mobrand et al. 2005, Ford 2002, Lindley et al. 2007).

The mechanism of genetic change most likely to occur in conservation hatcheries is domestication (i.e., natural selection in artificial environments; Busack and Currens 1995; Campton 1995). Conservation hatcheries use methods such as representative broodstock selection, factorial mating, low rearing densities, and a high proportion of natural origin fish in the broodstock to control for other sources of potential genetic change (Busack and Currens 1995). These practices have been incorporated into the SCARF's HGMP (Börk and Adelizi 2010). The use of genetic broodstock management to guide selection of salmon breeding pairs has also been demonstrated to reduce inbreeding and increase offspring survival in the wild (Conrad et al. 2013). Nonetheless, artificial selection (domestication) impacts on genetic diversity, fitness, and population viability are expected to occur in conservation stock, to some degree.

To reduce or moderate domestication selection, the Proposed Project would (1) select and collect hatchery-origin broodstock in a manner that would capture phenotypic and genotypic diversity of the source population(s), and (2) conduct genetic management to minimize domestication selection and to maximize effective population size of the broodstock, experimental population, and the combined (broodstock and experimental) populations. If eggs from naturally spawning fish are collected and cultured to produce SCARF broodstock, they would be taken from multiple redds, multiple streams, and over a period of time, to the extent allowable by ESA section 10(a)(1)(A) permits, to maximize genetic and life history diversity. Similarly, if juveniles are collected from naturally spawning fish and reared for use as SCARF broodstock, they would be taken from multiple locations over a period of months, to the extent allowable by ESA section 10(a)(1)(A) permits, to maximize diversity in life history strategy. In addition to selecting for robust broodstock with adequate genetic diversity, conservation hatchery procedures would be implemented to avoid inbreeding and maintain the initial genetic diversity in the captured broodstock. This would include genetic monitoring and adaptive breeding management practices such as the development of pairwise genetic relatedness mating matrix prior to each spawning season to mate least-related broodstock pairs.

Conservation stock would solely consist of fish reared for their entire juvenile freshwater lives in Restoration Area water. This practice should allow fish released from the SCARF to sufficiently imprint natural odors from the Restoration Area, minimizing the straying rate of returning adults. The volitional release channels connected to SCARF smolt production tanks would allow fish to be released from the hatchery directly to the river without the need for transport, in an effort to maximize imprinting and thereby reduce straying. If hatchery-raised juveniles are required to be released at other locations in the Restoration Area due to barriers to outmigration, fish would be released only after sufficient acclimation to maximize their homing ability. Releases would occur early enough in the season to provide adequate temperatures while imprinting.

In conclusion, the practices described above and detailed in the SCARF's HGMP would minimize the potential for undesirable genetic traits to develop in the conservation stock, and the proposed reintroduction strategy would reduce the potential for straying. With these measures in place, reductions in genetic fitness or population viability of Sacramento River basin spring-run Chinook or San Joaquin River basin fall-run Chinook would be sufficiently minimized. Therefore, this impact is considered to be less than significant.

Impact FISH-REINTRO-4: Reductions in Fitness or Population Viability of Naturally Spawning Chinook Salmon due to Straying by Fish Translocated from the Feather River Fish Hatchery (Significance Criterion A, Project Level, Less than Significant)

As part of the Proposed Project, over a period of 5 years, CDFW would collect up to 80,000 eyed eggs or 54,400 juveniles annually from the FRFH for translocation into the Restoration Area. As discussed in Impact FISH-REINTRO-3, high levels of straying would be of concern, particularly to the genetics of naturally spawning spring-run populations in the Sacramento River basin with minimal hatchery influence (i.e. Butte, Deer, and Mill creeks). Interbreeding by strays with fall-run Chinook in the San Joaquin River basin is also a concern.

A primary concern is the possibility of fitness reduction in Sacramento River basin populations due to selection of traits advantageous in the San Joaquin River among straying transplanted fish. Many fitness-related traits in salmonids are heritable (Carlson and Seamons 2008), allowing for natural selection to drive adaptation to local conditions. In hatchery Coho salmon, survival was found to be inversely related to transplant distance, suggesting that stocks in close proximity to each other may share common genetic characters that are maladapted for distant transplant sites (Reisenbichler 1988). Therefore, introgression of traits adaptive to conditions in the San Joaquin River may be detrimental to populations within the Sacramento River basin. Reduction of fitness among the Sacramento River basin populations may also result from straying of transplanted fish that have experienced domestication selection in the FRFH and/or during instream acclimation.

While practices such as translocation are recognized to promote straying, most salmon transplanted before the critical imprinting period (i.e., smolt stage) return to the site of release and not the rearing facility (e.g., Donaldson and Allen 1958; Quinn et al. 1989, reviewed by Quinn 1993). Past displacement studies (Quinn et al. 1989, Quinn 1990) indicate that maturing salmon will attempt to reverse the sequence of their outward migration as juveniles. This will lead them to the river or hatchery where they originate under natural conditions. However, displaced salmon will attempt to first return to the odors of their release site and will continue to the rearing site if its odors can be detected. Upon failure to detect rearing site, the returning salmon will seek the nearest river or hatchery for spawning location (Quinn 1993).

The return rate of translocated fish is also determined by both displacement distance and water characteristic differences. If the release and rearing sites are close to one another, especially if they are within the same river, salmon are likely to return to the rearing site rather than the release site (Quinn 1993). Given sufficient imprinting process, the differences in water geochemistry between Sacramento River and San Joaquin River (Barnett-Johnson et al. 2007), and the distance between the Sacramento River basin spring-run salmon populations and the Restoration Area, the return rate of fish to rearing site is expected to be low. To promote the return of displaced fish, the proper imprinting will be required. Transplanted juvenile Chinook salmon would be acclimated for a certain period of time in the Restoration Area to minimize their probability of returning to other tributaries and will only be released within the Restoration Area.

The potential for translocated fish to stray may be exacerbated by the incomplete passage and inferior habitat conditions in the Restoration Area at the time when adults return to spawn, which could be as early as 2016 if juveniles are released in 2014. At the time fish begin to return to spawn, CDFW would assess habitat and passage condition in the Restoration Area. Trap and haul activities would be conducted, as necessary (See Chapter 2, *Project Description*), to minimize straying that could result from inadequate passage or habitat conditions.

Finally, mortality at various life stages greatly reduces the number of smolts released for outmigration that will eventually return for upmigration. According to Healey (1991), mortality of juveniles in fresh water can be as high as 70-90%, and annual ocean mortality can range from 20-35%. As a result, return rates can be as low as 5%, which in the case of

80,000 eyed eggs or 54,400 juveniles, results in numbers between approximately 2,700 and 4000 adults.

In conclusion, the potential for translocated fish to reduce the genetic fitness or population viability of Sacramento River basin spring-run Chinook or San Joaquin River basin fall-run Chinook would be minimal given; (1) the relatively low number of fish proposed for release through translocation that would return as adults, and; (2) the reintroduction strategy, including imprinting juveniles to the Restoration Area; and (3) the methods proposed to monitor and manage returning adults (i.e., trap and haul, as necessary). Therefore, this impact is considered to be less than significant.

Impact FISH-REINTRO-5: Adverse Effects on Other Native or Special-Status Fish Species from Release of SCARF-produced Juveniles through Disease Transmission, Predation, and Competition for Food, Space, or Other Limited Resources (Significance Criteria A, B, C, and D, Project Level, Less than Significant)

The transmission of disease from hatchery fish to wild fish is often cited as a concern in fish stocking programs. Diseases known to affect salmonids in the Central Valley drainage include IHNV, ceratomyxosis, cold water disease, bacterial kidney disease (BKD), and whirling disease. Since these diseases have only been found in salmonids, they are most likely to pose threats to wild salmon and steelhead in the Restoration Area and in downstream reaches (DWR 2004). However, standard hatchery protocols, such as periodic examinations of hatchery fish by pathologists and disinfecting procedures, are designed to control disease in hatchery stocks (Leitritz and Lewis 1980). Consequently, there is little evidence of disease transmission between hatchery fish and wild fish (Perry 1995) (see Impact FISH-OP-4).

As described above, the spread of disease by fish released from the SCARF to special-status and other wild fish is unlikely. Any potential for spread of disease would be minimized because the health of juveniles would be assessed according to American Fisheries Society accepted standards prior to release from the SCARF, as described in the HGMP (Börk and Adelizi 2010). In addition, the SCARF would implement a biosecurity program to reduce the presence of disease in the hatchery (see Impact FISH-OP-4). Thus, the potential for disease transmission to special-status and other wild fish is not considered substantial.

Release of hatchery-produced spring-run Chinook salmon can trigger ecological risks to both salmonid and non-salmonid fishes. Some potential risks include competition for food and territory, predation by hatchery fish due to their larger size, negative social interactions, and carrying capacity issues. Competition between hatchery salmon and other fishes is most likely to occur if the fish have similar habitat and diet requirements. If hatchery-released salmon are larger than wild salmon, the hatchery salmon could prey on wild salmon and other smaller non-salmonid fishes. However, juvenile Chinook salmon in freshwater are not understood to commonly forage on fish, and it is only after salmon reach smolt size or larger and migrate into estuaries that fish (juvenile herring, sticklebacks, and other small fishes) become part of their diet (Healey 1991; Moyle 2002).

Large releases of hatchery salmon can also attract predators such as piscivorous fish, birds, and mammals, and expose wild salmon or other small-bodied fish species that co-occur with the hatchery fish to higher levels of predation (Kostow 2009). Not only is there an increased density of prey available to predators, but hatchery fish also tend to out-migrate in unnatural, concentrated groups compared with the more dispersed and variable behavior of wild fish (Kostow 2004). This tendency to concentrate (school) increases the attractiveness of hatchery fish to predators. The problem can be exacerbated by other abnormal behaviors of hatchery fish, such as an increased level of aggressive displays, surface feeding, and failure to seek cover, which further increase their attractiveness or vulnerability to predators (Berejikian 1995; Johnsson et al. 2001). Wild fish may co-occur with hatchery fish and, as a result, may also be consumed at higher than natural rates when the hatchery fish are present and attracting predators (Collis et al. 1995; Nickelson 2003).

Human “predators” are also attracted to abundant hatchery fish. Wild fish survival is decreased when the presence of large numbers of hatchery fish facilitate over-harvest of small wild populations by human fishers (Hilborn and Eggers 2000; Flagg et al. 1995; Wright 1993). Although anglers are not likely to fish for juvenile salmonids, they may impact larger fish species if hatchery juveniles are attracting predatory fish that are commonly harvested by anglers. However, potential regulations, public communication efforts, recreation enhancements, and increased enforcement would make this impact unlikely.

Juvenile salmon establish and defend foraging territories through aggressive contests. When large numbers of hatchery fish are released in streams where there are small numbers of wild fish, hatchery fish are more likely to be aggressive, disrupting natural social interactions. High fish densities in freshwater have been associated with decreased growth, increased or premature outmigration, increased competition for food, decreased feeding territory sizes, and increased mortalities (Kostow 2009). A single release of large numbers of hatchery fish would increase the overall (hatchery and wild) fish density and may interfere with the density-dependent mechanisms that regulate wild populations.

Finally, the introduction of hatchery juveniles may reduce the overall carrying capacity of wild salmon juveniles in the system. Carrying capacity is a measure of the size of population that can be supported by a particular ecosystem, and it changes over time with the abundance of predators and resources such as food and habitat. When hatchery fish are released into streams, they consume food and utilize habitat. If these are limiting factors for the carrying capacity of the system, population sizes of hatchery and wild salmon, as well as other fishes with similar food or habitat requirements, may be reduced.

In effort to minimize impacts to other native or special-status fish species from release of SCARF-produced juveniles, the SJRRP has adopted many of the recommendations found in NOAA’s technical memorandum that establishes a conceptual framework for conservation hatchery strategies for Pacific Salmon (Flagg and Nash 1999) and HSRG recommendations. These plans are also consistent with the existing conservation hatchery guidelines for Coho salmon found in CDFW’s Coho Salmon Recovery Strategy (CDFG 2004). The SCARF would base goals for growth patterns of hatchery fish and size at emigration on natural population parameters to reduce the risk that hatchery fish would outcompete or prey on naturally produced juveniles. This would be done by determining spawning, hatching and emergence times, growth rates, and body size of the local population, and then duplicating these in the hatchery by controlling diet composition, feeding rates and, when possible, water temperatures.

Although the potential ecological impacts described above may occur following implementation of the flow augmentation and habitat enhancement actions, the baseline condition of the Restoration Area is predominantly poor instream habitat with fish assemblages dominated by non-native warm water species (see Section 6.3.2). As has been observed in other systems, a shift to native fish assemblages is anticipated following the implementation of a more natural flow regime (Brown and Ford 2002; Kiernan et al. 2012). However, due to the conservation hatchery approaches to be followed at the SCARF, the poor baseline aquatic habitat conditions, and low abundance of native and special-status species in the Restoration Area, the ecological effects of spring-run Chinook reintroduction described above are expected to be less than significant.

Impact FISH-REINTRO-6: Cascading Effects in Aquatic Food Webs from Chinook Salmon Produced either within the Restoration Area or by the SCARF (Significance Criterion B, Project Level, Beneficial)

Pacific salmon are considered important vectors for returning large amounts of nutrients from the northern Pacific Ocean back to both the freshwater and terrestrial ecosystems, representing a unique way to move nutrients upstream (Cederholm et al. 1999). Chinook salmon, which are semelparous (dying after spawning once), release marine-derived nutrients through excretion, gametes, or their own mortality. (A healthy spawning run will produce a large number of carcasses after the fish have spawned.) Although differences can occur from locality to locality, the pathways for use of nutrients by stream biota seemingly occur through three avenues: (1) uptake by primary producers after mineralization to inorganic forms that then transfer the nutrients up the food chain; (2) uptake of dissolved organic matter released by decomposing carcasses by microfauna in the streambed substrate; and (3) direct consumption of salmon eggs, fry, and carcasses (Cederholm et al. 1999). Bilby et al. (1996) showed that stream-resident salmonids consumed salmon eggs and tissue in two Washington streams, and that marine-derived nitrogen and carbon were subsequently taken up by these fishes, as evidenced by the presence of isotopes ^{15}N and ^{13}C in body tissues. Chaloner et al. (2002) found that stream-resident salmonids in southeastern Alaska, as well as lower trophic levels including biofilm and several taxa of aquatic insects, incorporated marine nitrogen (up to 73%) and carbon (up to 52%) in their tissues. These marine nutrients appear to increase food web productivity, elevating stream biofilm and chlorophyll a levels (Wipfli et al. 1999), invertebrate densities and growth rates (Wipfli et al. 1998; Minakawa and Gara 1999; Chaloner et al. 2002; Chaloner and Wipfli 2002), and fish growth rates and biomass (Bilby et al. 1996; Wipfli et al. 2003).

Fish health also appears to be positively affected by salmon runs. Heintz et al. (2004) found elevated levels of triacylglycerides (energy reserves) and marine-derived fatty acids (omega-3 fatty acids) in juvenile Coho salmon exposed to salmon carcasses, which could lead to increased survival, reproduction, and overall performance (Adams 1998). Pacific salmon also transfer large quantities of marine-derived nutrients to adjacent ecosystems. Marine-derived nitrogen has been found in riparian vegetation tissue far from river banks (Ben-David et al. 1998). Marine-derived nitrogen signatures were detected in bird guano (Hocking and Reimchen 2002), adult aquatic insects, and terrestrial vertebrate scat and urine (Hilderbrand et al. 1999), suggesting a pathway of nutrient transport from salmon carcasses to terrestrial systems beyond simple transport through root systems (Naiman et al. 2002). In human-dominated ecosystems of central California, Merz and Moyle (2006) even reported finding evidence of marine-derived nitrogen in cultivated wine grapes that presumably benefited the agricultural industry.

The primary impact of spring-run Chinook salmon on aquatic food webs in the Restoration Area is likely to be associated with marine-derived nutrients transported upriver by returning adults who spawn and subsequently die. Both aquatic and terrestrial food webs have evolved to take advantage of marine-derived nutrients, so the effects of these nutrients are considered beneficial.

Impact FISH-REINTRO-7: Outbreeding Depression and Reduced Fitness from Hybridization between Fall-Run and Spring-Run Chinook Salmon within the Restoration Area (Significance Criterion A, Project Level, Less than Significant)

Fisheries resource managers involved with the SJRRP have identified potential concerns related to the hybridization of fall- and spring-run Chinook salmon in the Restoration Area. Potential adverse effects of hybridization include outbreeding depression, which can result when isolated populations evolve different complexes of genes that interact well within a particular population, but poorly when the genes are mixed through cross-population matings, resulting in reduced fitness of the hybrid offspring (McClure et al. 2008).

Although outbreeding depression is a generally accepted genetic phenomenon that has been documented in plants (e.g., Wasser and Price 1989), comparable studies in animals are rare. Experiments on marine copepods in intertidal pools show that hybrid individuals between populations some tens of kilometers apart show breakdowns in salinity tolerance and prolonged development (Burton 1987, 1990). In another study, clones of *Daphnia* in the same lake exhibited hybrid breakdown (Lynch and Deng 1994). In rainbow trout, outbreeding depression has been suggested as an explanation for reduced disease resistance and loss of predator avoidance behavior (McClure et al. 2008). Outbreeding experiments with Atlantic salmon found no effect of outbreeding depression on any of the measured physiological or genetic fitness parameters (Houde et al. 2011a, 2011b); it should be noted, however, that these experiments only followed lineages through two generations, so these results should be considered with caution because it may take several generations before outbreeding depression reveals itself. However, until outbreeding depression can be conclusively demonstrated in salmon, the threat from this genetic phenomenon resulting from hybridization of fall- and spring-run Chinook salmon in the Restoration Area remains hypothetical.

In the hypothetical circumstance that substantial hybridization does occur in the Restoration Area, then the progeny of hybrid fish could stray to other streams in the San Joaquin River and Sacramento River basins that support Chinook salmon populations.

However, the Proposed Project includes a variety of techniques to minimize straying, including acclimation of fish prior to release, operation of HFB to minimize hybridization, etc. As described in Impacts FISH-REINTRO-3 and -4, the impacts of straying by conservation stock outside of the Restoration Area are considered less than significant.

Currently, the presence of fall-run Chinook in the Restoration Area is extremely limited; the population is comprised of a few fish that make it past HFB and fish that are trapped and hauled as part of experimental reintroductions. Under baseline conditions, there are no viable fall- or spring-run Chinook salmon populations in the Restoration Area. Therefore, there are no populations with which fish released under the Proposed Project could hybridize. The impacts related to hybridization within the Restoration Area are therefore considered less than significant.

Fisheries Management

Impact FISH-MANAGEMENT-1: Impacts on Special-Status Aquatic Species during Construction of Fish Segregation Weirs or Barriers (Significance Criterion A, Program Level, Less than Significant with Mitigation)

Proposed fisheries management actions may include modifications to or replacement of HFB, installation of a segregation weir in Reach 1A, and/or construction of migration barriers at false migration pathways (i.e., Mud and Salt sloughs and potentially other locations if deemed necessary by the SJRRP). Construction of segregation weirs and barriers may impact special-status aquatic species with the potential to occur in the Restoration Area (Table 6-4), particularly if the new features require establishment of permanent foundations on the river's bed and bank. Impacts associated with construction of fish segregation weirs may include clearing vegetation, grading, and placement of fill in the river. Direct impacts to special-status aquatic species and their habitats would be considered potentially significant. Implementation of Mitigation Measure FISH-MANAGEMENT-1 would reduce this impact to a less than significant level.

Mitigation Measure FISH-MANAGEMENT-1: Implement Conservation Measures prior to and during Construction Activities.
CDFW shall implement appropriate Conservation Measures from Appendix I, CDFW's *Conservation Measures for Biological Resources That May Be Affected by Program-level Actions*, prior to and during the construction of fish segregation weirs and barriers. Pre-construction planning shall include a site assessment by a qualified fisheries biologist to determine the potential for special-status species to occur in the vicinity. If the biologist determines that special-status aquatic species may be present, CDFW shall implement the applicable Appendix I avoidance and minimization measures for each species that may be present.

Impact FISH-MANAGEMENT-2: Impacts to Aquatic Species from Bank Destabilization, Erosion, and Increased Sedimentation during Installation and Operation of Weirs and Barriers or Trap and Haul Activities (Significance Criteria A, B, and C, Project/Program Level, Less than Significant with Mitigation)

An evaluation of the fish-blocking effectiveness of the HFB was performed by Reclamation during August through November 2010 (Portz et al. 2011). Portz et al. (2011) determined that the sand-silt-clay substrate comprising the river bottom experienced erosion, especially around the barrier's support structures, footings, base, and conduit panels, with scour holes also developing underneath and at each end of the barrier. The scour holes allowed at least 22 Chinook salmon to pass through the barrier. Substrate conditions at the potential Salt and Mud sloughs barrier sites have not been investigated, but are likely to be similar to the HFB site.

Although the Reach 1A Segregation Weir is proposed for construction in the vicinity of the Hwy 41 crossing, its exact location has not yet been identified. Nevertheless, substrate conditions in the San Joaquin River at the Hwy 41 crossing are much different than at the HFB, with a seemingly less erodible gravel-cobble substrate being dominant.

The highly erodible river bed and bank at the HFB makes installation of an instream weir at this location problematic. Even installation of a permanent concrete sill to stabilize vertical and horizontal erosion and provide a solid barrier foundation (recommended by Portz et al. 2011) might be compromised by the highly unstable bottom substrate. By comparison, substrate conditions at the proposed Reach 1A Segregation Weir are seemingly much more stable. In one of the few studies that assessed fish forage conditions in the San Joaquin River, Saiki and Schmitt (1985) reported that benthic macroinvertebrate standing crop and Shannon-Weaver diversity index were much lower at Fremont Ford (shifting sand substrate; located within Reach 5 immediately upstream of the HFB) than at an upstream location at Fort Washington (gravel-cobble substrate; located within Reach 1A). Saiki and Schmitt (1985) also reported that resident bluegills had fuller stomachs and ate a more diverse diet where the supply of benthic macroinvertebrates was most abundant and diverse. If native aquatic species respond in similar fashion to environmental conditions, then the degraded habitat (e.g., unstable and erodible substrate, and high sedimentation) found at the HFB could have an adverse effect on fish.

Modification and operation of the HFB, the Reach 1A Segregation Weir, barriers at Salt and Mud sloughs or other locations, and other activities related to trap-and-haul efforts (collection, streamside rearing) may result in some level of bank and bed erosion and resultant sedimentation, which is considered a potentially significant impact on fish for the reasons stated above. Erosion and sedimentation resulting from construction would be minimized by **Mitigation Measures GEO-CONSTRUCT-1a, GEO-MANAGEMENT-1a and GEO-MANAGEMENT-1b**. Erosion and resultant sedimentation resulting from weir operations may occur, but it would not be significant enough to degrade habitat so that it resulted in a significant adverse effect to fish or their habitat (i.e., the quantity of sediment generated from local bank erosion and scour is very small in comparison to the annual watershed load in the San Joaquin River). Thus, with implementation of **Mitigation**

Measures GEO-CONSTRUCT-1a, GEO-MANAGEMENT-1a and GEO-MANAGEMENT-1b, these impacts are considered to be less than significant. The impact analysis and significance conclusion above is considered project level for operation of the existing HFB and for trap and haul activities, and programmatic for new or reconstructed weirs and barriers; for further discussion of the approach to the project and programmatic analysis in this document, please see Chapter 3.

Impact FISH-MANAGEMENT-3: Concentration of Predators, including Piscivorous Fish, Birds, and Mammals, Resulting from the Increased Structure (Cover) Provided by Segregation Weirs or Barriers (Significance Criteria A, B, and C, Project Level, Less than Significant)

As mentioned above, Reclamation evaluated the fish-blocking effectiveness of the HFB from August through November 2010 (Portz et al. 2011). According to Portz et al. (2011), the HFB is typically operated from September to December, and then removed from the river. Portz et al. (2011) determined that large fish (i.e., common carp, channel catfish, white catfish, striped bass, Chinook salmon) concentrated at the downstream face of the barrier seemingly because it inhibited their upstream movement, it provided protective cover, or both. The adult salmon encountered by Portz et al. (2011) were fall-run fish because they migrate into the San Joaquin River and its tributaries in the October-January timeframe. By comparison, spring-run Chinook salmon migrate into the river system from March through July when the HFB is not in place. Although adult Central Valley steelhead have not been observed at the HFB since 1996, early arrivals may occur from November through December, even though peak migration is usually in January and February, at least in the Mokelumne River (Workman 2001). With the possible exception of river lamprey and green sturgeon, other special-status fish species that currently exhibit spawning migrations in the San Joaquin River system during fall months are not known to exist.

In addition to blocking the movement of large fish, Portz et al. (2011) noted that schools of threadfin shad, an important forage species in the San Joaquin River, swam freely on both sides of the HFB and occasionally passed through its conduit pickets. The proposed Reach 1A Separation Weir, which would likely be operated on a similar seasonal schedule as the HFB, and possibly the weirs at Salt and Mud sloughs as well, are expected to have a similar effect on large fish and smaller schooling fish by blocking their movements and causing them to concentrate below the weir. Schools of threadfin shad attract predators such as striped bass and largemouth bass, but these piscivorous fish are not likely to forage on adult salmon. Fish-eating birds may also be attracted to weirs for similar reasons as piscivorous fish, but even large wading birds (e.g., great blue heron), pelicans, and raptors are unlikely to actively pursue and consume adult salmon. Merz and Moyle (2006) noted that 14 vertebrate species, including two domestic animals, were observed feeding on salmon carcasses in the Mokelumne and Calaveras rivers, but none of these scavengers are expected to prey on live adult salmon. Toweill (1974) reported that river otter (*Lutra canadensis*), which are present in the San Joaquin Valley, often forage on fish and will even consume spawning salmon; however, large game fish are not a significant component of otter diets because they (the fish) are usually fast swimmers and difficult to capture.

By comparison, juvenile fish are highly vulnerable to predation. After reintroduction, fall- and spring-run Chinook salmon yearlings emigrating downstream from October through December could encounter predators attracted to weirs. However, this life stage of salmonids is not currently present in the Restoration Area while weirs are in operation. Other special-status fish species with juvenile life stages that might occur in the vicinity of the HFB or other proposed weirs during fall months include hardhead, Kern brook lamprey, river lamprey, and San Joaquin roach, but these life stages have rarely or never been encountered at these localities during fish surveys conducted over the past 35 years.

The HFB, the proposed Reach 1A Segregation Weir, and possibly the weirs at Salt and Mud sloughs and in other locations are expected to attract fish-eating predators such as piscivorous fish, birds, and mammals. However, potential predators found in the Restoration Area are either too small or too slow to effectively prey upon large actively swimming fish. Although juvenile life stages of some special-status fish species may occur during fall months in the vicinity of weirs, their rarity in fish surveys conducted at this location suggests that, under baseline conditions, they are not likely to be present or consumed in large numbers, the Proposed Project would not involve any actions to change these conditions. Therefore, impacts from predators attracted to segregation weirs are expected to be less than significant.

Impact FISH-MANAGEMENT-4: Interference with Reintroduction of Fall-Run Chinook Salmon into the Restoration Area due to Operation of Weirs to Segregate Fall-Run from Spring-Run Chinook Salmon (Significance Criteria C and D, Project Level, No Impact)

The HFB is intended to prevent fall-run Chinook salmon into the San Joaquin River above the confluence with the Merced River where habitat and water temperatures are potentially unsuitable for this fish (Portz et al. 2011). Even after restoration efforts create suitable habitat conditions for salmon and steelhead, resource managers are concerned that fall-run salmon may need to be seasonally excluded from the Restoration Area to prevent interference and hybridization with spawning and rearing of spring-run Chinook salmon (see Impact FISH-REINTRO-7). Based on observations from the Sacramento River basin, spring-run Chinook salmon are expected to enter the Restoration Area from March through September (peak migration is May-June), with spawning occurring from late August through October (peak spawning is mid-September) and juvenile emergence occurring from November through March (Moyle 2002). Juvenile residency can extend over 3 to 15 months. By comparison, fall-run salmon in the San Joaquin River basin (Tuolumne River) migrate upstream from October through early January (peak migration is November), with spawning occurring from late October through January (peak spawning is November) and juvenile emergence occurring from December through April (Moyle 2002). Residency of fall-run juveniles extends over 1 to 3 months. To prevent spawning interference and hybridization with spring-run salmon, upstream migration of fall-run Chinook salmon would have to be impeded at least until November and preferably later, which would result in artificial selection for later-arriving individuals. If spawning of fall-run Chinook salmon can be delayed until late November through December, overlap of fry emergence will also be reduced for the two runs, and spring-run fry should be older (and larger) than fall-run fry, giving the spring-run fish a competitive advantage.

However, because there are no Chinook salmon populations currently established in the Restoration Area, there would be no adverse impact with respect to baseline conditions.

Impact FISH-MANAGEMENT-5: Interference of Segregation Weirs or Trap and Haul Activities with Movements of Other Large-Bodied (Non-Target) Fish, including Federally Listed Species such as Central Valley Steelhead and Green Sturgeon (Significance Criteria A, C and D, Project/Program Level, Less than Significant with Mitigation)

As previously discussed, the HFB is intended to impede passage of fall-run Chinook salmon from ascending the San Joaquin River above the confluence with the Merced River where habitat and water temperatures are potentially unsuitable for this fish (Portz et al. 2011). Under the Proposed Project, HFB may be removed or repurposed to continue to serve as a control structure to segregate up-migrating spring- and fall-run Chinook salmon, in which case it would continue to serve as a migration barrier to fall-run Chinook. The proposed Reach 1A Segregation Weir also would be expected to block upstream passage of fall-run Chinook salmon. The HFB also potentially impedes the adult Central Valley steelhead from moving upstream, although the weir is not intended to be in place during the time when steelhead are most likely to occur in the area (mid-December through mid-February) (Portz et al. 2011). According to Moyle (2002), the southernmost population of green sturgeon (*Acipenser meditrotris*) occurs in the Sacramento-San Joaquin Delta and spawns in the Sacramento River. Spawning of the closely related white sturgeon (*Acipenser transmontanus*) has recently been documented in several locations along the San Joaquin River, and this species has been tracked near the confluence with the Merced River (Jackson 2013). Green sturgeon also have been reported to have been caught upstream of the Highway 140 bridge, which is located in upstream of the HFB (DuBois et al. 2011).

Following restoration, improved flows and water quality in the upper San Joaquin River may attract Central Valley steelhead, green sturgeon, and other large-bodied fishes (e.g., white sturgeon, striped bass, common carp, channel catfish). Operation of the HFB and other proposed weirs to impede upstream passage of fall-run Chinook salmon is expected to affect all large-bodied special-status fishes. To the extent that operation of weirs for fisheries management under the Proposed Project impede passage to a greater extent than under existing operations of the HFB, these impacts would be considered potentially significant. Implementation of **Mitigation Measures FISH-MANAGEMENT-5a and -5b** would reduce this impact to a less than significant level. The impact analysis and significance conclusion above is considered project level for operation of the existing HFB and for trap and haul activities, and programmatic for any new or reconstructed weirs and barriers; for further discussion of the approach to the project and programmatic analysis in this document, please see Chapter 3.

Mitigation Measure FISH-MANAGEMENT-5a: Monitor Fish Communities in the Vicinity of Segregation Weirs and Traps.

If actions described above in **Impact FISH-MANAGEMENT-5** are used in the Restoration Area, CDFW shall assess the species composition of fish communities within the 500-foot reach both upstream and downstream of each segregation weir or trap, during the time of year that the weir(s) or trap is in place. The monitoring activities shall focus on large bodied special-status fish species such as green sturgeon and steelhead. Monitoring techniques may include the use of visual surveys, rod and reel angling, set lines, fyke nets, DIDSON™, or seines.

Mitigation Measure FISH-MANAGEMENT-5b: Develop and Implement Measures that Allow Special-Status Large Bodied Fishes to Bypass Weirs and Traps.

If as a result of Mitigation Measure FISH-MANAGEMENT-5a or through other means, CDFW identifies that, outside of the current seasonal operation of the HFB (September to mid-December), the migration of special-status large bodied fishes could be impeded by the operation of the weir(s) or trap and haul activities, then CDFW shall modify the operation of the weir or implement measures that allow fish to bypass the weir so that movement of large bodied special-status fish species such as green sturgeon and steelhead is not impeded. Such measures may include removal or relocation of the weir(s), or operating a trap(s) to allow for manual selection of fish passing across the barrier.

Impact FISH-MANAGEMENT-6: Effects on Chinook Salmon in San Joaquin River Tributaries due to Non-Operation of Hills Ferry Barrier (Significance Criteria A, C, and D, Project Level, Beneficial)

As previously discussed, the HFB is intended to impede passage of fall-run Chinook salmon from ascending the San Joaquin River above the confluence with the Merced River where habitat and water temperatures are potentially unsuitable for this fish (Portz et al. 2011). With the HFB in place (i.e., baseline conditions), any fall-run Chinook encountering the barrier would presumably 1) be turned away and move back toward their natal stream, 2) stray to another San Joaquin River tributary, or 3) circumvent the barrier and move into the Restoration Area.

The primary fall-run Chinook reintroduction strategy of volitional reintroduction, which may include no longer operating the HFB, could have the initial effect of reducing overall fall-run population sizes in San Joaquin River tributaries (e.g., Merced, Stanislaus, Tuolumne rivers), because those fish encountering the HFB would no longer be redirected into the tributaries. If the HFB is no longer operated after river continuity has been restored, volitional salmon migration should be possible and would contribute to salmon populations in the San Joaquin Basin as a whole. As discussed previously, if significant structural or non-structural passage barriers still exist within the Restoration Area after the HFB is no longer operated, trap and haul operations for both adult and juvenile fish may be conducted to aid migration. These actions would provide access to a greater quantity of spawning habitat and the overall numbers of fall-run in the San Joaquin Basin should increase as a result.

Additionally, fall-run adults attempting to migrate into the Restoration Area to spawn presumably are doing so as strays from other streams. If they are turned away by a barrier, they may stray into other tributary streams rather than returning to their natal streams. While it is unknown what proportion of these fish return to their natal streams after encountering the barrier, this could have a detrimental effect on the population genetics of the streams to which they ultimately stray. Removing HFB and allowing these strays to migrate up the San Joaquin River, or to be trapped and hauled to suitable spawning habitat in Reach 1 and allowing their offspring to imprint on the San Joaquin River should reduce the number of strays to other San Joaquin River tributaries. Furthermore, it is understood that HFB is not 100% effective at restricting movement past the barrier which leads to a loss of fish into the Restoration Area, which currently does not support complete passage to suitable spawning habitat. Providing safe passage to suitable spawning habitat above the barrier would minimize these losses. These may be viewed as beneficial impacts in terms of maintaining the genetic integrity of the tributary populations and ensuring survival for fish that would migrate up the San Joaquin River. This impact is considered beneficial.

Impact FISH-MANAGEMENT-7: Impacts on Aquatic Species Associated with Disturbance of Sediment Transport Regimes and Accumulation of Organic Material Resulting from Operation of Segregations Weirs or Barriers (Significance Criteria B and C, Project/Program Level, Less than Significant)

The river substrate poses a challenge to the integrity of the HFB because loose bed material and river hydraulics cause substrate erosion around weir support structures, barrier footings, base of conduit bars, and barrier panels (Portz et al. 2011). Erosion was exacerbated by eddy currents and hydraulic disturbances. However, another phenomenon noted by Portz et al. (2011) was the deposition (accretion) of eroded material where current velocity was reduced especially downstream from the weir, which caused a rise in the river bed. This problem may be exacerbated by the accumulation of plant material such as water hyacinth behind the weir.

Deposition of eroded sediment is likely to occur in areas where current velocity is reduced due to instream roughness. If the barriers are removed, this sediment will be resuspended and redeposited, but the volumes of sediment are not anticipated to be so substantial that this would be considered to have a potentially significant impact.

However, if the upstream faces of weirs are excessively clogged by floating debris, including mats of water hyacinth, water flow in front of the weir may be further reduced, resulting in further increases in sediment deposition. Excessive bio-fouling of the weir due to accumulation of water hyacinth also may collapse the weir. However, plant materials would be removed from the weirs daily, or as needed, to ensure that these impacts to not rise to a level of significance. This impact is considered less than significant. The impact analysis and significance conclusion above is considered project level for operation of the existing HFB, and programmatic for any new or reconstructed weirs and barriers; for further discussion of the approach to the project and programmatic analysis in this document, please see Chapter 3.

Impact FISH-MANAGEMENT-8: Impacts on Fish Associated with Deployment of Fish Trapping Devices for Trap and Haul Activities or Segregation Weirs (Significance Criterion A and C, Project Level, Less than Significant with Mitigation)

Under the Proposed Project, CDFW may deploy various types of fish traps to move fish within the Restoration Area (i.e., trap and haul activities). Furthermore, the HFB is porous and does not prohibit passage of all adult salmon. CDFW will typically deploy Fyke nets or other fish trapping devices to capture any fish that succeed in passing the weir. Prolonged entrainment of fish in the trapping devices can cause stress and reduce fitness. Management activities involving trap and haul of spring-run Chinook salmon in the Restoration Area may also have similar impacts to large bodied fish as those described for the segregation weirs. These impacts would be potentially significant with regard to special-status fishes such as Chinook salmon and steelhead. Implementation of **Mitigation Measures FISH-MANAGEMENT-5a, FISH-MANAGEMENT-5b, FISH-MANAGEMENT-8a,** and **FISH-MANAGEMENT-8b,** would reduce this impact to a less than significant level.

Mitigation Measure FISH-MANAGEMENT-8a: Check Traps Daily and Minimize Handling of Fish.

To reduce stress on captured fish, all trapping devices will be checked at least once per day. Untargeted wildlife (e.g., snakes, turtles) caught in traps will be released into suitable habitat for the species. Traps will be checked more frequently during times when conditions are stressful (e.g., high temperatures, large amounts of debris during high flow events) to reduce the time that fish are subject to trap-related stress. Fish will be carefully handled and given sufficient time to recover (at least 30 minutes) prior to being released back into the river. If rotary screw traps are used, they will be operated in accordance with the USFWS "*Draft Rotary Screw Trap Protocol for Estimating Production of Juvenile Chinook Salmon*" (USFWS 2008) and/or similar protocols which are at least as protective and developed after conferring with USFWS and, if required, NMFS.

Mitigation Measure FISH-MANAGEMENT-8b: Adaptively Manage Trap Operations.

If mortalities greater than 2 fish or 2% of total catch are observed in a given day due to high debris loads, traps will be removed or raised out of the water until conditions are suitable for survival of fish (i.e., reduced winds or streamflow, improved weat her conditions). For rotary screw traps, if predation causes such mortality, a structural refuge will be installed inside the trap to reduce predation. This will consist of a perforated plastic box or similar refuge for small fish within the rotary screw trap to prevent predation by larger fish captured in the trap.

Fisheries Research and Monitoring

Impact FISH-MONITORING-1: Unintended Consequences on the Health of Hatchery or Wild Populations from Fish Used in SCARF-related Laboratory Experiments (Significance Criterion A, Project Level, Less than Significant)

Under the Proposed Project, CDFW plans to conduct research investigations in the Restoration Area related to Chinook salmon habitat, genetics, and survival. The investigations may include laboratory-based activities conducted at the SCARF, as well as field-based activities in the Restoration Area. Laboratory activities may involve collection of genetic samples from Chinook salmon in the Restoration Area. Fish used in hatchery experiments or captured in the field and brought back to the laboratory for biological assessments carry ecological risks similar to those involved in releasing hatchery fish to supplement natural reproduction and collecting wild fish to establish hatchery broodstock.

CDFW would use HGMP protocols (e.g., pathogen screening) and the CDFW AIS Decontamination Protocol (Appendix F, *Aquatic Invasive Species Monitoring and Decontamination Protocols*) to maintain hatchery and wild fish during laboratory experiments, and any study fish that may detrimentally effect other hatchery or wild fish would be sacrificed after study is complete. Thus, impacts associated with laboratory research and monitoring activities are considered to be less than significant.

Impact FISH-MONITORING-2: Incidental Mortalities as a Result of Field Research and Monitoring Activities (Significance Criteria A and B, Project Level, Less than Significant with Mitigation)

Field activities conducted in the Restoration Area may include studies and assessments of spawning habitat suitability, egg survival, juvenile rearing habitat, juvenile predation, fish species assemblages, fish movements (using acoustic telemetry or PIT tags), stream temperature, water quality/bioassessments, and juvenile monitoring (e.g., rotary screw traps and fry [minnow] traps). Potential locations for rotary screw traps and fyke nets deployed in support of Juvenile Chinook Salmon Monitoring are shown in Table 2-7.

Monitoring of aquatic resources is essential to support and evaluate the success of the Proposed Project. However, instream monitoring activities have potential for impacts on aquatic resources within the lotic (flowing water) environment. For instance, the simple act of wading in streams and shallow rivers can cause trampling of salmon redds, potentially damaging embryos and pre-emergent larvae. Furthermore, the passage of jet boats through spawning areas during monitoring activities can kill salmon eggs buried in the riverbed (Sutherland and Ogle 1975). Any embryos and larvae dislodged from redds would be vulnerable to predation by fish, birds, and other predators or scavengers and damage from ultraviolet radiation. High foot traffic and the use of power boats can also injure and dislodge aquatic insects and other benthic macroinvertebrates, and even damage periphyton and rooted macrophytes. The impacts from these activities are exacerbated if they are conducted while sampling fish and macroinvertebrates. If seine hauls are made, they can affect habitat complexity as the leadline is dragged over bottom sediments and, in the process, reduces bottom roughness by dislodging small branches and other snags. Water quality (e.g., turbidity, suspended solids) can also be affected temporarily if bottom sediments are disturbed. Use of electrofishing can pose additional problems to fish, other vertebrates, and even macroinvertebrates, especially if the power settings are too high (Nielsen 1998). When stunned by the electrical field, affected animals become more vulnerable to predation, and repeated or prolonged exposure to electricity or inappropriate application of electricity (i.e., excessive high voltage, amperage, or pulse widths) can further damage fish tissue, reducing growth or otherwise cause delayed mortality (Ainslie et al 1998). If snorkeling is used to census fish populations, the mere presence of the snorkeler can elicit an escape response in fish and some macroinvertebrates (e.g., crayfish, shrimp), thus creating stress in affected animals and increasing their vulnerability to predation. During periods of reduced water quality, fish and other aquatic organisms actively sampled may become stressed or otherwise impaired, reducing health, survival, and future reproductive success.

Individual research and monitoring events are not likely to result in significant impacts. However, the collective impact of all research and monitoring efforts have the potential to result in significant impacts on fish and aquatic habitats in the Restoration Area and broodstock collection streams. Potential impacts associated with instream monitoring activities are generally associated with sampling techniques that are intrusive and potentially injurious to fish and fish habitats, suggesting that the substitution of less intrusive and non-lethal procedures is preferable.

Two common methods for sampling juvenile salmonids in lotic waters involve use of rotary screw traps and fry (minnow) traps. Particularly in studies involving fish species protected by federal or state regulations, mortality of the sampled fish is an undesired result. Mortality incurred during field sampling for scientific purposes contributes to mortalities from other sources (e.g., predation, heavy fishing pressure, toxic chemical spills), thereby further stressing already compromised populations.

Field studies employing rotary screw traps to sample juvenile salmon in Central Valley rivers have documented incidental mortalities ranging between 0.2% and 4.5% (Gaines et al. 2003; Montgomery et al. 2007; Watry et al. 2007), although one study reported an unusually high daily mortality rate of 50% during a period of extremely low catches (Watry et al. 2007). Scientific collecting permits that authorize take of juvenile salmon may include stipulations requiring permit holders to terminate sampling when mortalities exceed a certain threshold. The permit holder may also be required to notify the appropriate federal or state agencies, and to retain dead fish on ice or in an appropriate preservative for delivery to research or museum facilities.

Incidental sampling mortality has the potential to significantly impact fish populations. Implementation of **Mitigation Measures FISH-MONITORING-2a, -2b -2c, -2d, and -2e** would reduce this impact to a less than significant level.

Mitigation Measure FISH-MONITORING-2a: Implement Standard Protocols for Active Sampling of Aquatic Species.

When conducting active sampling, CDFW shall adhere to fish handling procedures prescribed in *Guidelines for the Use of Fishes in Research* (Nickum et al. 2004), or any more current protocols which are considered at least as protective.

Mitigation Measure FISH-MONITORING-2b: Use Passive Sampling Techniques in place of Active Sampling Techniques, When Appropriate.

To reduce impacts associated with active instream monitoring activity such as electrofishing, seining, and use of jet or propeller motor boats by investigators, the use of passive capture equipment will be used in place of active sampling whenever appropriate and feasible. Passive sampling equipment includes entanglement gear such as gill nets and trammel nets, and entrapment gear such as Fyke nets and rotary screw traps.

Mitigation Measure FISH-MONITORING-2c: Use Observational Techniques in place of Traditional Capture Techniques, When Appropriate.
Both passive and active capture gears require collection and handling of organisms, which can potentially result in injury and stress to fish. Wherever possible and appropriate, observational techniques will be used in place of capture techniques to reduce the need to handle organisms. Examples of observational techniques include snorkeling, underwater photography, and video monitoring (Merz and Merz 2004). When water clarity is poor, remote-sensing camera procedures, such as DIDSON™ and other electronic or acoustic techniques will be used (Baumgartner 2006).

Mitigation Measure FISH-MONITORING-2d: Check Rotary Screw Traps Daily.
Rotary screw traps will be operated in accordance with the USFWS "*Draft Rotary Screw Trap Protocol for Estimating Production of Juvenile Chinook Salmon*" (USFWS 2008) and/or similar protocols which are at least as protective and developed after conferring with USFWS and, if required, NMFS. USFWS (2008) includes several measures, as follows. To reduce stress on captured fish, all trapping devices will be checked at least once per day when in the fishing position. Untargeted wildlife (e.g., snakes, turtles) caught in traps will be released into suitable habitat for the species. Traps will be checked more frequently during times when conditions are stressful (e.g., high temperatures, large amounts of debris during high flow events) to reduce the time that fish are subject to trap-related stress. Fish may need to be anesthetized, which would be done using methods acceptable to USFWS and NMFS before they are handled and given sufficient time to recover (at least 30 minutes) prior to being released back into the river.

Mitigation Measure Impact FISH-MONITORING-2e: Adaptively Manage Trap Operations.
If mortalities greater than two fish or 2% of total catch are observed in a given day due to high debris loads, traps will be raised out of the water until conditions are suitable for survival of fish (i.e., reduced winds or streamflow, improved weather conditions). If predation causes such mortality, a structural refuge will be installed inside the trap to reduce predation. This will consist of a perforated plastic box or similar refuge for small fish within the rotary screw trap to prevent predation by larger fish captured in the trap.

Impact FISH-MONITORING-3: Inadvertent Spread of Invasive Species or Disease by Researchers (Significance Criterion B, Project Level, Less than Significant)

Aquatic invasive species and fish diseases may be introduced into the Restoration Area by researchers conducting field studies on fall- and spring-run Chinook salmon and their habitats. Infestations of AIS and diseases can cause considerable ecological and economic damage and threaten the long-term survival of salmon and steelhead (see Impact FISH-OP-6). To prevent the spread of AIS, all equipment would be disinfected according to the CDFW Aquatic Invasive Species Decontamination Protocol (Appendix F, *Aquatic Invasive Species Monitoring and Decontamination Protocols*). With these measures in place, impacts associated with the spread of AIS and disease during research activities would be less than significant.

Recreation Management

Impact FISH-RECREATION-1: Impacts on Special-Status Fish Species during Construction of Improvements at Recreational Angling Sites (Significance Criteria A and B, Program Level, Less than Significant with Mitigation)

As part of the Proposed Project, CDFW may enhance recreational angling opportunities in off-channel ponds adjacent to the San Joaquin River. These enhancements may include ground-disturbing activities such as excavation or placement of fill. These activities have the potential to adversely affect special-status fish species and their habitats, including species listed in Table 6-4. Species identified as potentially occurring in Reach 1A are the most likely to be impacted by actions conducted to enhance recreational angling. Direct impacts on special-status fish and their habitats would be considered potentially significant. Implementation of **Mitigation Measure FISH-RECREATION-1** would reduce this impact to a less than significant level.

> **Mitigation Measure FISH-RECREATION-1: Implement Conservation Measures prior to and during Construction of Recreational Enhancements.**
> CDFW shall implement appropriate conservation measures from Appendix I, CDFW's *Conservation Measures for Biological Resources That May Be Affected by Program-level Actions*, prior to and during the construction of recreational fishing enhancements. Pre-construction planning shall include a site assessment by a qualified fisheries wildlife biologist to determine the potential for special-status species to occur in the vicinity. If the biologists determine that special-status species may be present, CDFW shall implement the applicable Appendix I avoidance and minimization measures for each species that may be present.

Impact FISH-RECREATION-2: Spread of Disease between Stocked and Wild Fish during Stocking of Off-Channel Ponds for Recreational Fishing (Significance Criteria A and B, Program Level, Less than Significant)

CDFW is currently assessing potential locations to enhance fishing opportunities in off-channel ponds adjacent to the San Joaquin River in Reach 1A between Friant Dam and SR 99. These off-channel ponds, consisting of existing ponds or abandoned gravel mining pits that lack river connectivity, may be stocked with rainbow trout reared at the CDFW-operated SJFH, or other species. Fish species resident to Reach 1 of the San Joaquin River (mostly non-native species such as sunfish, crappie, striped bass, largemouth bass, smallmouth bass, and catfish; but also native species, such as Sacramento pikeminnow, Sacramento sucker, and three-spined stickleback) are also likely to occur in the off-channel ponds. Although fish inhabiting the off-channel ponds are not expected to gain access to the river under typical conditions, this area has experienced major flooding as recently as 1997 (Reclamation and DWR 2012). Other potential ways that fish in the off-channel ponds might be transferred into the river include unintentional fish-drop by predatory birds hunting in the ponds, and intentional releases by anglers who fish the ponds.

CDFW maintains a comprehensive fish health monitoring program that includes a professional staff of pathologists and veterinarians. Pathologists at the CDFW Fish Health Laboratory conduct diagnostic examinations and health inspections at CDFW fish hatcheries, including the SJFH (ICF Jones and Stokes 2010). Rainbow trout reared at the SJFH are subjected to periodic screening for presence of specific pathogens, and are treated as directed by CDFW pathologists. These practices would ensure that the potential impacts from the spread of disease between stocked and wild fish are less than significant.

Impact FISH-RECREATION-3: Inadvertent Harvesting of Listed Salmonids as a Result of Improved Access for Recreational Fishing Enhancements (Significance Criterion A, Program Level, Less than Significant)

Under the Proposed Project, CDFW is contemplating enhancing off-channel features (e.g., ponds and abandoned gravel pits) for recreational fishing in the San Joaquin River corridor. Such enhancements may include providing improved access to recreational facilities (see Table 3-11 in NMFS 2012). Although angling opportunities for salmonids would decline due to cessation of stocking of rainbow trout by CDFW in Reach 1 and the potential implementation of new fishing restrictions (e.g., fishing method restrictions, gear restrictions, bait limitations, seasonal closures, zero bag limits) to avoid disturbance and take of Chinook salmon, fishing for other species may continue and may even increase following improvement of fishing and boating access. Although the San Joaquin River would not be the focus of the recreational enhancements, these enhancements may inadvertently lead to take of salmon and steelhead by providing anglers better access to the river. To address this, as part of design and implementation of these enhancements, as described in Chapter 2, *Project Description*, CDFW would take measures (e.g., access or activity restrictions, enforcement, public education) to help ensure that the enhancements do not unintentionally lead to poaching or other impacts to the reintroduced fish or other species of concern in the main stem of San Joaquin River. As a result, this impact is considered less than significant.

Impact FISH-RECREATION-4: Riparian or Instream Habitat Degradation or Spread of Invasive Species or Pathogens from Recreational Fishing Enhancements (Significance Criteria B, Program Level, Significant and Unavoidable)

Improved access to recreational facilities in Reach 1 would encourage increased vehicular (including off-road) and foot traffic in the vicinity of the facilities, and increased boat traffic in the river. Off-road vehicular and foot traffic can lead to riparian and instream habitat degradation ranging from trampling and removal of streambank vegetation to damage to the river bottom substrate. Exposed soil is vulnerable to erosion during windy and rainy conditions, resulting in increased turbidity and sedimentation in the river. Higher vehicular and boat traffic also increases the likelihood that invasive species (e.g., New Zealand mudsnail, quagga and zebra mussels, didymo) and pathogens (viruses, parasites) from other waters may be spread to the San Joaquin River if special efforts are not made by members of the public to clean and disinfect contaminated vehicles, boats, boat trailers, and fishing equipment.

Disturbance of soil and subsequent erosion caused by increased foot traffic by recreational anglers is not anticipated to significantly adversely impact fisheries resources (see Impact HYD-RECREATION-2). Impacts associated with AIS and pathogens have the potential to significantly impact fish and aquatic habitats. Existing public education programs and control measures are already implemented, such as those available at the Stop Aquatic Hitchhikers! Website:

http://www.protectyourwaters.net/prevention/prevention_generic.php.

Despite these practices, this impact is considered significant because public education programs and control measures rely primarily on voluntary efforts by members of the public to help avoid the spread of invasive species. Because no other feasible mitigation exists beyond the measures currently in place, this impact is considered significant and unavoidable.

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Chapter 7
BIOLOGICAL RESOURCES - VEGETATION AND WILDLIFE

7.1 Introduction

This chapter discusses the potential for the Proposed Project to affect wetland, riparian, and upland habitats, and the special-status plant and wildlife species that may utilize these habitats. Specifically, this section: (1) discusses federal, state, and local regulations relevant to vegetation and wildlife resources that may be affected by the Proposed Project; (2) describes the existing environmental setting in the Potentially Affected Area; (3) identifies plant and wildlife species potentially affected by the Proposed Project; (4) and proposes mitigation measures to avoid or reduce the potentially significant impacts.

The following appendices support this chapter:

- Appendix I: California Department of Fish and Wildlife's Conservation Measures for Biological Resources That May Be Affected by Program-level Actions
- Appendix J: Supporting Documentation related to Biological Resources - Vegetation and Wildlife

7.2 Regulatory Setting

Much of the regulatory setting relevant to vegetation and wildlife in the Potentially Affected Area is described in other chapters of this DEIR, and are not repeated here, including:

Chapter 6, *Biological Resources – Fisheries*:

- Clean Water Act of 1972 section 404;
- Rivers and Harbors Act of 1899 section 10;
- Federal Endangered Species Act of 1973 sections 7 and 9 (as amended);
- California Environmental Quality Act section 15380;
- California Endangered Species Act of 1985; and
- California Fish and Game Code sections 1600 et seq.

Chapter 12, *Hydrology, Geomorphology and Water Quality*:

- California Porter-Cologne Water Quality Control Act of 2006 section 401;

This section continues with a brief description of other federal, state, and local regulations that are applicable to vegetation and wildlife resources.

7.2.1 Federal Laws, Regulations and Policies

Migratory Bird Treaty Act

The Migratory Bird Treaty Act (MBTA) (Title 16, United States Code [USC], Part 703) enacts the provisions of treaties between the United States, Great Britain, Mexico, Japan, and the Soviet Union and authorizes the U.S. Secretary of the Interior to protect and regulate the taking of migratory birds. It establishes seasons and bag limits for hunted species and protects migratory birds, their occupied nests, and their eggs (16 USC 703, 50 Code of Federal Regulations [CFR] 21, 50 CFR 10). Most actions that result in taking of, or the permanent or temporary possession of, a protected species constitute violations of the MBTA. The MBTA also prohibits destruction of occupied nests. The Migratory Bird Permit Memorandum dated April 15, 2003, clarifies that destruction of most unoccupied bird nests (without eggs or nestlings) is permissible under the MBTA; exceptions include nests of federally threatened or endangered migratory birds, bald eagles (*Haliaeetus leucocephalus*), and golden eagles (*Aquila chrysaetos).* The USFWS is responsible for overseeing compliance with the MBTA. On December 8, 2004, the U.S. Congress passed the Migratory Bird Treaty Reform Act (Division E, Title I, Section 143 of the Consolidated Appropriations Act, 2005, PL 108–447), which excludes all migratory birds non-native or human-introduced to the U.S. or its territories. It defines a native migratory bird as a species present within the U.S. and its territories as a result of natural biological or ecological processes. The USFWS published a list of the bird species excluded from the MBTA on March 15, 2005 (70 FR 12710).

7.2.2 State Laws, Regulations and Policies

California Fish and Game Code – Native Plant Protection Act

The Native Plant Protection Act (NPPA) of 1977 (Fish & G. Code, §§ 1900-1913) directs CDFW to carry out the Legislature's intent to "preserve, protect and enhance rare and endangered plants in this state." The NPPA authorizes the Commission to designate plants as 'endangered' or 'rare' and prohibits 'take' of any such plants, except as authorized in limited circumstances.

CDFW and the California Native Plant Society (CNPS), a non-governmental organization, jointly maintain California Rare Plant Rank (CRPR) lists. These lists include plant species of concern in California. Vascular plants included on these lists are defined as follows:

- List 1A: Plants considered extinct or extirpated in California.
- List 1B: Plants that are rare, threatened, or endangered in California and elsewhere.
- List 2: Plants that are rare, threatened, or endangered in California, but more common elsewhere.
- List 3: Plants about which more information is needed - review list.

- List 4: Plants of limited distribution - watch list.

Plants appearing on Lists 1 and 2 are, in general, considered to meet the CEQA Guidelines section 15380(b) criteria (see Chapter 6, *Biological Resources - Fisheries*), and adverse effects to these species may be considered significant. Impacts to plants that are on Lists 3 and 4 are also considered during CEQA review, although because these species are typically not as rare as those on Lists 1 and 2, impacts to them are less frequently considered potentially significant.

California Fish and Game Code – Other Sections

Other sections of the Fish and Game Code describe protection for specific types of wildlife. For example, Fish and Game Code sections 3503, 3513, and 3800 (and other sections and subsections) protect native birds, including their active or inactive nests and eggs, from all forms of take ('take' means hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill [Fish & G. Code, § 86]). Raptors (i.e., eagles, falcons, hawks, and owls) and their nests are specifically protected in California under Fish and Game Code section 3503.5, which states that it is "unlawful to take, possess, or destroy any birds in the order Falconiformes or Strigiformes (birds of prey) or to take, possess, or destroy the nest or eggs of any such bird except as otherwise provided by this code or any regulation adopted pursuant thereto." Certain species are designated as fully protected under Fish and Game Code sections 3511 (birds), 5515 (fish), 4700 (mammals), and 5050 (amphibians) and it is illegal to take these species. Non-game mammals are also protected by Fish and Game Code section 4150.

7.2.3 Local Laws, Regulations and Policies

Fresno County General Plan

The Fresno County 2000 General Plan (County of Fresno 2010) recognizes that the historic broad floodplains in the San Joaquin Valley have been reduced by agriculture and urbanization. The General Plan's natural resource policies in the Open Space and Conservation element are based on the realization that the remaining riparian and riverine corridors are perhaps the most significant providers of wildlife habitat in the County. The General Plan seeks to protect riparian and wetland habitats while allowing compatible uses where appropriate.

San Joaquin River Parkway Plan

The San Joaquin Parkway Master Plan (Parkway Master Plan) was developed to ensure the protection of 23 miles of the San Joaquin River from the Friant Dam to State Highway 99. The Parkway Master Plan is based on goals to preserve and restore the natural resource values of the river corridor and to provide public use of the river without adverse impacts on these resources (SJRC 2000). The fundamental goals of the Parkway Master Plan provide for a harmonious combination of low-impact recreational uses, education, and natural resource protection. See Chapter 13, *Land Use and Planning*, for more details regarding the Parkway Master Plan and its policies.

7.3 Environmental Setting

7.3.1 Potentially Affected Area

The area potentially affected by the Proposed Project for the purposes of vegetation and wildlife resources includes portions of the San Joaquin Valley, Sacramento Valley, the Sacramento/San Joaquin Delta, the San Francisco Bay, and Sierra Nevada Mountains that are accessible to salmon released under the Proposed Project (Figure 2-1). This area encompasses multiple ecosystems that support a tremendous diversity of vegetation and wildlife species. The primary focus of this EIR is the vegetation and wildlife of the Project Area and the SCARF site, being the locations with greatest potential to be affected by the Proposed Project, each of which are described in the following sections.

7.3.2 Project Area

The Project Area includes locations in which physical actions that are part of the Proposed Project would take place. This includes: broodstock collection sites; Chinook salmon production and reintroduction sites; fisheries management, monitoring and research areas; and recreation enhancement areas (Figure 2-1). These sites are predominately located in the Restoration Area, but also include streams in the Sacramento Valley where broodstock collections may take place. This section describes the vegetation communities and wildlife species that are associated with the Project Area. Chapter 6, *Biological Resources – Fisheries* provides a description of the instream environmental setting for the Project Area.

Broodstock Collection Areas

The primary broodstock collection areas consist of the FRFH and Butte, Deer, and Mill creeks. Additional opportunistic collection may be conducted along the Stanislaus, Mokelumne, and Yuba rivers, and Battle and Clear creeks. These streams and their associated riparian areas support a broad diversity of vegetation and wildlife species. Brief descriptions of vegetation and wildlife resources associated with these drainages follow.

<u>Battle, Butte, Deer and Mill Creeks</u>

Vegetation

The Battle, Butte, Deer, and Mill Creek watersheds span several floristic provinces and climate zones. These watersheds begin in the Sierra Nevada Foothills subregion (Sierra Nevada province) and the Cascade Range Foothills subregion (Cascade Ranges province) and end in the Sacramento Valley subregion of the Great Central Valley province (Hickman 1993).

The headwaters of these creeks are situated in Lassen National Forest, where snowmelt from Mt. Lassen and other peaks, as well as seasonal rains, collect in volcanic highlands and alpine meadows. Vegetation communities in the upper extent of spring-run Chinook spawning areas (1,200 to 2,000 feet) consist of mosaics (vegetation patterns), whose distributions have been interrupted by lava flows and faulting and other geographic barriers, microclimates (such as south-facing glades versus persistent snow on north-facing slopes), as well as logging, road building, and agriculture (primarily cattle ranching). Vegetation communities, according to classifications in Sawyer, Keeler-Wolf, and Evens (2009), include: Mixed North Slope Cismontane Woodland Alliances, including black oak woodland; Cismontane Juniper Woodland and Scrub Alliance; Mixed Evergreen Forest alliances; Montane Riparian Scrub alliances; Northern Mixed and Montane Chaparral alliances; and Western Cordilleran Montane Wet Meadow, Shrubland, and Grassland alliances.

These creeks drop quickly in elevation where they have incised steep and narrow canyons through the metamorphic and igneous bedrocks. Vegetation communities in these middle elevations areas (200 to 1,200 feet) consist primarily of: Mixed North Slope Cismontane Woodland Alliances, including mixed oak woodland/forest and blue oak/gray pine woodland associations; Montane Riparian Scrub alliances (such as Black willow thickets association); Coastal and Valley Freshwater Marsh; Northern Mixed Chaparral alliances; Non Native Grassland association; California Cliff, Scree, and Other Rock Vegetation associations.

These creeks have lower gradients as they exit the foothills within alluvial fans and paleo-river terraces and meander through the Sacramento Valley floor. Flood control activities and agricultural developments have reduced channel diversity, instream cover, and riparian and floodplain habitats. Vegetation communities in these lower elevations of the broodstock collection areas (40 to 200 feet) consist mainly of: Mixed North Slope Cismontane Woodland Alliances, including valley oak woodland; Southwestern Riparian, Flooded and Swamp Forest alliances (such as Great Valley Willow Scrub, Fremont cottonwood forest, Great Valley Cottonwood Riparian Forest, Great Valley Mixed Riparian Forest associations); Introduced North American Mediterranean Woodland and Forest alliances; California Annual and Perennial Grassland associations; and Coastal and Valley Freshwater Marsh association.

Wildlife Habitat

A variety of terrestrial wildlife habitats exist within the broodstock collection areas, including riparian forest, riparian scrub, coniferous forest, chaparral, oak woodland, annual grassland, bluff/rock outcrop, flooded-field agriculture, orchard, pasture and range, and ruderal/developed. Besides the main channels of Mill, Deer, Battle, and Butte Creeks, numerous other water resources exist in the vicinity of the broodstock collection areas, including ephemeral tributaries, irrigation and water diversion ditches and canals, flooded agricultural fields, ox-bow lakes, tailings pools, ponds and other small impoundments, riverine wetlands, riparian forest and scrub wetlands, seasonal marshes, alpine wet meadows, and springs. These varied water resources sustain high levels of animal and plant diversity, and provide cover/resting, foraging, and reproductive habitat for numerous wildlife species. The riparian and riverine habitats along the creeks also function as wildlife dispersal and migration corridors. Agricultural and flood management practices, as well as gravel extraction, mining, and commercial/recreational developments, have altered these riverine and riparian ecosystems.

Clear Creek

Vegetation

The Clear Creek watershed begins in the Trinity Mountains, which are in the Klamath Ranges subregion (Northwestern California province) and ends in the Sacramento Valley subregion of the Great Central Valley province (Hickman 1993). Spring-run Chinook spawning areas on Clear Creek begin at about 1,000 feet elevation at the base of Whiskeytown Dam. From this point down to Clear Creek Road Bridge, the river is confined to a steep canyon. Vegetation communities in the middle reaches of Clear Creek consist primarily of: Jeffrey Pine Forest or Mixed Conifer Forest alliances; Coast / Canyon Live Oak Woodland Alliance; Montane Riparian Scrub alliances; Coastal and Valley Freshwater Marsh; Northern Mixed Chaparral alliances; Non Native Grassland association; California Cliff, Scree, and Other Rock Vegetation associations.

Below Clear Creek Road Bridge at about 400 feet elevation, the stream channel widens into an alluvial reach with a much lower gradient. Flood control activities and agricultural developments have reduced channel diversity, riparian habitat, instream cover, and floodplain habitat. Vegetation communities in these lower elevations consist mainly of the following: Mulefat and Willow thickets alliances; Semi-natural Stands of Tamarisk and Giant Reed; California Chaparral (*Ceanothus)*/Manzanita alliances; North Slope Chaparral alliances; Southwestern Riparian, Flooded and Swamp Forest alliances (such as Great Valley Willow Scrub, Fremont Cottonwood Forest, Great Valley Cottonwood Riparian Forest, Great Valley Mixed Riparian Forest associations); California Semi-Natural and Non-Native Grassland associations; and Coastal and Valley Freshwater Marsh association.

Wildlife Habitat

Although some habitat degradation has occurred from dredge mining, gravel extraction, agricultural and urban developments, and other land uses and activities, a wide variety of terrestrial wildlife habitats exist within the potential broodstock collection areas of Clear Creek, including riparian forest, riparian scrub, mixed oak/pine forest, chaparral, oak woodland, annual grassland, bluff/rock outcrop, flooded-field agriculture, orchard, pasture and range, and ruderal/developed habitats. The riparian and riverine habitats along Clear Creek also function as wildlife dispersal and migration corridors.

Feather and Yuba Rivers

Vegetation

Although the potential broodstock collection areas on the Feather and Yuba rivers span several floristic provinces and climate zones (the Northern Sierra Nevada Foothills and the San Joaquin Valley subregion), they do not include the higher elevation areas of these watersheds.

On the Feather River, the potential broodstock collection areas are on the main stem below Oroville Dam at about 220 feet elevation. The Lower Yuba River extends downstream from Englebright Dam at about 400 feet elevation to the confluence with the Feather River at about 60 feet elevation. Riparian habitat quality on both rivers has been greatly diminished by past mining activity, ongoing agriculture, and the effects of water diversions and impoundments throughout the system. Dredge tailings and gravel borrow pits have simplified riparian and riverine vegetation communities.

Vegetation communities in these potential broodstock collection areas consist mainly of: Mixed North Slope Cismontane Woodland Alliances, including valley oak woodland; Mulefat and Willow thickets Alliances; Semi-natural Stands of Tamarisk and Giant Reed; Southwestern Riparian, Flooded and Swamp Forest alliances (such as Great Valley Willow Scrub, Fremont Cottonwood Forest, Great Valley Cottonwood Riparian Forest, Great Valley Mixed Riparian Forest associations); California Semi-Natural and Non-Native Grassland associations; and Coastal and Valley Freshwater Marsh association.

Wildlife Habitat

Historical gold mining activities in the Yuba and Feather River watersheds dramatically reduced the diversity and complexity of riverine, floodplain, and riparian habitats. Within the Yuba Goldfields area, confinement of the river by massive deposits of cobble and gravel derived from hydraulic and dredge mining activities resulted in a relatively simple river corridor dominated by a single main channel and large cobble-dominated bars, with little riparian and floodplain habitat. Upstream impoundments, such Englebright Dam, have contributed to reductions in habitat complexity and diversity by preventing the transport of sediment, woody material, and nutrients from upstream sources to the lower river.

Nevertheless, a wide variety of terrestrial wildlife habitats exist within the potential broodstock collection areas, including riparian forest, riparian scrub, mixed oak/pine forest, chaparral, oak woodland, annual grassland, bluff/rock outcrop, flooded-field agriculture, orchard, pasture and range, and ruderal/developed habitats.

Mokelumne and Stanislaus Rivers

Vegetation

The potential broodstock collection areas on the Mokelumne and Stanislaus rivers begin at the tailwaters of instream dams (Comanche Reservoir at 140 feet, and Tulloch Reservoir at 400 feet, respectively). These portions of the Mokelumne and Stanislaus Rivers fall within the San Joaquin Valley subregion, and exclude the upper watersheds that lie within the Central Sierra Nevada Foothills and the Central High Sierra Nevada subregion. Snowmelt runoff from the Sierra Nevada is the major source of water to the San Joaquin River tributaries. Historically, natural flooding distributed higher flows beyond the main river channels into a complex network of sloughs, which supported large patches of riparian forest and tule marshes. This flooding created several thousands of acres of permanent tule marsh and more than one million acres of seasonally flooded wetlands and native grasslands, which in turn, supported vast, diverse riparian forests. San Joaquin River tributaries, such as the Mokelumne and Stanislaus rivers, are now confined by agricultural and urban development, resulting in the fragmentation and loss of floodplain habitats. The alteration of hydrologic and fluvial processes has shifted and simplified terrestrial vegetation communities within the potential broodstock collection areas. The elimination of large flood events, and corresponding scouring flows that remove vegetation, has allowed some riparian habitat to mature into dense, even-aged stands, which impoverishes community richness. Elimination of floods also has allowed riparian scrub and trees to establish within channels and gravel bars, which anchors substrates that typically are rearranged during high flow events. Despite the loss of habitat associated with these activities, the rivers are generally flanked by a ribbon of riparian and wetland habitats.

Vegetation communities in the lower elevations of the Mokelumne and Stanislaus rivers consist mainly of: Valley Oak and Mixed Oak Woodland alliances; California Sycamore Woodlands and Fremont Cottonwood Forest alliances (such as Southern Cottonwood Willow Riparian Forest association); Southwestern Riparian, Flooded and Swamp Forest alliances (such as Great Valley Willow Scrub, Great Valley Cottonwood Riparian Forest, Great Valley Mixed Riparian Forest associations); Introduced North American Mediterranean Woodland and Forest alliances (such as Eucalyptus); California Semi-Natural and Non Native Grassland associations; and Coastal and Valley Freshwater Marsh and Western Cool Temperate Scrub Swamp associations.

Wildlife Habitat

The wildlife habitats of the potential broodstock collection areas on the Mokelumne and Stanislaus rivers have been severely reduced or modified by flood control activities, agricultural water diversions, gravel extraction, urbanization and sewage disposal from the growth of cities (e.g., Lodi, Ripon, Oakdale), and historic dredge mining. Historically, the San Joaquin Valley supported a diverse assemblage of wildlife species, including tule elk (*Cervus canadensis* ssp*. nannodes*) and grizzly bear (*Ursus arctos californicus*). However, agricultural, urban, and commercial development have reduced, fragmented, and heavily modified natural habitat on the valley floor. Although a few large mammals such as mule deer (*Odocoileus hemionus*) remain in the San Joaquin Valley along riverine corridors, the remnant habitat continues to support a diverse group of vertebrate and invertebrate species. These species include: small mammals such as California vole (*Microtus califonicus*), (*Castor canadensis*), river otter (*Lontra canadensis*), raccoon (*Procyon lotor*), and coyote (*Canis latrans*); various reptile species; insects such as valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*) and rare, solitary bees; and a vast assemblage of avian species that use the various habitats for nesting and foraging habitat. Loss of off-channel habitats such as floodplains, riparian, and wetland habitats has substantially reduced the productive capacity of the Central Valley for many native wildlife species. The San Joaquin River National Wildlife Refuge was established in 1987 between the Tuolumne River and Stanislaus River confluences and encompasses more than 6,500 acres of riparian forest, wetlands, and grasslands.

7.3.3 Restoration Area

The vegetation and/or wildlife resources of the Restoration Area have been described previously in:

- SJRRP PEIS/R (Reclamation and DWR 2012)

- Riparian Vegetation of the San Joaquin River (DWR 2002)
- San Joaquin River Restoration Study Background Report (FWUA and NRDC 2002)
- Historical Riparian Habitat Conditions of the San Joaquin River (Jones and Stokes 1998)

The description of the vegetation and wildlife resources in the Restoration Area provided in this section has been adapted from these references. Changes in baseline conditions compared to those described in these sources are noted, where applicable. Vegetation communities are described using a modified version of Holland's system (Holland 1986). Wildlife species typically associated with these vegetation communities are also discussed. It should not be inferred that presence of species listed has been confirmed, except where specifically mentioned.

Vegetation Communities

The spatial extent of vegetation communities described in this section is reported from the *Riparian Vegetation of the San Joaquin River* (DWR 2002). DWR's mapping of the Restoration Area covered 1,000 feet outside of San Joaquin River levees or, where no levee was present, 1,000 feet outside the outer edge of the riparian vegetation. In areas where riparian vegetation extended into adjacent sloughs or side channels, and natural vegetation was present throughout, the entire area covered by aerial photographs was mapped (DWR 2002). While the DWR vegetation surveys were conducted in 2000, it is expected that the current extents of vegetation communities are generally similar to that described by DWR (2002). This is because the San Joaquin River in the Restoration Area is not a particularly dynamic fluvial system, and has not exhibited flooding at the scale that would result in widespread creation or destruction of riparian habitats since the surveys were completed. However, Interim Flows released in accordance with the Settlement Agreement have rewetted portions of the San Joaquin River channel that were previously dry except during flood flows. The dry portions of the channel did not support substantial riparian vegetation, and the bare substrates are considered to be prone to recruitment by native and invasive vegetation (SJRRP 2012). It is likely that the spatial extent of certain invasive, non-native plants (weeds) has increased relative to the 2000 survey results independent of changes in the river's flow regime. The Implementing Agencies conducted baseline invasive plant surveys in the Restoration Area in 2008, but invasive species cover relative to the DWR's 2000 mapping efforts was not assessed. More recent intensive weed mapping efforts conducted by River Partners have documented an expansion in the distribution of several weed species relative to the surveys conducted in 2000. While it is not clear whether the expansion was due to more intensive sampling or actual changes in abundance, it is clear that the spatial extent of species such as red sesbania (*Sesbania punicea*) is currently greater than that documented by DWR in 2000 (Rentner pers. comm.).

Riparian Forest

DWR (2002) reported that riparian forest comprises 17% of all habitats within the Restoration Area. The riparian forest can be divided into four major types based on dominant species: cottonwood riparian forest, willow riparian forest, mixed riparian forest, and valley oak riparian forest.

Cottonwood Riparian Forest

In 2000, cottonwood riparian forest made up approximately 62% of all riparian forest vegetation within the Restoration Area (DWR 2002). Cottonwood riparian forest is described as multilayered riparian forest found along active low floodplains. Common dominant trees in the overstory include Fremont cottonwood (*Populus fremontii*) and willows (*Salix* spp.) The midstory is often dominated by shade-tolerant shrubs and trees, such as boxelder (*Acer negundo*), ash (*Fraxinus* spp.); shrubby species of willow may also be present within the midstory. Often sporadically interspersed within the midstory to understory are vine-like plants such as California wild grape (*Vitis californica*), (which also can be found growing within the canopy), blackberry (*Rubus* spp.), and California rose (*Rosa californica*). The understory more typically is dominated by native and non-native grasses and forbs. Some native species include creeping wildrye (*Elymus [=Leymus] triticoides*), stinging nettle (*Urtica dioica*), and Santa Barbara sedge (*Carex barbarae*).

Willow Riparian Forest

In 2000, willow riparian forest comprised approximately 25% of the riparian forest habitat within the Restoration Area (DWR 2002). Typically this classification is dominated almost exclusively by black willow (*Salix nigra*). Red willow (*Salix laevigata*), arroyo willow (*Salix lasiolepis*), and California buttonbush (*Cephalanthus occidentalis*) are also common. Occasional scattered cottonwoods, ashes, or white alders (*Alnus rhombifolia*) may be present, but are never a dominant part of the canopy cover.

Mixed Riparian Forest

In 2000, mixed riparian forest encompassed roughly 9% of the riparian forest (DWR 2002). This community is considered a multilayered winter-deciduous forest. It is typically found on the intermediate terrace of floodplains. Species dominance in mixed riparian forest depends on site conditions, such as availability of groundwater and frequency of flooding. Typical dominant trees in the overstory and midstory include cottonwood, boxelder, black willow, Oregon ash (*Fraxinus latifolia*), and California sycamore (*Platanus racemosa*). Common midstory shrubs include red willow, arroyo willow, and California buttonbush. The understory of mixed riparian forest is similar to that of cottonwood riparian forest.

Valley Oak Riparian Forest

In 2000, valley oak riparian forest classification formed less than 4% the riparian forest within the Restoration Area (DWR 2002). This forest type is found on the higher portions of the floodplain and is therefore exposed to less flood-related disturbance than other riparian vegetation types. Valley oak (*Quercus lobata*) is the dominant tree in this vegetation type; California sycamore, Oregon ash, and Fremont cottonwood are typically present in small numbers. Common midstory to understory species in this vegetation type include California wild grape, blackberry, and California wild rose.

Scrub

In 2000, scrub habitats formed a total of 7% of all habitats within the Restoration Area (DWR 2002). Three dominant types of scrub habitat are found within the Restoration Area: willow scrub, riparian scrub, and elderberry savanna.

Willow Scrub

Willow scrub comprises most of the scrub habitat within the Restoration Area (DWR 2002). This scrub type is a dense collection of willow shrubs often found within the active floodplain. Sites with willow scrub are subject to more frequent scouring flows than sites supporting riparian forests. Willow scrub often occupies stable sand and gravel point bars immediately above an active channel. Dominant shrubs in willow scrub include narrowleaf willow (*Salix exigua*), arroyo willow, and red willow.

Riparian Scrub

Areas classified as riparian scrub formed 17% of the scrub habitat within the Restoration Area in the 2000 vegetation survey (DWR 2002). This community consists of woody shrubs and herbaceous species and is dominated by different species depending on river system. In the Restoration Area, some dominant species include mugwort (*Artemisia douglasiana*), stinging nettle and various tall weedy herbs; others are dominated either by blackberry or wild rose in dense thickets, with or without scattered small emergent willows. Such ruderal associations may be maintained by periodic disturbance (i.e., scour, vegetation clearing/ channel maintenance).

Elderberry Savanna

In 2000, elderberry savanna formed less than 2% of shrub habitat within the Restoration Area (DWR 2002). Elderberry savanna is an elderberry (*Sambucus spp.*) shrub-dominated community characterized by widely spaced elderberry shrubs with an herbaceous understory typically dominated by grasses and forbs that are characteristic of annual grassland communities. This community is found on fine-textured, rich alluvium outside active channels, but in areas that are subject to periodic flooding (Holland 1986).

Emergent Wetlands

According to DWR (2002), emergent wetlands cover about 2% of the Restoration Area. This community typically occurs in the river bottom immediately adjacent to the low-flow channel. Sites like backwater channels and sloughs where water is present through much of the year support emergent marsh vegetation such as bulrush (*Schoenoplectus* spp.) and cattails (*Typha* spp.). More ephemeral wetlands, especially along the margins of the river and in swales adjacent to the river, support an array of herbaceous species, including western goldenrod (*Euthamia occidentalis*), smartweed (*Polygonum* spp.), rush (*Juncus* spp.), horseweed (*Conyza canadensis*), willow herb (*Epilobium* spp.), saltgrass (*Distichlis spicata*), sunflower (*Helianthus* spp.), and curly dock (*Rumex crispus*).

Non-native/ Invasive Vegetation

Non-native vegetation within the Restoration Area includes a wide range of vegetative species ranging in form from free floating aquatic mat-like plants to terrestrial hardwood trees that can reach heights of almost 200 feet. Vegetation surveys conducted by DWR estimated that less than 1% of the Restoration Area would fall solely under the classification of "non-native trees".

Because the Restoration Area is so large and a vast number of vegetative species fall under the non-native classification, only those non-native species considered as "invasive" by the California Invasive Plant Council (Cal-IPC) and/or those considered as a "noxious weed" as defined by the California Department of Food and Agriculture (CDFA) and the U.S Department of Agriculture (USDA) are addressed. The term "invasive plant" differs from the classification terms "non-native," "exotic," or "introduced plant" because it is (when applied correctly) used only to describe those non-native plant species that displace native species on a large enough scale to alter habitat functions and values. The term "noxious weed" is used by government agencies for non-native plants that have been defined as pests by law or regulation (CDFA 2007). Many invasive noxious trees and shrubs that have the ability to occupy channel and floodplain surfaces are constant threats to river floodway capacity, and substantial cost and resources are required to remove and control large stands. lnvasive plants and noxious weeds found within the Restoration Area include: red sesbania, salt cedar (*Tamarix* spp.), giant reed (*Arundo donax*), Chinese tallow (*Sapium sebiferum*), tree-of-heaven (*Ailanthus altissima*), blue gum (*Eucalyptus globulus*), perennial pepperweed (*Lepidium latifolium*), water hyacinth (*Eichornia crassipes*), water milfoil (*Myriophyllum spicatum*), parrot's feather (*Myriophyllum aquaticum*), curly-leaf pondweed (*Potamogeton crispus*), and sponge plant (*Limnobium spongia*).

Giant Reed

As mentioned above, giant reed is listed as an invasive/noxious weed. Giant reed comprised less than 1% (13 acres) of the Restoration Area in 2000 (DWR 2002). These areas are characterized by dense stands of the giant reed which can grow in height up to 13 feet, and consist solely of giant reed with no other plant species present.

Grassland/Pasture

In 2000, the grassland and pasture classification totaled more than 16% of the vegetation communities within the Restoration Area (DWR 2002). These areas are forb and grass dominated plant communities that are well drained and above the frequently flooded zone of the San Joaquin River. The grassland and pasture vegetation type is composed of an assemblage of non-native annual and perennial grasses interspersed with non-native and native forbs. The most abundant species are non-native grasses such as barley (*Hordeum* spp.), bromes (*Bromus* spp.), rattlesnake grasses (*Briza* spp.), oats (*Avena* spp.), and forbs such as filaree (*Erodium spp.*) and dove weed (*Eremocarpus setigerus*).

Alkali Sink

This community was found solely in Reach 5 of the Restoration Area (Figure 1-1), and totaled approximately 2 acres (0.004%) of habitat (DWR 2002). Alkali sinks are seasonally flooded shallow depressions which are dominated by salt-tolerant plants. Soils typically are fine-textured with an impermeable caliche layer or clay pan. Salt encrustations are often formed on the surface as the playa dries. Alkali sinks support valley sink scrub, which is a low-growing open-to-dense succulent shrubland community dominated by alkali-tolerant members of the goosefoot family, especially iodine bush (*Allenrolfea occidentalis*) and seablites (*Suaeda* spp.). An herbaceous understory is usually lacking, but sparse cover of annual grasses, such as Mediterranean barley (*Hordeum marinum* ssp. *gussoneanum*) and red brome (*Bromus madritensis* ssp. *rubens*), may be present.

Agriculture

Agricultural lands in the Restoration Area consist primarily of row crops, orchards, and vineyards. This classification is the most abundant vegetation class, composing 40% (20,619 acres) of the Restoration Area in 2000 (DWR 2002). Row crops commonly include cotton, corn, safflower, tomatoes, bell peppers, strawberries, melons, and rice. Orchards primarily consist of a variety of citrus fruits, nectarines, olives, and deciduous fruit and nut trees including apples, peaches, plums, almonds, pistachios, and walnuts. The vineyards are composed of a variety of raisin, table, and wine grapes.

Open Water

In 2000, open water made up a little more than 4% of the Restoration Area (DWR 2002). Typically these areas are characterized by permanent/semi-permanent standing or flowing waters. Open water may be the result of anthropogenic impoundments or naturally occurring water bodies.

Riverwash

Riverwash comprised less than 1% of the Restoration Area in 2000 (DWR 2002). It should be noted however that during the vegetation surveys and mapping conducted by DWR, areas classified as riverwash were dependent on flow at the time of the survey/photograph, and therefore seasonal and yearly variations in water may change the total area of this community (DWR 2002). The riverwash community consists of alluvial sands and gravel associated with the active channel of the San Joaquin River. Generally, these areas exist as sand and gravel bars within the river or a nearby floodplain. Woody and herbaceous plant cover historically can be low. However, with the construction of dams and control structures along the San Joaquin River, some areas have averted scour, which allows denser plant growth on some bars. Numerous herbaceous species occur in riverwash areas. Rattail fescue (*Vulpia myuros*), Bermuda grass (*Cynodon dactylon*), red-stemmed filaree (*Erodium cicutarium*), panicled willow herb (*Epilobium brachycarpum*), and lupine species (*Lupinus* spp.) are typically the most abundant plant species on riverwashes in the Restoration Area.

Urban/Disturbed Areas

Urban/disturbed areas comprised approximately 10% of the land cover within the Restoration Area during the DWR survey. These include roads (paved, gravel, and dirt), canals, levees, and aggregate pits. Also included are areas used by off-highway vehicles and sites where rubble or fill has been deposited. As with agricultural habitats, low vegetation cover and species diversity in disturbed habitats limit their value to wildlife. The little vegetation that does exist in these areas consists of non-native grasses and forbs, and lacks a consistent vegetative community structure. The altered condition of these lands affords abundant opportunities for aggressive non-native vegetation and greatly reduces the ability to sustain native and rare plants, and in general a wide diversity wildlife. However, species that are considered tolerant of human activities and/or are known as primary successor species may be common in these areas. Vegetative species commonly found to inhabit these areas include black mustard (*Brassica nigra*), prickly lettuce (*Lactuca serriola*), thistles (*Carduus pycnocephalus*; *Centaurea solstitialis*; *Cirsium* spp.; *Silybum marianum*.), and wild radish (*Raphanus sativus*).

Wildlife Associated With Vegetation Communities

Riparian Forest and Scrub

A number of wildlife species tend to utilize and inhabit both riparian forest and scrub habitat in a non-mutually exclusive way during their life histories. This is in part due to the close proximity where these vegetation communities are typically found in relation to each other. These two habitat types provide ample high-quality nesting habitat for raptors through the abundance of tall trees. Raptor species such as great horned owl (*Bubo virginianus*), red-tailed hawk (*Buteo jamaicenesis*), red-shouldered hawk (*Buteo lineatus*), Swainson's hawk (*Buteo swainsoni*), white-tailed kite (*Elanus leucurus*), and American kestrel (*Falco sparverius*) are common in these habitats. Passerine species may utilize smaller trees or cavities within the trees. These species include belted kingfisher (*Megaceryle alcyon*), downy woodpecker (*Picoides pubescens*), northern flicker (*Colaptes auratus*), ash-throated flycatcher (*Myiarchus cinerascens*), oak titmouse (*Baeolophus inornatus*), black phoebe (*Sayornis nigricans*), bushtit (*Psaltriparus minimus*), Bewick's wren (*Thryomanes bewickii*), lazuli bunting (*Passerina amoena*), blue grosbeak (*Passerina caerulea*), and species of goldfinches (*Carduelis* spp.). Mammalian species known to utilize riparian forests and scrub habitat within the region include: coyote, beaver, river otter, raccoon, desert cottontail (*Sylvilagus audubonii*), and striped skunk.

Emergent Wetlands

Many wildlife species are known to use emergent wetlands, and these areas can contain a wide range of biodiversity. A broad range of avian, mammalian and herpetofauna (amphibians and reptiles) species utilize emergent wetland habitat as a source for nesting, denning, and overwintering within dense cattails, reeds and along the banks of this vegetation community. Several avian species common for this region of California include blackbirds (*Agelaius tricolor*; *Agelaius phoeniceus*; and *Euphagus cyanocephalus*), song sparrow (*Melospiza melodia*), common yellowthroat (*Geothlypis trichas*), and marsh wren (*Cistothorus palustris*). Mammalian species include the California vole, common muskrat

(*Ondatra zibethicus*), and Norway rat (*Rattus norvegicus*). Western pond turtle (*Actinemys marmorata*), Sierran treefrog (*Pseudacris sierra*), and western terrestrial garter snake (*Thamnophis elegans*) are common herpetological species that inhabit these areas.

Non-native/ Invasive Vegetation/Giant Reed

Non-native/invasive plant communities tend to attract smaller, less diverse populations of wildlife due to the fact that many of these vegetative species do not produce edible seed and fruit. Non-native tree species such as tree of heaven or blue gum may support nesting birds and insects; however, studies have shown that these non-native communities are far less biologically productive, and are more homogeneous in biodiversity than their native counterparts (Hanson et al. 1979).

Grassland/ Pasture

The grassland and pasture vegetation communities support a numerous and a widely biologically diverse set of wildlife species. Not only do ground and fossorial nesting avian species such as northern harrier, ring-necked pheasant (*Phasianus colchicus*), western meadowlark (*Sturnella neglecta*), and burrowing owl (*Athene cunicularia*) utilize this vegetation type for nesting, but many avian species like the loggerhead shrike (*Lanius ludovicianus*) also use these areas for foraging, and other aspects of their life histories. Mammalian species that use grasslands for denning and food include San Joaquin kit fox (*Vulpes macrotis mutica*), California vole, California ground squirrel (*Otospermophilus beecheyi*), Botta's pocket gopher (*Thomomys bottae*), and American badger (*Taxidea taxus*). Common amphibian and reptile species associated with grasslands in the San Joaquin Valley include western toad (*Bufo boreas*), western fence lizard (*Sceloporus occidentalis*), western racer (*Coluber constrictor mormon*), gopher snake (*Pituophis catenifer*), and rattlesnakes (*Crotalus* spp.).

Alkali Sink

Alkali sink habitat, which was historically prevalent in the San Joaquin Valley, has increasingly become scarce with the development of lands for agricultural purposes. Therefore, those species that relied heavily on the alkali sink communities have become increasingly scarce. Wildlife species typically associated with alkali sink habitat include species of common and listed kangaroo rats (*Dipodomys* spp.), Nelson's antelope squirrel (*Ammospermophilus nelsoni*), San Joaquin kit fox, coyote, side-blotched lizard (*Uta stansiburiana*), and blunt-nosed leopard lizard (*Gambelia sila*).

Agriculture

Cropland agricultural habitats can provide food and cover for wildlife species, but the value of the habitat varies greatly among crop type and agricultural practices. Grain crops provide forage for songbirds, small rodents, and waterfowl at certain times of year. Pastures, alfalfa, and row crops, such as beets and tomatoes, provide foraging opportunities for raptors because of the frequent flooding, mowing, or harvesting of fields, which make prey readily available. Orchards and vineyards have relatively low value for wildlife because understory vegetation growth that would provide food and cover typically are removed. Species that use orchards and vineyards, such as California ground squirrel, American crow (*Corvus brachyrhynchos*), Brewer's blackbird (*Euphagus cyanocephalus*), and European starling (*Sturnus vulgaris*), often are considered agricultural pests.

<u>Open Water</u>

Open water areas provide habitat for waterfowl, western pond turtle, Sierran treefrog, and bullfrog (*Rana catesbeiana*). Both submerged and floating aquatic vegetation are used as basking or foraging habitat and provide cover for aquatic wildlife species. Deeper open water areas without vegetation provide habitat for species that forage for fish, crayfish, or other aquatic organisms, such as river otter and waterfowl.

<u>Riverwash</u>

Riverwash is typically seasonally flooded and wildlife species that rely on this community are generally adapted to the disturbance regime. Avian species primarily utilize riverwash for nesting habitat, including species of shorebirds, such as killdeer (*Charadrius vociferous*) and other species, such as mallard (*Anas platyrhynchos*). Amphibians and reptiles like western toads and western pond turtle may use riverwash habitats for overwintering, roosting, and/or resting.

<u>Urban/Disturbed Areas</u>

While the urban/developed classification does not harbor many species, several that are well adapted to frequent anthropogenic disturbances include avian species like American robin (*Turdus migratorius*), doves and pigeons (Family Columbidae), sparrows, and killdeer; mammalian species such as California ground squirrel, deer mouse (*Peromyscus maniculatus*), desert cottontail, striped skunk, and raccoon; and herpetological species like western fence lizard, northern alligator lizard (*Elgaria coerulea*), and a variety of snakes.

7.3.4 SCARF Site

The SCARF site is situated along the eastern edge of the San Joaquin Valley at the base of the Sierra Nevada foothills. The SCARF site includes portions of the San Joaquin River floodplain and terrace landforms. The site has been developed for aquaculture production and is interspersed with abandoned mining pits, annual grassland, and vacant/disturbed areas. Land uses include disused aquaculture facilities, actively used effluent ponds, ponds managed for wildlife habitat, the Interim Conservation Facility, and a worm farming operation. Biotic habitats at the SCARF site include annual grassland, perennially flooded depressions (ponds), seasonally flooded depressions, riparian forest, emergent wetlands, and an ephemeral drainage. General descriptions of these habitats follow.

Annual Grassland

In the vicinity of the SCARF site, annual grassland predominantly occurs adjacent to the existing access road and in proposed borrow areas (Figure 2-2). This community also occurs in upland areas between aquaculture and effluent ponds, and on the margins of existing secondary dirt roads. In general, the grasslands have been heavily disturbed by grading, excavation, and authorized off-road vehicle traffic. Dominant grass species include ripgut brome (*Bromus diandrus*), soft chess brome (*Bromus hordeaceus*), wild oats (*Avena fatua*), and rattail fescue. Native forbs common in this community include species such as Heerman's tarweed (*Holocarpha heermanii*), vinegar weed (*Trichostemma lanceolata*), and dove weed. Dominant non-native forbs include species such as red-stem filaree, broad-leaf filaree (*Erodium botrys*), and smooth cat's-ear (*Hypochaeris glabra*). This habitat type provides important foraging grounds for raptors such as red-tailed and red-shouldered hawks, and American kestrel. Annual grasslands provide suitable habitat for burrowing owls. CDFW staff observed a nesting pair of burrowing owls at Lost Lake Park in 2012, and a burrowing owl was observed in flight on the SCARF site in 2011 (Single pers. comm). Many passerine species are likely to forage in the grassland areas at varying times of the year. Small mammal burrows in annual grasslands provide suitable upland habitat for amphibians such as western toad (*Bufo borealis*), western spadefoot toad (*Spea hammondii*), gregarious slender salamander (*Batrachoseps gregarius*), and California tiger salamander (CTS) (*Ambystoma californiense*). CDFW conducted surveys for CTS at the SCARF site during the 2012/2013 wet season in accordance with the *Interim Guidance on Site Assessment and Field Surveys for Determining Presence or a Negative Finding of the California Tiger Salamander* (USFWS 2003). The upland habitat surveys included 11 drift fences with associated pitfall traps placed throughout the SCARF site. No CTS were found during the surveys. Details of the methods and results of the surveys are provided in Appendix J, *Supporting Documentation Related to Biological Resources - Vegetation and Wildlife*.

Reptile species likely to occur in this habitat type include common side-blotched lizards (*Uta stansburiana*), western whiptails (*Aspidoscelis tigris*), gopher snakes, common kingsnakes (*Lampropeltis getula),* and western rattlesnakes (*Crotalus viridis*) (Live Oak Associates 2008). A broad range of mammal species use the grasslands on the site. California ground squirrels were observed during the field surveys, as were bobcats (*Lynx rufus*). Field observations indicate that small rodents and mule deer also commonly use this habitat.

Perennially Flooded Depressions (Ponds)

There are numerous aquaculture ponds, settling ponds, and constructed wetlands interspersed throughout the SCARF site. Many of these features are perennially ponded and therefore sustain aquatic and wetland habitats. Two relatively large constructed wetlands along the site's access road are perennially flooded by return flow discharges from the SJFH. Aquatic vegetation common in these wetlands includes mosquito fern (*Azolla filiculoides*), water primrose (*Ludwigia peploides*), and knotweed (*Polygonum lapathifolium*). Wetland plants that commonly grow along the margins of the constructed ponds include Pacific rush (*Juncus effusus ssp. Pacificus*), cattail and narrowleaf willow. These wetlands provide relatively high quality waterfowl and wading bird habitat. Species observed using these ponds during field reconnaissance surveys include common moorhen (*Gallinula chloropus*), mallard (*Anas platyrhynchos*), great blue heron (*Ardea herodias*) and black-crowned night heron (*Nycticorax nycticorax*).

Disused aquaculture ponds and treatment ponds throughout the site (Figure 2-4) provide relatively low habitat functions and values. These ponds support aquatic and wetland vegetation communities similar to the constructed wetlands, but the habitat is far less complex and structurally diverse. The aquaculture ponds do provide foraging and potential nesting habitat for wetland-associated passerines such as red-winged blackbird (*Agelaius phoeniceus*) and marsh wren.

All of the perennial ponds support dense populations of bullfrogs. This limits the suitability of this habitat for breeding of most native amphibians. Protocol-level CTS surveys were conducted in March and April 2013 in ponds at the SCARF site. No CTS adults, eggs or larvae were detected. Details of the methods and results of the surveys are provided in Appendix J, *Supporting Documentation Related to Biological Resources - Vegetation and Wildlife*.

The perennial ponds, particularly the constructed wetlands, provide suitable habitat for western pond turtle. Fish assemblages in ponds were sampled incidentally during CTS aquatic habitat surveys. Species recovered through seining and dip-netting included mosquito fish (*Gambusia affinis*), prickly sculpin (*Cottus asper*), three-spine stickleback *(Gasterosteus aculeatus),* Sacramento pikeminnow *(Ptychocheilus grandis),* and brown bullhead (*Ameiurus nebulosus*).

Seasonally Ponded Depressions

Seasonally ponded depressions at the SCARF site include roadside ditches, potholes in roads, and depressions in compacted or otherwise disturbed surfaces. These depressions may remain ponded throughout the wet season, or may be intermittently flooded, depending on the frequency and quantity of rainfall. Some of the seasonally ponded depressions are partially or completely unvegetated; some support hydrophytic vegetation species, but are generally dominated by upland plants. Some of these depressions have the potential to support aquatic invertebrates including vernal pool fairy shrimp (*Branchinecta lynchi*). Vernal pool branchiopod surveys were conducted at the SCARF site during the 2012-2013 wet season by CDFW staff under Recovery Permit Number TE-185595 in accordance with the *Interim Survey Guidelines to Permittees for Recovery Permits under Section 10(a)(1)(A) of the Endangered Species Act for the Listed Vernal Pool Branchiopods* (USFWS 1996). No vernal pool fairy shrimp or other listed branchiopods were detected.

Riparian Forest

Riparian forest occurs in and immediately adjacent to the SCARF site along the bank of the San Joaquin River. Fremont cottonwood, Oregon ash and willow (predominantly *S. gooddingii* and *S. laevigata*) are co-dominant in the overstory. Himalayan blackberry (*Rubus armeniacus*) is dominant in the understory. Riparian habitat in the vicinity of the SCARF site is expected to support a diverse range on terrestrial fauna. Amphibians and reptiles that may use this habitat include Sierran treefrog, western toad, gregarious slender salamander, Gilbert's skink (*Eumeces gilberti*), common garter snake (*Thamnophis sirtalis*), gopher snake, common kingsnake, and western racer (Live Oak Associates 2008). The riparian forest provides habitat for a broad range of avian species such as belted kingfisher, song sparrow, great blue heron, and many others. Raptors observed in this habitat include red-shouldered hawks and osprey (*Pandion haliaetus*), and white-tailed kite, a State Fully Protected species, may nest and forage in the riparian forest around the SCARF site. Mammals likely to use riparian habitats at the site include ornate shrew (*Sorex ornatus*), deer mice, desert cottontails, Virginia opossums (*Didelphis virginiana*), raccoon, striped skunk (*Mephitis mephitis*), gray fox (*Urocyon cinereoargenteus*), bobcat, and mule deer (Live Oak Associates 2008).

Emergent Wetland

Emergent wetlands at the SCARF site occur in the secondary channel of the San Joaquin River and a small, isolated wetland just west of the Interim Conservation Facility. The emergent wetlands associated with the secondary channel of the San Joaquin River are dominated by herbaceous hydrophytes such as paleyellow iris (*Iris pseudacorus*) and rice cutgrass (*Leersia oryzoides*). The emergent wetland in the ephemeral drainage has Goodding's black willow in the overstory; American pokeweed (*Phytolacca americana*), common sunflower (*Helianthus annuus*), and yellow nutsedge (*Cyperus esculentus*) are dominant in the understory.

Ephemeral Drainages

A small ephemeral drainage is situated between the Interim Facility and the Interim Facility's settling ponds (Figure 2-3). This drainage collects and conveys storm water from uplands to the east of the SCARF site. The drainage supports Fremont cottonwood in the overstory and mesic (moist) grasses and forbs in the understory.

7.4 Special-Status Species

7.4.1 Definitions

For the purposes of this EIR, special-status plant and wildlife species refers to those species that meet one or more of the following criteria:

- Species that are listed as threatened or endangered under the ESA (50 CFR 17.12 for listed plants, 50 CFR 17.11 for listed animals);
- Species that are candidates for possible future listing as threatened or endangered under ESA (76 FR 66370);
- Species that are listed or proposed for listing by the State of California as threatened or endangered under CESA (14 CCR 670.5);
- Plants listed as rare under the California Native Plant Protection Act of 1977 (Fish & G. Code, § 1900 et seq);
- Plants considered by the CNPS to be "rare, threatened, or endangered in California";
- Species that meet the definitions of rare or endangered under CEQA (CEQA Guidelines, § 15380);

- Animals fully protected in California (Fish & G. Code, § 3511 [birds], 4700 [mammals], and 5050 [reptiles and amphibians]); and
- Nesting raptors protected in California (Fish & G. Code, § 3503.5)

7.4.2 Methodology

Background information on special-status plant and wildlife species with potential to occur in the Project Area was compiled through a review of the following resources:

U.S. Fish and Wildlife Service

- List of Federal Endangered and Threatened Species that Occur in or May Be Affected by Projects in Fresno County (USFWS 2012; also see Appendix J, *Supporting Documentation Related to Biological Resources - Vegetation and Wildlife*, of this DEIR).

California Department of Fish and Wildlife

- California Natural Diversity Database (CNDDB) query for the nine USGS 7.5 minute quadrangles surrounding the SCARF site, which are Academy, Clovis, Friant, Fresno North, Lanes Bridge, Little Table Mountain, Millerton Lake East, Millerton Lake West, and Round Mountain
- CNDDB tables for the Restoration Area from the SJRRP PEIS/R (Reclamation and DWR 2012)
- CNDDB query for a 500-foot buffer around all potential broodstock collection streams.

Other Sources

- The California Native Plant Society's Inventory of Rare and Endangered Plants of California (CNPS 2012)
- The Jepson Manual: Higher Plants of California (Hickman 1993; Baldwin et al. 2012)
- San Joaquin River Restoration Study Background Report (FWUA and NRDC 2002)
- Constraints and Opportunities Analysis Lost Lake Master Plan (Live Oak Associates 2008)
- San Joaquin River Hatchery Avian Reconnaissance Survey conducted by CDFW biologists in 2008 and 2009

Tables 7-1 and 7-2 list the special-status plant and wildlife species known to occur in the vicinity of the SCARF site, and Figures 7-1 and 7-2 show the CNDDB occurrences of special-status plants and animals within a 5-mile radius of the SCARF site. The potential for special-status species to occur in the vicinity of the SCARF site was evaluated according to the following criteria:

- **None:** indicates that the area contains a complete lack of suitable habitat, the local range for the species is restricted, and/or the species is extirpated in this region.
- **Not Expected:** indicates situations where suitable habitat or key habitat elements may be present but may be of poor quality or isolated from the nearest extant occurrences. Habitat suitability refers to factors such as elevation, soil chemistry and type, vegetation communities, microhabitats, and degraded/significantly altered habitats.
- **Possible:** indicates the presence of suitable habitat or key habitat elements that potentially support the species.
- **Present:** indicates the target species was either observed directly or its presence was confirmed by diagnostic signs (i.e. tracks, scat, burrows, carcasses, castings, prey remains, etc.) during field investigations or in previous studies in the area.

The SJRRP PEIS/R (Reclamation and DWR 2012) evaluated the potential for special-status species to occur in the Restoration Area. Table J-1 of Appendix J, *Supporting Documentation Related to Biological Resources - Vegetation and Wildlife*, taken from the SJRRP Final PEIS/R, list special status species known or with potential to occur in the Restoration Area.

Tables J-2 and J-3 of Appendix J list special-status species known to occur in the vicinity of the broodstock collection streams, and the figures in Appendix J show the CNDDB occurrences of special-status plants and animals within a 500-foot buffer around the streams. CDFW has developed a conservation measures (see Section 7.4.1 in this chapter and Appendix I, *CDFW's Conservation Measures for Biological Resources That May Be Affected by Program-level Actions*, of this DEIR) and mitigation measures to evaluate the potential for special-status species to occur in these areas, as the need arises.

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Table 7-1. Special-Status Plant Species Known to Occur in the Vicinity of the SCARF site

Scientific Name	Common name	Federal listing status	State listing status	Rare Plant Rank	General Habitat	Micro Habitat	Potential to Occur at the SCARF site
Orcuttia pilosa	Hairy Orcutt grass	FE	SE	1B.1	Vernal pools	25-125m.	**Not Expected:** Due to absence of vernal pools on the site, this species is not likely to occur.
Pseudobahia bahiifolia	Hartweg's golden sunburst	FE	SE	1B.1	Valley and foothill grassland, cismontane woodland.	Clay soils, predominantly on the northern slopes of knolls, but also along shady creeks or near vernal pools. 15-150m.	**Not Expected:** Although there is a known population less than 1 mile east of the site (CNDDB 2012), appropriate soil conditions (Rocklin Series soils, pumice variant) are not present in the area.
Sidalcea keckii	Keck's checker-mallow	FE	None	1B.1	Cismontane woodland, valley and foothill grassland	Grassy slopes in blue oak woodland. 180-425m.	**Not Expected:** Species is generally associated with soils that tend to restrict competing vegetation (e.g., serpentine, heavy clays) (USFWS, 2012). Species distribution is extremely limited.
Caulanthus californicus	California jewel-flower	FE	SE	1B.1	Chenopod scrub, valley and foothill grassland, pinyon-juniper woodland.	Historical from various valley habitats in both the Central Valley and Carrizo Plain. 65-900m.	**Not Expected:** Although historically present in the vicinity of the site, this species is believed to be extirpated. The closest known occurrence was over 10 miles south of the site, and it is believed to be extirpated from that site (CNDDB 2012). The only extant occurrence in Fresno County is in the Kreyenhagen Hills.
Tuctoria greenei	Greene's tuctoria	FE	SR	1B.1	Vernal pools, Valley and foothill grassland.	Dry bottoms of vernal pools in open grassland. 30-1065m.	**Not Expected:** Due to absence of vernal pools on the site, this species is not likely to occur.
Monolopia congdonii	San Joaquin woolly-threads	FE	None	1B.2	Chenopod scrub and valley and foothill grassland.	Alkaline or loamy plains; sandy soils, often with grasses and within chenopod scrub. 60-800m.	**None:** Species only occurs in the grasslands of the hills and plateaus west of the San Joaquin Valley and is associated with the valley saltbrush scrub habitat in the valley floor (USFWS 2011). This species is found on the eastern side of the Coast Range.
Cordylanthus palmatus	Palmate-bracted bird's-beak	FE	SE	1B.1	Chenopod scrub, valley and foothill grassland.	Usually on Pescadero silty clay which is alkaline, with Distichlis, Frankenia, etc. 5-155m.	**None**: Site is not within species current range. Suitable soil conditions and common associated species are not present in the area.
Calyptridium pulchellum	Mariposa pussy-paws	FT	None	1B.1	Cismontane woodland.	On granite domes, restricted to exposed sites. 400-1100m.	**None:** Site is not within species range.
Camissonia benitensis	San Benito evening-primrose	FT	None	1B.1	Chaparral, cismontane woodland.	On gravelly serpentine alluvial terraces. 750-1280m.	**None:** Project site is not within species range.
Orcuttia inaequalis	San Joaquin Valley Orcutt grass	FT	SE	1B.1	Vernal pools	30-755m.	**Not Expected:** Due to absence of vernal pools on the site, this species is not likely to occur.
Pseudobahia peirsonii	San Joaquin adobe sunburst	FT	SE	1B.1	Valley and foothill grassland, cismontane woodland.	Grassy valley floors and rolling foothills in heavy clay soil. 85-800m.	**Not Expected:** Appropriate soil conditions are not present in the area.
Castilleja campestris ssp. succulenta	Succulent owl's-clover	FT	SE	1B.2	Vernal pools, valley and foothill grassland.	Moist places, often in acidic soils. 25-750m.	**Not Expected:** Although observed approximately one mile east of the project site, this species is unlikely to occur at the site due to absence of vernal pools and acidic soils.
Carpenteria californica	Tree-anemone	None	ST	1B.2	Cismontane woodland, chaparral.	A very localized endemic found on well-drained granitic soils, mostly on north-facing ravines and drainages. 340-1340m.	**None:** Due to the known elevation range of this species, it is unlikely to occur on the site.
Delphinium hansenii ssp. ewanianum	Ewan's larkspur	None	None	4.2	Cismontane woodland, valley and foothill grassland	Rocky soils. 60-600m.	**Possible**: Annual grassland on the site is potentially suitable habitat.
Downingia pusilla	Dwarf downingia	None	None	2.2	Valley and foothill grassland (mesic sites), vernal pools.	Vernal lake and pool margins with a variety of associates. In several types of vernal pools. 1-485m.	**Not Expected:** Due to absence of vernal pools on the site, this species is not likely to occur.

Table 7-1. Special-Status Plant Species Known to Occur in the Vicinity of the SCARF site

Scientific Name	Common name	Federal listing status	State listing status	Rare Plant Rank	General Habitat	Micro Habitat	Potential to Occur at the SCARF site
Eryngium spinosepalum	Spiny-sepaled button-celery	None	None	1B.2	Vernal pools, valley and foothill grassland.	Some sites on clay soil of granitic origin; vernal pools, within grassland. 100-420m.	**Possible**: Although vernal pools do not occur on the site, roadside ditches provide potentially suitable habitat. This species was observed along Friant Road within one mile from the project site (CNDDB 2012).
Gratiola heterosepala	Boggs Lake hedge-hyssop	None	SE	1B.2	Marshes and swamps (freshwater), vernal pools.	Clay soils; usually in vernal pools, sometimes on lake margins. 5-2400m.	**Not Expected:** Species is typically associated with clay soils and vernal pools. The nearest known population is on Big Table Mountain approximately 7 miles northeast of the site (CNDDB 2012).
Imperata brevifolia	California satintail	None	None	2.1	Coastal scrub, chaparral, riparian scrub, mojavean scrub, meadows and seeps (alkali).	Mesic sites, alkali seeps, riparian areas. 0-500m.	**Possible:** Suitable habitat for this species is present along the banks of the secondary channel of the San Joaquin River
Lagophylla dichotoma	Forked hare-leaf	None	None	1B.1	Valley and foothill grassland, cismontane woodland.	In openings. Gravelly roadsides to loam soils to dry clay; not known from serpentine. 50-760m.	**Possible:** Suitable habitat for this species is present along access road and annual grasslands.
Leptosiphon serrulatus	Madera leptosiphon	None	None	1B.2	Cismontane woodland, lower montane coniferous forest.	Dry slopes; often on decomposed granite in woodland. 80-1575m.	**None:** Due to the known elevation range and soil affinity of this species, it is unlikely to occur on the site.
Lupinus citrinus var. citrinus	Orange lupine	None	None	1B.2	Chaparral, cismontane woodland, lower montane coniferous forest.	Rocky, decomposed granitic outcrops, usually open areas, on flat to rolling terrain. 600-1350m.	**None:** Due to the known elevation range and soil affinity of this species, it is unlikely to occur on the site.
Mimulus acutidens	Kings River monkeyflower	None	None	3	Cismontane woodland, lower montane coniferous forest.	Moist places. 305-1220m.	**None:** Due to the known elevation range of this species, it is unlikely to occur on the site.
Navarretia nigelliformis ssp. nigelliformis	Adobe navarretia	None	None	4.2	Valley and foothill grassland, vernal pools.	Clay soils. 100-1000m.	**None:** Due to the known elevation range and soil affinity of this species, it is unlikely to occur on the site.
Sagittaria sanfordii	Sanford's arrowhead	None	None	1B.2	Marshes and swamps.	In standing or slow-moving freshwater ponds, marshes, and ditches. 0-610m.	**Present:** In September 2012, CDFW staff identified the species in one of the settling ponds west of the Interim Facility. Other perennial depressions and emergent wetlands in the project area also provide suitable habitat.
Tropidocarpum capparideum	Caper-fruited tropidocarpum	None	None	1B.1	Valley and foothill grassland.	Alkaline clay. 0-455m.	**None**: No suitable habitat is present and species is presumed extinct.

*** List of Abbreviations for Federal and State Species-Status:**

FE = Federal endangered
FT = Federal threatened
SE = State endangered
ST = State threatened
SR = State rare
1B = plants are considered rare, threatened, or endangered in California and elsewhere.
2 = plants are rare, threatened, or endangered in California, but more common elsewhere.
3 = plants about which more information is needed for review
4 = plants of limited distribution; a watch list

Threat Ranks:

0.1-Seriously threatened in California (over 80% of occurrences threatened / high degree and immediacy of threat)
0.2-Fairly threatened in California (20-80% occurrences threatened / moderate degree and immediacy of threat)

Table 7-2. Special-Status Wildlife Species Known to Occur in the Vicinity of the SCARF site

Scientific Name	Common Name	Federal Listing Status*	State Listing Status*	General Habitat	Micro Habitat	Potential to Occur at the SCARF site
INVERTEBRATES						
Branchinecta conservatio	Conservancy fairy shrimp	FE	SE	Endemic to the grasslands of the northern two-thirds of the Central Valley; found in large, turbid pools.	Inhabit astatic pools located in swales formed by old, braided alluvium; filled by winter/spring rains, last until June.	**Not Expected:** Due to absence of vernal pools on the site, this species is not likely to occur. Species has also not been documented within 5 miles of the site (CNDDB 2012). Seasonally ponded depressions at the site provide marginally suitable habitat.
Branchinecta longiantenna	Longhorn fairy shrimp	FE	None	Endemic to the eastern margin of the Central Coast mtns in seasonally astatic grassland vernal pools.	Inhabit small, clear-water depressions in sandstone and clear-to-turbid clay/grass-bottomed pools in shallow swales.	**Not Expected:** Due to absence of vernal pools on the site, this species is not likely to occur. Species has also not been documented within 5 miles of the site (CNDDB 2012). Seasonally ponded depressions at the site provide marginally suitable habitat.
Lepidurus packardi	Vernal pool tadpole shrimp	FE	None	Inhabits vernal pools and swales in the Sacramento Valley containing clear to highly turbid water.	Pools commonly found in grass bottomed swales of unplowed grasslands. Some pools are mud-bottomed & highly turbid.	**Not Expected:** Due to absence of vernal pools on the site, this species is not likely to occur. The nearest known population to the site is over 7 miles to the northeast (CNDDB 2012). Seasonally ponded depressions at the site provide marginally suitable habitat.
Branchinecta lynchi	Vernal pool fairy shrimp	FT	None	Endemic to the grasslands of the Central Valley, Central Coast mtns, and South Coast mtns, in astatic rain-filled pools.	Inhabit small, clear-water sandstone-depression pools and grassed swale, earth slump, or basalt-flow depression pools.	**Possible:** Although this species has been documented in vernal pools approximately 1 mile east of the site (CNDDB 2012), only marginally suitable habitat is present at the site.
Desmocerus californicus dimorphus	Valley elderberry longhorn beetle	FT	None	Occurs only in the central valley of California, in association with blue elderberry (*Sambucus mexicana*).	Prefers to lay eggs in elderberries 2-8 inches in diameter; some preference shown for "stressed" elderberries.	**Possible:** There are no blue elderberry shrubs (host plant) on the site, but there are known occurrences in the vicinity of the site.
Branchinecta mesovallensis	Midvalley fairy shrimp	None	None	Vernal pools in the Central Valley.	None specified.	**Not Expected**: Although this species has been documented within 5 miles of the site (CNDDB 2012), only marginally suitable habitat is present at the site.
Calicina mesaensis	Table Mountain harvestman	None	None	Known only from the type locality, Table Mountain, Fresno County. Known only from the type series.	None specified.	**Not Expected**: Species is believed to be endemic to Table Mountain site.
Efferia antiochi	Antioch efferian robberfly	None	None	Sand dunes from Contra Costa and Fresno Counties.	None specified.	**None:** Suitable habitat not present at the site.
Linderiella occidentalis	California linderiella	None	None	Seasonal pools in unplowed grasslands with old alluvial soils underlain by hardpan or in sandstone depressions.	Water in the pools has very low alkalinity, conductivity, and TDS.	**Not Expected:** Due to absence of vernal pools on the site, this species is not likely to occur.
Lytta moesta	Moestan blister beetle	None	None	Central California.	None specified.	**Not expected:** Species has been documented in the vicinity of the site, but the occurrence is a historical record (CNDDB 2012). Habitat requirements are not well documented.
Lytta molesta	Molestan blister beetle	None	None	Central California.	None specified.	**Not Expected:** Species is believed to be associated with vernal pools, but life history is not well documented. Not likely to occur on the site.
Metapogon hurdi	Hurd's metapogon robberfly	None	None	Known only from Antioch Dunes and Fresno.	None specified.	**None:** Suitable habitat not present on the site.
AMPHIBIANS AND REPTILES						
Ambystoma californiense	California tiger salamander	FT	ST	Central Valley DPS federally listed as threatened. Santa Barbara & Sonoma counties DPS federally listed as endangered.	Need underground refuges, especially ground squirrel burrows & vernal pools or other seasonal water sources for breeding	**Possible**: Species has been documented in vernal pools within 0.5 miles of the site (CNDDB 2012). Small mammal burrows at the site provide suitable upland habitat for this species.
Thamnophis gigas	Giant garter snake	FT	ST	Prefers freshwater marsh and low gradient streams. Has adapted to drainage canals and irrigation ditches.	This is the most aquatic of the garter snakes in California.	**Not Expected:** Species is endemic to Valley floor wetlands and has not been documented within 5 miles of the site (CNDDB 2012).

Table 7-2. Special-Status Wildlife Species Known to Occur in the Vicinity of the SCARF site

Scientific Name	Common Name	Federal Listing Status*	State Listing Status*	General Habitat	Micro Habitat	Potential to Occur at the SCARF site
Rana draytonii	California red-legged frog	FT	SSC	Lowlands & foothills in or near permanent sources of deep water with dense, shrubby or emergent riparian vegetation.	Requires 11-20 weeks of permanent water for larval development.	**None:** This species is thought to be extirpated from eastern Fresno County. Aquatic habitat at the site provides marginal habitat due to the presence of numerous bullfrogs.
Gambelia sila	Blunt-nosed leopard lizard	FE	SE, FP	Resident of sparsely vegetated alkali and desert scrub habitats, in areas of low topographic relief.	Seeks cover in mammal burrows, under shrubs or structures such as fence posts; they do not excavate their own burrows.	**Not Expected:** Occurrences in Fresno and Madera counties are limited to areas west of Highway 99. Marginal habitat is present at the site.
Bufo canorus	Yosemite toad	FC	None	Thick meadow vegetation or patches of low willows near or in water. Historical elevation range is 4,790 ft to 11,910 ft.	Breed on the edges of wet meadows, slow-moving streams, shallow ponds, and shallow areas of lakes	**None**: Site is not within species range.
Rana sierrae	Sierra Nevada yellow-legged frog	None	SCE	Inhabits high elevation lakes, ponds and streams in Sierra Nevada mountains from 4,500 ft to 12,00 ft.	None specified.	**None**: Site is not within species range.
Actinemys [=Emys] marmorata	Western pond turtle	None	SSC	A thoroughly aquatic turtle of ponds, marshes, rivers, streams & irrigation ditches with aquatic vegetation below 6000 ft elevation.	Need basking sites and suitable (sandy banks or grassy open fields) upland habitat up to 0.3 miles from water for egg-laying.	**Possible:** This species has been observed on adjacent land at Lost Lake Park (Live Oaks Assoc. 2008). Perennial depressions (ponds) and emergent wetlands along the San Joaquin River provide suitable habitat.
Spea hammondii	Western spadefoot	None	SSC	Occurs primarily in grassland habitats, but can be found in valley-foothill hardwood woodlands.	Vernal pools are essential for breeding and egg-laying.	**Possible:** Potential breeding habitat for this species has been documented in vernal pools adjacent to the site at Lost Lake Park (Live Oaks Assoc. 2008). The species has been documented to the east of the project site (CNDDB 2012). Small mammal burrows throughout the site provide suitable upland habitat for this species.
Rana boylii	Foothill Yellow-legged Frog	None	SSC	Historically occurred in Sierra foothill streams with cobble substrate. This species appears to have been extirpated from most southern foothill streams.	None specified.	**Not expected:** This species has not been documented in the San Joaquin drainage below Friant. Site provides marginally suitable habitat.
Phrynosoma coronatum	California Horned Lizard	None	SSC	Grasslands, scrublands, oak woodlands, etc. of central California. Common in sandy washes with scattered shrubs.	None specified.	**Not Expected:** Site provides marginally suitable habitat.
BIRDS						
Gymnogyps californianus	California condor	FE	SE	Require vast expanses of open savannah, grasslands, and foothill chaparral in mountain ranges of moderate altitude.	Deep canyons containing clefts in the rocky walls provide nesting sites. Forages up to 100 miles from roost/nest.	**Not Expected:** Site is not within species current range, but is within historical range.
Charadrius alexandrinus nivosus	Western snowy plover	FT	SSC	Sandy beaches, salt pond levees & shores of large alkali lakes.	Needs sandy, gravelly or friable soils for nesting.	**Not Expected:** Project area is not within species current range.
Coccyzus americanus occidentalis	Western yellow-billed cuckoo	FC	SE	Riparian forest nester, along the broad, lower flood-bottoms of larger river systems.	Nests in riparian jungles of willow, often mixed with cottonwoods, w/ lower story of blackberry, nettles, or wild grape.	**Not Expected:** The species is believed to be extirpated from the project vicinity. The nearest documented occurrence was approximately 16 miles south of the project site in the early 1900s (CNDDB 2012).
Buteo swainsoni	Swainson's hawk	None	ST	Breeds in grasslands with scattered trees, juniper-sage flats, riparian areas, savannahs, & agricultural or ranch lands with groves or lines of trees.	Requires adjacent suitable foraging areas such as grasslands, or alfalfa or grain fields supporting rodent populations.	**Possible:** Suitable nesting and foraging habitat is present, but few sightings have been made in the Friant/Millerton area (Live Oak Assoc. 2008).
Athene cunicularia	Burrowing owl	None	SSC	Open, dry annual or perennial grasslands, deserts & scrublands characterized by low-growing vegetation.	Subterranean nester, dependent upon burrowing mammals, most notably, the California ground squirrel.	**Present:** Suitable habitat is present. There have been several recent observations of this species on adjacent lands (Living Oak Assoc. 2008). CDFW staff observed a nesting pair of burrowing owls at Lost Lake Park in 2012, and a burrowing owl was observed in flight on the SCARF site in 2011 (Single pers. comm.).

Table 7-2. Special-Status Wildlife Species Known to Occur in the Vicinity of the SCARF site

Scientific Name	Common Name	Federal Listing Status*	State Listing Status*	General Habitat	Micro Habitat	Potential to Occur at the SCARF site
Agelaius tricolor	Tricolored blackbird	None	SSC	Highly colonial species, most numerous in Central Valley & vicinity. Largely endemic to California.	Requires open water, protected nesting substrate, & foraging area with insect prey within a few miles of the colony.	**Possible:** This species has been observed on adjacent lands; however, there is no documentation of a nesting colony in the vicinity of the site (Live Oaks Assoc. 2008).
Eremophila alpestris actia	California horned lark	None	WL	Coastal regions, chiefly from Sonoma Co. to San Diego Co. Also main part of San Joaquin Valley & east to foothills.	Short-grass prairie, "bald" hills, mountain meadows, open coastal plains, fallow grain fields, alkali flats.	**Possible:** This species has been observed on adjacent lands (Live Oak Assoc. 2008). The project site could provide suitable foraging and nesting habitat.
Falco mexicanus	Prairie falcon	None	WL	Inhabits dry, open terrain, either level or hilly.	Breeding sites located on cliffs. Forages far afield, even to marshlands and ocean shores.	**Possible:** This species was observed foraging on adjacent lands in 2006 (Live Oaks Assoc. 2008). The site could provide suitable foraging habitat; however nesting habitat is absent.
Aquila chrysaetos	Golden eagle	None	FP; WL	Rolling foothills, mountain areas, sage-juniper flats, & desert.	Cliff-walled canyons provide nesting habitat in most parts of range; also, large trees in open areas.	**Possible:** This species was observed on adjacent lands in 1995 (Live Oak Assoc. 2008). The site could provide suitable foraging habitat; however nesting habitat is absent.
Grus Canadensis tabida	Greater Sandhill Crane	None	ST	Winters in Central Valley farmlands.	Breeds in northern California.	**None:** No suitable habitat for this species on the site, and this species has not been documented in the vicinity of the site.
Falco peregrinus anatum	American Peregrine Falcon	None	SE	Occurs in many habitats if the state during migration and winter.	Breed on cliffs in the Sierra or in coastal habitats.	**Possible:** This species has been observed over adjacent lands (Live Oak Assoc. 2008).
Haliaeetus leucocephalus	Bald Eagle	FT	SE	Winters near Central Valley reservoirs.	Feeds on fish in large bodies of water or rivers.	**Possible:** Species has been observed along the San Joaquin River corridor. The site could provide suitable foraging habitat; however nesting habitat is absent.
Empidonax trailli	Willow Flycatcher	None	SE	Nests in riparian vegetation.	Breeds in willows of montane meadows in the Sierra Nevada.	**Possible:** This species has been observed in riparian vegetation on adjacent lands (Live Oak Assoc. 2008). Suitable nesting habitat is present along the San Joaquin River corridor in the vicinity of the site.
Elamus caeruleus	White-tailed kite	None	FP	Open grasslands and agricultural areas in Central California.	None specified.	**Possible:** Suitable foraging and nesting habitat is present on and adjacent to the site.
Plegadis chihi	White-faced Ibis	None	SSC	Forages in croplands and pastures in the Central Valley during the winter.	None specified.	**Possible:** Species is a possible visitor; suitable nesting habitat is not present.
Circus cyaneus	Northern Harrier	None	SSC	Frequents meadows, grasslands, open rangelands; uncommon in wooded habitats.	None specified.	**Possible:** Suitable foraging and marginal nesting habitat is present on and adjacent to the site.
Accipiter striatus	Sharp-skinned Hawk	None	SSC	Winters in a variety of habitats in California.	Breeds in mixed conifer forests of northern Sierra Nevada.	**Possible:** This species has been observed over wintering at adjacent Lost Lake Park in 2006. Nesting habitat is absent (Live Oak Assoc. 2008).
Numenius americanus	Long-billed Curlew	None	SSC	Winters in grasslands, pastures, and coastal wetlands of California.	Nests in grasslands of the arid west.	**Possible:** This species was observed at adjacent Lost Lake Park (Lost Lake Assoc. 2008). Foraging habitat may be along margins of perennial ponds.
Asio otus	Long-eared Owl	None	SSC	Riparian woodlands.	None specified.	**Possible:** This species has been observed on adjacent lands in riparian areas (Live Oak Assoc. 2008). Nesting and foraging habitat are present on site.
Asio flammeus	Short-eared Owl	None	SSC	Grasslands, marshes, and some agricultural lands of the San Joaquin Valley.	None specified.	**Not Expected:** Although this species was observed at adjacent Lost Lake Park in 2005, that siting was considered rare (Live Oak Assoc. 2008). Tall dense grass that is optimal for this species is not present on the site.
Cypseloides niger	Black Swift	None	SSC	Migrates throughout California.	Nests are often found in Sierra near waterfalls.	**Possible: S**pecies may forage in the area during migration.
Chaetura vauxi	Vaux's Swift	None	SSC	Migrates throughout California.	Migrates through the San Joaquin Valley in spring and fall.	**Possible:** Species has been observed in the project vicinity during migration (Live Oak Assoc. 2008).
Lanius ludovicianus	Loggerhead Shrike	None	SSC	Grasslands and agricultural lands in the Central Valley.	None specified.	**Possible:** This species has been observed on adjacent lands (Live Oaks Assoc. 2008). Foraging and breeding habitat is present in the vicinity of the site.

Table 7-2. Special-Status Wildlife Species Known to Occur in the Vicinity of the SCARF site

Scientific Name	Common Name	Federal Listing Status*	State Listing Status*	General Habitat	Micro Habitat	Potential to Occur at the SCARF site
Dendroica petechia brewster	Yellow Warbler	None	SSC	Riparian thickets of willow and cottonwoods; migrates through many different habitats.	None specified.	**Possible:** This species has been observed in riparian woodland on adjacent lands; however, no breeding sites have been documented (Live Oak Assoc. 2008).
Buteo regalis	Ferruginous Hawk	None	SSC	Winters in a variety of California habitats including grasslands and wetlands.	Breeds in Pacific Northwest and Canada.	**Possible:** This species may forage in grasslands adjacent to and on the site (Live Oak Assoc. 2008).
Accipiter cooperii	Cooper's Hawk	None	WL	Winters in a variety of habitats.	Breeds in oak woodlands, riparian forests, and mixed conifer forest of the Sierra Nevada.	**Possible:** Nesting and foraging habitat is present. This species has been observed on adjacent lands (Live Oak Assoc. 2008).
Falco columbarius	Merlin	None	WL	Winters in a variety of habitats throughout California including wetlands, grasslands, and savannas.	Breeds in Canada.	**Possible:** This species has been observed on adjacent lands in 1999 (Live Oak Assoc. 2008). It could forage on the site during migration.
MAMMALS						
Vulpes macrotis mutica	San Joaquin kit fox	FE	ST	Annual grasslands or grassy open stages with scattered shrubby vegetation.	Need loose-textured sandy soils for burrowing, and suitable prey base.	**Possible:** There is a reported sighting along Friant Road from the early 1990s. However, multiple recent surveys in the vicinity have failed to document presence (Live Oaks 2008).
Dipodomys ingens	Giant kangaroo rat	FE	SE	Annual grasslands on the western side of the San Joaquin Valley, marginal habitat in alkali scrub.	Need level terrain & sandy loam soils for burrowing.	**None:** Occurrences in Fresno and Madera counties are limited to areas west of Highway 99.
Dipodomys nitratoides exilis	Fresno kangaroo rat	FE	SE	Alkali sink-open grassland habitats in western Fresno County.	Bare alkaline clay-based soils subject to seasonal inundation, with more friable soil mounds around shrubs & grasses.	**None**: Suitable habitat for this species is not present on the site. The species has not been documented within 15 miles of the project site (CNDDB 2012).
Dipodomys nitratoides nitratoides	Tipton kangaroo rat	FE	SE	Saltbrush scrub and sink scrub communities in the Tulare Lake Basin of the southern San Joaquin Valley.	Needs soft friable soils which escape seasonal flooding. Digs burrows in elevated soil mounds at bases of shrubs.	**None**: Suitable habitat for this species is not present on the site. The species has not been documented within 5 miles of the project site (CNDDB 2012).
Ovis canadensis californiana	Sierra Nevada bighorn sheep	FE	SE, FP	Historically found along the east side and crest of the Sierra Nevada, and on the Great Western Divide.	Available water and steep, open terrain free of competition from other grazing ungulates.	**Not Expected:** Site is not within species current range.
Martes pennanti	Fisher	FC	None	Forested mountain areas, primarily dense coniferous forests with deciduous component and abundant physical structure near the ground.	None specified.	**Not Expected:** Site is not within species current range.
Antrozous pallidus	Pallid bat	None	SSC	Deserts, grasslands, shrublands, woodlands & forests. Most common in open, dry habitats with rocky areas for roosting.	Roosts must protect bats from high temperatures. Very sensitive to disturbance of roosting sites.	**Possible:** The site provides suitable foraging, breeding, and roosting habitat.
Corynorhinus townsendii	Townsend's Big-eared Bat	None	SSC	Occurs in a variety of habitats. Sensitive to human disturbance.	Roosts in caves and abandoned buildings.	**Possible:** The site could provide foraging habitat, although roosting and breeding habitat is absent (Live Oaks Assoc. 2008).
Euderma maculatum	Spotted bat	None	SSC	Occupies a wide variety of habitats from arid deserts and grasslands through mixed conifer forests.	Feeds over water and along washes. Feeds almost entirely on moths. Needs rock crevices in cliffs or caves for roosting.	**Not Expected:** Although the site provides suitable foraging habitat, this species is more likely to occur in the Sierra or east of the Sierra (Live Oak Assoc. 2008).
Eumops perotis californicus	Western mastiff bat	None	SSC	Many open, semi-arid to arid habitats, including conifer & deciduous woodlands, coastal scrub, grasslands, chaparral etc.	Roosts in crevices in cliff faces, high buildings, trees & tunnels.	**Possible:** Adjacent lands provide suitable foraging habitat, although rocky escarpments suitable for roosting are absent (Live Oak Assoc. 2008).
Onychomys torridus ramona	Southern grasshopper mouse	None	SSC	Sandy desert regions.	None specified.	**Not Expected:** This species has been known to occur in the Sierra foothills; however, suitable habitat is not present on the site.
Bassariscus astutus	Ringtail	None	SSC, FP	Wooded and brushy areas, especially near water courses	None specified.	**Possible:** Suitable habitat is present along the San Joaquin River corridor.

Table 7-2. Special-Status Wildlife Species Known to Occur in the Vicinity of the SCARF site

Scientific Name	Common Name	Federal Listing Status*	State Listing Status*	General Habitat	Micro Habitat	Potential to Occur at the SCARF site
Taxidea taxus	American badger	None	SSC	Most abundant in drier open stages of most shrub, forest, and herbaceous habitats, with friable soils.	Needs sufficient food, friable soils & open, uncultivated ground. Preys on burrowing rodents. Digs burrows.	**Possible:** This species has been observed on nearby lands (Live Oaks Assoc. 2008). Suitable breeding and foraging habitat is present in areas immediately adjacent to the construction areas.
Perognathus inornatus inornatus	San Joaquin pocket mouse	None	None	Typically found in grasslands and blue oak savannas.	Needs friable soils.	**Not Expected:** Marginal habitat exists in the area. Species has not been documented within 5 miles of the site (CNDDB 2012).

*** List of Abbreviations for Federal and State Species-Status:**

FE = Federal endangered
FT = Federal threatened
FC = Federal candidate for listing
FP = State fully protected species
SE = State endangered
ST = State threatened
SSC = State species of special concern
WL = Watch List

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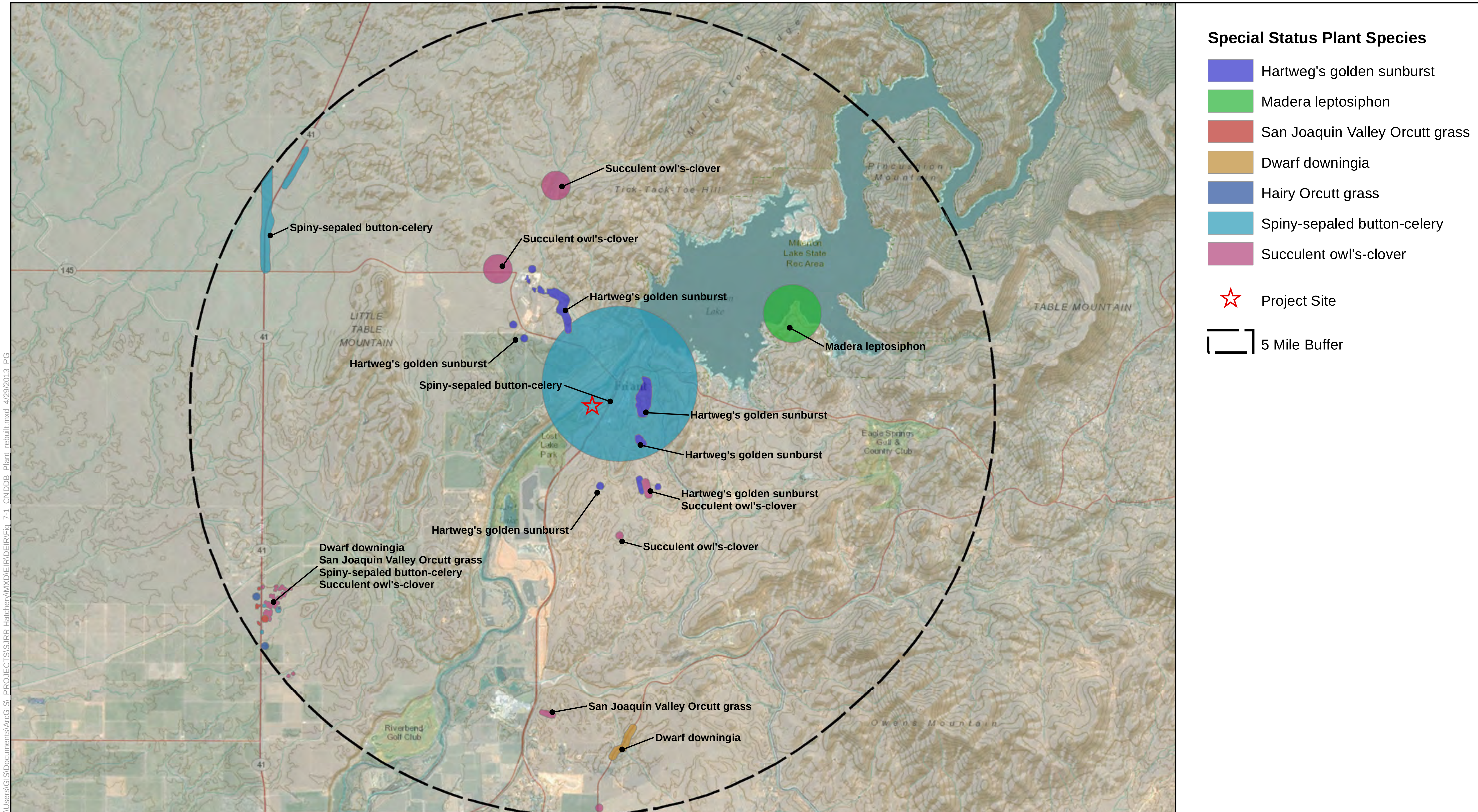

Prepared by:

Horizon WATER and ENVIRONMENT

Prepared for:
California Department of Fish and Wildlife
California Department of General Services

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Sources: California Natural Diversity Database (CNDDB) August 2012; Bing Maps

Figure 7-1: Special-Status Plant Species Known to Occur in the Vicinity of the SCARF Site

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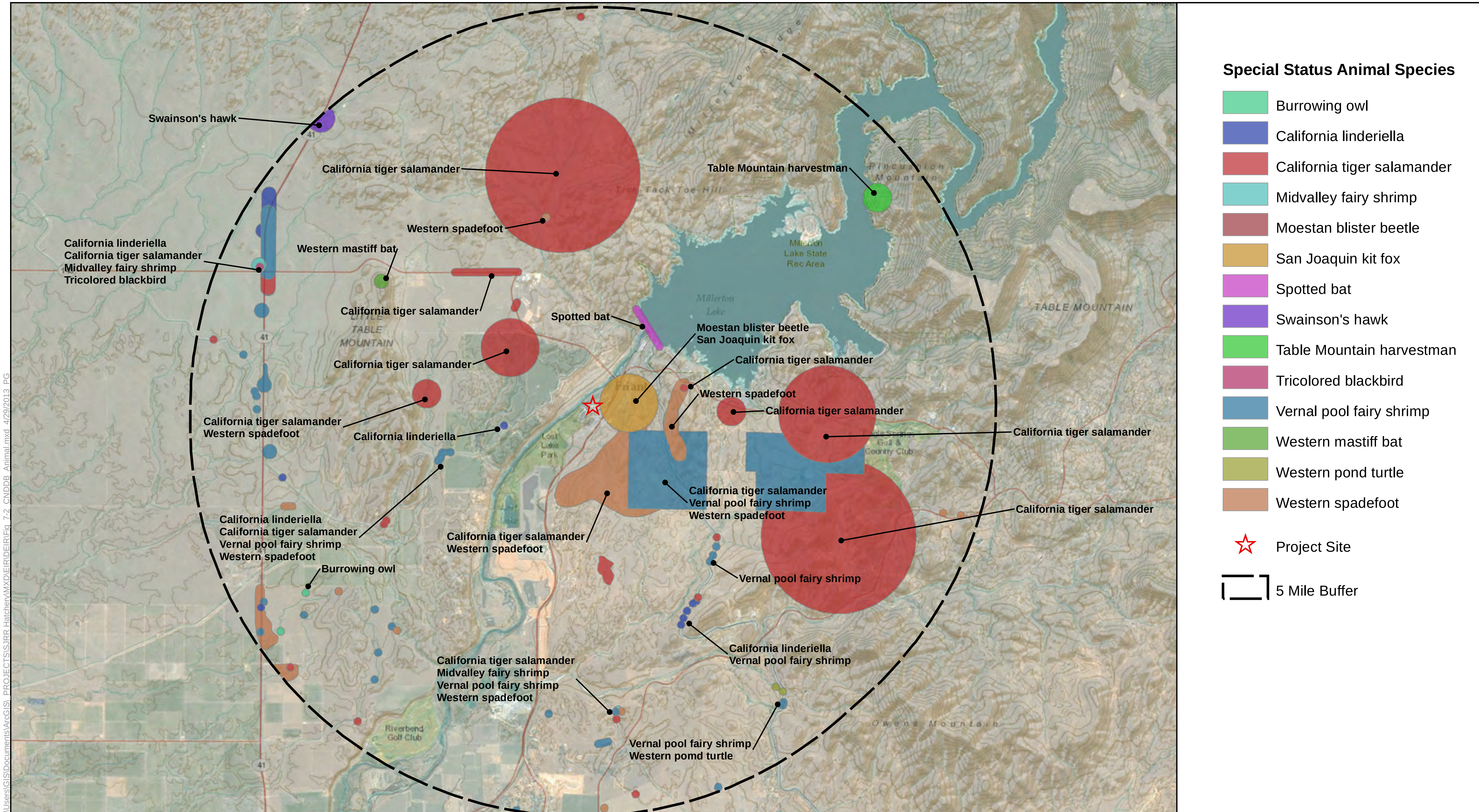

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Sources: California Natural Diversity Database (CNDDB) August 2012; Bing Maps

Figure 7-2: Special-Status Animal Species Known to Occur in the Vicinity of the SCARF Site

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7.5 Impact Analysis

7.5.1 Methodology

Analysis Approach

The Proposed Project may impact biological resources through the direct or indirect disturbance, modification, or destruction of habitat such that it results in death, injury or harassment of individuals or populations of plant or animal species, or impedes or prevents the dispersal of individuals or populations of special-status species. Potential impacts on existing biological resources were evaluated by comparing the quantity and quality of habitats present in the Project Area under baseline conditions to anticipate conditions after implementation of the Project activities. Direct and indirect impacts on special-status species were assessed based on the potential for the species or their habitat to be disturbed or enhanced by implementation of the Proposed Project.

Conservation Measures for Biological Resources that May Be Affected by Program-level Actions

CDFW has developed conservation measures for biological resources to avoid and minimize impacts on special-status species that may result from the program-level Proposed Project activities. The Conservation Measures are provided in Appendix I, *CDFW's Conservation Measures for Biological Resources That May Be Affected by Program-level Actions*. The Conservation Measures are intended to be applied as mitigation for components of the Proposed Project that have yet to be developed and are currently being evaluated at the programmatic level of detail. These components of the Proposed Project include by are not limited to: wild broodstock collection, certain aspects of fisheries management, and recreation enhancements (refer to Table 3-2 for a summary of project versus program actions). These Conservation Measures address the range of possible species that could be present at the various potential sites for these actions, and identify appropriate mitigation approaches depending upon actual site conditions.

7.5.2 Criteria for Determining Significance

For the purposes of this analysis, the Proposed Project would result in a significant impact to vegetation and wildlife biological resources if it would meet one or more of the following criteria:

A. Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by the CDFW, USFWS, or NMFS;

B. Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by CDFW, USFWS, or NMFS;

C. Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means; or

D. Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites.

E. Conflict with local policies or ordinances protecting biological resources, or conflict with the provisions of an adopted Habitat Conservation Plan (HCP) or Natural Community Conservation Plan (NCCP).

The analysis considers both species and their habitats. A *less than significant* impact generally refers to a situation where there is a measurable impact, but the impact is not likely to result in an adverse outcome for the survival or fitness of a particular species, or a widespread or long-lasting adverse effect on a natural community. Conversely, an impact would be considered *potentially significant* if it may substantially decrease the likelihood of survival or fitness of a particular species (e.g., substantial decrease in a local population size or extirpation), or result in widespread or long-lasting adverse effects on a natural community. For impacts found to be "potentially significant", mitigation measures are proposed. Any impact that remains significant after application of all feasible mitigation is considered *significant and unavoidable*.

7.5.3 Environmental Impacts

Table 3-1 in Chapter 3, *Introduction to the Environmental Analysis*, identifies components of the Proposed Project with the potential to result in impacts to vegetation and wildlife. Each impact is discussed in further detail in the section below.

SCARF Construction

Impact BIO-CONSTRUCT-1: Impacts to Special-Status Plant Species (Significance Criterion A, Project Level, Less than Significant with Mitigation)

Table 7-1 lists the special-status plant species known to occur in the vicinity of the SCARF site, and Figure 7-1 shows the CNDDB occurrences of special-status plants within a 5-mile radius of the SCARF site. There are no CNDDB occurrences of special-status plants on the SCARF site. However, in September 2012, CDFW staff identified a population of Sanford's arrowhead (*Sagittaria sanfordii,* CRPR 1B.2) in one of the Interim Facility percolation ponds (Figure 2-4).

Ten of the 25 plant species listed in Table 7-1 are considered to have no potential to occur at the SCARF site because the site is outside of the species' documented range or suitable habitat is clearly not present. An additional 10 species are "not expected" to occur at the site because the site provides only marginally suitable habitat. The remaining five species have a greater likelihood of occurring at the site because suitable habitat is present, or in the case of Sanford's arrowhead, the species has been observed at the site.

Construction activities for the SCARF would include ground disturbance and vegetation clearing, which could cause disturbance to special-status plant species. The Proposed Project would not significantly adversely affect habitat for special-status plant species. However, direct impacts to special-status plants would be considered potentially significant. Implementation of **Mitigation Measures BIO-CONSTRUCT-1a and -1b** would reduce this impact to a less than significant level.

Mitigation Measure BIO-CONSTRUCT-1a: Perform Focused Surveys for Special-Status Plant Species.

Within one year prior to commencement of ground disturbing activities, a qualified CDFW botanist will perform surveys for special-status plant species with the potential to occur at the SCARF site. Floristic surveys will be performed according to the *Protocols for Surveying and Evaluating Impacts to Specials Status Native Plant Populations and Natural Communities* (CDFG 2009 or current version). Floristic surveys will include the use of a reference population to increase the likelihood of detection, and will be performed during the appropriate bloom period(s) for each species. If special-status plants are detected within the construction zone or within a 100-foot radius of the construction zone, CDFW will implement Mitigation Measure BIO-CONSTRUCT-1b.

Mitigation Measure BIO-CONSTRUCT-1b: Avoid or Minimize Impacts to Special-Status Plant Species.

If special-status plants are detected within the construction zone or within a 100-foot radius of the construction zone, CDFW will adjust the construction footprint or establish exclusion fencing to avoid impacts to the plants. Locations of special-status plant populations will be clearly identified in the field by staking, flagging, or fencing a minimum 100-foot wide buffer around them prior to the commencement of activities that may cause disturbance. No activity will occur within the buffer area. Some special-status plant species are annual plants, meaning the plant completes its entire lifecycle in one growing season. Other special-status plant species are perennial plants that return year after year until they reach full maturity. Due to the differences in life histories, all general conservation measures will be developed on a case-by-case basis and will include strategies that are species and site-specific to avoid or minimize impacts to special-status plants.

If avoidance is not feasible, then CDFW will implement measures to minimize the impact to the species. Minimization measures may include transplanting perennial species, seed collection and dispersal for annual species, and other conservation strategies that will protect the viability of the local population. If minimization measures are implemented, monitoring of plant populations will be conducted annually for 5 years to assess the mitigation's effectiveness. The performance standard for the mitigation will be no net reduction in the size or viability of the local population.

Impact BIO-CONSTRUCT-2: Impacts to Special-Status Vernal Pool Branchiopods (Significance Criterion A, Project Level, Less than Significant with Mitigation)

Table 7-2 lists the special-status invertebrate species known to occur in the vicinity of the SCARF site, and Figure 7-2 shows occurrences within a 5-mile radius of the SCARF site. Seasonally ponded depressions at the site provide marginally suitable habitat for special-status branchiopods such as vernal pool fairy shrimp. CDFW conducted surveys for special-status vernal pool branchiopods at the SCARF site between November 2012 and March 2013; no special-status invertebrates were detected during the surveys. CDFW intends to conduct a second year for surveys during the 2013-2014 wet season. Based on the initial survey results, and assessment of habitat quality, the Proposed Project is not expected to directly impact special-status branchiopods. However, if special-status branchiopods are detected at the SCARF site during the second season of surveys, then impacts to occupied habitat would be considered potentially significant. Impacts to occupied habitat may occur during grading or excavation for construction of SCARF (e.g., construction of the access road). Implementation of **Mitigation Measures BIO-CONSTRUCT-2a, -2b, and -2c** would reduce this impact to a less than significant level.

Mitigation Measure BIO-CONSTRUCT-2a: Perform 2 Years of Surveys for Special Status Vernal Pool Branchiopods.
Prior to implementation of construction activities, CDFW biologists will perform surveys for special-status vernal pool branchiopods species in seasonally ponded depression with the potential to be impacted by construction of the SCARF. Surveys will be performed according to the *Interim Survey Guidelines to Permittees for Recovery Permits under Section 10(a)(1)(A) of the Endangered Species Act for the Listed Vernal Pool Branchiopods* (USFWS 1996 or current version).

Mitigation Measure BIO-CONSTRUCT-2b: Avoid Impacts to Suitable Vernal Pool Branchiopods Habitat.
The Proposed Project will be designed to avoid impacts to suitable vernal pool branchiopods habitat. Such avoidance measures may include adjusting roadway and pipeline alignments, minimizing the footprint of borrow sites, and locating staging/stockpile areas outside of suitable habitat.

If vernal pools are present, a 250-foot no disturbance buffer will be established from the high water mark of the vernal pools and seasonal wetlands that provide suitable habitat for vernal pool crustaceans. Wetland habitat will be delineated by staking, flagging or fencing. This buffer will be established prior to ground-disturbing activities, and it will remain until ground-disturbing activities in that area are completed.

Mitigation Measure BIO-CONSTRUCT-2c: Replace Vernal Pool Branchiopod Habitat.
If occupied vernal pool branchiopods habitat cannot be avoided, CDFW will first identify if there are potential wetland mitigation opportunities on-site and will preferentially conserve, restore, or construct new wetland habitat at this location. If habitat cannot be restored on-site or in the immediate vicinity of the disturbance

location, replacement at a nearby off-site location will be provided. The replacement of habitat will be equivalent to the nature of the habitat lost, and will be provided at a suitable ratio to ensure that, at a minimum, there is no net loss of habitat acreage or value. The replacement habitat will be set aside in perpetuity for habitat use. Mitigation ratios to achieve the "no net loss" standard will be determined in consultation with the USFWS.

If off-site compensation includes dedication of conservation easements, purchase of mitigation credits or other off-site conservation measures, the details of these measures will be developed through consultation with USFWS. The plan will include information on responsible parties for long-term management, holders of conservation easements, long-term management requirements, and other details, as appropriate, for the preservation of long-term viable populations. Any impacts that result in a compensation purchase will be required to do so with an endowment for land management in perpetuity prior to any project groundbreaking activities.

Impact BIO-CONSTRUCT-3: Impacts to California Tiger Salamander and Western Spadefoot (Significance Criterion A, Project Level, Less than Significant with Mitigation)

Small mammal burrows in annual grasslands within the SCARF site provide potentially suitable upland habitat for California tiger salamander (CTS) and western spadefoot. Wetlands and ponds within the SCARF site are not likely to provide suitable breeding habitat for these species due the presence of predators (i.e., bullfrog, mosquito fish, sunfish, etc.), or an insufficient hydroperiod duration. However, CTS and western spadefoot species are known to breed in close proximity to the SCARF site and may use burrows throughout the site as upland habitat.

CDFW conducted protocol-level surveys for CTS between October 2012 and May 2013. The surveys included upland and aquatic surveys. The upland surveys were conducted between October 23, 2012 and March 15, 2013, and consisted of drift fencing with pitfall traps placed around perennial ponds. The aquatic surveys were conducted between March 26, 2013 and April 19, 2013 in six perennial ponds at the site. The aquatic surveys were conducted with dip nets, seines, and/or minnow traps. No CTS were detected during the surveys. Further detail regarding the methods and results of the CTS surveys is provided in Appendix J, *Supporting Documentation Related to Biological Resources - Vegetation and Wildlife*.

Construction activities, such as excavation of borrow areas and placement of fill for the access road, that impact suitable upland habitat for CTS and western spadefoot, have the potential to result in significant direct and indirect impacts to these species. Implementation of the **Mitigation Measures BIO-CONSTRUCT-3a, -3b, -3c, and -3d** would reduce the impact to a less than significant level for both species.

Mitigation Measure BIO-CONSTRUCT-3a: Conduct Protocol-Level Surveys for California Tiger Salamander.

CDFW will conduct a minimum of 2 years of surveys to determine the presence/absence of CTS at the SCARF site. Surveys will be conducted in accordance with the *Interim Guidance on Site Assessment and Field Surveys for Determining Presence or a Negative Finding of the California Tiger Salamander* (USFWS 2003). In consultation with the USFWS, CDFW may modify survey protocols to reflect site conditions and potential utilization of habitat by CTS. If protocol surveys result in negative findings of CTS for 2 consecutive years, then Mitigation Measure BIO-CONSTRUCT-3c would not be implemented.

Mitigation Measure BIO-CONSTRUCT-3b: Avoid Impacts to Suitable Upland California Tiger Salamander.
To the extent feasible, the Proposed Project will be designed to avoid impacts to suitable upland CTS habitat. Such avoidance measures may include adjusting roadway and pipeline alignments, minimizing the footprint of borrow sites, and locating staging/stockpile areas outside of suitable upland habitat.

Mitigation Measure BIO-CONSTRUCT-3c: Minimize Construction-related Impacts to California Tiger Salamander.
If CTS are detected during protocol surveys conducted under Mitigation Measure BIO-CONSTRUCT-3a, or in the absence of conducting 2 years of protocol-level surveys, CDFW will implement the following actions during construction to minimize potential impacts to CTS.

- Prior to commencing ground disturbing activities, construction workers will be educated regarding CTS and the measures intended to protect this species.
- When feasible, there will be a 50-foot no-disturbance buffer around burrows that provide suitable upland habitat for CTS. Burrows considered suitable for CTS will be identified by a qualified CDFW biologist. The biologist will delineate and mark the no-disturbance buffer.
- All suitable burrows directly impacted by construction will be hand excavated under the supervision of a qualified wildlife biologist. If CTS are found, the biologist will relocate the organism to the nearest burrow that is outside of the construction impact area.
- All ground-disturbing work will occur during daylight hours. In coordination with USFWS, and depending on the level of rainfall and site conditions. CDFW will monitor the National Weather Service (NWS) 72-hour forecast for the work area. If a 70% or greater chance of rainfall is predicted within 72 hours of project activity, all activities in areas within 1.3 miles of potential or known CTS breeding sites will cease until no further rain is forecast. If work must continue when rain is forecast, a qualified biologist will survey the project site before construction begins each day rain is forecast. If rain exceeds 0.25 inch during a 24-hour period, work will cease until no further rain is forecast. This restriction is not applicable for areas located greater than 1.3 miles from potential or known CTS breeding sites once they have been encircled with CTS exclusion fencing. However, even after exclusion fencing is installed, this condition would still apply to construction related traffic moving though areas within 1.3 miles of

potential or known CTS breeding sites but outside of the salamander exclusion fencing (e.g. on roads).

- For work conducted during the CTS migration season (November 1 to May 31), exclusionary fencing will be erected around the construction site during ground disturbing activities after hand excavation of burrows has been completed. A biological monitor will visit the site weekly to ensure that the fencing is in good working condition. Fencing material and design will be subject to the approval of USFWS. If exclusionary fencing is not used, a qualified biological monitor will be on-site during all ground disturbance activities. Exclusion fencing will also be placed around all spoils and stockpiles.
- For work conducted during the CTS migration season (November 1 to May 31), a qualified biologist will survey the active work areas (including access roads) in mornings following measurable precipitation events. Construction may commence once the biologist has confirmed that no CTS are in the work area.
- Prior to beginning work each day, underneath equipment and stored pipes greater than 1.2 inches (3 cm) in diameter will be inspected for CTS. If any are found they will be allowed to move out of the construction area under their own accord.
- Trenches and holes will be covered and inspected daily for stranded animals. Trenches and holes deeper than 1 foot will contain escape ramps (maximum slope of 2:1) to allow trapped animals to escape uncovered holes or trenches. Holes and trenches will be inspected prior to filling.
- All food and food-related trash will be enclosed in sealed trash containers at the end of each workday and removed completely from the construction site once every three days to avoid attracting wildlife.
- A speed limit of 15 mph will be maintained on dirt roads.
- All equipment will be maintained such that there are no leaks of automotive fluids such as fuels, oils, and solvents. Any fuel or oil leaks will be cleaned up immediately and disposed of properly.
- Plastic monofilament netting (erosion control matting) or similar material will not be used at the project site because CTS may become entangled or trapped. Acceptable substitutes include coconut coir matting or tackified hydroseeding compounds.
- Hazardous materials such as fuels, oils, solvents, etc. will be stored in sealable containers in a designated location that is at least 100 feet from wetlands and the San Joaquin River channel. If it is not feasible to store hazardous materials 100 feet from wetlands and the river channel, then spill containment measures will be implemented to prevent the possibility of accidental discharges to wetlands and waters.

Mitigation Measure BIO-CONSTRUCT-3d: Minimize Construction-related Impacts to Western Spadefoot.

- Prior to commencing ground disturbing activities, construction workers will be educated regarding western spadefoot, and the measures intended to protect these species.
- For work conducted during the western spadefoot toad migration and breeding season (November 1 to May 31), a qualified biologist will survey the active work areas (including access roads) in mornings following measurable precipitation events. Construction may commence once the biologist has confirmed that no spadefoot toads are in the work area.
- When feasible, there will be a 50-foot no-disturbance buffer around burrows that provide suitable upland habitat for western spadefoot toad. Burrows considered suitable for spadefoot will be identified by a qualified CDFW biologist. The biologist will delineate and mark the no-disturbance buffer.
- If western spadefoot is toad is found within the construction footprint, it will be allowed to move out of harm's way of its own volition or a qualified biologist will relocate the organism to the nearest burrow that is outside of the construction impact area.
- Prior to beginning work each day, underneath equipment and stored pipes greater than 1.2 inches (3 cm) in diameter will be inspected for western spadefoot toad. If any are found, they will be allowed to move out of the construction area under their own accord.
- Trenches and holes will be covered and inspected daily for stranded animals. Trenches and holes deeper than 1 foot will contain escape ramps (maximum slope of 2:1) to allow trapped animals to escape uncovered holes or trenches. Holes and trenches will be inspected prior to filling.

Impact BIO-CONSTRUCT-4: Impacts to Western Pond Turtle (Significance Criterion A, Project Level, Less than Significant with Mitigation)

Perennially flooded depressions (i.e., ponds) and portions of the San Joaquin River within the SCARF site provide suitable habitat for western pond turtle (WPT). Construction activities that directly impact WPT or their nests have the potential to result in significant impacts to this species. These activities may include filling of ponds for construction of SCARF buildings and the access road, as well as construction of the volitional release channel in the secondary channel of the San Joaquin River. Implementation of **Mitigation Measure BIO-CONSTRUCT-4** would reduce this impact to a less than significant level.

Mitigation Measure BIO-CONSTRUCT-4: Implement Pre-construction Surveys and Minimization Measures for Western Pond Turtle.
Pre-construction surveys for WPT will be conducted by a qualified biologist 14 days before and 24 hours before the start of construction activities where suitable habitat exists (i.e., along riparian areas, ponds and freshwater emergent wetlands). If WPT

or their nests are observed during pre-construction surveys, the following measures will be implemented:

- A qualified biologist will be on site to monitor construction in suitable WPT habitat. WPT found within the construction area will be allowed to leave on its own volition or it will be captured by the qualified biologist and relocated out of harm's way to the nearest suitable habitat immediately upstream or downstream from the project site.
- If WPT nests are identified in the work area during pre-construction surveys, a 300-foot no-disturbance buffer will be established between the nest and any areas of potential disturbance. Buffers will be clearly marked with temporary fencing. Construction will not be allowed to commence in the exclusion area until hatchlings have emerged from the nest, or the nest is deemed inactive by a qualified biologist.

Impact BIO-CONSTRUCT-5: Impacts to Burrowing Owl (Significance Criterion A, Project Level, Less than Significant with Mitigation)

As mentioned in Section 7.3.4, a nesting pair of burrowing owls was sited at Lost Lake Park in 2012, and a burrowing owl was observed on the grounds of the proposed SCARF site in 2011. Construction could disturb burrowing owls through noise, visual distraction, or direct impacts to occupied habitat. These impacts would be considered potentially significant. Implementation of **Mitigation Measure BIO-CONSTRUCT-5** would reduce potential impacts to burrowing owls to a less than significant level.

Mitigation Measure BIO-CONSTRUCT-5: Implement Pre-construction Surveys and Minimization Measures for Burrowing Owls.
Prior to initiating ground-disturbing activities, CDFW will conduct surveys for burrowing owls in accordance with protocols established in the *Staff Report on Burrowing Owl Mitigation* (CDFG 2012 or current version). If ground-disturbing activities are delayed or suspended for more than 30 days after the pre-construction survey, the site will be resurveyed. If burrowing owls are detected, disturbance to burrows will be avoided during the nesting season (February 1 through August 31). CDFW will establish buffers around occupied burrows in accordance with guidance provided in the *Staff Report on Burrowing Owl Mitigation*, and at the discretion of the qualified CDFW wildlife biologist. Buffers around occupied burrows will be a minimum of 656 feet (200 meters) during the breeding season, and 160 feet (100 meters) during the non-breeding season.

Outside of the nesting season (February 1 through August 31), passive owl relocation techniques will be implemented. Owls would be excluded from burrows within 160 feet of construction by installing one-way doors in burrow entrances. The work area will be monitored daily for 1 week to confirm owl departure from burrows prior to any ground-disturbing activities. Where possible burrows will be excavated using hand tools and refilled to prevent reoccupation. Sections of flexible plastic pipe will be inserted into the tunnels during excavation to maintain an escape route for any animals inside the burrow.

If occupied burrows cannot be avoided during the non-breeding season, CDFW will enhance or create burrows in adjacent habitat at a 1:1 ratio (burrows destroyed to burrows enhanced or created) one week prior to implementation of passive relocation techniques. If burrowing owl habitat enhancement or creation takes place, CDFW will develop and implement a monitoring and management plan to assess the effectiveness of the mitigation.

Impact BIO-CONSTRUCT-6: Impacts to Raptors including Special-status Species (Significance Criterion A, Project Level, Less than Significant with Mitigation)

Raptors, including special-status species such as Swainson's hawk, white-tailed kite, bald eagle, and golden eagle, are known to nest along the San Joaquin River corridor and may construct nests in the vicinity of the SCARF site. Construction activities could disturb nesting raptors through generation of noise, visual distraction, or direct impacts to occupied nests (e.g., tree removal). Construction activities that disturb nesting raptors, including special-status raptors, would be considered potentially significant. Implementation of **Mitigation Measures BIO-CONSTRUCT-6a through -6b** would reduce impacts to special-status raptors to a less than significant level. Additionally, implementation of **Mitigation Measures BIO-CONSTRUCT-6c** would reduce impacts to non-listed raptors to a less than significant level.

Mitigation Measure BIO-CONSTRUCT-6a: Implement Pre-construction Surveys and Minimization Measures for Bald Eagle and Golden Eagle

Surveys for bald and golden eagle nests will be conducted within 2 miles of any construction area supporting suitable nesting habitat and important eagle roost sites and foraging areas. Surveys will be conducted in accordance with the *USFWS Interim Golden Eagle Inventory and Monitoring Protocols* (USFWS 2010), and CDFW's *Bald Eagle Breeding Survey Instructions* (CDFG 2010), or current guidance.

If an active eagle's nest is found, project disturbance will not occur within 0.5 mile of the active nest site during the breeding season (December 30 through July 1), or in any area that may disturb the nesting birds. The 0.5 mile no-disturbance buffer will be maintained throughout the breeding season or until the young have fledged and are no longer dependent upon the nest or parental care for survival.

Mitigation Measure BIO-CONSTRUCT-6b: Implement Pre-construction Surveys and Minimization Measures for Swainson's Hawk and White-tailed Kite.

If construction occurs between February 1 and August 31, CDFW will conduct surveys for nesting raptors, with a focus on Swainson's hawk and white-tailed kite, in accordance with established CDFW raptor survey protocols (e.g., CDFG 2000, or current guidance). Surveys will cover a minimum of a 0.5-mile radius around the construction area. If nesting raptors are detected, CDFW will establish buffers around nests that are sufficient to ensure that breeding is not likely to be disrupted or adversely impacted by construction. Buffers will be maintained until a qualified CDFW biologist has determined that young have fledged and are no longer reliant upon the nest or parental care for survival.

If potential nesting trees are to be removed during construction activities, removal will take place outside of Swainson's hawk nesting season and CDFW will develop a plan to replace known Swainson's hawk nest trees at a ratio of 3:1. If replacement planting is implemented, monitoring will be conducted annually for 5 years to assess the mitigation's effectiveness. The performance standard for the mitigation will be 65% survival of all replacement plantings.

Mitigation Measure BIO-CONSTRUCT-6c: Implement Pre-construction Surveys and Minimization Measures for Non-listed Raptors.
If construction occurs between February 1 and August 31, CDFW will conduct surveys for nesting raptors in accordance with established CDFW raptor survey protocols. Surveys will cover a minimum of a 0.5-mile radius around the construction area. If nesting raptors are detected, CDFW will establish buffers around nests that are sufficient to ensure that breeding is not likely to be disrupted or adversely impacted by construction. Buffers around active raptor nests will be 500 feet for non-listed raptors, unless a qualified biologist determines that smaller buffers would be sufficient to avoid impacts to nesting raptors. Factors to be considered for determining buffer size will include: the presence of natural buffers provided by vegetation or topography; nest height; locations of foraging territory; and baseline levels of noise and human activity. Buffers will be maintained until a qualified CDFW biologist has determined that young have fledged and are no longer reliant upon the nest or parental care for survival. If potential nesting trees are to be removed during construction activities, removal will take place outside of the raptor nesting season and CDFW will develop a plan to replace known nest trees at a ratio of 3:1. If replacement planting is implemented, monitoring will be conducted annually for 5 years to assess the mitigation's effectiveness. The performance standard for the mitigation will be 65% survival of all replacement plantings.

Impact BIO-CONSTRUCT-7: Impacts to Special-Status Passerine Species and Birds Protected under the MBTA (Significance Criterion A, Project Level, Less than Significant with Mitigation)

Table 7-2 lists the special-status bird species known to occur in the vicinity of the SCARF site. Special-status passerines such as willow flycatcher (*Empidonax traillii*) may construct nests in the vicinity of the SCARF site. Many species of birds protected under the MBTA may also nest at the SCARF site. Construction activities could disturb nesting passerines through generation of noise, visual distraction or direct impacts to occupied nests (e.g., vegetation removal). Construction activities that disturb nesting special-status passerines or birds protected under the MBTA would be considered potentially significant. Implementation of **Mitigation Measures BIO-CONSTRUCT-7a and -7b** would reduce this impact to a less than significant level.

Mitigation Measure BIO-CONSTRUCT-7a: Implement Pre-construction Surveys and Minimization Measures for Special-Status Passerine Species.
If construction begins between February 1 and August 31, CDFW will conduct surveys for special-status birds within a 1,000-ft radius of the construction area. Surveys will be conducted by biologists adhering to guidance offered in *Western*

Yellow-billed Cuckoo Natural History Summary and Survey Methodology (Halterman et al. 2009)*; Least Bell's Vireo Survey Guidelines* (USFWS 2001); and/*or A Survey Protocol for Willow Flycatcher in California* (Bombay et al. 2003). If nests are detected, CDFW will establish buffers around nests that are sufficient to ensure that breeding is not likely to be disrupted or adversely impacted by construction. No-disturbance buffers around active nests will be a minimum of 500 feet, unless a qualified CDFW biologist determines that smaller buffers would be sufficient to avoid impacts to nesting birds. Factors to be considered for determining buffer size will include: the presence of natural buffers provided by vegetation or topography; nest height; locations of foraging territory; and baseline levels of noise and human activity. Buffers will be maintained until a qualified CDFW biologist has determined that young have fledged and are no longer reliant upon the nest or parental care for survival.

Mitigation Measure BIO-CONSTRUCT-7b: Implement Pre-construction Surveys for Birds Protected under the MBTA.
Whenever possible, impacts to native nesting birds will be avoided by not conducting project activities that involve clearing of vegetation, generation of mechanical noise, or ground disturbance during the typical breeding season (February 1 to September 1), if species covered under the Migratory Bird Treaty Act and Fish and Game Code sections 3503, 3503.5, and/or 3513 are determined to be present.

If construction begins between February 1 and August 31, CDFW will conduct surveys for nesting birds within a 1,000-ft radius of the construction area. If nests are detected, CDFW will establish buffers around nests that are sufficient to ensure that breeding is not likely to be disrupted or adversely impacted by construction. Buffers around active nests will be a minimum of 250 feet, unless a qualified CDFW biologist determines that smaller buffers would be sufficient to avoid impacts to nesting birds. Factors to be considered for determining buffer size will include: the presence of natural buffers provided by vegetation or topography; nest height; locations of foraging territory; and baseline levels of noise and human activity. Buffers will be maintained until young have fledged or the nests become inactive.

Impact BIO-CONSTRUCT-8: Impacts to Special Status Bat Species (Significance Criterion A, Project Level, Less than Significant with Mitigation)

Natural communities and artificial structures at the SCARF site provide suitable roosting habitat for several species of special-status bats. Table 7-2 identifies bat species with potential to roost or forage in the vicinity of the SCARF site. None of these bat species have been documented within the site (CNDDB 2012). Removal of structures and large trees (i.e., greater than 24 inches DBH) has the potential to impact bats and their roosts. Implementation of Mitigation Measures BIO-CONSTRUCT-8a, -8b, and -8c would reduce this impact to a less than significant level.

Mitigation Measure BIO-CONSTRUCT-8a: Conduct Pre-construction Surveys for Bat Species.

No less than 7 days and no more than 14 days prior to the beginning of ground disturbance and/or construction activities, a qualified CDFW wildlife biologist, or wildlife biologist approved by CDFW, will conduct surveys for special-status bats during the appropriate time of day to maximize detectability to determine if bat species are roosting near the work area. Survey methodology may include visual surveys of bats (observation of presence of bats during foraging period), inspection for suitable habitat or bat sign (guano), or use of ultrasonic detectors (Anabat, etc.). Visual surveys may consist of a daytime pedestrian survey looking for evidence of bat use (e.g., guano) and/or an evening emergence survey to note the presence or absence of bats and will include trees within 0.25 mile of project construction activities. The type of survey will depend on the condition of the potential roosting habitat. If no bat roosts are found, then no further study is required. If evidence of bat use is observed, the number and species of bats using the roost will be determined.

Mitigation Measure BIO-CONSTRUCT-8b: Avoid and Minimize Impacts to Roosting/Breeding Sites
CDFW will avoid disturbance to roosts to the greatest extent feasible. If roosts must be removed, the bats will be excluded from the roosting site before it is removed. A mitigation program addressing compensation, exclusion methods, and roost removal procedures will be developed prior to implementation. Exclusion methods may include use of one-way doors at roost entrances (bats may leave, but not reenter), or sealing roost entrances when a site can be confirmed to contain no bats. Exclusion efforts may be restricted during periods of sensitive activity (e.g., during hibernation or while females in maternity colonies are nursing young).

Mitigation Measure BIO-CONSTRUCT-8c: Replace Bat Roosting/Breeding Sites
If roosts cannot be avoided or it is determined that construction activities may cause roost abandonment, such activities may not commence until permanent, elevated bat houses have been installed outside of, but near the construction area. Placement and height will be determined by a qualified CDFW wildlife biologist, but the height of bat house will be at least 15 feet. Bat houses will be multi-chambered and be purchased or constructed in accordance with CDFW standards. The number of bat houses required will be dependent upon the size and number of colonies found, but at least one bat house will be installed for each pair of bats (if occurring individually), or of sufficient number to accommodate each colony of bats to be relocated.

Impact BIO-CONSTRUCT-9: Impacts to American Badger (Significance Criterion A, Project Level, Less than Significant with Mitigation)

Annual grassland in at the SCARF site provides suitable habitat for the American badger. This species has been observed on nearby lands (Live Oak Associates 2008). Construction activities could directly harm badgers by burying or excavating active dens. These activities would be considered potentially significant. Implementation of **Mitigation Measure BIO-CONSTRUCT-9** would reduce this impact to a less than significant level.

Mitigation Measure BIO-CONSTRUCT-9: Conduct Pre-construction Surveys and Minimization Measures for American Badger.
No less than 14 days and no more than 30 days prior to the beginning of ground disturbance and/or construction activities, CDFW will conduct a survey to determine if American badger den sites are present at the SCARF site. If dens are found, they will be monitored for badger activity. If CDFW determines that dens may be active, the entrances of the dens will be blocked with soil, sticks, and debris for three to five days to discourage the use of these dens prior to project disturbance activities. The den entrances will be blocked to an incrementally greater degree over the three to five-day period. After the qualified CDFW biologist determines that badgers have stopped using active dens, the dens will be hand-excavated with a shovel to prevent re-use during construction. No disturbance of active dens will take place when cubs may be present and dependent on parental care, as determined by a qualified CDFW biologist.

Impact BIO-CONSTRUCT-10: Impacts to San Joaquin Kit Fox (Significance Criterion A, Project Level, Less than Significant with Mitigation)

Evidence of San Joaquin kit fox (SJKF) occurring at the SCARF site is scant, and the nearest confirmed record of a SJKF population is in western Madera County approximately 40 miles away. However, suitable habitat is present in the vicinity of the SCARF site. Construction vehicle traffic and ground disturbing activities including excavation, placement of fill, and soil compaction could potentially impact SJKF. Implementation of **Mitigation Measure BIO-CONSTRUCT-10** would reduce this impact to a less than significant level.

Mitigation Measure BIO-CONSTRUCT-10: Conduct Pre-construction Surveys and Minimization Measures for San Joaquin Kit Fox.
A qualified biologist will conduct pre-construction surveys no less than 14 days and no more than 30 days before the commencement of construction activities to identify potential dens more than 5 inches in diameter. CDFW will implement USFWS' *Standardized Recommendations for Protection of San Joaquin Kit Fox Prior to or During Ground Disturbance* (USFWS 1999, 2011b). CDFW will notify USFWS in writing of the results of the pre-construction survey within 30 days after these activities are completed.

If potential dens are located within the proposed work area and cannot be avoided during construction activities, a USFWS-approved biologist will determine if the dens are occupied. If occupied dens are present within the proposed work area, they will be avoided through the use of exclusion zones following the most current USFWS procedures (currently USFWS 1999, 2011b). Furthermore, CDFW will notify USFWS immediately if a natal or pupping den is found in the survey area, and will present the results of pre-activity den searches within 5 days after these activities are completed and before the start of construction activities in the area. CDFW, in coordination with USFWS, will determine if SJKF den removal is appropriate. If unoccupied dens need to be removed, the USFWS-approved biologist will remove these dens by hand-excavating them in accordance with USFWS procedures (USFWS 1999, 2011b).

Additional conservation measures will be coordinated between USFWS and CDFW, and may include replacing dens, installing off-site artificial dens, acquiring compensatory habitat, or other conservation options. Compensation may include dedicating conservation easements, purchasing mitigation credits, or other off-site conservation measures, and the details of these measures will be included in the mitigation plan and must occur with full endowments for management in perpetuity. The plan will include information on responsible parties for long-term management, holders of conservations easements, long-term management requirements, and other details, as appropriate, for the preservation of long-term viable SJKF populations. If conservation measures are implemented, CDFW will monitor their performance annually for 5 years to assess the mitigation's effectiveness. The performance standard for the mitigation will be no net reduction in the size or viability of the local SJKF population.

Impact BIO-CONSTRUCT-11: Impacts to Riparian Habitat and Freemont Cottonwood Woodlands (Significance Criterion B, Project Level, Less than Significant with Mitigation)

The majority of the SCARF would be constructed on disturbed and previously developed land. However, portions of the SCARF would be constructed in riparian habitat and Fremont Cottonwood woodland (Alliance code 61.1300.00), which is identified as a sensitive natural community by CDFW. Riparian habitat that would be impacted by construction is classified as black willow thickets [*Salix gooddingii/Rubus armeniacus* alliance (Alliance code 61.211.07)]. Impacts to riparian habitat would be required for construction of the volitional release channel, return flow drum filters, and return flow outfall (Figure 2-3). Construction activities would temporarily disturb approximately 11,000 sq ft of riparian habitat during clearing and grubbing for access, and would result in a permanent loss of approximately 5,000 sq ft of riparian habitat for construction of the volitional release channel, return flow drum filters, and return flow outfall. Impacts to Fremont Cottonwood woodland would result from tree removal and placement of fill for construction of the hatchery building and aquaculture tanks (Figure 2-3). This would result in a permanent loss of approximately 3,000 sq ft of Fremont Cottonwood woodland. According to a field survey conducted in April 2013 using protocols established by the U.S. Department of Forestry (USDF 2007), approximately 54 native trees (cottonwood, valley oak, interior live oak, willow, and white alder) greater than 4 inches DBH are located on the SCARF site and any number of these may be removed during construction in riparian and Fremont Cottonwood woodland habitats. These impacts are considered to be significant. Implementation of **Mitigation Measures BIO-CONSTRUCT-11a and -11b** would reduce this impact to a less than significant level.

Mitigation Measure BIO-CONSTRUCT-11a: Minimize Area of Disturbance of Riparian Habitat.
The disturbance or removal of vegetation will not exceed the minimum necessary to complete construction and will only occur within the defined work area.

Mitigation Measure BIO-CONSTRUCT-11b: Develop and Implement Revegetation Plan for Riparian Habitat Disturbed by Construction.

CDFW will develop a revegetation plan for riparian habitat and sensitive natural communities disturbed by construction. All disturbed soils and new fill in riparian habitat or sensitive natural communities will be revegetated with site-appropriate native species. Any native vegetation 4 inches or greater DBH damaged or removed as result of construction activity will be replaced at a 3:1 ratio; this ratio will increase to 10:1 for native trees of 24 inches DBH and greater. Revegetation areas will be maintained and monitored to ensure a minimum of 65 percent survival of the plantings after 5 years.

Impact BIO-CONSTRUCT-12: Impacts to Federally Protected Wetlands (Significance Criterion C, Project Level, Less than Significant with Mitigation)

A jurisdictional delineation of waters of the U.S. was completed in 2012, but has not yet been verified by USACE. Jurisdictional waters of the U.S. delineated within the SCARF site are anticipated to include wetlands in the secondary channel of the San Joaquin River, and a seasonal depression in an ephemeral drainage between the Interim Facility and the settling ponds to the west (Figure 2-3). Existing aquaculture ponds, effluent treatment ponds, and constructed wetlands are not anticipated to be considered jurisdictional because they are part of a permitted wastewater treatment system, and for the purposes of this analysis and evaluations of significance, are not considered to be jurisdictional waters of the U.S.

The Proposed Project would place fill in the jurisdictional waters of the U.S. for construction of the volitional release channel and return flow drum filters (Figure 2-3). Construction activities would temporarily disturb approximately 1,550 sq ft of wetlands, and fill approximately 3,500 sq ft of jurisdictional wetlands. These activities would result in a loss of wetland area and may degrade wetland function and values. This is considered a significant impact. Implementation of **Mitigation Measures BIO-CONSTRUCT-12a and -12b** would reduce this impact to a less than significant level.

Mitigation Measure BIO-CONSTRUCT-12a: Obtain Regulatory Permits for Work Activities Taking Place in Wetlands and Waters of the United States and the State.
Work within areas defined as waters of the U.S. that includes placement of fill will require a CWA Section 404 permit from the USACE and Section 401 Water Quality Certification from the RWQCB. All work proposed in jurisdictional waters of the U.S. will be authorized by permits from the USACE and RWQCB.

In areas where project activities are temporary in nature, jurisdictional wetland and other waters of the U.S. will be restored to their condition prior to disturbance. In areas where permanent disturbance to jurisdictional waters or wetlands will occur, CDFW will first identify if potential mitigation sites are present within close proximity to the area of disturbance, and will construct new or restore degraded wetlands. If waters or wetlands cannot be restored on-site or in the immediate vicinity of the disturbance location, replacement at a nearby off-site location will be provided. The replacement of waters or wetlands will be equivalent to the nature of the habitat lost, and will be provided at a suitable ratio to ensure that, at a minimum, there is no net loss of habitat acreage or value. The replacement habitat will be set aside in perpetuity for habitat use. Mitigation ratios to achieve the "no net loss" standard will be determined in consultation with the USACE and RWQCB.

Mitigation Measure BIO-CONSTRUCT-12b: Avoidance of and Mitigation for Incidental Fill.
Incidental fill of wetland areas will be minimized wherever possible. Temporary construction fencing will be erected around wetlands areas to reduce the potential of incidental fill. Areas affected by construction will be restored to pre-construction contours and revegetated using a mix of native vegetation in accordance with Mitigation Measure BIO-11b.

Impact BIO-CONSTRUCT-13: Construction of the SCARF Could Interfere with Wildlife Movement, Established Wildlife Corridors, or the Use of Native Wildlife Nursery Sites (Significance Criterion D, Project Level, Less than Significant)

The San Joaquin River and associated riparian habitat serves as a wildlife movement corridor. The majority of the SCARF would be constructed on disturbed and developed lands adjacent to the river; a portion of the volitional release channel would be constructed in riparian forest associated with the San Joaquin River. All of these areas are potentially utilized as movement corridors by a variety of birds, amphibians, reptiles and mammals.

Construction activities will create temporary physical barriers and noise disturbance which may affect species in the vicinity of the SCARF site. Disruption of nesting or breeding of special-status species will be minimized by conducting appropriate pre-construction surveys (as described in the other impact discussions) and working only during daylight hours. Permanent impacts to riparian habitat will be limited to a small area for the return flow outfall and volitional release channel. These features will not permanently affect wildlife movement. Therefore, this is a less than significant impact.

Impact BIO-CONSTRUCT-14: Conflict with Local Policies Protecting Biological Resources (Significance Criterion E, Project Level, Less than Significant)

In order to protect the foraging and nesting habitat for species that rely on the river for their existence, the Parkway Master Plan sets a policy to plan buffer zones for a wildlife corridor along the river. Natural Resource General Policy 1 of the Parkway Master Plan states that development along the river will provide a minimum width for the wildlife corridor of 200 feet on both sides of the river, acquire a wider corridor whenever possible to provide greater habitat diversity and protect additional areas of native vegetation, and provide a buffer wider than 150 feet whenever more intensive uses on adjacent lands exist or are planned. Exceptions may be necessary where the minimum-width corridor or buffer or both is infeasible due to topography or other physical constraints. In those instances, an offsetting expansion on the opposite side of the river should be provided. Where steep bluffs drop directly into, or close to, the river, the bluff face should be acquired for incorporation in the corridor. See Chapter 13, *Land Use and Planning*, for more details regarding the Parkway Master Plan and its policies.

While the Parkway Master Plan recommends guidelines for a wildlife habitat and movement buffer zone, the suggested buffer width is infeasible for the Proposed Project due to both topography (i.e., the site is constrained by the bluff to the south) and the need for the SCARF to be located in close proximity to the river to allow for volitional fish releases. However, since the land on the opposite (northwest) side of the river is protected land held by the San Joaquin River Parkway and Conservation Trust (Figure 2-2), the buffer zone has been accommodated on the opposite side of the river; therefore, there would be a less than significant impact arising from conflicts with local ordinances and policies protecting biological resources.

SCARF Operations

Impact BIO-OP-1: Impacts to Special-Status Wildlife Species and Their Habitats (Significance Criterion A, Project Level, Less than Significant with Mitigation)

Operations of the SCARF may generate noise, light, and an increased level of human activity that could potentially impact special-status wildlife species. Noise generated at the SCARF would come from sources such as from vehicles, water pumps, the water supply aeration tower, and human activity. The noise levels generated at the SCARF site may exceed the baseline condition, but would be of similar character and magnitude to the SJFH (see Chapter 14, *Noise*). For this reason, noise generated from operations is not anticipated to displace individuals from suitable habitat or otherwise result in a substantial adverse effect to any of the special-status wildlife species with the potential to occur at the site. Therefore, the impacts associated with noise are considered less than significant.

Lighting at the SCARF would include outdoor lighting used to illuminate aquaculture areas and building access points. Lighting has potential to displace individuals from suitable habitat or otherwise result in a substantial adverse effect to the special-status wildlife species with the potential to occur at the site. This is considered a potentially significant impact. However, **Mitigation Measure AES-CONSTRUCT-4** requires that lighting be properly shielded and not directed toward sensitive areas such as riparian habitat adjacent to the SCARF site. With implementation of this mitigation measure, lighting elements are not anticipated to displace individuals from suitable habitat or otherwise result in a substantial adverse effect to any of the special-status wildlife species with the potential to occur at the site. Therefore, implementation of this mitigation measure would reduce this impact to a less than significant level.

Increased human activity at the SCARF would include the daily activities of employees, visits by maintenance contractors, and occasional private and public tours. Most of these activities would occur during regular work hours in areas that are developed for aquaculture, although some evening activities are anticipated including afterhours security checks and evening transfers of fish. Some maintenance and monitoring may also occur along the volitional release channel and return flow outfall. However, special-status species that could be adversely affected by the increased level of human activity have not been documented at the SCARF site. Therefore, these activities are not anticipated to displace individuals from suitable habitat or otherwise adversely impact special-status wildlife species, and are considered less than significant.

Impact BIO-OP-2: Impacts to Riparian Habitat (Significance Criterion B, Project Level, Less than Significant)

SCARF operations in riparian habitat would include maintenance and monitoring activities conducted in the vicinity of the volitional release channel and return flow outfall. Maintenance activities are likely to include hand clearing of vegetation (e.g., blackberries or willows) and flood debris around the volitional release channel. Monitoring activities may include collection of water samples at the return flow outfall and assessment of fish passage in volitional release channel. Maintenance and monitoring activities are not anticipated to significantly adversely impact riparian habitats or other sensitive natural communities. Therefore, the impact is considered less than significant.

Impact BIO-OP-3: Impacts to Federally Protected Wetlands (Significance Criterion C, Project Level, Less than Significant)

SCARF operations in federally protected wetlands would include maintenance and monitoring activities conducted in the vicinity of the volitional release channel (see Impact BIO-OP-2) and discharge of return flows of hatchery process water to the San Joaquin River. Maintenance and monitoring activities would not substantially adversely affect federally protected wetlands. Discharge of return flow to the San Joaquin River would be monitored for compliance with the NPDES permit and waste discharge requirements for cold water concentrated animal production facilities (CVRWQCB 2010 and 2012). The discharge limits, monitoring requirements and enforcement thresholds of the NPDES permit and waste discharge requirements are protective of water quality and beneficial uses (see Chapter 12, *Hydrology, Geomorphology, and Water Quality*). Thus, return flow discharges would not substantially adversely affect federally protected wetlands, including the San Joaquin River. Therefore, these impacts are considered less than significant.

Impact BIO-OP-4: Noise Effects on Wildlife (Significance Criterion D, Project Level, Less than Significant)

SCARF operations would generate noise that exceeds the baseline condition in riparian areas adjacent to the site which function as wildlife movement corridors. Noise levels would increase due to the new aeration tower for water supply, mechanical equipment (e.g., air conditioners, pumps), and vehicle trips. These noise sources are similar to those currently operating at the SJFH, and would not greatly increase ambient noise levels at the SCARF site. As described in BIO-OP-1, the noise levels generated at the SCARF are not anticipated to displace individuals from suitable habitat or alter dispersal or migration patterns. Therefore, the impact is considered less than significant.

Fish Reintroduction

Impact BIO-REINTRO-1: Impacts to Special-Status Plant Species during Broodstock Collection, Translocation, or Fish Reintroduction (Significance Criterion A, Project/Program Level, Less than Significant)

Broodstock collection from wild populations (i.e., donor stock) would include collection of juveniles and possibly extraction of fertilized eggs from redds. Juvenile collection would be performed through seining, electrofishing and/or use of rotary screw traps. Redd extraction methods may include redd pumping, which uses a small, portable, backpack-mounted water pump, or hand excavation. Special-status plant species have the potential to be adversely affected during broodstock collection activities through access to and from streams, dispersal of non-native or invasive species, and release of noxious materials (e.g., fuel).

Fish reintroduction activities would occur at the SCARF and off-site locations. Potential off-site release locations are identified in Table 2-4. In general, releases would occur at developed (e.g., boat ramps, bridges, weirs) or previously disturbed areas that do not support special-status plant species. Off-site releases at undeveloped or undisturbed locations would have the potential to impact special-status plant species.

Tables J-1 and J-2 of Appendix J, *Supporting Documentation Related to Biological Resources - Vegetation and Wildlife*, list special-status plant species known to occur adjacent to streams targeted for broodstock collection and in the Restoration Area. Rare plants reported in the vicinity of broodstock collection streams and the Restoration Area include species such as Hartweg's golden sunburst (*Pseudobahia bahiifolia*), slender Orcutt grass (*Orcuttia tenuis*), pink creamsacs (*Castilleja rubicundula ssp. rubicundula*), and Butte County checkerbloom (*Sidalcea robusta*), among others (Appendix J, Tables J-1 and J-2).

Special-status plant species growing adjacent to streams may be trampled or matted during broodstock collections and fish reintroductions. However, access to and from streams for broodstock collection and fish reintroductions would not result in excessive ground disturbance, compaction or scarification of soils, and therefore are not anticipated to destroy or result in the local decline of special-status plants. The potential for introduction of invasive plant species would be minimized, but not eliminated, by CDFW protocols that require personnel to decontaminate equipment to control the spread of AIS (see Appendix F, *Aquatic Invasive Species Monitoring and Decontamination Protocols*). Personnel are not anticipated to substantially disperse invasive plants species because of the nature of the work is concentrated in discrete locations along streams. Finally, fuel used for broodstock collection and reintroduction equipment would be handled in accordance with extensive federal, state, and local regulations that ensure that there would be no significant risks to the environment during transport, use, storage, or disposal of hazardous materials (see Chapter 11, *Hazards and Hazardous Materials*). Therefore, the potential impacts to special-status plants species during broodstock collection and fish reintroductions is considered less than significant.

The impact analysis and significance conclusion above is considered project-level for all aspects of fish reintroduction, with the exception of wild broodstock collection, for which it is programmatic. For further discussion of the approach to the project and programmatic analysis in this document, please see Chapter 3, *Introduction to the Environmental Analysis*.

Impact BIO-REINTRO-2: Impacts to Special-Status Wildlife Species during Broodstock Egg Collection (Significance Criterion A, Program Level, Less than Significant)

Wild populations of Central Valley spring-run Chinook salmon generally spawn from mid-August through October. Peak spawning and egg incubation times vary among the

Sacramento River tributaries, but broodstock collection of spring-run Chinook salmon eggs would most typically occur between September and December. Fall-run Chinook salmon generally spawn from October through December. Peak spawning and egg incubation times vary among the San Joaquin River tributaries where broodstock collection of fall-run Chinook salmon eggs would occur, but would most typically takes place between October and February.

Table J-3 of Appendix J, *Supporting Documentation Related to Biological Resources - Vegetation and Wildlife*, list special-status wildlife species known to occur adjacent to streams targeted for broodstock collection. Rare invertebrates known to occur in close proximity to broodstock collection streams include vernal pool tadpole shrimp (*Lepidurus packardi*) and valley elderberry longhorn beetle. Numerous rare or protected bird species are found in these areas, including four species of hawk and goshawk (*Buteo* and *Accipiter*), white-tailed kite, western yellow-billed cuckoo (*Coccyzus americanus*), bald eagle, bank swallow (*Riparia riparia*), and tricolored blackbird (*Agelaius tricolor*). Rare herpetofauna consist primarily of western pond turtle, foothill yellow-legged frog (*Rana boylii*), Cascades frog (*Rana cascadae*), and giant garter snake (*Thamnophis gigas*). Rare mammals include species such as American badger, Sierra Nevada red fox (*Vulpes vulpes necator*), and a variety of bat species (Appendix J, Table J-3).

Broodstock collection of eggs could harm special-status invertebrates by direct disturbance of occupied habitat or individuals. However, the level of disturbance created by egg collections would not result in a significant impact to special-status invertebrates. Other special-status wildlife may be impacted by disrupting breeding activity by directly trampling or destroying nests, or indirectly by causing visual distractions, noise or temporary movement barriers. However, broodstock collection of eggs would not coincide with of the breeding season for special-status wildlife known to occur in the streams targeted for collection. Egg collection activities are not likely to substantially affect special-status wildlife or their habitats outside of the breeding season. Therefore, the impacts of Chinook salmon egg collection are considered less than significant.

Impact BIO-REINTRO-3: Impacts to Special-Status Wildlife Species during Broodstock Juvenile Collection (Significance Criterion A, Program Level, Less than Significant with Mitigation)

Collection of juvenile spring-run Chinook salmon from wild stocks may occur year-round. Broodstock collection of juveniles may coincide with the breeding season for special-status terrestrial wildlife species known to occur in the streams targeted for collection (Appendix J, *Supporting Documentation Related to Biological Resources - Vegetation and Wildlife*, Table J-3). Special-status wildlife species have the potential to be adversely affected by juvenile collection activities through excessive turbidity generate in the collection streams, access to and from streams, as well as noise levels that exceed the baseline condition.

For example, excessive turbidity generated during broodstock collection may harm non-target redds (see Chapter 6, *Biological Resources - Fisheries*), and may also adversely impact eggs and tadpoles of special-status amphibians such as the foothill yellow-legged frog. Increased suspension of solids in the water column can adversely affect the development of amphibian embryos and tadpoles. Excessive sedimentation downstream of the collection areas may coat the sand and gravel supporting interstitial algae, bacteria and diatoms upon which tadpoles feed. Furthermore, personnel wading in shallow water may crush or disturb amphibian eggs.

Access to and from streams for reintroduction activities could disturb special-status wildlife by directly trampling or destroying habitat, or indirectly by causing visual distractions. In the absence of mitigation, impacts to special-status terrestrial wildlife species during broodstock collection would be potentially significant. Implementation of **Mitigation Measure BIO-REINTRO-3** would reduce this impact to a less than significant level.

Mitigation Measure BIO-REINTRO-3. Conduct Project-Level Assessment of Activity, and Implement Conservations Measures to Avoid, Minimize, or Mitigate Impacts.
When project activities are defined to a level that impacts to biological resources can be evaluated, and prior to implementing that component or taking actions that commit CDFW to implementing that component, CDFW will assess the site to determine the potential for impacts to biological resources. At minimum, the assessment will include a CNDDB search of the site vicinity (minimum 5-mile radius), and a site visit by a qualified botanist and wildlife biologist to evaluate the potential for special-status species and sensitive habitats to be impacted by the activity. If the biologists determine that special-status species or sensitive habitats may be affected by the activity, CDFW will implement the conservation measures listed in Appendix I, *CDFW's Conservation Measures for Biological Resources That May Be Affected by Program-level Actions*, for each species and habitat type that may be affected.

Impact BIO-REINTRO-4: Impacts to Riparian Habitat and Other Sensitive Natural Communities during Broodstock Collection, Translocation, or Fish Reintroduction (Significance Criterion B, Project/Program Level, Less than Significant)

Riparian habitat and other stream-side sensitive natural communities would have the potential to be adversely affected by wild broodstock collection and off-site release activities by access to and from streams, dispersal of non-native or invasive species, and release of noxious materials (e.g., fuel). Access to and from streams for reintroduction activities could damage riparian vegetation by trampling or matting such habitat by personnel and their equipment. However, these activities would not result in excessive ground disturbance, compaction or scarification of soils, and therefore are not anticipated significantly adversely affect riparian habitats. Personnel and their equipment may also introduce or disperse invasive plant species, which may degrade riparian habitat. The potential for introduction of invasive plant species would be minimized, but not eliminated, by CDFW protocols that require personnel to decontaminate equipment to control the spread of AIS (see Appendix F, *Aquatic Invasive Species Monitoring and Decontamination Protocols*). As mentioned in Impact BIO-REINTRO-1, fuel used for broodstock collection and reintroduction equipment would be handled in accordance with extensive federal, state, and local regulations that ensure that there would be no significant risks to the environment. Therefore, the impact to riparian habitat and other stream-side sensitive natural communities is considered less than significant.

The impact analysis and significance conclusion above is considered project-level for all aspects of fish reintroduction, with the exception of wild broodstock collection, for which it is programmatic. For further discussion of the approach to the project and programmatic analysis in this document, please see Chapter 3, *Introduction to the Environmental Analysis*.

Impact BIO-REINTRO-5: Impacts to Federally Protected Wetlands during Broodstock Collection, Translocation, or Fish Reintroduction (Significance Criterion C, Project/Program Level, Less than Significant)

Broodstock collection and fish reintroduction impacts to federally protected wetlands would be similar to those described for riparian habitat and other sensitive natural communities (see Impact BIO-REINTRO-4). These activities would not place fill in federally protected wetlands, and would not substantially affect wetland functions and values. Therefore, these impacts are considered less than significant.

The impact analysis and significance conclusion above is considered project-level for all aspects of fish reintroduction, with the exception of wild broodstock collection, for which it is programmatic. For further discussion of the approach to the project and programmatic analysis in this document, please see Chapter 3, *Introduction to the Environmental Analysis*.

Impact BIO-REINTRO-6: Potential for Broodstock Collection to Interfere with Wildlife Movement, Established Wildlife Corridors, or the Use of Native Wildlife Nursery (Significance Criterion D, Program Level, Less than Significant with Mitigation)

Wild broodstock collection would not interfere with the movement of terrestrial wildlife species or affect nursery sites. However, movement of aquatic organisms, such as amphibians and reptiles, may be temporarily affected by stream seining, the use of fyke nets, and/or use of rotary screw traps. These impacts would be considered potentially significant. Implementation of **Mitigation Measure FISH-MANAGEMENT-8a** and **FISH-MONITORING-2d**, which would require CDFW to check traps on a daily basis would minimize impacts to aquatic wildlife movement and use of nursery sites, and reduce the impact to a level that is considered less than significant.

Fisheries Management

Impact BIO-MANAGEMENT-1: Impacts to Special-Status Species during Construction of Fish Segregation Weirs and Barriers (Significance Criterion A, Program Level, Less than Significant with Mitigation)

Proposed fisheries management actions may include installing fish segregation weirs to separate spawning spring- and fall-run Chinook salmon, and barriers to block fish migration into Salt and Mud sloughs. Construction of segregation weirs and migration barriers may impact special-status species and their habitats, particularly if the weirs or barriers require establishment of permanent foundations on the riverbank. Impacts associated with construction of fish segregation weirs and barriers may include clearing vegetation, grading, and placement of fill. Fish segregation weirs or barriers would likely be constructed in the vicinity of the existing HFB, in Reach 1A, at Salt and Mud sloughs, and/or various other sites (Figure 1-1), but the precise locations are not known at this time. Direct and indirect impacts to special-status species and their habitats would be considered potentially significant. Implementation of **Mitigation Measure BIO-REINTRO-3** would reduce this impact to a less than significant level.

Impact BIO-MANAGEMENT-2: Operation of Fish Segregation Weirs/Barriers and Other Instream Equipment Could Interfere with Wildlife Movement, Established Wildlife Corridors, or the Use of Native Wildlife Nursery (Significance Criterion D, Project/Program Level, Less than Significant with Mitigation)

Fish segregation weirs and migration barriers would not interfere with the movement of terrestrial wildlife species or affect nursery sites. However, movement of aquatic organisms, such as amphibians and reptiles, may be temporarily affected by weirs, use of traps or nets in conjunction with weirs or trap and haul efforts, and/or other equipment associated with trap and haul activities (e.g., streamside rearing). For example, movement of reptiles such as western pond turtle and giant garter snake may be obstructed by the weirs and associated nests. These impacts would be considered potentially significant. Implementation of **Mitigation Measure FISH-MANAGEMENT-8a** and **FISH-MONITORING-2d**, which would require CDFW to check traps on a daily basis would minimize impacts to aquatic wildlife movement and use of nursery sites, and reduce the impact to a level that is considered less than significant.

The impact analysis and significance conclusion above is considered project-level for the existing HFB and trap and haul activities, and programmatic for any new or reconstructed barriers. For further discussion of the approach to the project and programmatic analysis in this document, please see Chapter 3, *Introduction to the Environmental Analysis*.

Fisheries Research and Monitoring

Impact BIO-MONITORING-1: Impacts to Special-Status Plant Species during Research and Monitoring Activities (Significance Criterion A, Project Level, Less than Significant with Mitigation)

Field-based research and monitoring conducted as part of the Proposed Project may include a wide range of activities such as juvenile rearing habitat studies, egg survival and spawning studies, predation studies, fish community assessments, trap and haul of fall-run Chinook salmon, and others. These activities would often involve the use of seining, electrofishing and/or use of rotary screw traps. Special-status plant species have the potential to be adversely affected during research and monitoring activities through access to and from streams, dispersal of non-native or invasive species, and release of noxious materials (e.g., fuel).

Research and monitoring activities would be conducted throughout the Restoration Area, and to a limited extent, in streams identified as potential sources of wild broodstock. Table

J-1 of Appendix J, *Supporting Documentation Related to Biological Resources - Vegetation and Wildlife*, lists the special-status plant species with the potential to occur in the Restoration Area. Special-status plant species growing adjacent to streams may be trampled or matted during research and monitoring activities. Repeated access to and from streams for research and monitoring activities may result in introduction of invasive plant species, compaction of soils, and direct impacts to special-status plants. The potential for introduction of invasive plant species would be minimized, but not eliminated, by CDFW protocols that require personnel to decontaminate equipment to control the spread of AIS (see Appendix F, *Aquatic Invasive Species Monitoring and Decontamination Protocols*). These impacts, including direct impacts to special-status plants, are considered potentially significant. Implementation of **Mitigation Measure BIO-REINTRO-3** would reduce this impact to a less than significant level.

Impact BIO-MONITORING-2: Impacts to Special-Status Wildlife Species during Research and Monitoring Activities (Significance Criterion A, Project Level, Less than Significant with Mitigation)

Research and monitoring activities may adversely impact special-status wildlife species through generation of noise, access to and from streams, creation of temporary movement barriers, or the release of release of noxious materials (e.g., fuel).

Noise generated during research and monitoring would primarily come from vehicles, human conversation, and mechanized equipment. The noise levels generated by research and monitoring activities would exceed the baseline condition in many locations throughout the Restoration Area. However, these activities would occur in only a handful of locations spread throughout the Restoration Area and would be short-term and intermittent in nature. For these reasons, the increased noise and human activity are not anticipated to result in substantial displacement of individuals from suitable habitat or otherwise result in a substantial adverse effect to any of the special-status wildlife species.

Use of temporary research and monitoring equipment such as rotary screw traps would not adversely affect terrestrial wildlife. However, movement of semiaquatic organisms, such as amphibians and reptiles, may be temporarily affected by use of traps or nets. These impacts would be considered potentially significant. Implementation of **Mitigation Measure FISH-MANAGEMENT-8a and FISH-MONITORING-2d**, which would require CDFW to check traps on a daily basis would minimize impacts to special-status aquatic wildlife, and reduce the impact to a level that would be less than significant.

Access to and from streams for research and monitoring activities could disrupt breeding activity by directly trampling or destroying nests, or indirectly by causing visual distractions. In addition, use of equipment in proximity to nesting birds could have adverse effects due to repeated human disturbance near the nest. These impacts would be considered potentially significant. Implementation of **Mitigation Measure BIO-REINTRO-3** would reduce this impact to a less than significant level.

Impact BIO-MONITORING-3: Impacts to Riparian Habitat, Sensitive Natural Communities, and Federally Protected Wetlands during Research and Monitoring

Activities (Significance Criteria B and C, Project Level, Less than Significant with Mitigation)

Research and monitoring impacts to riparian habitat, sensitive natural communities, and federally protected wetlands would be similar to those described in Impact BIO-REINTRO-4 and 5. Repeated access to and from streams for research and monitoring activities may result in impacts to riparian habitat and sensitive natural communities. These impacts would be considered potentially significant. Implementation of **Mitigation Measure BIO-REINTRO-3** would reduce this impact to a less than significant level.

Impact BIO-MONITORING-4: Impacts to Wildlife Movement and Nursery Sites during Research and Monitoring Activities (Significance Criterion D, Project Level, Less than Significant with Mitigation)

Research and monitoring would not interfere with the movement of terrestrial wildlife species or affect nursery sites. However, movement of aquatic organisms, such as amphibians and reptiles, may be temporarily affected by instream trapping devices such as Fyke nets and rotary screw traps. These impacts would be considered potentially significant. Implementation of **Mitigation Measure FISH-MANAGEMENT-8a and FISH-MONITORING-2d**, which would require CDFW to check traps on a daily basis would minimize impacts to aquatic wildlife movement and use of nursery sites, and reduce the impact to a level that is considered less than significant.

Recreation Management

Impact BIO-RECREATION-1: Impacts to Special-Status Plant Species during Construction of Improvements at Recreational Angling Sites (Significance Criterion A, Program Level, Less than Significant with Mitigation)

As part of the Proposed Project, CDFW may enhance recreational angling opportunities in off-channel ponds adjacent to the San Joaquin River. These enhancements may include ground disturbing activities such as excavation or placement of fill. These activities have the potential to adversely affect special-status plant species and their habitats, including species listed in Table J-1 of Appendix J, *Supporting Documentation Related to Biological Resources - Vegetation and Wildlife*. Species identified as potentially occurring in Reach 1A are the mostly likely to be impacted by actions conducted to enhance recreational angling. Direct impacts to special-status plants and their habitats would be considered potentially significant. Implementation of **Mitigation Measure BIO-REINTRO-3** would reduce this impact to a less than significant level.

Impact BIO-RECREATION-2: Impacts to Special-Status Plant Species by Increased Traffic of Anglers and Other Recreational Users (Significance Criterion A, Program Level, Less than Significant with Mitigation)

Providing access to new angling areas along the San Joaquin River may result in impacts to special-status plant species and their habitats. Special-status plant species growing adjacent to streams may be trampled or matted by anglers. Repeated access to and from streams for angling may result in excessive ground disturbance and compaction of soils. This may result in the loss or decline of a special-status plants species population along the river or degradation of suitable habitat, which could result in potentially significant impacts. Implementation of **Mitigation Measures BIO-REINTRO-3 and BIO-RECREATION-2** would reduce this impact to a less than significant level.

> **Mitigation Measure BIO-RECREATION-2: Preserve and Protect Special-Status Plant Populations in the Vicinity of Recreational Enhancement Areas.** Prior to developing recreational enhancements, CDFW will implement the Mitigation Measure BIO-REINTRO-3. If the qualified botanist identifies special-status plants species in the vicinity of the recreational enhancements, CDFW will implement measures to minimize potential impacts. Minimization measures may include constructing pathways, fencing, signage, and other strategies to reduce the potential for trampling or matting that will protect the viability of the local plant population and suitable habitat. If minimization measures are implemented, monitoring of plant populations will be conducted annually for 5 years to assess the mitigation's effectiveness. The performance standard for the mitigation will be no net reduction in the size or viability of the local population.

Impact BIO-RECREATION-3: Impacts to Special-Status Wildlife Species during Construction of Improvements at Recreational Angling Sites (Significance Criterion A, Program Level, Less than Significant with Mitigation)

As part of the Proposed Project, CDFW may enhance recreational angling opportunities in off-channel ponds adjacent to the San Joaquin River. These enhancements may include ground disturbing activities such as excavation or placement of fill. These activities have the potential to adversely affect special-status wildlife species and their habitats, including species listed in Table J-1 of Appendix J, *Supporting Documentation Related to Biological Resources - Vegetation and Wildlife*. Species identified as potentially occurring in Reach 1A are the mostly likely to be impacted by actions conducted to enhance recreational angling. Direct impacts to special-status wildlife and their habitats would be considered potentially significant. Implementation of **Mitigation Measure BIO-REINTRO-3** would reduce this impact to a less than significant level.

Impact BIO-RECREATION-4: Impacts to Special-Status Wildlife Species by Increased Traffic of Recreational Anglers (Significance Criterion A, Program Level, Less than Significant)

Providing access to new angling areas along the San Joaquin River may generate noise and result in an increased level of human activity. Noise generated by anglers would primarily come from human conversation. The noise levels generated by anglers may exceed the baseline condition. Anglers may also disturb vegetation and create visual distraction for wildlife. However, the increased noise and human activity are not anticipated to result in substantial displacement of individuals from suitable habitat or otherwise result in a substantial adverse effect to any of the special-status wildlife species. Therefore, these impacts are considered less than significant.

Impact BIO-RECREATION-5: Construction of Angling Enhancements May Impact Riparian Habitat and Other Sensitive Natural Communities (Significance Criterion B, Program Level, Less than Significant with Mitigation)

Construction of angling enhancement projects is likely to occur adjacent to the San Joaquin River and may affect riparian habitat and other stream-side sensitive natural communities. Impacts may occur during clearing and grubbing, excavation, grading and placement of fill. Direct impacts to these habitats would be considered potentially significant**.** Implementation of **Mitigation Measure BIO-REINTRO-3** would reduce this impact to a less than significant level.

Impact BIO-RECREATION-6: Impacts to Federally Protected Wetlands Associated With Construction of Angling Enhancements (Significance Criterion C, Program Level, Less than Significant with Mitigation)

Construction of angling enhancement projects may include impacts to federally protected wetlands including placement of fill or change in hydrology. These activities may result in a loss of wetland area and may degrade wetland function and values. Implementation of **Mitigation Measure BIO-REINTRO-3** would reduce this impact to a less than significant level.

Impact BIO-RECREATION-7: Construction of Angling Enhancements Could Interfere With Wildlife Movement, Established Wildlife Corridors, or the Use of Native Wildlife Nursery Sites (Significance Criterion D, Program Level, Less than Significant with Mitigation)

The San Joaquin River and associated riparian habitat serves as a wildlife movement corridor. The lands adjacent to the river are also utilized as movement corridors by a variety of birds, amphibians, reptiles and mammals. No new permanent physical dispersal or migration barriers for terrestrial wildlife would be developed. However, construction of angling enhancements may create temporary physical barriers and noise disturbance which may affect species in the vicinity of the enhancement sites site. This may include disruption of nesting or breeding of wildlife species, which would be considered potentially significant. Implementation of **Mitigation Measure BIO-REINTRO-3** would reduce this impact to a level that is considered less than significant.

Chapter 8
CULTURAL RESOURCES

8.1 Overview

This chapter describes potential impacts of the Proposed Project related to cultural and paleontological resources. Cultural resources include prehistoric archaeological sites, historic-era archaeological sites, traditional cultural properties (TCPs), and historic buildings, structures, landscapes, districts, and linear features. Archaeological sites are places where Native Americans lived or carried out activities during the prehistoric period, and as recently as the early 1800s in Fresno County. Prehistoric and historic-era sites contain artifacts, cultural features, subsistence remains, and human burials.

Paleontological resources are the fossil remains of prehistoric flora and fauna, or traces of evidence of the existence of prehistoric flora and fauna. This chapter addresses the occurrence of paleontological resources within the project area and the potential impact that construction activities and operation of the Proposed Project will have on scientifically important fossil remains, as identified in the CEQA Guidelines. The analysis presented in this chapter conforms to the Society of Vertebrate Paleontology criteria.

The purpose of this chapter is to describe the regulatory setting associated with cultural and paleontological resources, the affected environment for these resources, project impacts on cultural and paleontological resources, and mitigation measures that would reduce these impacts.

8.2 Regulatory Setting

8.2.1 Federal Laws, Regulations, and Policies

National Historic Preservation Act

The Project would affect waters of the United States and thus would require a USACE Section 404 permit pursuant to the Clean Water Act of 1977 (33 USC § 1344). Issuance of a permit by USACE constitutes a federal undertaking and, therefore, mandates compliance with Section 106 of the NHPA of 1966 (16 USC § 470f). To comply with Section 106 of the NHPA, the project proponent must "take into account the effect of the undertaking on any district, site, building, structure, or object that is included in or eligible for inclusion in the National Register." The implementing regulations for Section 106 are found under 36 Code of Federal Regulations (CFR) section 800, as amended (2001).

The implementing regulations of the NHPA require that cultural resources be evaluated for NRHP eligibility if they cannot be avoided by an undertaking (project). To determine site significance through application of NRHP criteria, several levels of potential significance that reflect different (although not necessarily mutually exclusive) values must be considered. As provided in 36 CFR section 60.4, the quality of significance in American history, architecture, archaeology, and culture is present in districts, sites, buildings, structures, and objects of national, state, and local importance that must be considered within its historic context and possess integrity of location, design, setting, materials, workmanship, feeling, and association. Resources must also be at least 50 years old, except in rare cases, and meet one of the following criteria to be considered eligible for the NRHP:

1. That are associated with events that have made a significant contribution to the broad patterns of our history; or
2. That are associated with the lives of persons significant in our past; or
3. That embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or
4. That has yielded, or may be likely to yield, information important in prehistory or history.

For archaeological sites evaluated under Criterion 4, integrity requires that the site remain sufficiently intact to convey the expected information to address specific important research questions.

8.2.2 State Laws, Regulations, and Policies

CEQA Guidelines

California cultural resources laws and regulations are located in CEQA and the CEQA Guidelines, as well as the Public Resources Code (PRC). PRC section 5097.2 requires responsible state agencies to determine whether a project area contains resources that include archaeological or paleontological sites, burial grounds or historical features. CEQA requires that state agencies determine whether the project has a significant effect on a unique archaeological resource or a historical resource, pursuant to sections 21083.2 and 21084.1, respectively. Section 15064.5 of the CEQA Guidelines states that “a project with an effect that may cause a substantial adverse change in the significance of a historical resource is a project that may have a significant effect on the environment.” Lead agencies must identify potentially feasible measures to mitigate significant adverse changes in the significance of a historical resource. Historical resources are those that:

- Are listed in, or determined to be eligible for listing in, the California Register of Historical Resources (CRHR) (Pub. Resources Code, § 5024.1(k));

- Are included in a local register of historical resources (Pub. Resources Code, § 5020.1) or identified as significant in a historical resource survey meeting the requirements of section 5024.1(g); or
- Are determined by a lead agency to be historically significant.

Eligibility criteria for the CRHR are set forth in PRC section 5024.1 and defined as any resource that:

1. Is associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage;
2. Is associated with lives of persons important in our past;
3. Embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of an important creative individual, or possesses high artistic values; or
4. Has yielded, or may be likely to yield, information important in prehistory or history.

Types of resources eligible for the CRHR, provided they meet the criteria defined above, are outlined in California Code of Regulations, title 14, section 4852(a). Resource types include buildings, sites, structures, objects, or historic districts, as defined below:

1. **Building.** A resource, such as a house, barn, church, factory, hotel, or similar structure created principally to shelter or assist in carrying out any form of human activity. "Building" may also be used to refer to an historically and functionally related unit, such as a courthouse and jail or a house and barn;
2. **Site.** A site is the location of a significant event, a prehistoric or historic occupation or activity, or a building or structure, whether standing, ruined, or vanished, where the location itself possesses historical, cultural, or archeological value regardless of the value of any existing building, structure, or object. A site need not be marked by physical remains if it is the location of a prehistoric event, and if no buildings, structures, or objects marked it at that time. Examples of such sites are trails, designed landscapes, battlefields, habitation sites, Native American ceremonial areas, petroglyphs, and pictographs;
3. **Structure.** The term "structure" is used to describe a construction made for a functional purpose rather than creating human shelter. Examples of structures include mines, bridges, and tunnels;
4. **Object.** The term "object" is used to describe those constructions that are primarily artistic in nature or are relatively small in scale and simply constructed, as opposed to a building or a structure. Although it may be moveable by nature or design, an object is associated with a specific setting or environment. Objects should be in a setting appropriate to their significant historic use, role, or character. Objects that are relocated to a museum are not eligible for listing in the California Register. Examples of objects include fountains, monuments, maritime resources, sculptures, and boundary markers; and

5. **Historic district.** Historic districts are unified geographic entities which contain a concentration of historic buildings, structures, objects, or sites united historically, culturally, or architecturally. Historic districts are defined by precise geographic boundaries.

CEQA Guidelines section 15064.5 also applies to unique archaeological resources, as defined in PRC section 21083.2(g). A unique archaeological resource is an archaeological artifact, object, or site for which it can be clearly demonstrated that, without merely adding to the current body of knowledge, there is a high probability that it meets one of the following criteria:

1. The archaeological artifact, object, or site contains information needed to answer important scientific questions, and there is a demonstrable public interest in that information; or
2. The archaeological artifact, object, or site had a special and particular quality, such as being oldest of its type or the best available example of its type; or
3. The archaeological artifact, object, or site is directly associated with a scientifically recognized important prehistoric or historic event or person.

A non-unique archaeological resource is an archaeological artifact, object, or site that does not meet the above criteria. Impacts on non-unique archaeological resources and resources are not historical resources, and thus receive no further consideration under CEQA.

Although locations of cultural value are included in the CRHR definition of a site under California Code of Regulations, title 14, section 4852(a)(2), there are no guidelines for identifying and evaluating places of cultural significance in CEQA, other applicable PRC sections, or the CCR. However, when no such specific guidance is offered by the State, CEQA often defers to federal guidance for addressing cultural resource issues (e.g., Secretary of the Interior's Standards). The federal government has provided guidance for the evaluation of places of cultural significance, referred to as traditional cultural properties (TCPs) that are presented in *National Register Bulletin: Guidelines for Evaluating and Documenting Traditional Cultural Properties* (Parker and King 1990, rev. 1998). These guidelines are generally referred to by cultural resource professionals when there is a need to evaluate places of cultural significance under CEQA. A TCP is eligible as a resource "because of its association with cultural practices or beliefs of a living community that (a) are rooted in that community's history, and (b) are important in maintaining the continuing cultural identity of the community." Furthermore, the resource must be a tangible property, meaning that it must be a place with a referenced location. Spring-run Chinook salmon, a natural resource that is a focus of the Project, do not meet the criteria for a TCP because they are transient and do not occupy a specific place.

Under CEQA Guidelines section 15064.5, a project potentially would have significant impacts if it would cause substantial adverse change in the significance of one of the following:

1. A historical resource;

2. A unique archaeological resource;
3. Human remains (i.e., where Native American human remains are identified or likely within the project).

Section 15064.5 of CEQA also assigns special importance to human remains and specifies procedures to be used when Native American remains are discovered. These procedures are detailed under PRC section 5097.98.

No state or local agency has specific jurisdiction over paleontological resources on private lands. A paleontological collecting permit is not required by any state or local agency to allow for the recovery of fossil remains discovered as a result of construction-related activities on state or private land in the project area. However, on state-owned lands, PRC Chapter 1.7, "Archaeological, Paleontological, and Historical Sites," applies. This section of the code specifies that surveys, excavations, or other operations as necessary on state lands may be undertaken to preserve or record paleontological resources.

As noted above, PRC section 21083.2 and CEQA Guidelines section 15064.5 provide specific guidance on historical and unique archaeological resources, and under CEQA resources called historical resources include resources whether they are of historical or prehistoric age. It is possible that a paleontological resource could be determined to be a historical resource. Although CEQA does not define what constitutes "a unique paleontological resource," it would be reasonable to assume that the criteria defining a unique archaeological resource could be applied to define a unique paleontological resource.

8.2.3 Local Laws, Regulations and Policies

Fresno County General Plan

The Fresno County General Plan includes 13 policies that "seek to preserve the historical, archaeological, paleontological, geological, and cultural resources" of the county (County of Fresno 2000). Those policies of the Fresno County General Plan that are most pertinent to the cultural and paleontological resources in the current project are listed below.

- *Policy OS-J.1:* The County shall require that discretionary development projects, as part of any required CEQA review, identify and protect important historical, archaeological, paleontological, and cultural sites and their contributing environment from damage, destruction, and abuse to the maximum extent feasible. Project-level mitigation shall include accurate site surveys, consideration of project alternatives to preserve archaeological and historic resources, and provision for resource recovery and preservation when displacement is unavoidable.
- *Policy OS-J.2:* The County shall, within the limits of its authority and responsibility, maintain confidentiality regarding the locations of archaeological sites in order to preserve and protect these resources from vandalism and the unauthorized removal of artifacts.

- *Policy OS-J.3:* The County shall solicit the views of the local Native American community in cases where development may result in disturbance to sites containing evidence of Native American activity and/or sites of cultural importance.
- *Policy OS-J.7:* The County shall use the State Historic Building Code and existing legislation and ordinances to encourage preservation of cultural resources and their contributing environment.
- *Policy OS-J.12:* The County should encourage the inclusion of unique geologic resources on the National Registry of Natural Landmarks.
- *Policy OS-J.13:* The County shall encourage State and Federal agencies to purchase significant geologic resources for permanent protection.

Madera County General Plan

The Madera County General Plan (County of Madera 1995) also addresses the general issue of protecting important historical, archaeological, paleontological, and cultural sites and their contributing environment, but does not give specific guidance with respect to paleontological resources alone.

8.3 Environmental Setting

8.3.1 Potentially Affected Area

For the purposes of the cultural resources analysis, the Potentially Affected Area is the eastern edge of the Great Valley (Sacramento and San Joaquin Valleys) geomorphic province of California. Soil and geologic conditions at the Potentially Affected Area are primarily unconsolidated alluvium lining the stream and river channels of portions of the San Joaquin River watershed, Sacramento River watershed, Delta, and San Francisco Bay. These are predominantly clay and silt size materials that are actively undergoing bed load transport downstream. Topography over the Potentially Affected Area ranges from mean sea level in San Francisco Bay to about 315 feet above mean sea level at the SCARF site.

8.3.2 Project Area

The Project Area includes areas in which physical actions that are part of the Proposed Project would take place. The Project Area for purpose of cultural resource impact analysis includes all locations in the Project Area that would involve ground disturbance of any kind, such as minor grading, excavating, and trenching, and structural modifications that would not necessarily include ground disturbance. This includes the locations for construction/modifications of weirs and for the improvement of recreational opportunities.

8.3.3 SCARF Site

Prehistory

Little archaeological work has been conducted in the vicinity of the town of Friant. Consequently, a cultural chronology of the prehistoric archaeology must rely on information generated by excavations performed in the general region. The work performed at Eastman Lake (Buchanan Reservoir) on the Chowchilla River 22 miles northwest of Friant provides a basic chronology in a comparable environment.

Moratto and King conducted excavations at a number of sites at Buchanan Reservoir between 1967 and 1970 (Moratto 2004). The analysis of their data has resulted in the identification of three temporal phases. From oldest to youngest, these include the Chowchilla Phase (800 B.C.–A.D. 550), Raymond Phase (A.D. 550–1500), and the Madera Phase (A.D. 1500–1850) (Moratto 2004).

The Chowchilla Phase reflects a substantial, stable population that was gathered in large villages along the river. The society was complex and they traded extensively with neighboring villages. Technology relied heavily on the atlatl and dart, milling stones and cobble mortars, and bone fish spear tips. The material culture indicates trade with populations in the Great Basin, southwestern California, and the northern San Joaquin Valley.

Contrastingly, the Raymond Phase appears to have been a time of instability. Populations were scattered in small communities, trade was disrupted, and violence appears to have been common. The bow and arrow with medium-size arrow points replaced the dart and atlatl, bedrock mortars were used in concert with milling stones, and artifacts of exotic materials were rare.

The Madera Phase reflects the ancestral Southern Sierra Miwok, who lived in the area of Buchanan Reservoir at the time of colonization in the mid-1800s. The population once again increased, and small villages were established close to large villages settled along the river. Arrow points diminished in size, while milling equipment from the Raymond Phase persisted. Trade routes were re-established and imported goods, including Brown Ware pottery, were diverse (Moratto 2004).

Ethnography

The SCARF site lies within the ethnographic territory of the Dumna tribe, one of approximately 15 groups that spoke dialects of the Foothill Yokuts language. The Dumna occupied the lands along the San Joaquin River from just below the SCARF site, upstream to Willow Creek (Spier 1978). The area under present-day Millerton Lake was central to the Dumna territory and was the primary location for the Dumna village of Kuyu-Illik. The villages of Aho-lu'l and Taka-tipao were nearby along the San Joaquin River (Dumna Indians 2012).

Villages consisted of conical bark houses that sometimes had shallow excavated floors. Sweathouses doubled as assembly rooms for the community. Other structures used by the Foothill Yokuts included a shade ramada that provided a covered outdoor living area in the summer months, and a temporary shade structure used around bedrock mortar milling stations to provide women shelter while grinding acorns (Spier 1978).

Deer and acorns were the most important sources of food, followed by salmon and quail. These were widely supplemented with small mammals, fish, birds, and a broad range of vegetal resources (Spier 1978).

The tribelet was the primary socioeconomic unit for the Foothill Yokuts, though it was loosely organized. Each village had one or more chiefs, and all were of equal prominence. The chiefs made decisions for their respective communities in consultation with other chiefs. Another important position within the village was that of the messenger, as special assistant to the chief. This individual gathered information for, and disseminated information from, the chief to community members and other tribes (Spier 1978).

Today, the Dumna and their close geographical neighbors and cultural kin, the Kechayi, are seeking federal recognition as a sovereign tribe of Foothill Yokuts on their ancestral lands. The Table Mountain Rancheria Band of Indians, residing in Dumna territory in Friant, is a consortium of displaced Foothill Yokuts and Monache Indians from the region (Dumna Indians 2012). The Rancheria owns a casino in Friant, approximately 5 miles east of the SCARF site.

History

The town known as Friant went through a number of name changes before its current name was settled nearly 100 years ago. Established by Charles Converse in 1852, the town was originally known as Converse Ferry; shortly thereafter, it became Jones Ferry when it was named after a local merchant. A post office was established in 1881, and the town became known as Hamptonville in honor of the first postmaster. Once a branch of the Southern Pacific Railroad was constructed from Fresno in 1891, the town was renamed Pollasky after a railroad agent. Friant adopted its current name in the early 1920s when it was renamed for Thomas Friant of the White-Friant Lumber Company (Gudde 1998).

In 1942, the U.S. Bureau of Reclamation constructed Friant Dam, just upstream of the town, as part of the Central Valley Project (Reclamation 2012). The impoundment of the San Joaquin River to form Millerton Lake inundated the town of Millerton, which was near the Dumna village of Kuyu-Illik.

The existing SJFH was constructed on the site of an earlier hatchery, the Friant Bass Hatchery, which was constructed in 1932 and closed in 1937 (Leitritz 1970). After World War II, the SJFH began in 1948 as an experimental fish hatchery to determine if Millerton Lake water was suitable for cultivating fish. It was determined a success, so in October 1953 the Wildlife Conservation Board allocated $748,000 for a 59-acre parcel for the construction of the existing SJFH. The facility, which replaced the 1948 experimental fish hatchery, was completed and dedicated on July 16, 1955 (Leitritz 1970).

The hatchery initially had 36 standard California-type rearing ponds. The hatchery building originally had 104 aluminum troughs and twelve 14-foot redwood circular tanks for rearing fingerlings. Also present were four rectangular ponds for rearing warm-water game and forage fish, a food storage and preparation building, and 10 dwellings for permanent employees. In 1960, 12 additional ponds were added, bringing the total to 48. With the exception of the four rectangular open ponds, all were replaced in 1978 with a more elaborate system that involved raised concrete beds and provided the fish with a stream-like environment. A flood in 1997 damaged the facility, especially the employee residences, and three of the homes were razed.

The San Joaquin Rock and Gravel Company was established at Friant, immediately downstream of the SJFH, around 1910. It was a gravel pit mine operation that covered some 400 acres, and produced sand and gravel primarily used in concrete and other types of construction work. The operation was purchased in April 1915 for $150,000 by A. R. Kerstetter, and was incorporated as the Grant Rock and Gravel Company on September 20, 1915 (Vandor 1919).

The Grant Rock and Gravel Company had a gravel pit that covered 13 acres (California State Mining Bureau 1921:70). The gravel deposits within the pit went to a depth of 25 to 35 feet. The materials were trammed by Western side-dump cars on a 40-ton, Climax narrow gauge locomotive to mill hoppers installed on site. The gravel was carried from the pit to a "fantail-shape" mill (California State Mining Bureau 1921:70). The mill consisted of two 40-inch by 18-inch scalping screens with 2.5-inch-diameter, round perforations that led directly by conveyor to a washing plant. The material in the mill was crushed into smaller pieces by a 36-inch horizontal Symons disc crusher. Stones larger than 3.5 inches were passed to a Farrell Jaw crusher that carried the material to another cylindrical screen with 1.5-inch-diameter round perforations. Rejected material was led back to the scalping screens on a 30-inch-wide conveyor belt.

Water from the San Joaquin River was used to wash the gravel in the company's washing plant, located closer to the river and southwest of the mill. A 35-horsepower motor pumped water from the pit back to the washing plant for the purpose of draining the pit in wet weather and supplying an additional amount of water for washing purposes (California State Mining Bureau 1921:71). The washing plant was supplied water pumped from the San Joaquin River via a 7-inch-diameter pipe. The water was sprayed into two revolving conical screens to clean and sort the materials into sizes from 0.25 inch to 1.5 inches in diameter. At the last screen, the remaining sands were passed through Hungarian riffles, or a slated belt, where they were processed with quicksilver, which resulted in the recovery of about $500 to $1,500 of gold per month (California State Mining Bureau 1921:71).

Between the pit and the washing plant, there was a gravity-pulled track, known as an "incline conveyor belt" (California State Mining Bureau 1921:71). Furnished by the Pacific Mill & Mine Supply Company of San Francisco, the belt was unusual for its time. It worked on a steep incline as a 380-foot-long, 24-inch-wide covered conveyor belt; the belt itself was eight plies thick of VALQUA rubber-filled material (Irvine 1919). Rail tracks connected all of the facilities, where 70 loaded cars, accommodating 3,500 tons of material, operated. The average production in 1921 was 2,500 tons of gravel per day; 1 cent per cubic yard of gold was recovered through these processes.

In addition to the gravel operations, the plant had a blacksmith shop with a drill press, lathe, forge, and small compressor. Cottages were arranged along the San Joaquin River "under shade trees in sufficient number to insure the operating of the plant with married men," which are apparent in the 1922 historic aerials of the site (California State Mining Bureau 1921:71; Nationwide Environmental Title Research 2012). A boarding house, run by the Grant Rock and Gravel Company, was set up to feed approximately 50 men, though 35 to 40 men were generally on the payroll during a "rush season."

Paleontology

The SCARF site overlies fill material on top of alluvial terrace deposits of the Modesto Formation. The fill material ranges from a few feet to approximately 10 feet thick and the underlying alluvial terrace deposits are typically about 4 feet thick over most of the project site. The alluvial terrace deposits, which consist of loose sandy gravel, increase slightly in thickness to greater than 6 feet thick in the project site's northwest section. These alluvial deposits directly overlie granitic bedrock and most likely represent reworked river deposits. The nature and thickness of the fill material, and the loose sand and gravel of the alluvial terrace deposits overlying granitic bedrock, suggests it is highly unlikely that paleontological resources exist at the SCARF site. Additionally, no unique geological features were identified at the site during a comprehensive surface and subsurface geotechnical investigation (Geocon 2012).

8.4 Impact Analysis

8.4.1 Methodology

In-depth cultural resources studies have been conducted of the SCARF site and are described below. Many programmatic-level activities associated with the Proposed Project have not yet been defined or exact locations determined. Once specific activities/locations have been chosen, additional analyses will be conducted.

Before SCARF field work began, a record search was conducted by the Southern San Joaquin Valley Information Center (SSJVIC) of the California Historical Resources Information System at California State University, Stanislaus. The purpose of the record search was to identify any previously recorded cultural resources within the SCARF site and determine if any of the area had previously been surveyed for cultural resources. The record search indicated that no cultural resources had previously been recorded within the SCARF site, although no fewer than five archaeological surveys had been conducted on various portions of the property. One prehistoric archaeological site and numerous historical-era buildings and features have been recorded near the SCARF site.

A request was made to the California Native American Heritage Commission (NAHC) to review its files for records of sacred sites in the SCARF vicinity. No sacred sites were identified during this search. The NAHC provided a list of individuals who might have additional information about important Native American sites in or near the SCARF site. These individuals were contacted by mail, then by phone. Table 8-1 provides a summary of contacts with the Native Americans identified by NAHC. Most of the individuals contacted had no concerns about the Proposed Project. However, members of the Dumna Wo-Wah and North Fork Mono tribes expressed concern about the potential presence of both archaeological sites and traditional-use areas in the SCARF vicinity. Numerous individuals also requested copies of the completed cultural resources report for the SCARF.

On July 27, 2012, a cultural resources field survey was conducted of the entire SCARF site by personnel who meet the U.S. Secretary of Interior's professional standards in archaeology and architectural history. The archaeological field survey included pedestrian transects spaced approximately 60 feet apart in broad open spaces, such as the proposed borrow areas. The architectural history inventory focused on photographing buildings and other built-environment features of the existing SJFH, as well as buildings immediately adjacent to the SCARF site. All cultural resources were recorded on appropriate Department of Parks and Recreation 523 series forms. Archaeological sites were further recorded with GPS and by photography.

The potential impacts of SCARF Operations, Fish Reintroduction, and Fisheries Research and Monitoring on cultural resources will not be discussed below. This is because these actions are not anticipated to cause ground disturbance or modifications to existing buildings. Furthermore, SCARF Operations, Fish Reintroduction, and Fisheries Research and Monitoring are not anticipated to have any impact on cultural resources that are TCPs. With regard to Fish Reintroduction, the exact locations of broodstock collection have not yet been determined, and it is remotely possible that a selected collection location may coincide with a place that may have cultural value as a site pursuant to California Code of Regulations, title 14, section 4852(a)(2) (aka TCP) as a place that has been an important fishing spot for generations of Native Americans. However, as discussed in Chapter 2, *Project Description*, ground disturbance as the result of broodstock collection activities would be minimal (i.e., limited to incidental disturbance caused by the collection techniques). Furthermore, the limited time it will take to make the collections will not substantially impede access to any fishing location that might be of significant cultural value. Any impacts from Fish Reintroduction will be culturally beneficial to the Yokuts who live along the San Joaquin River, but there will be no impacts to TCPs.

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Table 8-1. Native American Consultation

Organization/Tribe	Name of Contact	Letter Date	Telephone Follow-up Date	Comments
Big Sandy Rancheria of Mono Indians	Liz Hutchins Kipp, Chairperson	June 26, 2012	August 7, 2012	A voice message was left. No return call was received as of date of writing.
Dumna Wo-Wah	Robert Ledger, Sr., Tribal Chairperson	June 26, 2012	August 7, 2012	Mr. Ledger recommends a Native American monitor during construction. He also requested a follow-up e-mail. The follow-up e-mail was sent on August 7, 2012. Further e-mail communication continued.
Cold Springs Rancheria of Mono Indians	Robert Marquez, Chairperson	June 26, 2012	August 23, 2012	Mr. Marquez requested that detailed project maps be sent to him via e-mail. After initial difficulty with the e-mail address, the maps were sent on September 26, 2012.
Sierra Nevada Native American Coalition	Lawrence Bill, Interim Chairperson	June 26, 2012	August 23, 2012	Telephone number provided is not functioning.
North Fork Mono Tribe	Ron Goode, Chairperson	June 26, 2012	August 23, 2012	Mr. Goode expressed concern for potential impacts on traditional-use areas and archaeological resources. He requests that archaeological and Native American monitors be present during ground-disturbing activities related to the Project.
Choinumni Tribe; Choinumni/Mono	Lorrie Planas	June 26, 2012	August 23, 2012	No telephone number is listed.
Santa Rosa Rancheria	Rueben Barrios	June 26, 2012	August 23, 2012	A voice message was left. No return call was received as of date of writing.
Table Mountain Rancheria	Bob Pennell, Cultural Resources Director	June 26, 2012	August 23, 2012	A message was left with Ms. Taylor, a staff member at Table Mountain Rancheria. Further telephone communications and e-mails are included in Appendix B, *Native American Correspondence*, of the Cultural Resources Appendix (Appendix K, *Cultural Resources Appendix*, of this DEIR).

Table 8-1. Native American Consultation

Organization/Tribe	Name of Contact	Letter Date	Telephone Follow-up Date	Comments
Kings River Choinumni Farm Tribe	John Davis, Chairman	June 26, 2012	August 23, 2012	Mr. Davis requests to be called upon discovery of cultural resources.
The Choinumni Tribe of Yokuts	Rosemary Smith, Chairperson	June 26, 2012	August 23, 2012	No telephone number is listed.
Dunlap Band of Mono Historical Preservation Society	Mandy Marine, Board Chairperson	June 26, 2012	August 23, 2012	Ms. Marine indicated that she has no immediate concerns, but requests a copy of the final report.
Unaffiliated	Frank Marquez	June 26, 2012	August 23, 2012	A voice message was left. No return call was received as of date of writing.
Chowchilla Tribe of Yokuts	Jerry Brown	June 26, 2012	August 23, 2012	Telephone number provided is not functioning.
Santa Rosa Tachi Rancheria	Lalo Franco, Cultural Coordinator	June 26, 2012	August 23, 2012	A voice message was left. No return call was received as of date of writing.
Kings River Choinumni Farm Tribe	Stan Alec	June 26, 2012	August 23, 2012	Mr. Alec requests that the letter be resent to a new address. Letter was resent on October 1, 2012.
Dumna Wo-Wah Tribal Government	Eric Smith, Cultural Resource Manager	June 26, 2012	August 23, 2012	Telephone number provided is the same for all members of the Dumna Wo-Wah Tribal Government. See comments related to communication with Robert Ledger, Sr.
Dumna Wo-Wah Tribal Government	John Ledger, Assistant Cultural Resource Manager	June 26, 2012	August 23, 2012	Telephone number provided is the same for all members of the Dumna Wo-Wah Tribal Government. See comments related to communication with Robert Ledger, Sr.

Archaeological Resources

One historic-era archaeological resource was recorded at the northeastern portion of proposed Borrow Area 2 (see Figure 2-2 in Chapter 2, *Project Description*). The site was assigned the trinomial CA-FRE-3643H by the SSJVIC. Research indicates that the site is the location of a portion of the Grant Rock and Gravel Company, a gravel operation that was first established as the San Joaquin Rock and Gravel Company in 1910. The San Joaquin Rock and Gravel Company was purchased in 1915 by A. R. Kerstetter and incorporated as the Grant Rock and Gravel Company, which operated into the 1930s or 1940s. The site consists of three consecutive (northwest to southeast) large earthen embankment-type pads (Pads 1, 2, and 3) that may have once supported large, industrial structures associated with the gravel operations, such as the washing plant or mill. These pads are approximately 6 to 8 feet high, 50 feet wide (generally east-west), and 100 feet long (north-south). The walls on the southern side of Pads 1 and 2 are particularly well-defined. A two-stepped channel, approximately 20 feet deep, has been cut on a northwest-southeast axis along the northern sides of the pads; the channel terminates near the San Joaquin River at its northern end.

Pad 1 (most southeastern) contains the remains of a concrete slab, the top of which is visible above the ground surface. A light scatter of domestic refuse was also visible around Pad 1. Materials observed include fragments of cobalt glass and iridescent glass, one glass piece that appeared to be the neck of a milk bottle, other fragmented bottle bases and panels (mostly clear), red fiesta ware, fragmented brown crockery, fragmented white porcelain bathroom fixtures, bolts and wire nails, and an asbestos gasket. These material remains appear to date to the early twentieth century and are compatible with the dates of the gravel operations. Other features identified at the site include open pits, trenches, and a level embanked area that might have been an equipment staging area or pad.

An evaluation of CA-FRE-3643H indicates that the site does not appear eligible for the CRHR because the infrastructure (i.e., the rail tracks) and machinery that would have been associated with the pads and gravel operation are no longer extant; therefore, the industrial context is lacking and the site is not eligible for the CRHR under Criterion 3 (Pub. Resources Code, § 5024.1, discussed under Section 8.2.2, above). Furthermore, the site is not associated with a significant event or person, making it ineligible under CRHR Criteria 1 and 2. Lastly, the archaeological deposit appears surficial and has been previously disturbed, and thus is unlikely to yield information important in prehistory or history that might make it eligible under Criterion 4 of the CRHR.

Built Environment Resources

Identified as a cultural resource, the SJFH was assigned identification number P-10-006200 (also referred to as URS-02) by the SSJVIC. Numerous buildings and features related to the existing SJFH were recorded during the field survey. These included linear concrete hatchery ponds and auxiliary structures, four open ponds, seven residences with garages, and numerous structures. All of these buildings and features appear to date to a construction period of between 1955 and 1978. Their period of construction was corroborated by reviewing historic aerial photographs of the area that ranged from 1922 to the present. Although some of the existing buildings and features date to the earliest period of construction in 1954–55, the original hatchery ponds were replaced in 1978 with raised concrete beds and many of the other buildings have been modified with upgrades and additions. Several other modular structures and auxiliary buildings less than 50 years old are also present on the facility grounds.

The existing SJFH does not appear to meet the eligibility criteria for inclusion in the NRHP or the CRHR. The SJFH is not associated with a significant event, and it has not contributed to a broad pattern in history. The earlier hatcheries at this location, the Friant Bass Hatchery and the San Joaquin Fish Experimental Hatchery, were replaced by the current facility; hence, no features exist of the earlier facilities that may have been more significant.

Although the SJFH was successful and eventually replaced existing hatcheries along the San Joaquin River and other river tributaries in the Central Valley, no historical event occurred that would make it eligible under Criterion 1 of the CRHR. The hatchery was originally designed by CDFW, an agency that designed other hatcheries in the Central Valley, and no historically important people are associated with the hatchery. Therefore, the hatchery is ineligible under Criterion 2 of the CRHR.

The SJFH does not embody a type, period, or method of construction as a fish hatchery, and it does not represent the work of a master or possess any high artistic values represented in distinguishable characteristics. Although the SJFH retains its location and association as a mid-century-designed fish hatchery, its feeling has been altered with the lack of historic fabric, making it ineligible under Criterion 3 of the CRHR. Lastly, the SJFH has not yielded, and is not likely to yield, information important in prehistory or history, thus making it ineligible under Criterion 4 of the CRHR.

Native American Resources

Coordination with the NAHC and local Native American tribes and community members did not identify any TCPs, such as significant traditional-use areas or sacred sites, within the SCARF site. However, the entire Project Area encompasses much of the San Joaquin River, which was the core of the Yokuts homeland and provided a variety of resources that contributed to their subsistence. Salmon was a primary and important resource in the Yokuts' diet. As such, the riverscape presented by the San Joaquin remains important to contemporary Yokuts culture, and the memory of the importance of salmon fishing survives. Furthermore, as important as fishing is to the Yokuts culture, it is essential to note that, while fishing locations as specific *places* can be identified as historical resources (TCPs), the fish themselves do not meet the criteria of a TCP because they are transient and do not reside at a specific, tangible location.

Paleontological Resources

The methodology applied to the evaluation of potential project impacts on paleontological resources within the SCARF site involved two elements. The initial element was to evaluate the potential for unique paleontological resources to exist within the site, and then to evaluate the impacts that construction and/or operation of the Proposed Project would have on those resources.

A search of known paleontological sites in California did not identify any known sites within the Potentially Affected Area, project area, or SCARF site. (This online search was conducted at http://www.fossilsites.com/STATES/CA.HTM).

8.4.2 Criteria for Determining Significance

Significance criteria represent the thresholds that were used to identify whether an impact would be significant. Appendix G of the CEQA Guidelines suggests the following evaluation criteria for cultural resources:

Would the project:

A. Cause a substantial adverse change in the significance of a historical resource as defined in CEQA Guidelines section15064.5?

B. Cause a substantial adverse change in the significance of an archaeological resource pursuant to CEQA Guidelines section 15064.5?

C. Directly or indirectly destroy a unique paleontological resource or site or unique geological feature?

D. Disturb any human remains, including those interred outside of formal cemeteries?

The evaluation criteria used for this impact analysis represent a combination of the Appendix G criteria and professional judgment that considers current regulations, standards and/or consultation with agencies with knowledge of the area. For the purposes of this analysis, an alternative would cause a significant impact if it would result in any of the following:

A. A substantial adverse change in the significance of an archaeological resource pursuant to CEQA Guidelines section 15064.5.

B. A substantial adverse change in the significance of a historical resource of the built environment as defined in CEQA Guidelines section 15064.5.

C. Directly or indirectly destroy a unique paleontological resource or site or unique geological feature.

D. Disturb any human remains, including those interred outside of formal cemeteries.

CEQA does not establish criteria for determining significance of paleontological resources. The environmental checklist form contained in Appendix G of the CEQA Guidelines and the standard guidelines for assessment and mitigation of adverse impacts on paleontological resources set forth by the Society of Vertebrate Paleontologists (1995) were used to establish three categories of sensitivity. These are High, Low, and Undetermined. Areas that consist of rock that is not of sedimentary origin and that have not been known to produce fossils are considered low sensitivity areas and monitoring is not required during project construction or operation. Additionally, when it can be demonstrated that the conditions of the unconsolidated sediments are such that fossils could not form in these sediments, and that any fossils found in the sediments could not be considered in situ, they would have minimal scientific value, and the area would be considered low sensitivity. When both of these low sensitivity conditions were present, it was considered that no significant paleontological resource was present and consequently no impact would occur.

The nature and thickness of the fill material, and the loose sand and gravel of the alluvial terrace deposits overlying granitic bedrock, clearly suggest that no paleontological resources exist at the SCARF site. Additionally, no unique geological features were identified at the site during a comprehensive surface and subsurface geotechnical investigation (Geocon 2012). As a result, the Proposed Project would not directly or indirectly destroy a unique paleontological resource or site or unique geological feature. Therefore, no potential impacts to paleontological resources or unique geologic features would result from activities and elements of the Proposed Project, and this issue is not discussed further.

8.4.3 Environmental Impacts

Table 3-1 in Chapter 3, *Introduction to the Environmental Analysis,* identifies components of the Proposed Project with the potential to result in impacts on a cultural or a unique paleontological resource or site or a unique geologic feature. Each impact is discussed in further detail in the section below.

SCARF Construction

Impact CR-CONSTRUCT-1: A Substantial Adverse Impact on Archaeological Resources from Project Construction (Significance Criterion A, Project Level, Less than Significant with Mitigation)

One archaeological site, CA-FRE-3643H, the remains of an early twentieth-century gravel quarry operation, lies within the SCARF site. SCARF construction proposes to use portions of the archaeological site as borrow for fill under new building foundations or road bed. Borrow will be taken from Feature 7 at the site, which is likely an equipment staging area or pad. Feature 7 is a depressed, leveled area surrounded by gravel embankments. It is trapezoidal in shape and measures approximately 200 feet long and 175 feet wide.

As discussed in Section 8.4.1 above, an evaluation of the site suggests CA-FRE-3643H is not eligible for the CRHR because the infrastructure (i.e., the rail tracks) and machinery that would have been associated with the pads and gravel operation are no longer extant; therefore, the industrial context is lacking and the site is not eligible for the CRHR under Criterion 3. Furthermore, the site is not associated with a significant event or person, making it ineligible under CRHR Criteria 1 and 2, respectively. Lastly, the archaeological deposit is surficial and has been previously disturbed, and thus is not likely to yield information important in prehistory or history that might make it eligible under Criterion 4 of the CRHR. Therefore, the Project will have no impact to site CA-FRE-3643H.

Although an archaeological survey was conducted of the SCARF site and one archaeological resource, CA-FRE-3643H, was identified and recorded, additional archaeological remains may be buried with no surface manifestation. It is estimated that building site preparation would extend to depths of up to 10 feet. In addition, trenching for pipelines and underground utilities could potentially uncover buried archaeological deposits, as could improvements to East Belcher Road. Archaeological remains could consist of prehistoric or historic-era artifacts. Prehistoric materials most likely would include obsidian and chert flaked-stone tools (e.g., projectile points, knives, choppers); tool-making debris; or milling equipment, such as mortars and pestles. Historic-era materials may include structural remains associated with the Grant Rock and Gravel Company or the San Joaquin Rock and Gravel Company that were not previously identified as part of site CA-FRE-3643H; agricultural implements; stone or concrete footings and walls; and deposits of metal, glass, and/or ceramic refuse. Should previously undiscovered resources be found that are determined eligible for the CRHR, and Proposed Project activities be determined to have potential to render the resource ineligible for the CRHR, impacts would be considered potentially significant. Implementation of Mitigation Measure CR-CONSTRUCT-1a and -1b would reduce any impacts on CRHR-eligible archaeological sites accidentally uncovered during construction to less than significant.

Mitigation Measure CR-CONSTRUCT-1a: Evaluate Cultural Resources for Eligibility for Inclusion in the CRHR, and Implement Appropriate Mitigation Measures for Eligible Resources.

CDFW shall ensure that all cultural resources identified prior to or during construction of the various Proposed Project components will be evaluated for eligibility for inclusion in the CRHR. Where implementation of the Proposed Project necessitates ground disturbance at sites besides the SCARF (e.g., sites for recreational enhancements), a records search and pedestrian survey shall be conducted prior to construction. Resource evaluations will be conducted by individuals who meet the U.S. Secretary of Interior's professional standards in archaeology and architectural history. If any of the resources that are identified during this evaluation meet the eligibility criteria identified in PRC section 5024.1, or PRC section 21083.2(g), CDFW will develop and implement mitigation measures according to CEQA Guidelines section 15126.4(b) before construction begins or resumes.

For resources eligible for listing in the CRHR that would be rendered ineligible by the effects of project construction, CDFW shall implement mitigation measures. Mitigation measures for archaeological resources shall be selected from the following: avoidance; incorporation of sites within parks, greenspace, or other open space; capping the site; deeding the site into a permanent conservation easement; or data recovery excavation. Mitigation measures for archaeological resources shall be developed in consultation with responsible agencies, including but not limited to the State Office of Historic Preservation and, as appropriate, interested parties such as Native American tribes. Mitigation measures for historic architectural resources shall be consistent with the U.S. Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring, and Reconstructing Historic Buildings. Implementation of the approved mitigation would be required before beginning/resuming any construction activities with potential to affect identified eligible resources at the site.

Mitigation Measure CR-CONSTRUCT-1b: Immediately Halt Construction if Cultural Resources are Discovered.

Not all cultural resources are visible on the ground surface. If any cultural resources, such as structural features, unusual amounts of bone or shell, flaked or ground stone artifacts, historic-era artifacts, human remains, or architectural remains are encountered during any project construction activities, work shall be suspended immediately at the location of the find and within an appropriate radius of at least 50 feet. A qualified archaeologist shall conduct a field investigation of the specific site and recommend mitigation necessary for the protection or recovery of any cultural resource concluded by the archaeologist to represent a historical resource or unique archaeological resource. Mitigation Measure CR-CONSTRUCT-1a would then be implemented.

Impact CR-CONSTRUCT-2: A Substantial Adverse Impact to Built Environment Site URS-02, the Existing San Joaquin Fish Hatchery (Significance Criterion B, Project Level, No Impact)

The SJFH was recorded as resource URS-02. SCARF construction will affect a number of features in the westernmost portion of the resource, including the open fish ponds, various utility buildings, and other miscellaneous structures. Construction of the existing SJFH dates to 1954-55, and although some buildings dating to that period remain, the original hatchery ponds were replaced in 1978. An evaluation of the SJFH determined that the resource is not eligible for the CRHR because it is not associated with a historical event or a person important in history, and the architecture does not represent a particular style, represent the work of a master, or possess any high artistic values. Lastly, it does not appear to contain information important to history or prehistory. Because the SJFH does not appear eligible for the CRHR, proposed SCARF construction will have no impact on the resource.

Impact CR-CONSTRUCT-3: Disturb Human Remains, including Those Interred Outside of Formal Cemeteries within the SCARF Construction Area (Significance Criterion D, Project Level, Less than Significant with Mitigation)

Human remains are not known to exist within the SCARF site, and soils consist of alluvial terrace deposits of loose sand and gravel that have been subject to inundation and scouring during flood events; however, buried human remains may be present. Any ground disturbance could uncover subsurface remains, but excavations of up to 10 feet in depth for building site preparation, and trenching for pipelines and underground utilities, have the greatest potential to expose human remains, if they are present.

Impacts on accidentally discovered human remains would be considered a significant impact. Implementation of **Mitigation Measures CR-CONSTRUCT-1b** and **CR-CONSTRUCT-3** would ensure that the Proposed Project would not result in any substantial adverse effects on human remains uncovered during the course of construction, by requiring that work be halted if human remains are uncovered and the County Coroner be contacted. Adherence to these procedures and other provisions of the California Health and

Safety Code would reduce potential impacts on human remains to a less than significant level.

Mitigation Measure CR-CONSTRUCT-3: Immediately Halt Construction if Human Remains are Discovered and Implement California Health and Safety Code.

If human remains are accidentally discovered during the Proposed Project's construction activities, the requirements of California Health and Human Safety Code section 7050.5 must be followed. Potentially damaging excavation must halt in the area of the remains, with a minimum radius of 50 feet, and the local County Coroner must be notified. The Coroner is required to examine all discoveries of human remains within 48 hours of receiving notice of a discovery on private or state lands (Health and Safety Code section 7050.5[b]). If the Coroner determines that the remains are those of a Native American, he or she must contact NAHC by phone within 24 hours of making that determination (Health and Safety Code section 7050[c]). Pursuant to the provisions of PRC section 5097.98, the NAHC shall identify a Most Likely Descendent (MLD). The MLD designated by the NAHC shall have at least 48 hours to inspect the site and propose treatment and disposition of the remains and any associated grave goods.

Fisheries Management

Impact CR-MANAGEMENT-1: Impacts on CRHR-eligible Archaeological Resources from Weir Construction, Demolition, or Modification and Trap and Haul Activities (Significance Criterion A, Project/Program Level, Less than Significant with Mitigation)

Details for the installation of fish segregation weirs within the San Joaquin River have not yet been developed, but actions are likely to include structural modifications to or relocation of the HFB, construction of similar structures near the downstream end of Reach 1A of the San Joaquin River, at Salt or Mud Sloughs, or at other locations to be determined. Trap and haul efforts would involve temporary instream traps (e.g., fyke nets, etc.) and streamside rearing equipment. Access to new weir and locations of instream equipment would also be required. CDFW will be required to determine whether archaeological resources are present within these project areas prior to construction and whether the construction activities have the potential to accidentally uncover archaeological remains.

Trap and haul activities for fisheries management would involve temporary installation of fyke nets or other fish traps, and use of streamside rearing equipment. Streambed disturbance would be minimal from this equipment, and the likelihood of impacting cultural resources exceptionally low. The construction, demolition, or modification of fish segregation weirs, on the other hand, could involve ground disturbance. Thus, these ground-disturbing actions have the potential to significantly affect archaeological resources that are eligible for the CRHR. Implementation of **Mitigation Measures CR-CONSTRUCT-1a and -1b** would reduce impacts to less than significant.

The impact analysis and significance conclusion above is considered project-level for trap and haul activities and programmatic for fish segregation weirs. For further discussion of the approach to the project and programmatic analysis in this document, please see Chapter 3, *Introduction to the Environmental Analysis*.

Impact CR-MANAGEMENT-2: Impacts to CRHR-eligible Structures from Weir Construction, Demolition, or Modification (Significance Criterion B, Project/Program Level, Less than Significant with Mitigation)

The HFB is a seasonal weir on the San Joaquin River, 850 feet upstream from the river's confluence with the Merced River, which was first constructed in 1993 and subsequently modified in 2003. Details have not yet been determined, but the Project will likely either modify the existing weir by constructing a permanent concrete sill to stabilize erosion and provide a solid barrier foundation, or move the weir downstream toward the Merced River confluence. The HFB is not eligible for listing in the CRHR because of its age. However, other proposed developments regarding the construction, demolition, or modification of weirs, such as construction of a new weir on Reach 1A of the San Joaquin River or construction of access to new weir sites, have the potential to significantly affect historical resources of the built environment. Implementation of **Mitigation Measures CR-CONSTRUCT-1a** and **1b** would reduce significant impacts to such resources to less than significant.

The impact analysis and significance conclusion above is considered project-level for the HFB and programmatic for all other fish segregation weirs. For further discussion of the approach to the project and programmatic analysis in this document, please see Chapter 3, *Introduction to the Environmental Analysis*.

Impact CR-MANAGEMENT-3: Disturb Human Remains, Including Those Interred Outside of Formal Cemeteries from Weir Construction, Demolition, or Modification (Significance Criterion D, Program Level, Less than Significant with Mitigation)

Modifications to the HFB, relocation of the HFB, construction of a new weir on Reach 1A of the San Joaquin River, and construction of access to new weir sites are all ground-disturbing activities that have the potential to accidentally affect buried human remains, which would be considered a significant impact. These significant impacts can be reduced to less than significant by implementing **Mitigation Measures CR-CONSTRUCT-1b and -3**.

Recreation Management

Impact CR-RECREATION-1: Impacts on CRHR-eligible Archaeological Resources from Recreation Enhancement Actions (Significance Criterion A, Program Level, Less than Significant with Mitigation)

Plans for improving recreational opportunities have not yet been developed, but could include ground-disturbing activities such as enhancing off-channel ponds and providing access (trails and roads) to recreation facilities for additional fishing opportunities near the Restoration Area. CDFW will be required to determine whether archaeological resources are present within these project areas before construction begins and whether the construction activities have the potential to accidentally uncover archaeological remains. Were CRHR-eligible archaeological deposits to be identified as the result of recreation enhancement projects, and Proposed Project activities would render the deposits ineligible for the CRHR, a significant impact would result. Implementation of **Mitigation Measures CR-CONSTRUCT-1a and -1b** would reduce impacts to less than significant.

Impact CR-RECREATION-2: Impacts to CRHR-eligible Structures from Recreation Enhancements (Significance Criterion B, Program Level, Less than Significant with Mitigation)

Plans for improving recreational opportunities have not yet been developed, but recreation enhancement actions could affect buildings or structures eligible for the CRHR. Proposed Project activities that would render such buildings or structures ineligible for the CRHR would be considered a significant impact. Implementation of **Mitigation Measures CR-CONSTRUCT-1a and 1b** would reduce impacts on historical resources of the built environment to less than significant.

Impact CR-RECREATION-3: Disturb Human Remains, Including Those Interred outside of Formal Cemeteries, from Recreation Enhancement (Significance Criterion D, Program Level, Less than Significant with Mitigation)

Ground-disturbing activities related to recreation enhancement activities, such as enhancing off-channel ponds and providing access (trails and roads), have the potential to accidentally affect buried human remains. This would be a potentially significant impact. This impact would be reduced to less than significant with the implementation of **Mitigation Measures CR-CONSTRUCT-1b and -3**.

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Chapter 9
GEOLOGY, SOILS AND SEISMICITY

9.1 Overview

This chapter identifies geologic, soils, and seismic conditions that could affect or be affected by the Proposed Project. The chapter describes the regulatory setting, affected environment, impacts, and possible mitigation measures associated with the geology, soils, and seismicity, based on published geologic reports and maps and a site-specific technical report. The discussion of impacts considers the consequences of the Project on geology, soils, and seismicity, and how geology, soils, and seismicity would affect the project. This chapter also evaluates whether project implementation would expose people or structures to major geologic hazards or would damage geologic resources.

9.2 Regulatory Setting

9.2.1 Federal Laws, Regulations, and Policies

Earthquake Hazards Reduction Act

In October 1977, the U.S. Congress passed the Earthquake Hazards Reduction Act to reduce the risks to life and property from future earthquakes in the United States through the establishment and maintenance of an effective earthquake hazards and reduction program. To accomplish this, the Earthquake Hazards Reduction Act established the National Earthquake Hazards Reduction Program. This program was significantly amended in November 1990 by the National Earthquake Hazards Reduction Program Act (NEHRPA) by refining the description of agency responsibilities, program goals, and objectives. The mission of NEHRPA includes improved understanding, characterization, and prediction of hazards and vulnerabilities; improved building codes and land use practices; risk reduction through post-earthquake investigations and education; development and improvement of design and construction techniques; improved mitigation capacity; and accelerated application of research results. The NEHRPA designates the Federal Emergency Management Agency (FEMA) as the lead agency of the program and assigns several planning, coordinating, and reporting responsibilities. Other NEHRPA agencies include the National Institute of Standards and Technology, the National Science Foundation, and USGS.

National Pollutant Discharge Elimination System Construction General Permit

In California, State Water Resources Control Board (SWRCB) administers regulations governed by EPA requiring the permitting of stormwater-generated pollution under NPDES. In turn, the SWRCB's jurisdiction is administered through nine regional water quality control boards. Under these federal regulations, construction activities on 1 acre or more are subject to the permitting requirements of the NPDES General Permit for Storm Water

Discharges Associated with Construction and Land Disturbance Activities (Construction General Permit) (Order No. 2009-0009-DWQ, NPDES No. CAS000002) (SWRCB 2012). The Construction General Permit implements a risk-based permitting approach, specifies minimum BMP requirements, and requires monitoring and reporting activities to regulate stormwater discharges from construction sites, reduce sedimentation into surface waters, and control erosion. The Construction General Permit establishes three project risk levels that are based on site erosion and receiving-water risk factors. Risk Levels 1, 2, and 3 correspond to low-, medium-, and high-risk levels for a project, and each has their own specific requirements (SWRCB 2012).

One element of compliance with the NPDES permit is preparation of a SWPPP that addresses control of water pollution, including sediment, in runoff during construction.

9.2.2 State Laws, Regulations, and Policies

Alquist-Priolo Earthquake Fault Zoning Act

The Alquist-Priolo Earthquake Fault Zoning Act, signed into law in 1972, requires the delineation of zones along active, potentially active, and well-defined faults. The purpose of the Alquist-Priolo Earthquake Fault Zoning Act is to identify the hazard of surface faulting so that appropriate action to mitigate these hazards can be taken. The act only addresses the hazard of surface fault rupture and is not directed toward other earthquake hazards. This state law was a direct result of the 1971 San Fernando Earthquake, which was associated with extensive surface fault ruptures that damaged numerous homes, commercial buildings, and other structures.

California Seismic Hazards Mapping Act

The California Seismic Hazards Mapping Act of 1990 (Pub. Resources Code §§ 2690–2699.6) addresses seismic hazards other than surface rupture, such as liquefaction and seismically induced landslides. The purpose of the California Seismic Hazards Mapping Act is to minimize the loss of life and property through the identification, evaluation, and mitigation of seismic hazards. The Seismic Hazards Mapping Act specifies that the lead agency for a project may withhold development permits until geologic or soil investigations are conducted for specific sites and mitigation measures are incorporated into plans to reduce hazards associated with seismicity and unstable soils. The act became effective in 1991 to identify and map seismic hazard zones for the purpose of assisting cities and counties in preparing the safety elements of their general plans and to encourage land use management policies and regulations that reduce seismic hazards.

California Building Standards Commission

The Uniform Building Code (UBC), which is widely used throughout the United States (generally adopted on a state-by-state or district-by-district basis), has been modified for California conditions with numerous, more detailed, and/or more stringent regulations. The California Building Standards Code governs the design and construction of buildings, associated facilities, and equipment. The State of California provides minimum standards for building design through the California Building Standards Code (Cal. Code Regs., tit. 24).

Where no other building codes apply, Chapter 29 regulates excavation, foundations, and retaining walls; Chapter 70 regulates grading activities, including drainage and erosion control. The state's earthquake protection law (California Health and Safety Code § 19100 et seq.) requires that buildings be designed to resist stresses produced by lateral forces caused by wind and earthquakes. Specific minimum seismic safety requirements are set forth in Chapter 23 of the UBC. Installation of underground utility lines must comply with industry standards specific to the type of utility (e.g., the National Clay Pipe Institute for sewers and the American Water Works Association for water lines). These standards contain specifications for installation and design.

9.2.3 Local Laws, Regulations, and Policies

Fresno County General Plan

<u>Chapter 5, Open Space and Conservation Element:</u>

- *Goal OS-A and Policies OS-A.25 and OS-A.26* address water quality and sedimentation and soil erosion.
- *Goal OS-C and Policies OS-C.2, OS-C.9, and OS-C.10* address mineral deposits and oil and gas resources.
- *Goal OS-G, Policy OS-G.13,* and *Implementation Program OS-G.C* address air quality and dust control.

<u>Chapter 6, Safety Element:</u>

- *Goal HS-D* addresses minimizing the loss of life, injury, and property damage related to seismic and geologic hazards.
- *Policies HS-D.2, HS-D.3, HS-D.4, and HS-D.7* address seismic and geological unstable conditions that include seismic hazards, and geological and soil hazards.
- *Policy HS-D.8* addresses shrink-swell or expansive soils.
- *Policy HS-D.9* addresses soil erosion.
- *Policies HS-D.10, HS-D.11, and SH-D.12* address unstable slopes, steep slopes, and landslide hazards (County of Fresno 2000).

9.3 Environmental Setting

9.3.1 Potentially Affected Area

For the purposes of this chapter, the Potentially Affected Area consists of the project area and the SCARF site, both of which are described below.

9.3.2 Project Area

The geology, soils, and seismicity of the project area can be characterized by that of the San Joaquin River and its tributaries and surrounding area, shown in Figure 2-1. The project area is located near the eastern edge of the Great Valley (Sacramento and San Joaquin Valleys) geomorphic province of California, with the Coast Ranges to the west and the Sierra Nevada Mountains to the east. The region's topography is generally flat, with elevations ranging from about 100 to 300 feet above mean sea level (MSL). The presence of subsurface faults within the coastal foothills and along the eastern flank of the Sierra Nevada Mountains in proximity to the project area could result in the potential for seismic ground shaking in the region. However, according to the USGS Earthquake Hazards Program, the project area is in a region of low earthquake hazard and will likely experience lower levels of shaking less frequently in most earthquakes (USGS 2013). However, very infrequent earthquakes could still cause strong shaking in the region. In addition, the project area does not include an Alquist-Priolo (AP) zone (DOC 2013).

9.3.3 SCARF Site

The proposed SCARF site topography is generally flat, with localized undulations and depressions currently used as settling ponds. Topographic mapping provided by the Department of General Services shows that site elevations range from approximately 305 feet above MSL near the San Joaquin River to approximately 315 feet MSL within the central portion of the site (Geocon 2012). Soil and geologic conditions at the project site generally consist of fill material and alluvium overlying granitic bedrock. Fill materials generally consist of medium dense silty and/or gravelly sand and sandy gravel with cobbles (Geocon 2012). The Geotechnical Investigation Report notes that the majority of excavations in undisturbed alluvial soils will be classified, according to the California Department of Industrial Relations, Division of Occupational Safety and Health (Cal/OSHA) categorization system, as "Type C" soil.

The Proposed SCARF site is not located on any known "active" earthquake fault trace (Geocon 2012). The closest active faults include the Ortigalita fault (approximately 66 miles west of the site), the Nunez fault (approximately 66 miles southwest of the site), the Hartley Springs fault zone (approximately 59 miles northeast of the site), and the San Andreas fault (approximately 80 miles southwest of the site). The project area is considered to have low seismic hazards (Geocon 2012). The project site is not located in a currently established State of California Seismic Hazards Zone for liquefaction. In addition, based on soil data collected in the Geotechnical Investigation Report (Geocon 2012), subsurface conditions indicate the liquefaction potential is low during seismic events.

9.4 Impact Analysis

9.4.1 Methodology

The methodology used to evaluate the potential environmental impacts of the Proposed Project on geology, soils, and seismicity involved a review and assessment of published maps, professional publications, and reports pertaining to the geology, soils, and seismicity of the project vicinity. The information included USGS topographic maps, USGS and California Geological Survey geologic and landslide maps, Natural Resources Conservation Services soils maps, and California Emergency Management Agency dam inundation maps.

The analysis also included a review of the Geotechnical Investigation Report produced for the proposed SCARF site, presenting findings, conclusions, and recommendations regarding geotechnical aspects of designing and constructing the proposed SCARF site (Geocon 2012). The mitigation measures in this section incorporate the recommendations of the Geotechnical Investigation Report into the design and construction of the project.

The five criteria listed in Section 9.4.2, *Criteria for Determining Significance*, below, all contain an element of physical change to the load being placed on or removed from an existing soil. This impact analysis focuses on the following elements of the Proposed Project: the construction and operations of the SCARF site, fisheries management actions that may include fish segregation weirs or trap-and-haul activities, traps and fyke nets for research and monitoring, and recreational management actions. The fish reintroduction element of the Proposed Project does not apply to this analysis of geologic, soil, and seismic hazards since the physical disturbance to the existing streambed from fish reintroduction would not be load bearing and, thus would not be substantial.

Additionally, operations of the SCARF would pose minimal geological or seismic risks. These potential impacts, which arise from the site location, and their associated mitigation measures are addressed in Section 9.4.3, *Environmental Impacts*, under the subheading, *SCARF Construction* below. No additional related impacts would result from SCARF operations that have not already been addressed by the design and construction measures. Therefore, the potential impacts arising from the site location are not addressed again in this operations section.

Fisheries management actions and research and monitoring would not generate wastewater requiring treatment. Therefore, no impacts associated with septic tanks or alternative wastewater disposal systems (Significance Criterion E) would occur, and no further discussion is provided.

9.4.2 Criteria for Determining Significance

The Proposed Project would have a significant effect on geology and soils if it would meet any of the following conditions:

A. Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving rupture of a known earthquake fault; strong seismic ground shaking; seismic-related ground failure, including liquefaction; or landslides;

B. Result in substantial soil erosion or the loss of topsoil;

C. Be located on a geologic unit or soil that is unstable or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse;

D. Be located on expansive soil, creating substantial risks to life or property; or

E. Have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for disposal of waste water.

9.4.3 Environmental Impacts

Table 3-1 in Chapter 3, *Introduction to the Environmental Analysis,* identifies components of the Proposed Project with the potential to result in impacts on geology, soils, or seismicity. Each impact is discussed in further detail in the section below.

SCARF Construction

Impact GEO-CONSTRUCT-1: Potential for Substantial Soil Erosion or the Loss of Topsoil from SCARF Construction (Significance Criterion B, Project Level, Less than Significant with Mitigation)

As described in the Chapter 2, *Project Description*, approximately 18,800 cubic yards (cy) of fill would be used for building foundations and 4,800 cy would be used in road construction, totaling approximately 23,600 cy of fill that would be needed. Approximately 12,100 cy of fill would be taken from two potential borrow sites on adjacent state-owned lands (Geocon 2012). The two potential borrow areas are identified in Figure 2-2 in Chapter 2. Further soil disturbance would occur near Friant Dam where the water supply improvements would be constructed. These disturbances over an 11-month period would create loose soils that could potentially be transported via stormwater runoff, causing loss of soil productivity and potential degradation of receiving waters. This would be considered a potentially significant impact.

However, to comply with the 2010 Building Code and the Fresno County Ordinance Code of Fresno County, the Proposed Project would implement erosion control methods during construction that would minimize the Proposed Project's potential to result in substantial soil erosion. In addition, the Proposed Project would include preparation and implementation of a SWPPP in compliance with the SWRCB's General Permit for Discharges of Storm Water Associated with Construction Activity. The SWPPP would, at a minimum, include an Erosion Control Plan and describe BMPs and their implementation, inspection, maintenance, and repair requirements, and their monitoring or reporting requirements. The SWPPP and the associated mitigation measure would minimize the Proposed Project's potential to result in substantial soil erosion. The implementation of BMPs is included as Mitigation Measure GEO-CONSTRUCT-1a, which is described in detail below.

In addition, excavation recommendations from the Geotechnical Investigation Report (Geocon 2012) are included as Mitigation Measures GEO-CONSTRUCT-1b and -1c, which would be implemented to minimize erosion-related risks. With implementation of these mitigation measures, these impacts would be less than significant.

Mitigation Measure GEO-CONSTRUCT-1a: Implement Construction Best Management Practices to Minimize Erosion and the Loss of Topsoil.
CDFW, DGS, or their contractor(s) shall implement the following measures:

- Implement practices to minimize the contact of construction materials, equipment, and maintenance supplies with storm water.
- Limit fueling and other activities involving hazardous materials to use in designated areas only; provide drip pans under equipment and conduct daily checks of vehicle condition.
- Implement wildlife-friendly practices to reduce erosion of exposed soil, including stabilization for soil stockpiles, watering for dust control, establishment of perimeter silt fences, and/or placement of fiber rolls.
- Implement practices to maintain water quality, including silt fences, stabilized construction entrances, and storm-drain inlet protection.
- Develop spill prevention and emergency response plans to handle potential fuel or other spills.
- Where feasible, limit construction to dry periods.

The performance standard for this mitigation measures is use of the best available technology that is economically achievable.

Mitigation Measure GEO-CONSTRUCT-1b: Comply with Cal/OSHA Requirements for Excavation Slopes.
CDFW, DGS, or their contractor(s) shall ensure that temporary excavation slopes meet Cal/OSHA requirements, as appropriate. Excavation sloping, benching, the use of trench shields, and the placement of trench spoils should conform to the last applicable Cal/OSHA standards. Nearby utilities, structures, and other improvements shall be protected from potential damage by earth movements.

Mitigation Measure GEO-CONSTRUCT-1c: Design Cut-and-Fill Slopes to Minimize Erosion.
CDFW, DGS, or their contractor(s) shall implement the following measures:

- Construction methods will incorporate appropriate erosion-prevention actions. This may include, but will not be limited to, reducing slope steepness as much as possible, re-vegetating slopes as appropriate, and directing surface drainage away from the tops of slopes. Actions shall be taken to compact fill soils uniformly.
- The guidance from the Geocon 2012 Geotechnical Investigation Report shall be used for erosion-prevention techniques, modified if necessary depending on actual field conditions.

Impact GEO-CONSTRUCT-2: Risk of Settlement at the SCARF Site as a Result of Soil Instability and Expansion (Significance Criteria C and D, Project Level, Less than Significant with Mitigation)

Soils underlying the proposed SCARF site have a low shrink-swell (expansive) potential (Geocon 2012). In addition, as described above, the project site overlies soils that consist of fill material and alluvium overlying granitic bedrock, which have a low liquefaction potential. The Proposed Project is also not likely to be affected by lateral spreading (Geocon 2012). However, the variable and loose consistency of the alluvium found in some borings makes it unsuitable for direct support of additional fill or building improvements in its existing condition (Geocon 2012). In addition, fill material may impact the soil stability for building improvements. This could result in a significant impact. Mitigation Measures GEO-CONSTRUCT-2a and -2b, as recommended in the geotechnical investigation, are described below and will be incorporated into the Proposed Project to minimize this risk, resulting in a less than significant impact.

Mitigation Measure GEO-CONSTRUCT-2a: Test Fill for Recommended Compaction and Moisture Content, and Apply Appropriate Measures to Reach Desired Content When Necessary.

CDFW, DGS, or their contractor(s) shall implement the following measures:

- All earthwork operations should be observed by a qualified inspector who is a California licensed Professional Geologist and is also a California Certified Engineering Geologist. A test fill will be constructed to determine the suitability of fill material for use at the site. The results of the test fill will be used to determine the appropriate method for conditioning, placement and compaction of fill material necessary at the site to ensure stable foundation conditions are achieved. Within the existing effluent detention pond area, existing fill and loose alluvium should be removed down to competent granite bedrock. The removal should extend at least 5 feet laterally beyond the footprint of the proposed hatchery compound, including the parking area.
- Over-excavation bottoms, areas to receive fill or areas left at-grade should be thoroughly scarified to a minimum depth of 8 inches, uniformly moisture-conditioned at or near optimum moisture content, and compacted to at least 90% relative compaction. Scarification in exposed, hard bedrock areas is not required.

Mitigation Measure GEO-CONSTRUCT-2b: Ensure Fill Soils Contain Adequate Binder.

CDFW, DGS, or their contractor(s) shall implement the following measures:

- If fill soils consist of sand and gravel mixtures with silt or clay binder, these soils should be blended with other soils containing sufficient fines to provide adequate binder (usually 10–15% fines by dry weight).
- If pond-bottom sediment is used, it should be dried and sufficiently blended with other soils such that the resulting fill does not contain organics in excess of 3% by dry weight.
- Imported fill material should be primarily granular with a “very low” expansion potential (Expansion Index less than 20) and a Plasticity Index less than 15. Imported fill material should also contain sufficient binder and

be free of organic material and construction debris; it should not contain rocks/cementations larger than 6 inches in their greatest dimension.

Impact GEO-CONSTRUCT-3: Risk of Subsidence and Collapse On-site as a Result of Shallow Groundwater Levels (Significance Criterion C, Project Level, Less than Significant with Mitigation)

The depth to groundwater in the immediate vicinity of the settling ponds ranges from 3 to 6 feet below ground surface (Geocon 2012). These relatively shallow groundwater levels could potentially affect the stability of soils underlying the Proposed Project, resulting in potential subsidence and collapse, which would be a significant impact. However, recommendations made in the Geotechnical Investigation Report (Geocon 2012) with respect to groundwater are listed below as Mitigation Measure GEO-CONSTRUCT-3 and will be incorporated into the design and construction of the Proposed Project to reduce the potential for subsidence, collapse, and subsurface seepage. The incorporation of Mitigation Measure GEO-CONSTRUCT-3 would reduce this impact to a less than significant level.

Mitigation Measure GEO-CONSTRUCT-3: Accommodate Shallow Groundwater and Potential Perched Groundwater and Seepage throughout the Project Excavation Sites.

CDFW, DGS, or their contractor(s) shall implement the following measures:

- Drain the settling ponds several weeks prior to grading, and perform earthwork and grading operations during the summer, if possible.
- Be prepared to accommodate potential perched groundwater and seepage in deeper project excavations, such as the pond removal excavations. Depending on the extent of perched groundwater at the time of grading, temporary dewatering measures, such as wellpoints or trench drains, may be required. Some form of subgrade stabilization may be necessary where wet, unstable soils are exposed.
- Depending on conditions found at the time of construction, mitigation alternatives, such as over-excavation and replacement with gravel wrapped in geosynthetic fabric, may be necessary to provide a stable bottom.

Impact GEO-CONSTRUCT-4: Risk of On-site Structure Instability (Significance Criterion C, Project Level, Less than Significant with Mitigation)

Foundation instability could result in damage to structures and/or hazards to humans, and thus would be considered a significant impact. Foundation stability depends on the site geologic conditions and design. The Geotechnical Investigation Report provided several recommendations to ensure that the proposed buildings may be supported on conventional shallow foundations bearing entirely on engineered fill. The proposed recommendations are described as Mitigation Measure GEO-CONSTRUCT-4 and will be incorporated into the design of the Proposed Project. Incorporation of Mitigation Measure GEO-CONSTRUCT-4 would result in a less than significant impact.

Mitigation Measure GEO-CONSTRUCT-4: Take Recommended Grading and Fill Actions to Maximize Foundation Stability.

CDFW, DGS, or their contractor(s) shall implement the following measures:

- Foundation design will incorporate appropriate measures to maximize long-term stability. This may address, but will not be limited to, footings and reinforcement specifications, the use of aggregate base and compacted fill or native soils, and methods to permit drainage for areas below the design flood elevation.
- The Geocon 2012 Geotechnical Investigation Report may be used as guidance, but final design and implementation will depend on actual field conditions, and modifications will be made as necessary.
- A qualified geotechnical engineer will oversee onsite field investigations and approved final design.

Impact GEO-CONSTRUCT-5: Potential Seismic Risks Resulting from the Geographic Location of the Proposed SCARF Site (Significance Criterion A, Project Level, Less than Significant)

As described in Section 9.3, *Environmental Setting*, above, the proposed SCARF site is not located on any known "active" earthquake fault trace or within an AP zone, and the nearest active fault is located approximately 59 miles away. In addition, the region is categorized as an area of low earthquake hazard that is likely to experience lower levels of shaking less frequently in most earthquakes. Thus, ground ruptures of an earthquake fault or significant ground shaking would be unlikely to occur within the SCARF site.

Liquefaction can occur when water-saturated, loose, sandy soils lose cohesion during seismic shaking. The primary factor that triggers liquefaction is moderate to strong ground shaking. Physical properties that increase susceptibility to liquefaction are relatively clean/loose granular soils and saturated conditions. Soil and geologic conditions at the project site generally consist of fill material and alluvium overlying granitic bedrock. The project site, which would be constructed on a relatively flat area with minimal potential to result in a landslide, is not located in a currently established State of California Seismic Hazards Zone for liquefaction. Liquefaction potential at the site is low during seismic events, and a potential seismic event in the AP zone would not generate significant seismic acceleration beneath the site.

Construction activities, including clearing, grubbing, excavating, and placing and compacting fill, would follow the requirements contained in the 2010 UBC. Excavation down to a depth of 10 feet would occur in areas where buildings and structures would be located, but would not increase landslide or other seismic risks.

Therefore, the potential exposure of workers and nearby community members to increased seismic risk from the proposed SCARF construction is less than significant.

SCARF Operations

Impact GEO-OP-1: Significant Increase in Discharge Flow as a Consequence of SCARF Operations, Resulting in Substantial Soil Erosion along the Return Flow Outfall Channel (Significance Criterion B, Project Level, Less than Significant with Mitigation)

Water would flow either directly into the secondary channel of San Joaquin River or into the SCARF settling ponds, before eventually discharging to the secondary channel of San Joaquin River. Table 2-2 in Chapter 2, *Project Description,* lists the estimated monthly flow rates for the fully operational SCARF. Although the expected range of flow would be between 2 and 15 cfs, peak flow may be as high as 20 cfs. The channel receiving this discharge will need to be able to accommodate a potential peak flow of 20 cfs. Otherwise, such discharges could lead to channel erosion, which would be considered a potentially significant impact. Mitigation Measure GEO-OP-1 is necessary to determine if additional flow resulting from the Proposed Project would exceed the capacity of the return flow outfall channel or cause erosion. Investigations as included in Mitigation Measure GEO-OP-1 would involve recommendations that would be incorporated into SCARF operations to minimize this potential impact. Therefore, the impact would be reduced to less than significant with implementation of this mitigation measure.

Mitigation Measure GEO-OP-1: Conduct an Additional Investigation into the Flow Capacity of Impacted Channels and Implement the Investigation's Recommendations.

Due to the increased flow through the return flow outfall channel, CDFW, DGS, or their contractor(s) shall conduct an investigation into the capacity of the channel and its connection to the San Joaquin River to verify that the channel and connection point have the capacity to support potential increased flows. Similarly, the volitional release channel would require the same investigation. The geotechnical investigation would be conducted by a qualified hydrologist(s) or hydraulic engineer(s) (or team of such experts) and detailed in a technical report.

If the geotechnical investigation results indicate that the flow capacities of the affected channels would not be sufficient to accommodate the Proposed Project's flows, recommended actions will be included in the report. CDFW will implement the report's recommended actions. Potential recommendations may include but not be limited to: expansion and/or reinforcement of the existing outfall and volitional release channels, a reduction of flow rates to a level that can be supported by the existing channels, and/or an investigation into and development of alternative channels to support peak flows. As a performance standard, in no case shall the return flows from the outfall or the volitional release channel cause channel instability or erosion and sedimentation downstream.

Impact GEO-OP-2: Increased Domestic Waste Production (Significance Criterion E, Project Level, Less than Significant)

Domestic waste water from the hatchery building and residences would be discharged to the septic system serving the SJFH, as shown in Figure 2-3. This septic system was recently upgraded and has sufficient capacity to support domestic waste water from the hatchery building and residences. As a result, the increased domestic waste water generated from the proposed SCARF operations would result in a less than significant impact.

Impact GEO-OP-3: Potential for Project Structures, Specifically the Aeration Tower and Rearing/Holding/Quarantine Tanks, to Affect Soil Stability (Significance Criterion C, Project Level, No Impact)

Proposed SCARF operations would require an aeration tower and several tanks. As described in Impact GEO-CONSTRUCT-4, these facilities would be built according to recommendations included in the Geotechnical Investigation Report (Geocon 2012) and include incorporation of Mitigation Measure GEO-CONSTRUCT-4. Inclusion of these recommendations and mitigation in the design and construction of the facilities would minimize impacts related to geologic and soil stability. As a result, SCARF operations of these facilities would not change the structures in any way and thus would not have any impact on geologic or soil stability. Therefore, there would be no impact related to geologic and soil stability during the operational phase of SCARF.

Impact GEO-OP-4: Expose Workers and Nearby Community Members to Increased Seismic and Related Risks from SCARF Construction (Significance Criterion A, Project Level, Less than Significant)

Potential seismic-related hazards include the potential rupture of a known earthquake fault, ground shaking, liquefaction, or landslides that could occur as a result of the location of the proposed SCARF site. These potential impacts have been addressed in the "SCARF Construction" section, above. Given that the operation of the SCARF would not include any activities that could have a direct or indirect effect on the seismicity of the area, no additional impacts would result from SCARF Operations. Therefore, this impact would be less than significant.

Fisheries Management

Impact GEO-MANAGEMENT-1: Potential for Erosion due to Disturbance of the Streambank or Stream Channel from the Installation, Removal, or Repurposing of Segregation Weirs and Trap and Haul Activities (Significance Criterion B, Project/Program Level, Less than Significant with Mitigation)

Weirs and trap and haul activities may be required for the management of spring- and fall-run Chinook salmon populations in the Restoration Area. The installation, removal, or repurposing of fish weirs potentially could create loose soils and increase erosion on the streambanks. Additionally, installing or removing the weirs and/or releasing fish that have been trapped and hauled for management purposes may change the flow of water in both the upstream and downstream vicinity of the barrier or the release location. This changed flow could affect erosion patterns. These would be potentially significant impacts. **Mitigation Measures GEO-MANAGEMENT-1a and -1b** would be implemented to minimize erosion-related risks. With implementation of these mitigation measures, these impacts would be less than significant.

The impact analysis and significance conclusion above is considered project-level for trap and haul activities and programmatic for the fish segregation weirs. For further discussion of the approach to the project and programmatic analysis in this document, please see Chapter 3, *Introduction to the Environmental Analysis*.

Mitigation Measure GEO-MANAGEMENT-1a: Stabilize Soils to Avoid Increasing Erosion on Streambanks

Project activities will be done in such a manner as to not increase erosion within the banks of the river during or immediately following rainfall events. All disturbed soils at project activity sites will be stabilized to reduce erosion potential, both during and following installation of equipment (e.g., weirs, fyke nets, traps, etc.). After removal of such equipment, soils shall be stabilized and recontoured, as necessary.

Mitigation Measure GEO-MANAGEMENT-1b: Use Energy Dissipaters to Minimize Turbidity at the Point of Discharge

Water deposited back into the river following Chinook salmon transport shall be done at a rate to minimize water turbidity and erosion. As necessary at each site, temporary energy dissipaters such as rip rap shall be placed at the point of discharge to moderate the return of water to the channel.

Fisheries Research and Monitoring

Impact GEO-MONITORING-1: Potential for Erosion due to Disturbance of the Streambank or Stream Channel from the Installation, Operation or Removal of Research and Monitoring Equipment (Significance Criterion B, Project Level, Less than Significant with Mitigation)

Instream monitoring equipment, including screw traps and fry traps, may be used in order to assess the effectiveness of the Proposed Project. Traps would need to be anchored either to the streambed or banks, and may disturb the streambanks or stream bottom during installation or removal. Such disturbances could create loose sediment that could potentially cause erosion and degrade downstream waters. This would be a potentially significant impact. Similar to Impact GEO-MANAGEMNT-1 above, **Mitigation Measures GEO-MANAGEMENT-1a and -1b** would be implemented to minimize erosion-related risks. With implementation of these mitigation measures, these impacts would be less than significant.

Recreation Management

Impact GEO-RECREATION-1: Required Geotechnical Investigation as a Result of Additional Structural Improvements before Initiation of Recreation Management Activities (Significance Criteria A, B, and C, Program Level, Less than Significant with Mitigation)

Because the specific locations for physical improvements associated with recreation management activities have not been identified, the geologic, soil, and seismic stability of these sites has not yet been investigated in great detail. That said, due to the distance from the closest known fault, potential seismic-related hazards, such as the potential rupture of a known earthquake fault, ground shaking, liquefaction, or landslide, are not considered substantial. However, foundation stability depends on the site's geologic unit stability and soil stability, as well as on accommodation of the project design to the site's geologic features. This factor could result in a potentially significant impact.

Construction of new off-stream or in-stream recreational facilities would require additional geotechnical field investigations to assess appropriate mitigation measures. Based on the assessment for construction of the SCARF and the geologic evaluation of the project area, it would appear that any geologic or seismic issues that arise can be adequately addressed such that significant impacts would not result. The geotechnical investigation is included below as **Mitigation Measure GEO-RECREATION-1**. With incorporation of the mitigation recommendations in the Geotechnical Investigation Report, the Proposed Project would have a less than significant impact.

Mitigation Measure GEO-RECREATION-1: Conduct a Geotechnical Investigation and Incorporate Report Recommendations into the Design and Construction of any Future Recreation Management Roads or Facilities.
A geotechnical investigation must be conducted by a qualified geotechnical engineer (or team of geotechnical engineers) to evaluate subsurface soil and geologic conditions at future sites of recreation management roads and facilities. The investigation report should provide conclusions and recommendations relative to the geotechnical aspects of designing and constructing the recreation management roads and facilities, which are yet to be determined. Recommendations should address site and geologic conditions, including soil, groundwater, and corrosion. They should also address geologic hazards, such as regional active faults, ground shaking, liquefaction, and flooding. The report should provide seismic design criteria; excavation and cut-and-fill characteristics; criteria for foundations, retaining walls, and pavement; and any other design criteria appropriate for the Proposed Project such that the facilities remain stable.

The proposed recreation management activities will incorporate all recommendations put forth by the Geotechnical Investigation Report into the design and construction of the Proposed Project.

Impact GEO-RECREATION-2: Potential Loss of Soil Productivity and Potential Degradation of Receiving Waters Resulting from Soil Erosion or the Loss of Topsoil Caused by Construction Activities Associated with Enhancing Fishing Opportunities in or Near the Recreation Area (Significance Criteria B, Program Level, Less than Significant with Mitigation)

As stated above, the exact location and design of future recreation enhancement actions are yet to be determined. However, potential activities may include the construction of access roads and facilities near enhanced recreational fishing sites as a component of recreation management activities. This would be considered a potentially significant impact.

To comply with the 2010 UBC, standard erosion control methods would be implemented during construction; this would minimize the Proposed Project's potential to result in substantial soil erosion from construction activities associated with enhancing recreational fishing opportunities. If construction activities meet applicable criteria, prior to any construction activities, the Proposed Project would include preparation and implementation of a SWPPP in compliance with the SWRCB's General Permit for Discharges of Storm Water Associated with construction activity of the fisheries management barriers. The SWPPP would, at a minimum, include an Erosion Control Plan and describe BMPs and their implementation, inspection, maintenance, and repair requirements, as well as their monitoring or reporting requirements. In addition BMPs, as described in **Mitigation Measure GEO-CONSTRUCT-1a**, and Cal/OSHA excavation standards, as described in **Mitigation Measure GEO-CONSTRUCT-1b**, would be implemented to reduce erosion and loss of topsoil.

The SWPPP and associated mitigation measures would minimize the Project's potential to result in substantial soil erosion. With the incorporation of **Mitigation Measures GEO-CONSTRUCT-1a and -1b**, this impact would be less than significant.

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Chapter 10
GREENHOUSE GAS EMISSIONS

10.1 Overview

This chapter describes the greenhouse gas (GHG) regulatory and environmental settings and then evaluates the Proposed Project's GHG emission impacts. The impact evaluation begins by describing the methodology used to evaluate significance and the air quality significance criteria, and then presents the impact evaluation. Mitigation measures are identified for impacts that are determined to be significant.

10.2 Regulatory Setting

10.2.1 Federal Laws, Regulations, and Policies

There are no federal regulations related to GHG emissions that would be applicable to the Proposed Project.

10.2.2 State Laws, Regulations, and Policies

Assembly Bill 1493 (2002)

In 2002, the signing of Assembly Bill (AB) 1493 (also known as the Pavley Law or Pavley regulations) required that the CARB develop and adopt, by January 1, 2005, regulations that achieve the maximum feasible reduction of GHGs emitted by passenger vehicles, light-duty trucks, and other vehicles determined by CARB to be vehicles whose primary use is non-commercial personal transportation. Legal challenges delayed CARB's implementation of AB 1493. On June 30, 2009, the EPA granted California the authority to implement GHG emission-reduction standards for new passenger cars, pickup trucks, and sport utility vehicles. Following the direction set by President Obama on May 21, 2010, the National Highway Transportation Safety Administration and the EPA have issued joint Final Rules for Corporate Average Fuel Economy and Greenhouse Gas emissions regulations for model years 2017 and beyond. These Rules are designed to reduce the United States' dependence on imported oil, save consumers money at the pump, and reduce emissions of greenhouse gases that contribute to global climate change.

Executive Order S-3-05

On June 1, 2005, Governor Arnold Schwarzenegger signed Executive Order S-3-05. This executive order was created to achieve the following:

- Reduction of California's GHG emissions to 2000 levels by 2010.
- Reduction of GHG emissions to 1990 levels by 2020.
- Reduction of GHG emissions to 80 percent below 1990 levels by 2050.

Assembly Bill 32 (2006), the California Global Warming Solutions Act of 2006

In 2006, the goals of S-3-05 were further reinforced with the passage of AB 32, the Global Warming Solutions Act of 2006. AB 32 sets the same overall GHG emissions reduction goals while further mandating that CARB create a plan (including market mechanisms) and implement rules to achieve "real, quantifiable, cost-effective reductions of greenhouse gases." Executive Order S-20-06 further directs state agencies to begin implementing AB 32, including the recommendations made by the state's Climate Action Team. CARB adopted regulations identifying the establishment, administration, and enforcement of the California Greenhouse Gas Cap-and-Trade Program, which became effective on January 1, 2012 (Cal. Code Regs., tit. 17, § 95801). The program applies an aggregate GHG allowance budget on covered entities and provides a trading mechanism for compliance instruments.

Climate Change Scoping Plan

Pursuant to AB 32, CARB adopted a Scoping Plan in 2008, outlining measures to meet the 2020 GHG-reduction limits. At the time of the Scoping Plan adoption, California needed to reduce its GHG emissions by approximately 29 percent below the projected 2020 business-as-usual (BAU) emissions (596 million metric tons of carbon dioxide equivalent ($MMTCO_2E$)) to return to the 1990 levels (427 $MMTCO_2E$). The Scoping Plan originally estimated a reduction of 174 $MMTCO_2E$ from the transportation, energy, agriculture, forestry, and high global warming potential sectors. CARB identified an implementation timeline for the GHG-reduction strategies in the Scoping Plan. Some measures required new legislation to implement, some required subsidies, some have already been developed, and some required additional effort to evaluate and quantify (CARB 2009).

Since the adoption of the original Scoping Plan, CARB has updated the projected BAU emissions to consider existing reduction measures and more current economic forecasts. The new projected 2020 BAU emission estimate is 507 $MMTCO_2E$, which is 16 percent greater than the 1990 levels (CARB 2011).

Senate Bill 97

In 2007, Senate Bill 97 (SB 97) was adopted to provide greater certainty to lead agencies that GHG emissions and the effects of GHG emissions are appropriate subjects for CEQA analysis. Pursuant to SB 97, the state's Natural Resources Agency adopted amendments to the CEQA Guidelines to address analysis and mitigation of the potential effects of GHG emissions in CEQA documents and processes. These amendments became effective on March 18, 2010.

10.2.3 Local Laws, Regulations, and Policies

SJVAPCD Climate Change Action Plan

The SJVAPCD's Climate Change Action Plan (CCAP), adopted in 2008, directed the District Air Pollution Control Officer to develop guidance to assist lead agencies, project proponents, permit applicants, and interested parties in assessing and reducing the impacts of project-specific GHG emissions on global climate change (SJVAPCD 2012a). On December 17, 2009, the SJVAPCD adopted *Guidance for Valley Land-use Agencies in Addressing GHG Emission Impacts for New Projects under CEQA* (Guidance) (SJVAPCD 2009). The Guidance establishes a streamlined process that can be used to evaluate the significance of project-specific GHG emission impacts on global climate change, based on the use of Best Performance Standards (BPS) (SJVAPCD 2009). The SJVAPCD defines BPS as "the most effective achieved-in-practice means of reducing or limiting GHG emissions from a GHG emissions source." Types of BPS include equipment type, equipment design, operational and maintenance practices, measures that improve energy efficiency, and measures that reduce vehicle miles traveled (SJVAPCD 2009).

SJVAPCD Zero Equivalency Policy

The SJVAPCD has not developed CEQA significance thresholds for construction-related GHG emissions (Montelongo pers. comm.). However, the SJVAPCD has adopted a Zero Equivalency Policy for Greenhouse Gases that establishes a level (230 metric tons of carbon dioxide equivalent [CO_2e/year]) below which project-specific increases in GHG emissions are considered equivalent to zero for CEQA and District permitting purposes (SJVAPCD 2012b; Montelongo pers. comm.).

SJVAPCD Rule 2301

In January 2012, SJVAPCD amended Rule 2301, Emission Reduction Credit Banking, to provide an administrative mechanism for sources to bank voluntary GHG emission reductions for later use or transfer banked GHG emission reductions to others. Rule 2301 defines the eligibility standards and procedures for the GHG emission reduction banking and requires that banked GHG emission reductions are real, permanent, quantifiable, surplus, and enforceable (SJVAPCD 2012c).

10.3 Environmental Setting

Climate change results from the accumulation in the atmosphere of GHGs produced primarily by the burning of fossil fuels for energy. These anthropogenic GHG emissions are widely accepted in the scientific community as contributing to global warming. According to *Climate Change 2007: The Physical Science Basis: Summary for Policymakers* (IPCC 2007), there is no doubt that the climate system is warming. Global average air and ocean temperatures, as well as the global average sea level, are rising. The 11 years from 1995 through 2006 ranked as among the warmest on record since 1850. While some of the increase is explained by natural occurrences, the 2007 report asserts that the increase in temperature is very likely (approximately 90 percent) due to human activity, most notably the burning of fossil fuels.

For California, similar effects are described in *Our Changing Climate: Assessing the Risks to California* (California Climate Change Center 2006). Based on projections using state-of-the art climate modeling, temperatures in California are expected to rise between 3.0 and 10.5°F (1.7 and 5.8°C) by the end of the century, depending upon how much California and the rest of the world are able to reduce their GHG emissions. The report states that these temperature increases would negatively impact public health, water supply, agriculture, plant and animal species, and the coastline.

Because GHGs (CO_2, methane, and nitrous oxide) persist and mix in the atmosphere, emissions anywhere in the world affect the climate everywhere in the world. Consequently, GHG emissions that contribute to climate change result in a worldwide cumulative impact (global warming) rather than a local or regional project-specific impact typically associated with criteria pollutants. Impacts related to GHG emissions are discussed in the context of the Proposed Project's contribution to statewide and global GHG emissions.

10.3.1 Potentially Affected Area

As described above, climate change is a global issue and planning surrounding it has been conducted at the state level; accordingly, the potentially affected area for the purposes of this chapter considers two geographic scales: (1) statewide and (2) global GHG emissions. The project area and SCARF site are also relevant, as they are the locations where the Proposed Project could generate GHG emissions. In particular, the SCARF site has characteristics that are relevant to the GHG analysis, and is described below.

10.3.2 SCARF Site

The SCARF site's Interim Facility is currently generating GHG emissions, and would continue to operate and potentially generate GHG emissions in 2020, when GHG emissions must be reduced to 1990 levels.

10.4 Impact Analysis

10.4.1 Methodology

GHG emissions produced by SCARF construction and operational activities were estimated using the CALEEMOD model, as required by the SJVAPCD. SCARF construction-related GHG emissions were compared to the SJVAPCD's zero equivalency threshold of 230 metric tons CO_2e per year. SCARF operational emissions were compared to a significance threshold of 1,100 metric tons CO_2e per year (further details provided below). In addition, CDFW evaluated whether SCARF construction and operational emissions would conflict with the CARB's Scoping Plan and associated regulations.

For the Proposed Project's components that would involve construction (fisheries management and recreation management)[1], but for which construction-related GHG emissions cannot be quantified at this time, the emissions sources were evaluated qualitatively to determine (1) whether SJVAPCD's construction-specific zero equivalency policy would be exceeded and/or (2) consistency with CARB's GHG Scoping Plan and associated regulations. Also, operations of the Proposed Project's components for which operational GHG emissions cannot be quantified at this time were evaluated qualitatively to determine whether activities would potentially exceed the GHG operational emission threshold or conflict with the CARB's GHG Scoping Plan and associated regulations.

The Interim Facility's GHG emissions would be eliminated by operation of the proposed SCARF facility. However, the Interim Facility's GHG emissions are minor and are assumed to be negligible. Thus, impacts related to GHG emissions from the SCARF site's Interim Facility are not discussed or evaluated further in this GHG analysis.

Projected changes in climate associated with global warming may have future related effects on other resources, including on the Proposed Project (such as changed weather patterns). However, the evaluation of such effects is beyond the scope of this GHG analysis.

10.4.2 Criteria for Determining Significance

A significant impact would occur with respect to GHG emissions if the Proposed Project would:

A. Generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment.

B. Conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing emissions of GHGs.

[1] Fisheries reintroduction and research and development would not result in construction emissions.

For Significance Criterion A, construction emissions have been considered less than significant if GHG emissions are less than SJVAPCD's zero-equivalency threshold of 230 metric tons of CO_2e/year. The SJVAPCD has adopted a Best Management Practice (BMP) threshold for GHG emissions based on an achievable in practice analysis of improvement over a business-as-usual scenario or 29% improvement. However, at this time there is not an approved BMP for this type of project nor has suitable data to establish a business-as-usual scenario been provided by the SJVAPCD. Therefore, the published California air district mass emissions thresholds were reviewed and considered in developing an appropriate threshold. The Bay Area Air Quality Management District has an operational threshold of 1,100 CO_2e per year. Other operational mass emissions GHG thresholds include those set by the San Luis Obispo County Air Pollution Control District (1,150 metric tons per year, which includes amortized construction plus operational emissions), the Santa Barbara Air Pollution Control District (10,000 metric tons per year for industrial sources), the South Coast Air Quality Management District (10,000 metric tons per year for industrial sources). The most stringent of these thresholds is 1,100 metric tons CO_2e per year, therefore this threshold is considered conservative. Operational GHG emissions have therefore been considered less than significant if the generated GHG emissions are less than the operational threshold of 1,100 metric tons CO_2e/year.

For Significance Criterion B, the applicable plans and policies for operational-related emissions were determined to be CARB's Scoping Plan. Specifically, if a project activity does not conflict with CARB's GHG emission reduction policies, it would have a less than significant impact. For construction-related GHG emissions, the applicable significance threshold is compliance with the SJVAPCD's zero equivalency policy, which is considered to be consistent with CARB's Scoping Plan and associated regulations.

10.4.3 Environmental Impacts

Table 3-1 in Chapter 3, *Introduction to the Environmental Analysis,* identifies components of the Proposed Project with the potential to result in impacts from the Proposed Project on GHG emissions. Each impact is discussed in further detail in the section below.

SCARF Construction

Impact GHG-CONSTRUCT-1: Potential for SCARF Construction to Generate Substantial GHG Emissions (Significance Criterion A, Project Level, Less than Significant)

SCARF construction would generate GHG emissions during construction as summarized in Table 10-1. Construction activities would generate approximately 1,023 metric tons CO_2e during the 11-month construction period from early 2015 through early 2016. The SJVAPCD recommends amortizing GHG emissions by the operational life of a project. Construction emissions equal approximately 114 metric tons per year when amortized over the project's 9-year operation period. These emissions are less than the SJVAPCD's approved zero equivalency value of 230 metric tons of CO_2e per year (SJVAPCD 2012b; Siong pers. comm.). Consequently, the project's construction-related GHG emissions are considered equal to zero and therefore are less than significant.

Table 10-1. SCARF Construction-Related GHG Emissions (metric tons/year)

	CO_2e
Construction 2015	1,020
Construction 2016	2.8
Total Construction	1,023
Construction (9-year amortization)	114
SJVAPCD Zero Equivalency Value	230

Notes:
Construction emissions based on CALEEMOD modeling results. Nine-year amortization based on the Proposed Project facility's operation, which is currently scheduled to begin production in 2016 and end in 2025. Zero equivalency value and its application based on information supplied by SJVAPCD (SJVAPCD 2012b; Siong pers. comm.).

Impact GHG-CONSTRUCT-2: Potential for SCARF Construction to Conflict with the SJVAPCD's or CARB's Applicable Plans, Policies, or Regulations Adopted for the Purpose of Reducing the Emissions of GHGs (Significance Criterion B, Project Level, No Impact)

The Proposed Project's construction activities would be consistent with the SJVAPCD's recommended GHG zero equivalency policy (SJVAPCD 2012b). Consequently, the project would not conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of GHGs. Therefore, there would be no impact.

SCARF Operations

Impact GHG-OP-1: Potential for SCARF Operation to Generate Substantial GHG Emissions (Significance Criterion A, Project Level, Less than Significant)

Operation of the SCARF would generate employee vehicle and truck trips that would contribute GHG emissions. Approximately 16 daily employee vehicle trips would be generated by the four full-time and two part-time workers, including the two employees living on-site or in Friant. In addition, the SCARF would require truck deliveries twice a month for hatchery-related supplies, such as fish food, chemicals, and therapeutics, as well as miscellaneous travel for SCARF operations, meetings, and training estimated by DFW to be less than two trips per day. Truck trips associated with relocation of fish is addressed under Fish Relocation. Operation of the SCARF also would generate indirect GHG emissions from facility energy use, water use, and waste generation.

As shown in Table 10-2, operation of the SCARF would result in GHG emissions ranging from approximately 384 metric tons CO_2e per year in 2016 to 380 metric tons/year in 2020. The reduction in SCARF emissions between 2016 and 2020 would result from implementation of CARB's low carbon fuel standard and the Pavley regulations, both of which reduce CO_2e emissions from on- and off-road motor vehicles. If a business-as-usual analysis were to be performed, reduction would show a larger decrease in vehicle emissions due to improvements made since a typical 2002-2004 baseline. Other improvements to adopted regulations, including reduction in building energy use, carbon intensity of electricity and water, will result in further reduction in GHG emissions that have not been quantified. Since the SCARF facility's operational emissions, in combination with the operational emissions of the other project components, would be less than the 1,100 metric ton CO_2e threshold, SCARF facility operations would result in a less than significant impact.

Table 10-2. Operation-Related GHG Emissions (metric tons/year)

	CO_2e					
	SCARF operations	**Fish Reintroduction**	**Fisheries Management**	**Fisheries Research and Monitoring**	**Recreational Management**	***Total Operational Emissions***
Operation 2016	389	94	55	83	4	625
Operation 2020	385	87	52	79	3	606
Significance Threshold						1,100
Emissions Exceed Significance Threshold						**No**

Notes:
Operation emissions are based on CALEEMOD modeling results. The difference between the 2016 and 2020 unmitigated scenarios is that the 2020 scenario assumes full ramp-in of the CARB's Low-Carbon Fuel Standard, Pavley regulations, and other associated measures required by CARB's Scoping Plan.

Impact GHG-OP-2: Potential for SCARF Operation to Conflict with the CARB's Applicable Plans, Policies, or Regulations Adopted for the Purpose of Reducing the Emissions of GHGs (Significance Criterion B, Project Level, Less than Significant)

As described in Impact GHG-OP-2, the SCARF operations would generate GHG emissions that are less than the operational significance threshold. In addition, there are no aspects of the SCARF project that would conflict with the CARB's GHG Scoping Plan, which is designed to reduce California statewide emissions to 1990 levels by 2020.

Fish Reintroduction

Impact GHG-REINTRO-1: Potential for Fish Reintroduction Activities to Generate Substantial GHG Emissions or Conflict with the CARB's Applicable Plans, Policies, or Regulations Adopted for the Purpose of Reducing the Emissions of GHGs (Significance Criteria A and B, Project/Program Level, Less than Significant)

Fish reintroduction would consist entirely of operational activities and, consequently, construction emissions are not evaluated for this project component.

Fish reintroduction activities would primarily consist of mobile source trips. The GHG emissions from such trips would comply with CARB's adopted Scoping Plan because all vehicles would be subject to the Low Carbon Fuels Rule and the Pavley regulations. Consequently, fish reintroduction would not conflict with CARB's GHG Scoping Plan and the resulting impacts related to plans, policies, or regulations would be less than significant.

The fish reintroduction activities would require truck and vehicle trips for the collection, transport, and/or release of Chinook salmon (eggs, juveniles, or adults). These activities are estimated to be seasonal, likely spanning 5 months per year during the fall and 5 months during the spring. The frequency of delivery trips from the FRFH to the quarantine facilities is assumed to be 4 times per week, and the frequency of delivery trips from the quarantine facility to SCARF is also assumed to be 4 times per week. The emissions from these truck trips are shown in Table 10-2, illustrating that the GHG emissions from fish reintroduction activities, in combination with the operational emissions from other project components, are substantially less than the 1,100 metric tons/year of CO_2e significance threshold.

Since the fish reintroduction activities' operational emissions, in combination with the operational emissions of the other project components, would be less than the 1,100 metric ton CO_2e threshold, fish reintroduction activities would result in a less than significant impact.

The impact analysis and significance conclusion above is considered project-level for all aspects of fish reintroduction, with the exception of wild broodstock collection, for which it is programmatic. For further discussion of the approach to the project and programmatic analysis in this document, please see Chapter 3, *Introduction to the Environmental Analysis*.

Fisheries Management

Impact GHG-MANAGEMENT-1: Potential for Construction of Fish Segregation Weirs to Generate Substantial GHG Emissions or Conflict with the CARB's Applicable Plans, Policies, or Regulations Adopted for the Purpose of Reducing the Emissions of GHGs (Significance Criteria A and B, Program Level, Significant and Unavoidable)

Construction of the fish segregation weirs would potentially generate GHG emissions from construction equipment exhaust, including exhaust from haul or equipment trucks and worker commutes. Specific project-level data about the amount, use, and locations of this equipment are not available at this time. In addition, specific project-level data about the construction periods are not available. In the absence of such information, it is believed that these activities would generate GHG emissions that, in combination with the other Proposed Project components, could exceed the construction significance threshold. This is considered a potentially significant impact.

Implementation of **Mitigation Measure GHG-MANAGEMENT-1** would ensure that construction GHG emissions would be below the construction significance threshold. Compliance with these significance thresholds would ensure that the fisheries management activities also comply with CARB's adopted Scoping Plan. Therefore, with implementation of **Mitigation Measure GHG-MANAGEMENT-1**, this impact is considered less than significant. However, this mitigation measure may not be feasible. Should the mitigation be determined to be infeasible (for instance, if inadequate funding were available to purchase emissions offsets), impacts would be considered significant and unavoidable.

Mitigation Measure GHG-MANAGEMENT-1: Prepare Project-Level Quantitative Analysis of Construction-Related GHG Emissions, and Implement Measures to Reduce and/or Offset Emissions.

As future individual Proposed Project components are further defined to a level that construction emissions can be estimated, and prior to implementing that component or taking actions that commit CDFW to implementing that component, CDFW will prepare a complete, quantitative project-level GHG emissions analysis for that component.

The GHG emissions analysis will be based on the types, locations, numbers, and operations of equipment to be used; the amount and distance of material to be transported; and worker trips required. The analysis will determine whether the combined emissions of the various quantified components' construction activities exceed the construction thresholds (230 metric tons CO_2e/year amortized or district approved BPS).

If the analysis determines that construction emissions will exceed the construction thresholds, CDFW will first implement all feasible, applicable GHG emission reduction measures and propose these as BPS for the project, up to a 29% reduction from a defined business-as-usual baseline or 1,100 metric tons CO_2e per year. Potential GHG emission reduction measures to be considered include, but are not limited to the following:

- Utilize alternative fueled vehicles such as electric or biodiesel for equipment and vehicles.
- Utilize newer, more fuel efficient equipment and vehicles for construction.
- Increase employee vanpool share (2% of vanpool mode share).
- Utilize locally sourced material.

In the event that the mitigation measures are insufficient to reduce construction emissions to be equal to or less than the significance thresholds, then CDFW shall purchase sufficient GHG emission credits to offset the Proposed Project's construction net increase in emissions above the thresholds. These may include GHG credits that have been banked under SJVAPCD Rule 2301 or other GHG credits that are considered acceptable by SJVAPCD.

Impact GHG-MANAGEMENT-2: Potential for Operation of Fish Segregation Weirs and Trap and Haul Efforts to Generate Substantial GHG Emissions or Conflict with the CARB's Applicable Plans, Policies, or Regulations Adopted for the Purpose of Reducing the Emissions of GHGs (Significance Criteria A and B, Project/Program Level, Less than Significant)

Operation of the weir(s) may involve infrequent truck or vehicle trips by SCARF employees to perform minor maintenance or operation activities on the weir(s), such as minor patchwork or temporary removal of portions of the weir. Likewise, operation of instream fyke nets or traps would involve vehicle trips by SCARF employees. Although the exact quantity of vehicle trips is unknown for the management of fish segregation weirs and traps, it can reasonably be assumed that these activities would average less than two vehicle trips daily and would occur seasonally. The emissions from these vehicle trips are shown in Table 10-2, illustrating that (in combination with the operations of other project components) the GHG emissions would be substantially less than the 1,100 metric tons/year of CO_2e significance threshold. It is not anticipated that any stationary emission sources (e.g., diesel generators) would be required to operate the weir(s) or traps.

Since the fisheries management activities' operational emissions, in combination with the operational emissions of the other project components, would be less than the 1,100 metric ton CO_2e threshold, fisheries management activities would result in a less than significant impact.

The impact analysis and significance conclusion above is considered project-level for trap and haul activities and the existing HFB, and programmatic for any new or reconstructed fish weirs or barriers. For further discussion of the approach to the project and programmatic analysis in this document, please see Chapter 3, *Introduction to the Environmental Analysis*.

Fisheries Research and Monitoring

Impact GHG-MONITORING-1: Potential for Fisheries Research and Monitoring Activities to Generate Substantial GHG Emissions or Conflict with the CARB's Applicable Plans, Policies, or Regulations Adopted for the Purpose of Reducing the Emissions of GHGs (Significance Criteria A and B, Project Level, Less than Significant)

Fisheries research and monitoring is not expected to involve construction activities and therefore, it would not generate construction emissions.

The Proposed Project's fisheries research and monitoring activities would require truck and vehicle trips and would potentially require the use of watercraft for the various research and monitoring activities located along the San Joaquin River and within the SJVAPCD's jurisdiction. These research and monitoring activities are not expected to require any permanent stationary emission sources (e.g., diesel generators). Although the exact quantity of vehicle trips and watercraft use is unknown, for the fisheries research and monitoring, it can reasonably be assumed that these activities would average less than four vehicle trips daily and 4,752 hours of annual boat use The emissions from these vehicle trips and boat use are shown in Table 10-2, illustrating that (in combination with the operations of other project components) the GHG emissions would be substantially less than the 1,100 metric tons/year of CO_2e significance threshold.

Since the fisheries research and monitoring activities' operational emissions, in combination with the operational emissions of the other project components, would be less than the 1,100 metric ton CO_2e threshold, fisheries research and monitoring activities would result in a less than significant impact.

Recreation Management

Impact GHG-RECREATION-1: Potential for Construction Activities Related to Enhancing Recreational Fishing Opportunities to Generate Substantial GHG Emissions or Conflict with the CARB's Applicable Plans, Policies, or Regulations Adopted for the Purpose of Reducing the Emissions of GHGs (Significance Criteria A and B, Program Level, Significant and Unavoidable)

Enhancement of recreational fishing opportunities on the San Joaquin River may require construction activities that would potentially generate GHG emissions from construction equipment exhaust, including exhaust from haul or equipment trucks and worker commutes. Specific project-level data about the amount, use, and locations of this equipment are not available at this time. In addition, specific project-level data about the construction periods is not available. Thus, these activities, in combination with SCARF construction and construction of fish segregation weirs, would generate construction-related GHG emissions that could exceed the construction significance threshold. This is considered a potentially significant impact.

Implementation of **Mitigation Measure GHG-MANAGEMENT-1** would ensure that construction GHG emissions would be below the construction significance threshold. Compliance with these significance thresholds would ensure that the enhanced recreation opportunities also comply with CARB's adopted Scoping Plan. Therefore, with implementation of **Mitigation Measure GHG-MANAGEMENT-1**, this impact is considered less than significant. However, this mitigation measure may not be feasible. Should the mitigation be determined to be infeasible (for instance, if inadequate funding were available to purchase emissions offsets), impacts would be considered significant and unavoidable.

Impact GHG-RECREATION-2: Potential for Operational Activities Related to Enhancing Recreational Fishing Opportunities to Generate Substantial GHG Emissions or Conflict with the CARB's Applicable Plans, Policies, or Regulations Adopted for the Purpose of Reducing the Emissions of GHGs (Significance Criteria A and B, Program Level, Less than Significant)

Enhancement of recreational fishing opportunities on the San Joaquin River may result in increased recreation-related or maintenance and enforcement vehicle trips to or within the SJVAB and would potentially require the use of watercraft. Although the exact quantity of vehicle trips and watercraft use is unknown for the recreational activities, it can reasonably be assumed that these activities would average less than one vehicle trip daily for recreation management activities associated with stocking and other enhancements. This does not analyze any changes in recreational user vehicle trips. However, it is unclear that these vehicle trips and watercraft use associated with recreational visitors would be new activities in the global sense. It is likely that the recreational visitors are choosing alternative locations that may be closer or further from their current location. Since the GHG emissions have an impact on a global scale rather than the local environment it is unlikely that there will be a net increase globally in emissions due to the displacement of use. The emissions from the recreation management vehicle trips are shown in Table 10-2, illustrating that (in combination with the operations of other project components) the GHG emissions would be substantially less than the 1,100 metric tons/year of CO_2e significance threshold.

Since the recreation management activities' operational emissions, in combination with the operational emissions of the other project components, would be less than the 1,100 metric ton CO_2e threshold, recreation management activities would result in a less than significant impact.

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Chapter 11
HAZARDS AND HAZARDOUS MATERIALS

11.1 Overview

This chapter describes the regulatory setting and affected environment associated with hazardous materials and wastes, the significance criteria and the methodology used to evaluate significance, and the potential project impacts related to hazardous materials and wastes. For significant impacts, the chapter identifies mitigation measures to reduce these impacts. Hazards related to the proximity to airports, wildland fires, and emergency response are also addressed.

11.2 Regulatory Setting

Because regulations for hazardous materials were developed over time, hazardous materials are regulated by numerous agencies whose jurisdictions and responsibilities sometimes overlap. Federal agencies that regulate hazardous materials include the EPA and the U.S. Department of Labor, Occupational Safety and Health Administration (OSHA). At the state level, agencies such as the California Department of Industrial Relations, Cal/OSHA, and the California Emergency Management Agency (Cal EMA) govern the use of hazardous materials. State and local agencies often have either parallel or more stringent rules than federal agencies.

Generation, transportation, and disposal of hazardous wastes can also be regulated by different agencies. The lead federal agency is EPA. The California Department of Toxic Substances Control (DTSC) has primary state regulatory responsibility but may delegate enforcement authority to local jurisdictions that enter into agreements with the state agency.

The following is a review of federal and state regulations that are potentially pertinent to the Proposed Project.

11.2.1 Federal Laws, Regulations, and Policies

Resources Conservation and Recovery Act

The Resource Conservation and Recovery Act (RCRA) of 1976, as amended by the Hazardous and Solid Waste Amendments of 1984, is the primary federal law for the regulation of solid waste and hazardous waste in the United States. These laws provide for the "cradle-to-grave" regulation of hazardous wastes, including generation, transportation, treatment, storage, and disposal. Any business, institution, or other entity that generates hazardous waste is required to identify and track its hazardous waste from the point of generation until it is recycled, reused, or disposed.

EPA has primary responsibility for implementing the RCRA, but individual states are encouraged to seek authorization to implement some or all RCRA provisions. California received authority to implement the RCRA program in August 1992. DTSC is responsible for implementing the RCRA program as well as California's own hazardous waste laws, which are collectively known as the Hazardous Waste Control Law.

Comprehensive Environmental Response, Compensation, and Liability Act

The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA, also called the Superfund Act) is intended to protect the public and the environment from the effects of past hazardous waste disposal activities and new hazardous material spills. Under CERCLA, the EPA has the authority to seek the parties responsible for hazardous materials releases and to ensure their cooperation in site remediation. CERCLA also provides federal funding (the "Superfund") for the remediation of hazardous materials contamination. The Superfund Amendments and Reauthorization Act of 1986 (Public Law 99-499) amends some provisions of CERCLA and provides for a Community Right-to-Know program.

Hazardous Materials Transportation Act

The U.S. Department of Transportation is the federal agency with regulatory responsibility for the safe transportation of hazardous materials. These regulations govern all means of transportation, except for those packages shipped by mail, which are covered by U.S. Postal Service regulations.

Occupational Safety and Health Act

Under the authority of the Occupational Safety and Health Act of 1970, OSHA is the federal agency responsible for ensuring worker safety in the handling and use of chemicals in the workplace, and has adopted numerous regulations for that purpose (29 CFR 1910). These regulations set standards for safe workplaces and work practices, including accident and occupational injury reporting, hazardous material handling, workplace conditions, employee protection requirements, first aid and fire protection, and material handling and storage.

11.2.2 State Laws, Regulations, and Policies

California Public Resource Code Section 21151.4

This code requires the lead agency to consult with any school district with jurisdiction over a school within 0.25 mile of a project, regarding potential impacts on the school if the project might reasonably be anticipated to emit hazardous air emissions, or handle an extremely hazardous substance or a mixture containing an extremely hazardous substance.

Hazardous Materials Release Response Plans and Inventory Law

This law, also known as the Business Plan Act of 1985, requires facilities using hazardous materials to prepare Hazardous Materials Business Plans that include such information as inventory of hazardous materials handled, facility floor plans showing where hazardous materials are stored, an emergency response plan, and provisions for employee training in safety and emergency response procedures (California Health and Safety Code, Division 20, Chapter 6.95, Article 1).

Hazardous Waste Control Act

DTSC regulates the generation, transportation, treatment, storage, and disposal of hazardous waste under the RCRA and the California Hazardous Waste Control Law. Both laws impose “cradle-to-grave” regulatory systems for handling hazardous waste in a manner that protects human health and the environment. DTSC has delegated some of its authority under the Hazardous Waste Control Law to local health or fire departments.

Hazardous Waste and Substances Site List

The Hazardous Waste and Substances Sites List (Cortese List, California Government Code Section 65962.5) is a planning document used by the state, local agencies, and developers to comply with the California Environmental Quality Act requirements to provide information about the location of hazardous materials release sites. Government Code Section 65962.5 requires the California Environmental Protection Agency to develop, at least annually, an updated Cortese List. DTSC is responsible for a portion of the information contained in the Cortese List. Other state and local government agencies are required to provide additional hazardous material release information for the Cortese List.

California Department of Forestry and Fire Protection Wildland Fire Management

The Office of the State Fire Marshal and the California Department of Forestry and Fire Protection (CAL FIRE) administer state policies regarding wildland fire safety. Construction contractors are required to comply with the following requirements in the Public Resources Code during construction activities at any sites with forest-, brush-, or grass-covered land:

- Earthmoving and portable equipment with internal combustion engines must be equipped with a spark arrestor to reduce the potential for igniting a wildland fire (Pub. Resources Code § 4442).
- Appropriate fire-suppression equipment must be maintained from April 1 to December 1, the highest-danger period for fires (Pub. Resources Code § 4428).
- On days when a burning permit is required, flammable materials must be removed to a distance of 10 feet from any equipment that could produce a spark, fire, or flame, and the construction contractor must maintain the appropriate fire-suppression equipment (Pub. Resources Code § 4427).

- On days when a burning permit is required, portable tools powered by gasoline-fueled internal combustion engines must not be used within 25 feet of any flammable materials (Pub. Resources Code § 4431).

11.2.3 Local Laws, Regulations, and Policies

The Unified Program Agencies

The Unified Program consolidates, coordinates, and makes consistent the administrative requirements, permits, inspections, and enforcement activities of six environmental and emergency response programs. The California Environmental Protection Agency (Cal/EPA) and other state agencies set the standards for their programs and local governments implement the standards. These local implementing agencies are called Certified Unified Program Agencies (CUPAs). For each county, the CUPA regulates/oversees:

- Hazardous-materials business plans;
- California accidental-release prevention plans or federal risk management plans;
- The operation of underground storage tanks (USTs) and aboveground storage tanks (ASTs);
- Universal waste and hazardous-waste generators and handlers;
- On-site hazardous-waste treatment;
- Inspections, permitting, and enforcement;
- Proposition 65 reporting; and
- Emergency response.

Fresno County General Plan

Chapter 6, the Health and Safety Element of the Fresno County General Plan contains the *Fresno County Operational Area Master Emergency Services Plan*. The Fresno County General Plan also contains several relevant sections that address potential hazards that may affect a project. Specifically, Section A (Emergency Management and Response), Section B (Fire Hazards), Section C (Flood Hazards), Section E (Airport Hazards), and Section F (Hazardous Materials) all include goals and policies designed to minimize public risk and to ensure that activities associated with a project adhere to applicable laws and regulations.

11.3 Environmental Setting

11.3.1 Potentially Affected Area

The relevant portions of the Potentially Affected Area related to hazards and hazardous materials associated with the Proposed Project are the project area and the SCARF site. These locations are described further under the Section 11.3.2, *Project Area*, and Section 11.3.3, *SCARF Site*, below.

11.3.2 Project Area

The project area will include undeveloped areas that may be heavily vegetated, thus posing potential fire risks. With respect to hazardous materials, neither a Phase 1 Environmental Site Assessment nor a records search of listed hazardous-materials release sites has been undertaken in support of this DEIR for the locations within the project area where Proposed Project activities would take place, with the exception of the SCARF site (see below).

11.3.3 SCARF Site

Environmental Data Resources, Inc. (EDR) conducted a search of available environmental records on the SCARF site in July 2012; results of that search are provided as Appendix L, *The EDR Radius Map™ Report*. *The EDR Radius Map™ Report*® was prepared to identify and assess the potential for hazardous-site-related risks (EDR 2012). A review of listed hazardous-material release sites, compiled pursuant to California Government Code section 65962.5 (the Cortese List), indicates that historic Cortese site #9 is near the project site (Appendix L). The following sites were listed as within 0.25 mile of the SCARF site:

- UST sites: HIST UST site #G23; HIST UST sites #24, #16, #26, #B7, #E18, and #F21; leaking underground storage tank (LUST) site #12; California Facility Inventory Database (FID) UST sites #B8, #E19; Statewide Environmental Evaluation and Planning System (SWEEPS) UST sites #F20 and site #A5.
- AST site #A3, RCRA non-generator site #13, and two RCRA-small-quantity generator (RCRA-SQG) sites (RCRA-SQG site #25 and site #A1).
- Notify 65 site #C11, Recycling Facilities in California Database (SWRCY) site #17, state and tribal landfill and/or solid-waste disposal site lists (Solid-Waste Facility/Landfill [SWF/LF]), Waste Management Unit Database (WMUDS/SWAT) site #D14, Facility Index System Database (FINDS) sites #D15 and #A2, Hazardous Waste Manifests Database (HAZNET) site #A4, National Pollutant Discharge Elimination System (NPDES) site #A6, and ENVIROSTOR site #G22.

Certain populations are considered sensitive receptors because of their fragile immune systems and special sensitivity to environmental discharges. These sensitive receptors typically include the elderly, the sick, and children. The EDR report identifies buildings and facilities (e.g., schools, daycare facilities, hospitals, and medical centers) where individuals who are sensitive receptors are likely to be located (Appendix L, *The EDR Radius Map™*

Report). The Detail Map in the EDR report identifies one sensitive receptor, an elementary school, which is approximately 0.25 mile from the proposed SCARF site.

A Phase I Environmental Site Assessment on the SCARF site and adjacent parcels was conducted in the fall of 2012 (URS 2012). The scope of work for this assessment included the following:

- A visual inspection of the site performed on August 23, 2012;
- Interviews with the site occupant representatives;
- Review of pertinent background and historical information;
- Contact with appropriate regulatory agencies;
- Prior ownership review;
- Review of chemical and waste handling, storage, and disposal practices;
- Observation of land use on surrounding land;
- Review of a regulatory database report; and
- Photographic documentation of the site.

The SCARF site is currently improved with an approximately 1,350-square-foot office building and other smaller storage buildings or covered storage areas. The main building contains a concrete slab-on-grade foundation, stucco exterior, and concrete access ramp. Other storage buildings consist of metal support structures with metal roofs. Eight houses occupied by California Department of Fish and Wildlife (CDFW) employees consist of two-story structures with concrete slab-on-grade foundations, stucco exteriors, and shingled roofs. According to information obtained during this Environmental Site Assessment, the main site improvements were completed in the 1950s (URS 2012). Historical research performed during this Environmental Site Assessment indicated that the site was used for fish farming as early as the 1920s (URS 2012). CDFW has occupied the site since the hatchery was constructed in 1954. By 1955, the hatchery was in full operation (URS 2012). A portion of the site also has been leased to an individual for farming since the 1960s (URS 2012). Development of surrounding residential and commercial properties began in the 1940s, and since 1998, has looked similar to its current appearance.

According to URS (2012), the following are recognized environmental conditions (RECs) and historical RECs associated with the SCARF site:

- **Drum Storage Area** — Several 55-gallon drums containing used oil filters and used oil were situated on a wooden pallet in the drum storage area. Stained soil was observed in the immediate vicinity of the drums. Based on this observation, the drums pose an environmental concern for the site and are considered an REC.
- **Fill Material** — Excavated soil from Friant Dam was reportedly disposed of on parcel 30016002ST during the dam's construction between 1937 and 1942. Because of the absence of detailed information, the undocumented fill material poses an REC to the subject property.

- **Potential AST Release during 1997 Flood** — The site flooded during a storm in January 1997, causing damage to one 10,000-gallon propane AST; one 1,000-gallon diesel AST; and one 1,000-gallon gasoline AST. On the basis of the information obtained from the Fresno County Environmental Health Department inspection report, these damaged ASTs were removed from the site and replaced with the ASTs observed during the site visit. Because flooding may have caused the tanks to release their product, this event represents a historical REC for the site. However, because of the absence of regulatory requirements for follow-up, the ability of petroleum products to naturally attenuate, and the dilution of any released product under a flood scenario, any products released during the flood do not appear to be currently affecting the site.
- **Lost Lakes Park Maintenance, 16385 North Friant Road** — This site was listed as a LUST cleanup site as a result of a diesel release. The Central Regional Water Quality Control Board–Central Valley Region issued a No Further Action letter regarding the site in May 2002. Based on the proximity and groundwater flow direction relative to the subject property, this site is considered a historical REC. The professional environmental opinion is that the site is not currently affecting the subject property.

11.4 Impact Analysis

11.4.1 Methodology

For the purpose of this assessment, hazardous materials are defined as any materials that, because of quantity, concentration, or physical or chemical characteristics, pose a significant, present, or potential hazard to human health and safety or to the environment, if released. Hazardous materials include, but are not limited to, hazardous substances, hazardous wastes, and any material that a handler or the administering regulatory agency has a reasonable basis for believing would be injurious to the health and safety of persons or would be harmful to the environment if released into the workplace or the environment (California Health and Safety Code § 25501).

Although often treated separately from hazardous materials, petroleum products (including crude oil and refined products such as fuels and lubricants) and natural gas are considered in this analysis because they might pose a potential hazard to human health and safety if released into the environment. Hazardous wastes include residues, discards, byproducts, contaminated products, or similar substances that exceed regulatory thresholds for properties of toxicity, ignitibility, corrosivity, or reactivity. Federal and state regulations identify by name the specific hazardous wastes that EPA has designated as "listed wastes."

The proposed SCARF site is 7 miles from the nearest public airport and 6 miles from the nearest private airstrip (Airport-Data.com 2012; AirNav 2012). The proposed SCARF site is more than 2 miles from the nearest public-use airport or private airstrip and potential impacts from hazards and hazardous materials associated with the proposed SCARF construction would not meet the threshold of Significance Criterion D, as described below in Section 11.4.2, *Criteria for Determining Significance*. Therefore, there would be no safety hazard for people residing or working in the project area, and this impact is not discussed in further detail under SCARF Construction or Operations within Section 11.4.3, *Environmental Impacts*.

Construction- and operations-related impacts of the Proposed Project's elements for which specific locations have yet to be defined were evaluated qualitatively to determine their potential to create, disturb, or increase sensitive receptors' exposure to hazards or hazardous materials. For these elements, the proximity to sensitive receptors, schools, and public-use airports or private airstrips cannot be determined. The activities associated with fish reintroduction, fisheries management operations, and fisheries research and monitoring would not take place at an elevation that would be affected by air traffic within a 2-mile radius. Therefore, these impacts (Significance Criterion D) would be less than significant and are not discussed in further detail in the impacts discussions for fish reintroduction, fisheries management, and fisheries research and monitoring.

With respect to recreation management activities, this analysis assumes that facilities and roads may be developed to allow greater access to recreational areas. No hazardous materials, aside from fuel, are assumed to be introduced to recreational areas as a result of recreation management activities.

11.4.2 Criteria for Determining Significance

The Proposed Project would have a significant effect related to hazards and hazardous materials if it would:

A. Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials or the reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment.

B. Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or wastes within 0.25 mile of an existing or proposed school.

C. Be located on a site that is included on a list of hazardous materials sites compiled pursuant to California Government Code section 65962.5, and as a result, create a significant hazard to the public or the environment.

D. Result in a safety hazard for people residing or working in the project area if the project is within an airport land use plan or, where such a plan has not been adopted, within 2 miles of a public airport or public-use airport or private airstrip.

E. Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan.

F. Expose people or structures to a significant risk of loss, injury, or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands.

11.4.3 Environmental Impacts

Table 3-1 in Chapter 3, *Introduction to the Environmental Analysis,* identifies elements of the Proposed Project with the potential to result in impacts from the Project on hazards and hazardous materials. Each impact is discussed in further detail in the section below. All elements of the Proposed Project were evaluated for potential impacts, and potential impacts from hazards and hazardous materials would affect all elements of the Proposed Project. Each component is discussed below.

SCARF Construction

Impact HAZ-CONSTRUCT-1: Risk to the Public or Environment, including Nearby Sensitive Receptors, due to an Accidental Spill Resulting from the Transport, Use, and Disposal of Hazardous Materials during SCARF Construction (Significance Criteria A and B, Project Level, Less than Significant)

Hazardous materials that would be used or transported to support the use and maintenance of the Project's construction equipment would include fuels, lubricating oil, grease, and/or hydraulic fluid. These materials would pose a potential hazard to construction workers, the public, and the environment. Construction workers could be exposed to hazardous materials, particularly during project construction equipment maintenance activities. The nearest sensitive receptor to the proposed SCARF site is Friant Elementary School, approximately 0.25 mile away (URS 2012). Accidental spills or improper use, storage, transport, or disposal of these hazardous materials could result in pollutant contamination at the project site, and could be a potential, although unlikely, hazard off-site with regard to this nearby sensitive receptor and the general public. The transport of hazardous materials (particularly during storm events) to the underlying soils and groundwater could also occur.

Although hazardous materials would pose a potential hazard to construction workers, the public, and the environment, chemical processing or storage or stockpiling of quantities of hazardous materials, other than what would be necessary for standard construction operations, would not take place. In addition, the Proposed Project would be required to comply with extensive federal, state, and local regulations to ensure that there were no significant risks to construction workers, the public, or the environment from the construction-related transport, use, storage, or disposal of hazardous materials. Compliance with these regulations would include preparation of a hazardous materials business plan, which would include a training program for employees, an inventory of the Proposed Project's hazardous materials, and an emergency plan (Cal EMA 2012). As described in Chapter 9, *Geology, Soils, and Seismicity*, an SWPPP would be prepared and would include spill prevention and control measures. Implementation of the applicable provisions of the EPA, OSHA, Cal/OSHA, Cal/EPA, Cal EMA, and CUPA permitting processes, as well as Fresno County's General Plan policies (County of Fresno 2000), would ensure that potential hazardous materials conditions would be fully addressed. Therefore, this impact would be less than significant.

Impact HAZ-CONSTRUCT-2: Potential for SCARF Construction to Be Located on a Site which Is Included on a List of Hazardous Materials Sites Compiled Pursuant to California Government Code Section 65962.5, and Create a Significant Hazard to the Public or the Environment (Significance Criterion C, Project Level, No Impact)

As described in the Section 11.3.3, *SCARF Site*, above, a review of the Cortese List revealed that there is one historical Cortese site (the Friant Store) within approximately 0.125 mile of the project site (Appendix L, *The EDR Radius Map™ Report*). However, the project site is not included on the Cortese List of hazardous materials sites compiled by DTSC (Appendix L) and would not create a hazard to the public or the environment. Therefore, there would be no impact.

Impact HAZ-CONSTRUCT-3: Potential for SCARF Construction Activities to Impede Fire or Emergency Response Because of a Temporary Increase in Vehicle Traffic (Significance Criterion E, Project Level, Less than Significant with Mitigation)

Construction-related employee vehicle trips and truck trips for the Proposed Project would potentially increase traffic on North Friant Road over the duration of the 11-month construction period. In addition, construction of the Proposed Project's access road improvements that would extend from East Belcher Avenue to the SCARF site may result in temporary traffic impacts. An increase in traffic or roadway construction activities could potentially impair emergency responders. However, construction-related vehicles would be temporary and only a limited number of employee vehicles and trucks would travel to and from the project site on a daily basis during the 11-month construction period. Staging areas would be within the project site, and access to the project site for fire and emergency response vehicles would be maintained at all times. This impact is considered potentially significant.

To minimize any potential interference with an adopted emergency response plan or emergency evacuation plan, **Mitigation Measure HAZ-CONSTRUCT-3** would be implemented and include a construction traffic management plan. This impact would be less than significant with mitigation.

Mitigation Measure HAZ-CONSTRUCT-3: Implement a Construction Management Plan to Minimize Interference with Emergency Response.
CDFW, DGS, or the construction contractor, in consultation with the County, will prepare and implement a Traffic Management Plan (TMP). CDFW will be responsible for ensuring that the plan is adequately developed and implemented. CDFW will provide the TMP to the Fresno County Public Works and Planning Department and Caltrans. The TMP will include recommended traffic-control and traffic-reduction measures as identified in the Transportation Management Plan Guidelines issued by the Division of Traffic Operations Office of System Management Operations (Caltrans 2009). CDFW will implement all traffic-control or traffic-reduction measures described in the TMP. In addition, to the extent feasible, construction-related traffic and any temporary road closures shall be scheduled during non-peak traffic periods.

The measures included in the TMP shall be consistent with any applicable guidelines outlined in the Standard Specifications for Public Works Construction, the U.S. Department of Transportation's Manual on Uniform Traffic Control Devices, and the Work Area Traffic Control Handbook. The plan will include the following items:

- Defined location and timing of any temporary lane closures;
- Identification and provision for circumstances requiring the use of temporary traffic control measures, flag persons, warning signs, lights, barricades, and cones, etc. to provide safe work areas in the vicinity of the project site or along the haul routes, including for those roadway segments that have substandard width (less than 18 feet), and to warn, control, protect, and expedite vehicular and pedestrian traffic and access by emergency responders;
- Implementation of comprehensive traffic control measures, including scheduling of major truck trips and deliveries to avoid peak-hour traffic, placement of detour signs (if required), lane closure procedures (if required), flaggers (if required), placement of cones for drivers, and designated construction access routes and access points;
- Notification to adjacent property owners and public safety personnel regarding when major deliveries, detours, and lane closures will occur;
- Address the potential for construction-related traffic to impede emergency response vehicles and present a specific training and information program for construction workers to ensure awareness of emergency procedures from project-related accidents;
- Identification of haul routes for movement of construction vehicles that will minimize impacts on vehicular and pedestrian traffic and circulation and safety, and provision for monitoring surface streets used for haul routes so that any damage and debris attributable to the haul trucks can be identified and corrected by CDFW and/or DGS in coordination with the construction contractor;
- Development of a process for responding to and tracking complaints pertaining to construction activity, including identification of an onsite complaint manager; and
- Documentation of road pavement conditions for all routes that would be used by construction vehicles both before and after project construction. Roads damaged by construction vehicles will be repaired to the level at which they existed before project construction.

Impact HAZ-CONSTRUCT-4: Potential Fire Hazard from the Use of Construction Equipment within or near Vegetation Areas in the Proposed SCARF Site (Significance Criterion F, Project Level, Less than Significant)

The project site is not in a designated wildland fire hazard area (CAL FIRE 2007). However, most of the undeveloped project site and adjacent bank of the San Joaquin River are covered with vegetation (e.g., shrubs, grasses, riparian habitat). The Proposed Project's construction equipment within or near vegetated areas could potentially present an ignition source and fire hazard. However, the Project would be required to comply with the Public Resources Code requirements for construction activities at sites with forest-, brush-, or grass-covered land, and vegetation would be cleared, as necessary, for construction activities, which would minimize the Project's potential to expose people or structures to a significant risk of wildland fires. Therefore, this impact would be less than significant.

SCARF Operations

Impact HAZ-OP-1: Risk to the Public or Environment, Including Nearby Sensitive Receptors, from an Accidental Spill during Transport, Use, and Disposal of Hazardous Materials as Part of SCARF Operations (Significance Criteria A and B, Project Level, Less than Significant)

Operation of the SCARF facility would pose minimal hazardous risks. While operations would use relatively common chemicals (NaCl, KMnO4, or hydrogen peroxide [H_2O_2]), and antibiotics to manage fish disease, these are commonly used household products not falling within the definition of hazardous materials. These products pose minimal risk to workers, the public, and the environment, and the potential impact from their use would be less than significant. Fuel used to power vehicles and equipment during SCARF operations would also pose a potential risk of exposure to workers and other nearby sensitive receptors. Impact HAZ-CONSTRUCT-1 discusses potential impacts on workers and nearby sensitive receptors at the SCARF site (the potential receptors are essentially the same for both construction and operations). SCARF operational activities would follow all federal, state, and local regulations in the event of an accidental spill or release of hazardous materials, and would implement an evacuation plan for on-site workers and materials. Therefore, this impact would be less than significant.

Impact HAZ-OP-2: Potential for the Proposed SCARF Site to Create a Significant Hazard to the Public and the Environment by Being Located on a Site Included on a List of Hazardous Materials Sites Compiled Pursuant to California Government Code Section 65962.5 (Significance Criterion C, Project Level, No Impact)

As discussed in Impact HAZ-CONSTRUCT-2, there is one historical Cortese site (the Friant Store) within approximately 0.125 mile of the project site (Appendix L, *The EDR Radius Map™ Report*). However, the project site is not included on the Cortese List of hazardous materials sites compiled by DTSC (Appendix L) and would not create a hazard to the public or the environment. SCARF operations would occur within essentially the same location as SCARF construction, and discussion of hazardous materials sites in Impact HAZ-CONSTRUCT-2 would apply to SCARF operations. Therefore, there would be no impact.

Impact HAZ-OP-3: Potential for SCARF Operations to Impair Implementation of, or Physically Interfere with, an Adopted Emergency Response Plan or Emergency Evacuation Plan (Significance Criterion E, Project Level, Less than Significant)

SCARF operations would require four full-time and two part-time staff; two of the full-time staff may live on-site. The SCARF would not be open to the public, but there may be San

Joaquin River Restoration Program staff visiting the SCARF regularly, and other occasional visitors. Vehicle and truck trips associated with these operations would only minimally increase truck and vehicle trips. The access road to the facilities would be improved through construction activities, thus improving access for emergency response. The SCARF operations would have an emergency evacuation plan and comply with all regulations, including the Fresno County General Plan. No operational activities would impede the emergency response time to the site; therefore, this impact would be less than significant.

Impact HAZ-OP-4: Potential Fire Hazard from the Use of Equipment within or near Vegetated Areas in the Proposed SCARF Site during SCARF Operations (Significance Criterion F, Project Level, Less than Significant)

SCARF operations would generate similar potential for fire hazards to those described in Impact HAZ-CONSTRUCT-4. Operations would not require equipment that would pose a fire hazard, and similar processes would be followed to meet the requirements of the Public Resources Code. Therefore, this impact would be less than significant.

Fish Reintroduction

Impact HAZ-REINTRO-1: Potential for Fish Reintroduction Activities to Pose a Risk to the Public or Environment, including Nearby Sensitive Receptors, in the Event of an Accidental Spill from the Transport, Use, and Disposal of Hazardous Materials (Significance Criteria A and B, Project/Program Level, Less than Significant)

The only hazardous materials that would be involved in fish reintroduction activities would be the use and transport of fuel. While specific data about the amount, use, and some of the locations of these materials and the relative location of sensitive receptors relative to these activities are not available, the discussion in Impact HAZ-CONSTRUCT-1 examines potential hazardous materials use, transport, and disposal risks which would be similar to those associated with fish reintroduction activities. In addition, fish reintroduction activities would follow all federal, state, and local regulations in the event of an accidental spill or release of hazardous materials. Therefore, this impact would be less than significant.

The impact analysis and significance conclusion above is considered project-level for all aspects of fish reintroduction, with the exception of wild broodstock collection, for which it is programmatic. For further discussion of the approach to the project and programmatic analysis in this document, please see Chapter 3, *Introduction to the Environmental Analysis*.

Impact HAZ-REINTRO-2: Potential for Fish Reintroduction Activities to Impair Implementation of, or Physically Interfere with, an Adopted Emergency Response Plan or Emergency Evacuation Plan (Significance Criterion E, Project/Program Level, Less than Significant)

Vehicle and truck trips required for activities associated with fish reintroduction would only minimally increase truck and vehicle trips. The Proposed Project would have an emergency evacuation plan and comply with all regulations. Activities associated with fish reintroduction would not impede the emergency response time to the site; therefore, this impact would be less than significant.

The impact analysis and significance conclusion above is considered project-level for all aspects of fish reintroduction, with the exception of wild broodstock collection, for which it is programmatic. For further discussion of the approach to the project and programmatic analysis in this document, please see Chapter 3, *Introduction to the Environmental Analysis*.

Impact HAZ-REINTRO-3: Potential for Fish Reintroduction Activities to Take Place on a Site that Is Included on a List of Hazardous Materials Sites Compiled Pursuant to California Government Code Section 65962.5 (Significance Criterion C, Project/Program Level, Less than Significant)

The locations associated with potential fish reintroduction activities have not been assessed for inclusion on hazardous-materials sites lists. Therefore, selected sites for these activities may take place on locations listed as current or historical hazardous materials sites. However, no significant ground disturbance or other similar activities would take place during these activities that would expose workers or nearby sensitive receptors to hazardous materials. Therefore, this impact would be less than significant.

The impact analysis and significance conclusion above is considered project-level for all aspects of fish reintroduction, with the exception of wild broodstock collection, for which it is programmatic. For further discussion of the approach to the project and programmatic analysis in this document, please see Chapter 3, *Introduction to the Environmental Analysis*.

Impact HAZ-REINTRO-4: Potential Fire Hazard from the Use of Equipment for Fish Reintroduction within or near Vegetated Areas (Significance Criterion F, Project/Program Level, Less than Significant)

Fish reintroduction activities may take place over a wide region, and as a result may occur in areas designated as wildland fire hazard areas (CAL FIRE 2007). In addition, most of the river banks where activity may occur are covered with vegetation (e.g., shrubs, grasses). The equipment that would be used, as described in Chapter 2, *Project Description*, would not pose a risk as potential ignition sources or fire hazards, and the Proposed Project would be required to comply with the Public Resources Code, which would minimize the Project's potential to expose people or structures to a significant risk involving wildland fires during fish reintroduction activities. Therefore, this impact would be less than significant.

The impact analysis and significance conclusion above is considered project-level for all aspects of fish reintroduction, with the exception of wild broodstock collection, for which it is programmatic. For further discussion of the approach to the project and programmatic analysis in this document, please see Chapter 3, *Introduction to the Environmental Analysis*.

Fisheries Management

Impact HAZ-MANAGEMENT-1: Potential for Construction and Operation of Fish Segregation Weirs to Pose a Risk to the Public or Environment, Including Nearby

Sensitive Receptors, in the Event of an Accidental Spill from the Transport, Use, and Disposal of Hazardous Materials (Significance Criteria A and B, Project/Program Level, Less than Significant)

Potential hazardous materials and associated risks presented by the construction and operation of fish segregation weirs are similar to those described in Impact HAZ-CONSTRUCT-1. With the exception of operation of the existing HFB, specific data about the amount, use, and locations of these materials are not available at this time. In addition, specific data about the location and proximity of sensitive receptors relative to the project sites are not available. However, the discussion in Impact HAZ-CONSTRUCT-1 examines potential risks of hazardous materials transport, use, and disposal risks which would be similar to those associated with fisheries management activities, inasmuch as similar processes would be followed to meet the requirements of the applicable provisions of EPA, OSHA, Cal/OSHA, Cal/EPA, Cal EMA, and CUPA permitting processes, as well as of applicable county general plans, to ensure that potential hazardous materials conditions would be fully addressed. Therefore, this impact would be less than significant.

The impact analysis and significance conclusion above is considered programmatic for all aspects of weir/barrier construction and operation, with the exception of operation of the existing HFB, for which it is project-level. For further discussion of the approach to the project and programmatic analysis in this document, please see Chapter 3, *Introduction to the Environmental Analysis*.

Impact HAZ-MANAGEMENT-2: Potential for Construction of Fish Segregation Weirs and Barriers to Impair Implementation of, or Physically Interfere with, an Adopted Emergency Response Plan or Emergency Evacuation Plan (Significance Criterion E, Program Level, Less than Significant with Mitigation)

Vehicle and truck trips would be required for the construction of fish segregation weirs. An increase in traffic or roadway construction activities could potentially impair emergency responders. Although the presence of construction-related vehicles would be temporary, and access to the project site for fire and emergency response vehicles would be maintained at all times, this impact is considered potentially significant.

To minimize any potential interference with an adopted emergency response plan or emergency evacuation plan, a construction management plan, as described in **Mitigation Measure HAZ-CONSTRUCT-3**, would be implemented and include a construction traffic management plan. This impact would be less than significant with mitigation.

Impact HAZ-MANAGEMENT-3: Potential for Fish Segregation Weirs to Be Constructed on a Site that Is Included on a List of Hazardous Materials Sites Compiled pursuant to California Government Code Section 65962.5 (Significance Criterion C, Program Level, Less than Significant with Mitigation)

The project area associated with fish segregation weir activities has not been assessed for inclusion on hazardous materials sites lists nor assessed with a Phase 1 Environmental Site Assessment. Therefore, selected sites for fish segregation weir construction or removal may take place on locations that are current or historical hazardous materials sites. Neither specific project-level data about construction activities, nor specific project-level data about the location of sensitive receptors relative to the project site, are available at this time. Thus, these activities would have the potential to expose workers and nearby sensitive receptors to hazardous materials.

Implementation of **Mitigation Measure HAZ-MANAGEMENT-3** would reduce the risk of hazardous materials exposure to a less-than-significant level.

Mitigation Measure HAZ-MANAGEMENT-3: Prepare Project-Level Quantitative Analysis of Site-specific Current and Historical Hazardous Materials, Implement Recommendations in the Phase I Environmental Site Assessment, and Comply with all Applicable Regulations.

CDFW will implement the following measures to assess and minimize potential hazards on sites selected for the construction or removal of fish segregation weirs. CDFW will have a qualified expert perform a Phase 1 Environmental Site Assessment and hazardous-site records search for the Proposed Project sites. This process will include the identification of potential hazards within the project sites and identification of nearby sensitive receptors. The assessment will determine whether hazards and hazardous materials are present and, if so, their potential impact on workers and nearby sensitive receptors. The analysis will also include recommendations to reduce potential risks from identified hazards and hazardous materials. CDFW will implement recommendations provided in the Phase 1 Environmental Site Assessment and comply with all applicable regulations. Compliance with these regulations will include preparation of a hazardous materials business plan, which would include a training program for employees and an emergency plan (Cal EMA 2012). CDFW will implement applicable provisions of the EPA, OSHA, Cal/OSHA, Cal/EPA, Cal EMA, and CUPA permitting processes, and any applicable county general plan policies. Should the site have unmitigable hazardous conditions, or mitigation is not feasible, CDFW shall choose an alternate site.

Impact HAZ-MANAGEMENT-4: Potential that Operation of Weirs and Other Fisheries Management Activities May Take Place on a Site Included on a List of Hazardous Materials Sites Compiled pursuant to California Government Code Section 65962.5 (Significance Criterion C, Project/Program Level, Less than Significant)

The project area associated with potential fisheries management activities has not been assessed for inclusion on hazardous materials sites lists. Thus, these activities may take place on locations listed as current or historical hazardous materials sites. However, no significant ground disturbance or other similar activities would take place during the operation of fish segregation weirs or trap and haul activities that would expose workers or nearby sensitive receptors to hazardous materials. Therefore, this impact would be less than significant.

The impact analysis and significance conclusion above is considered project-level for trap and haul activities, and programmatic for the fish segregation weirs. For further discussion of the approach to the project and programmatic analysis in this document, please see Chapter 3, *Introduction to the Environmental Analysis*.

Impact HAZ-MANAGEMENT-5: Potential for Operation of Fish Segregation Weirs and Trap and Haul Activities to Impair Implementation of, or Physically Interfere with, an Adopted Emergency Response Plan or Emergency Evacuation Plan (Significance Criterion E, Project/Program Level, Less than Significant)

Only a limited number of employee vehicles would travel intermittently to and from sites for the operation of the fish segregation weirs and barriers, fyke nets or other traps, and streamside rearing equipment. Activities associated with the operations of fish segregation weirs and traps would not impede emergency response time to the sites and would comply with all regulations. Therefore, this impact would be less than significant.

The impact analysis and significance conclusion above is considered project-level for trap and haul activities, and programmatic for the fish segregation weirs. For further discussion of the approach to the project and programmatic analysis in this document, please see Chapter 3, *Introduction to the Environmental Analysis*.

Impact HAZ-MANAGEMENT-6: Potential for the Use of Equipment within or near Vegetated Areas in the Project Area for Fisheries Management Activities to Present a Potential Fire Hazard (Significance Criterion F, Project/Program Level, Less than Significant)

The discussion of fire hazards in Impact HAZ-CONSTRUCT-4 and Impact HAZ-REINTRO-4 adequately examines potential fire risks from fish segregation weir construction and operation, inasmuch as operations would not require equipment that would pose a fire hazard, and similar processes would be followed for construction and operations to meet the requirements of the Public Resources Code. Therefore, this impact would be less than significant.

The impact analysis and significance conclusion above is considered project-level for trap and haul activities, and programmatic for the fish segregation weirs. For further discussion of the approach to the project and programmatic analysis in this document, please see Chapter 3, *Introduction to the Environmental Analysis*.

Fisheries Research and Monitoring

Impact HAZ-MONITORING-1: Potential for Fisheries Research and Monitoring Activities to Pose a Risk to the Public and Environment, Including Nearby Sensitive Receptors, in the Event of an Accidental Spill during the Transport, Use, and Disposal of Hazardous Materials (Significance Criteria A and B, Project Level, Less than Significant)

The only hazardous materials that would be involved in fisheries research and monitoring would be the use and transport of fuel. While specific data about the amount, use, and locations of these materials and the relative location and proximity of sensitive receptors are not available, the discussion in Impact HAZ-CONSTRUCT-1 examines the potential hazardous materials use, transport, and disposal risks which would be similar to those associated with fisheries research and monitoring activities. Although the location and proximity of potential receptors are unknown, fisheries research and monitoring activities would follow all federal, state, and local regulations in the event of an accidental spill or release of hazardous materials. Therefore, this impact would be less than significant.

Impact HAZ-MONITORING-2: Potential for Fisheries Research and Monitoring Activities to Take Place on a Site Included on a List of Hazardous Materials Sites Compiled pursuant to California Government Code Section 65962.5 (Significance Criterion C, Project Level, Less than Significant)

The project area associated with potential fisheries research and monitoring activities has not been assessed for inclusion on hazardous materials sites lists. Thus, selected sites for fish reintroduction may take place on locations listed as current or historical hazardous materials sites. However, no significant ground disturbance or other similar activities would take place during research and monitoring activities that would expose workers or nearby sensitive receptors to hazardous materials. Therefore, this impact would be less than significant.

Impact HAZ-MONITORING-3: Potential for Fisheries Research and Monitoring to Impair Implementation of, or Physically Interfere with, an Adopted Emergency Response Plan or Emergency Evacuation Plan (Significance Criterion E, Project Level, Less than Significant)

Vehicle and truck trips required for activities associated with fisheries research and monitoring would be intermittent and only minimally increase truck and vehicle trips. The Proposed Project would have an emergency evacuation plan and comply with all regulations. Activities associated with fisheries research and monitoring would not impede the emergency response time to the site; therefore, this impact would be less than significant.

Impact HAZ-MONITORING-4: Potential Fire Hazard Associated with the Use of Equipment for Fisheries Research and Monitoring Activities within or near Vegetated Areas (Significance Criterion F, Project Level, Less than Significant)

The discussion of fire hazards in Impact HAZ-RELEASE-4 adequately examines potential fire risks from fisheries research and monitoring, inasmuch as these activities would not require equipment that would pose a fire hazard, and similar processes would be followed to meet the requirements of the Public Resources Code. Therefore, this impact would be less than significant.

Recreation Management

Impact HAZ-RECREATION-1: Potential Risk to the Public or Environment, including Nearby Sensitive Receptors, from an Accidental Spill during Transport, Use, and Disposal of Hazardous Materials during Construction and Operational Activities

Associated with Enhancing Recreational Fishing Opportunities (Significance Criteria A and B, Program Level, Less than Significant)

Potential hazardous materials and associated risks presented by the enhancement of recreational fishing opportunities would be similar to those described in Impact HAZ-CONSTRUCT-1. Specific project-level data about the amount, use, and locations of these materials are not available at this time. In addition, specific project-level data about the location and proximity of sensitive receptors relative to the project sites are not available. However, the discussion in Impact HAZ-CONSTRUCT-1 examines potential hazardous materials use, transport, and disposal risks which would be similar to those associated with construction and operational activities related to enhancing recreational fishing opportunities. Similar processes would be followed to meet the requirements of the applicable provisions of the EPA, OSHA, Cal/OSHA, Cal/EPA, Cal EMA, and CUPA permitting processes, as well as applicable county general plans, to ensure that potential hazardous materials conditions would be fully addressed. Therefore, this impact would be less than significant.

Impact HAZ-RECREATION-2: Potential for Construction and Operations Activities Related to Enhancing Recreational Fishing Opportunities to Take Place on a Site that Is Included on a List of Hazardous Materials Sites Compiled pursuant to California Government Code Section 65962.5 (Significance Criterion C, Program Level, Less than Significant with Mitigation)

The discussion of hazardous sites in Impact HAZ-MANAGEMENT-3 adequately examines potential risks from recreation management, inasmuch as the project area associated with these activities has not been assessed for inclusion on hazardous materials sites lists or assessed with a Phase 1 Environmental Site Assessment. Moreover, selected sites for recreation management may take place on locations that are current or historical hazardous materials sites. Neither specific project-level data about recreation management activities, nor specific project-level data about the location of sensitive receptors relative to the project sites, are available at this time. Thus, these activities would have the potential to expose workers and nearby sensitive receptors to hazardous materials.

Implementation of **Mitigation Measure HAZ-MANAGEMENT-3** would reduce the risk of hazardous materials exposure to a less-than-significant level.

Impact HAZ-RECREATION-3: Potential for Recreation Management Activities to Take Place within Two Miles of a Public Airport or Private Airstrip (Significance Criterion D, Program Level, Less than Significant with Mitigation)

The proximity of recreation management activities to public airports or private airstrips cannot be determined at this time; therefore, recreation management activities could potentially take place within 2 miles of a public airport or private airstrip. For this reason, impacts are considered potentially significant. Implementation of **Mitigation Measure HAZ-RECREATION-3** would reduce any potential impacts to a less than significant level.

Mitigation Measure HAZ-RECREATION-3: Research and Consult Applicable Comprehensive Airport Land Use Plans before Construction Activities. As stated in the California Code of Regulations, Title 14, Division 6, Chapter 3, Section 15154, CDFW shall ensure that the design and construction will comply with all applicable comprehensive airport land use plans within which boundaries the Project falls.

If a comprehensive airport land use plan has not been adopted for a project within 2 nautical miles of a public airport or public-use airport, the Airport Land Use Planning Handbook published by the California Department of Transportation's Division of Aeronautics will serve as the guide for the design and construction of the Proposed Project with regard to potential airport-related safety hazards and noise problems.

Impact HAZ-RECREATION-4: Potential for Construction Activities Related to Enhancing Recreational Fishing Opportunities to Impair Implementation of, or Physically Interfere with, an Adopted Emergency Response Plan or Emergency Evacuation Plan (Significance Criterion E, Program Level, Less than Significant with Mitigation)

Construction activities would result in an increase in vehicle and truck trips. An increase in traffic or roadway construction activities could potentially impair emergency responders. However, construction-related vehicles would be temporary and access to the project sites for fire and emergency response vehicles would be maintained at all times. This impact is considered potentially significant.

To minimize any potential interference with an adopted emergency response plan or emergency evacuation plan, a construction management plan, as described in **Mitigation Measure HAZ-CONSTRUCT-3**, would be implemented and include a construction traffic management plan. This impact would be less than significant with mitigation.

Impact HAZ-RECREATION-5: Potential for Operational Activities Related to Enhancing Recreational Fishing Opportunities to Impair Implementation of, or Physically Interfere with, an Adopted Emergency Response Plan or Emergency Evacuation Plan (Significance Criterion E, Program Level, Less than Significant)

Activities associated with enhanced recreational fishing opportunities would comply with all regulations consistent with any publically used site—for example, vehicle codes that ensure priority access for emergency responders. The Project would not impede emergency response time to the sites, and therefore this impact is less than significant.

Impact HAZ-RECREATION-6: Potential Fire Hazard from the Use of Equipment within or near Vegetated Areas (Significance Criterion F, Program Level, Less than Significant)

The discussion of fire hazards in Impact HAZ-CONSTRUCT-4 and Impact HAZ-RELEASE-4 adequately examines potential fire risks from construction and operational activities related to enhancing recreational fishing opportunities, inasmuch as operations would not require equipment that poses a fire hazard. In addition, similar processes would be followed for construction and operations to meet the requirements of the Public Resources Code. Therefore, this impact is less than significant.

Chapter 12
HYDROLOGY, GEOMORPHOLOGY AND WATER QUALITY

12.1 Overview

This chapter describes the setting and potential impacts of the Proposed Project related to hydrology, geomorphology, and water quality. Data sources used to prepare this section include:

- State Water Resources Control Board 303(d) List of Impaired Water Bodies (SWRCB 2011)
- Central Valley Regional Water Quality Control Board Basin Plan 2011 Update (CVRWQCB 2011)
- California Department of Water Resources' Bulletin 118 (DWR 2003) and Water Plan (DWR 2009)
- The Hatchery and Genetic Management Plan (HGMP) for the proposed SCARF (Börk and Adelizi 2010)

12.2 Regulatory Setting

12.2.1 Federal Laws, Regulations and Policies

Clean Water Act

The CWA is the primary federal law that protects the quality of the nation's surface waters, including lakes, rivers, and coastal wetlands. The key sections pertaining to water quality regulation for the Proposed Project are Sections 303, 401 and 402. SWRCB and its nine RWQCBs implement Sections 303, 401, and 402 at the state level. CWA Section 404, which regulates the discharge of dredge and fill materials to the waters of the United States, is discussed in Chapter 6, *Biological Resources – Fisheries*.

Section 303(d)

Under CWA Section 303(d), states are required to identify "impaired water bodies" (those not meeting established water quality standards), identify the pollutants causing the impairment, establish priority rankings for waters on the list, and develop a schedule for development of control plans to improve water quality. The USEPA then approves the state's recommended list of impaired waters, or adds to and/or removes water bodies from the list. Each RWQCB must update the Section 303(d) list every two years. Water bodies on the list have no further assimilative capacity for the identified pollutant, and the Section 303(d) list identifies priorities for development of pollution control plans for each listed water body and pollutant.

The pollution control plans triggered by the CWA Section 303(d) list are called Total Maximum Daily Loads (TMDLs). The TMDL is a "pollution budget" designed to restore the health of a polluted body of water and ensure the protection of beneficial uses. The TMDL also contains the target reductions needed to meet water quality standards and allocates those reductions among the pollutant sources in the watershed (point sources, nonpoint sources, and natural sources) (40 CFR 130.2).

The current effective USEPA-approved 303(d) list for water bodies in California is the 2008–2010 list approved on November 12, 2010. Table 12-1 lists the 303(d) TMDL requirement status by reach for the San Joaquin River from Friant Dam to the Sacramento-San Joaquin Delta (SWRCB 2011).

Table 12-1. San Joaquin River 303(d) TMDL Requirement Status By Reach

Reach of San Joaquin River	Pollutant (TMDL Requirement Status)
Friant Dam to Mendota Pool	Invasive Species (5A)
Mendota Pool to Bear Creek	Boron (5A), Chlorpyrifos (5B), DDT(5A), Diazinon (5B), Group A Pesticides (5A), Unknown Toxicity (5A)
Bear Creek to Mud Slough	Arsenic (5A), Boron (5A), Chlorpyrifos (5B), DDT (5A), Electrical Conductivity (5A), E. coli (5A), Group A Pesticides (5A), Mercury (5A), Unknown Toxicity (5A)
Mud Slough to Merced River	Boron (5A), Chlorpyrifos (5B), DDT (5A), Diazinon (5B), Electrical Conductivity (5A), E. coli (5A), Group A Pesticides (5A), Mercury (5A), Selenium (5B), Unknown Toxicity (5A)
Merced River to Tuolumne River	Boron (5B), Chlorpyrifos (5B), DDE (5A), DDT (5A), Electrical Conductivity (5A), Group A Pesticides (5A), Mercury (5A), Temperature (5A), Unknown Toxicity (5A), alpha.-BHC (5A)
Tuolumne River to Stanislaus River	Chlorpyrifos (5B), DDT (5A), Diazinon (5B), Electrical Conductivity (5A), Group A Pesticides (5A), Mercury (5A), Temperature (5A), Unknown Toxicity (5A)
Stanislaus River to Delta	Chlorpyrifos (5B), DDE (5A), DDT (5A), Diuron (5A), Electrical Conductivity (5B), E. coli (5A), Group A Pesticides (5A), Mercury (5A), Temperature (5A), Toxaphene (5A), Unknown Toxicity (5A)

TMDL Requirement Status:

5A: TMDL still required

5B: Being addressed by USEPA-approved TMDL

Source: SWRCB 2011

Section 401

Section 401 of the CWA allows for evaluation of water quality when a proposed activity requiring a federal license or permit could result in a discharge to waters of the U. S. In California, the SWRCB and its nine RWQCBs issue water quality certifications. Each RWQCB is responsible for implementing Section 401 in compliance with the CWA and its water quality control plan (also known as a Basin Plan). Applicants for a federal license or permit to conduct activities that may result in the discharge to waters of the United States (including wetlands) must also obtain a Section 401 water quality certification to ensure that any such discharge will comply with the applicable provisions of the CWA. Compliance with Section 401 is required for all projects that have a federal component and may affect state water quality.

Section 402

CWA Section 402 regulates point-source discharges to surface waters (other than dredge or fill material) through the NPDES, administered by the USEPA. The NPDES program provides for both general permits (those that cover a number of similar or related activities) and individual permits for discharges to the waters of the U.S. This regulation is implemented at the state level and is described further below.

Federal Emergency Management Agency

Congress established the National Flood Insurance Program (NFIP) to provide access to federally-backed flood insurance protection for property owners and to address the need to reduce the destructive consequences of flooding. FEMA administers the NFIP. FEMA works closely with state and local officials to identify flood hazard areas and flood risks. Under the NFIP, if a community will adopt and enforce a floodplain management ordinance to reduce future flood risks to new construction in Special Flood Hazard Areas (SFHAs), flood insurance will be made available within the community. Floodplain management ordinances are designed to prevent new development from increasing the flood threat, and to protect new and existing buildings from anticipated flooding.

U.S. Bureau of Reclamation

The U.S. Bureau of Reclamation (Reclamation) operates Friant Dam for flood management purposes according to rules and regulations in the CFR Title 33 Part 208, *Report on Reservoir Regulation for Flood Control, Friant Dam and Millerton Lake, San Joaquin River, California* as developed by the USACE in 1955. The regulations set limitations on the storage space in Millerton Lake and flow releases from Friant Dam for flood management. The flood management objectives are to keep flows below 8,000 cfs below Cottonwood Creek and Little Dry Creek, or 6,500 cfs at the San Joaquin River near the Mendota USGS gaging station. The regulations also permit the maximum practical amount of storage space to be used for water deliveries without impairing flood control functions.

San Joaquin River Restoration Settlement Act

The San Joaquin River Restoration Settlement Act of 2009 (Settlement Act) was passed by Congress to authorize the implementation of the 2006 Settlement Agreement of *Natural Resources Defense Council et al. v. Kirk Rodgers et al*. The Settlement Act specifies modifications in Friant Dam operations to restore flows to the San Joaquin River to meet the Restoration Goal. Interim Flows to the Restoration Area began in 2009, and Restoration Flows are scheduled to begin no later than January 1, 2014. Currently, the SJRRP posts an Interim Flow release schedule, which lists the scheduled releases by Reclamation from

Friant Dam, consistent with the conditions of the Settlement Act. The schedule lists the estimated Interim Flow releases, estimated Riparian Releases (for downstream riparian rights holders), and adds the two to arrive at the total releases from Friant Dam. Under the March 21, 2013 schedule, which runs through February 2014, Interim Flow releases increase through March 2013 to reach a peak of 910 cfs at the end of April, and gradually decrease to a low of 120 cfs in July and August. Interim Flow releases will then increase to peak at 570 cfs in early November 2013 and will decrease to 230 cfs through February. Flow releases from Friant Dam vary depending on water year type and time of year, and may change slightly depending on inflow conditions to Millerton Reservoir, seepage concerns below Reach 1, conditions in Mendota Pool, or flood conditions (SJRRP 2013).

12.2.2 State Laws, Regulations, and Policies

Porter-Cologne Water Quality Act

The California Porter-Cologne Water Quality Control Act (Porter-Cologne Act) was passed in 1969 and together with the federal CWA, provides regulatory guidance to protect water quality and water resources. The Porter-Cologne Act established the SWRCB and divided California into nine regions, each overseen by a RWQCB. The Porter-Cologne Act established regulatory authority over *waters of the state,* which are defined as “any surface water or groundwater, including saline waters, within the boundaries of the state” (Wat. Code, §13050). More specifically, the SWRCB and its nine RWQCBs have jurisdiction over any surface or groundwater to which a beneficial use may be assigned. The Porter-Cologne Act also assigned responsibility for implementing CWA sections 303, 401, and 402 to the SWRCB and RWQCBs.

The Porter-Cologne Act requires the development and periodic review of Basin Plans for the protection of water quality in each of the state’s nine regions. The Porter-Cologne Act requires each RWQCB to formulate and adopt a Basin Plan, for all areas within the region (Wat. Code, § 13240). A Basin Plan is unique to each region and must identify beneficial uses, establish water quality objectives for the reasonable protection of the beneficial uses, and establish a program of implementation for achieving the water quality objectives. The Restoration Area is in the San Joaquin River Basin, within the jurisdiction of the Central Valley RWQCB.

The 2011 San Joaquin River Basin Plan (CVRWQCB 2011) specifies the following beneficial uses for the San Joaquin River from Friant Dam to Mendota Pool:

- Municipal and Domestic Supply: Uses of water for community, military, or individual water supply systems including, but not limited to, drinking water supply.
- Agriculture Irrigation and Stock Watering: Uses of water for farming, horticulture, or ranching including, but not limited to, irrigation (including leaching of salts), stock watering, or support of vegetation for range grazing.
- Industry Process Supply: Uses of water for industrial activities that depend primarily on water quality.
- Recreation (REC-1 and REC-2): Uses of water for recreational activities involving body contact with water (REC-1), where ingestion of water is reasonably possible. These uses include, but are not limited to, swimming, wading, water-skiing, skin and scuba diving, surfing, white water activities, fishing, or use of natural hot springs. Uses of water for recreational activities involving proximity to water, but where there is generally no body contact with water, nor any likelihood of ingestion of water (REC-2). These uses include, but are not limited to, picnicking, sunbathing, hiking, beachcombing, camping, boating, tidepool and marine life study, hunting, sightseeing or aesthetic enjoyment in conjunction with the above activities.
- Freshwater Habitat (Warm and Cold): Uses of water that support warm water ecosystems including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish, or wildlife, including invertebrates. Uses of water that support cold water ecosystems including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish, or wildlife, including invertebrates.
- Migration (Warm and Cold): Uses of water that support habitats necessary for migration or other temporary activities by aquatic organisms, such as anadromous fish.
- Spawning (Warm and Cold [potential]: Uses of water that support high quality aquatic habitats suitable for reproduction and early development of fish.
- Wildlife Habitat: Uses of water that support terrestrial or wetland ecosystems including, but not limited to, preservation and enhancement of terrestrial habitats or wetlands, vegetation, wildlife (e.g., mammals, birds, reptiles, amphibians, invertebrates), or wildlife water and food sources.

The beneficial uses for the San Joaquin River from Mendota Dam downstream to the mouth of the Merced River are the same as those described above, with the exclusion of cold freshwater habitat (CVRWQCB 2011).

The San Joaquin River Basin Plan covers the beneficial uses of groundwater within the Restoration Area, as well. All ground waters in the region are considered suitable or potentially suitable for municipal and domestic water supply, agricultural supply, industrial service supply, and industrial process supply, as defined above.

The San Joaquin River Basin Plan gives water quality objectives to maintain the high level of water quality in streams in the basin and to protect the beneficial uses listed above. The water quality objectives include specific concentrations and/or goals to protect beneficial uses for the following constituents and contaminants: ammonia, bacteria, biostimulatory substances, chemical constituents, color, dissolved oxygen, floating material, oil and grease, pH, pesticides, radioactivity, salinity (measured through electrical conductivity), sediment, settleable material, suspended material, tastes and odors, temperature, toxicity, and turbidity (CVRWQCB 2011).

National Pollutant Discharge Elimination System (NPDES) Permits

Aquatic Animal Production Facility Discharges

The Central Valley RWQCB regulates discharges for cold water concentrated aquatic animal production (CAAP) facilities to surface waters. The waste discharge requirements for CAAP facilities are specified in Order No. R5-2012-0012 (General NPDES No. CAG135001) (CVRWQCB 2012), which amends Order No. R5-2010-0018-01 (General NPDES No. CAG135001) (CVRWQCB 2010). The Order is applicable to the SJFH and planned SCARF operations, and covers discharges to surface waters from CAAP facilities in the Central Valley Region discharging to the Sacramento and San Joaquin River Basins and the Tulare Lake Basin. Discharges to land from domestic sewage from hatchery buildings and private residences on-site to septic tank/leachfield systems are regulated by the Order. Effluent limitation and discharge specifications are set in the Order. Influent monitoring and effluent monitoring is required for settleable solids, pH, electrical conductivity, copper, hardness, total suspended solids, and other constituents, depending on the use of copper sulfate, sodium chloride, and other chemicals and aquaculture drugs. Screening levels are specified for priority pollutant metals to determine whether reasonable potential to exceed water quality objectives exists. The Order authorizes the discharge of specific chemicals and aquaculture drugs to surface wasters in accordance with label directions, effluent limitations, Best Management Practice requirements, monitoring and reporting requirements and other conditions (CVRWQCB 2012).

Construction Activities

As described in Chapter 9, *Geology, Soils, and Seismicity*, construction activities covering one acre or more are subject to the permitting requirements of the General Construction Permit.

Dewatering Activities

While small amounts of construction-related dewatering are covered under the General Construction Permit, the RWQCB has also adopted a General Dewatering Permit, Order # R5-2008-0081 (NDPES No. CAG995001) (CVRWQCB 2008). This permit applies to various categories of dewatering activities and would likely apply to the Proposed Project, if construction required dewatering in greater quantities than that allowed by the General Construction Permit and discharging the effluent to surface waters. The General Dewatering Permit contains waste discharge limitations and prohibitions similar to those in the General Construction Permit. To obtain coverage, the applicant must submit a Notice of Intent and a pollution prevention and monitoring program.

Fish and Game Code Section 5650 - Water Pollution: Prohibited Materials

Pursuant to Fish and Game Code section 5650, "it is unlawful to deposit in, to permit to pass into, or place where it can pass into the waters of the State any of the following: any petroleum, acid, coal or oil tar, lampblack, aniline, asphalt, bitumen, or residuary product of petroleum, or carbonaceous material or substance." "… any refuse, liquid or solid, from any refinery, gas house, tannery, distillery, chemical works, mill or factory of any kind." "… any substance or material deleterious to fish, plant life, mammals, or bird life." Every person who violates section 5650 is subject to a civil penalty of not more than $25,000 for each violation.

Central Valley Flood Protection Board

The Central Valley Flood Protection Board (CVFPB) was established to control flooding along the Sacramento and San Joaquin Rivers and their tributaries in cooperation with the USACE. The CVFPB maintains the integrity of the existing flood control system, including levees, channels, other flood control works and designated floodways throughout its jurisdiction by issuing permits for encroachments. The CVFPB enforces standards for construction, maintenance and protection of adopted flood control plans to protect public lands from floods. Title 23 of California Code of Regulations specifies the types of activities for which a CVFPB permit is required prior to starting construction work within the CVFPB jurisdiction. These construction activities include:

- The placement, construction, reconstruction removal or abandonment of any landscaping, culvert, bridge, conduit, fence, projection, fill, embankment, building, structure, obstruction, encroachment, excavation, the planting, or removal of vegetation, and any repair or maintenance that involves cutting into a levee (Cal. Code Regs., tit. 23, § 6).
- Work on existing structures that predate permitting or where it is necessary to establish conditions normally imposed by permitting. The circumstances include those where responsibility for the encroachment has not been clearly established or ownership and uses have been revised (Cal. Code Regs., tit. 23, § 6).
- Construction of proposed residence and structures are subject to California Code of Regulations, Title 23, section 113(b) which states that dwellings and structures within an adopted plan of flood control must comply with the following requirements:

  New dwellings, with the exception of dwellings for seasonal occupancy (nonflood season, November 1 through July 15 for the SCARF site), are not permitted. Structures may be constructed within an adopted plan of flood control provided they conform to the following:

  - Structures may not be constructed on a levee section or within 10 feet of a levee toe (recommended 20 feet landside or 15 feet waterside);
  - Structures must be securely anchored and floodproofed to at least 2 feet above the 100-year flood elevation or 2 feet above the design flood plane, whichever

is higher. The floodproofing must be consistent with the potential uses of the structure;

- Structures must be located and oriented to have a minimal impact on flood flows; and
- The number of structures permitted is limited to the minimum reasonably necessary to accomplish an appropriate land use activity (Cal. Code Regs. § 113(b)).

12.2.3 Local Laws, Regulations and Policies

Fresno County Flood Hazard Area Ordinance

Fresno County's Flood Hazard Area Ordinance (Title 15, Chapter 15.48, Fresno County Code of Ordinance) describes regulations on methods of reducing flood losses, provisions for flood hazard reduction, floodways, variance procedures and an appeal process. The methods to reduce flood losses include:

- Restricting or prohibit uses which are dangerous to health, safety, and property due to water or erosion hazards, or which result in damaging increases in erosion or flood heights or velocities;
- Require that uses vulnerable to floods, including facilities which serve such uses, be protected against flood damage at the time of initial construction;
- Encourage natural floodplains, stream channels, and natural protective barriers to help accommodate or channel floodwaters;
- Control filling, grading, dredging and other development which may increase flood damage; and
- Prevent or regulate the construction of flood barriers which will unnaturally divert floodwaters or which may increase flood hazards in others areas.

12.3 Environmental Setting

12.3.1 Potentially Affected Area

The Potentially Affected area includes waterways accessible to salmon released under the Proposed Project, which includes portions of the San Joaquin River watershed, Sacramento River watershed, the Sacramento-San Joaquin River Delta (Delta), the San Francisco Bay, and the Pacific Ocean. Each area is described briefly below.

San Joaquin Watershed and Hydrology

The San Joaquin River is the second largest river in California, traversing roughly 300 miles from its headwaters near the crest of Sierra Nevada, flowing west to the San Joaquin Valley floor, then turns continuing northwestward until draining into the Sacramento-San Joaquin Delta. Its watershed covers about 32,000 square miles and is bound by the Sierra Nevada on the east, the coastal Diablo Range on the west, and a low broad ridge separating it from the

Tulare Lake hydrologic region. The San Joaquin River has an average annual unimpaired runoff of about 1.8 million acre-feet. From south to north (upstream to downstream), its major tributaries are the Fresno, Chowchilla, Merced, Tuolumne, Stanislaus, and Calaveras Rivers (DWR 2009).

Sacramento Watershed and Hydrology

The Sacramento River is the largest in California in terms of discharge and length. Its watershed covers a large portion of the northern portion of the state and extends north to the Cascade and Trinity mountains on the north and the Goose Lake and Pit River watersheds. Its watershed covers 27,246 square miles within the state and is bound by the Sierra Nevada on the east, the Coast Ranges on the west, and the Sacramento-San Joaquin Delta in the south. The basin runoff averages 22.4 million acre-feet per year, nearly one-third of the state's total natural runoff. The major tributaries are, from north to south (upstream to downstream), the Pit River, McCloud River, Cottonwood Creek, Battle Creek, Deer Creek, Cache Creek, Feather River, American River, and Putah Creek (DWR 2009).

Sacramento-San Joaquin Delta

The Delta is at the confluence of the Sacramento River and the San Joaquin River basins, which drain about 40 percent of California. The Delta covers an area of about 1,315 square miles, and is part of the largest estuary on the West Coast. In an average water year like 2000, the largest source of water into the Delta is the Sacramento River, which transported over 21 million acre-feet into the Delta. The Mokelumne and Cosumnes Rivers, other eastside tributaries, and the San Joaquin River added 3.9 million acre-feet, with an additional 1 million-acre feet of local precipitation (DWR 2009). The federal Central Valley Project, the State Water Project, and other water districts divert approximately 5 million acre-feet on average of the flow into the Delta (USGS 2000).

San Francisco Bay and Pacific Ocean

The San Francisco Bay is a large shallow estuary that receives water from Sacramento and San Joaquin Rivers through the Delta, and drains into the Pacific Ocean. The interaction between Delta outflows and tides controls the salinity levels throughout the San Francisco Bay. The salinity gradient influences the distribution of fishes, invertebrates, and terrestrial and aquatic wildlife. Outflow from the Delta varies with precipitation, reservoir releases, and upstream diversions, and contributes an average of 18.4 million acre-feet per year of freshwater to the Bay. Daily tidal flux through the Carquinez Strait is much higher than freshwater flows. The Golden Gate inlet connects the San Francisco Bay to the Pacific Ocean (DWR 2009). Chapter 6, *Biological Resources-Fisheries*, describes the range of Chinook salmon in the Pacific Ocean and the ocean's importance for the life cycle and ecology of Chinook salmon.

12.3.2 Project Area

Broodstock Collection and Salmon Reintroduction Sites

The Project Area includes broodstock collection sites and Chinook salmon reintroduction sites. Broodstock collection would occur from the FRFH and from wild, naturally spawning Chinook populations within the Feather River and on Butte, Deer and Mill Creeks, and an opportunistic collection of other spring-run Chinook from the Stanislaus, Mokelumne and Yuba rivers, and Battle and Clear Creeks. Each of these rivers and creeks is briefly described below.

Clear Creek, Battle Creek, Mill Creek, Deer Creek, Butte Creek, Feather River, and Yuba River are all tributaries to the Sacramento River, and listed in order from upstream to downstream. Clear Creek is a westside tributary to the Sacramento, and is located between Trinity Dam and Shasta Dam. Clear Creek has a watershed area of 249 square miles, and an average mean monthly flow of about 600 cfs (Sacramento River Watershed Program 2010). Battle Creek has a watershed of 370 square miles, an average daily flow of 1,000 cfs, and flows into the Sacramento River at Cottonwood, CA (Sacramento River Watershed Program 2010). Mill Creek originates at Lassen Peak and flows for approximately 60 miles through a narrow canyon, draining a 134 square-mile watershed. Mill Creek conveys an average daily flow of about 400 cfs to the Sacramento River, where the two waters join at Tehama, CA (Sacramento River Watershed Program 2010). Deer Creek has a watershed area of 229 square miles, and an annual mean flow of 318 cfs. Deer Creek meets the Sacramento River at Woodson Bridge State Recreation Area (Sacramento River Watershed Program 2010). Butte Creek has a drainage area of about 560 square miles and meets the Sacramento River at Colusa. Butte Creek has an annual mean discharge of 411 cfs, measured at Chico (USGS 2009a). The Feather River is the largest tributary of the Sacramento River, with a watershed area of about 6,000 square miles. Its average annual discharge is 8,321 cfs, measured south of Yuba City (USGS 2013a). The Yuba River is a tributary to the Feather River, has a watershed area of 1,339 square miles, and an average annual discharge of 2,432 cfs (USGS 2009b).

The Mokelumne and Stanislaus rivers are tributaries to the San Joaquin River. The Mokelumne flows into the San Joaquin River in the Delta (USGS 2010). It has a basin area of 2,143 square miles, sandwiched between Sacramento and Stockton, and bound on the east by the Sierra Nevada. The river has a length of 95 miles and an average discharge of 754 cfs, measured below Camanche Reservoir.

The Stanislaus River is one of the largest tributaries to the San Joaquin River. It has a long and narrow watershed draining an area of 1,075 square miles, with an average annual flow of 958 cfs (USGS 2011). The Stanislaus River meets the San Joaquin River west of Modesto.

Salmon production and reintroduction would occur primarily at the SCARF site. Additional potential release sites along the San Joaquin River from Lost Lake Park (downstream of the SCARF site) to the Hill's Ferry Barrier (upstream of the confluence with the Merced River) are listed in Table 2-4 in Chapter 2, *Project Description*.

Regional Climate

Climate is the accumulation of daily and seasonal, or average, weather events over a long-range period of time. The San Joaquin River basin is characterized by hot, dry summers and cool, rainy winters. Winter weather is characterized by periods of dense and persistent low-level fog most prevalent between storms. Most precipitation results from air masses that move in from the Pacific Ocean during winter. These storms usually move from the west or northwest. More than half of the total annual precipitation falls during the winter rainy season, November through February.

12.3.3 SCARF Site

San Joaquin River and Friant Dam

Friant Dam, a 319-foot high concrete gravity dam on the San Joaquin River with a storage capacity of 520,528 acre-feet, is a major dam on the San Joaquin approximately 1.1 miles upstream of the SCARF site. Friant Dam, which impounds Millerton Lake, provides flood control, conservation storage, and agricultural water deliveries, and downstream releases on the San Joaquin River. The most recent high flow event on the San Joaquin River was 60,300 cfs, which occurred on January 3, 1997. The SCARF site is susceptible to inundation from the San Joaquin River during periods of high flow releases from Friant Dam, described in detail below.

Flood Hazard Areas

Figure 12-1 shows the DWR designated floodway and the FEMA 100-year floodplain for the project area. The SCARF site is subject to flood hazards and is an area subject to the 100-year flood (Zone AE), or having a 1 percent or greater annual chance of flooding. According to the FEMA Flood Insurance Study (FEMA 2012), the base flood elevation (i.e., the peak flood elevation during a 100-year flood) at the SCARF site is approximately 323 feet North American Vertical Datum of 1988 (NAVD88). Existing ground elevations at the SCARF site vary between approximately 308 and 320 feet NAVD88. Therefore, the site is currently subject to inundation during a 100-year flood event.

Surface Water Quality

Water quality on the San Joaquin River adjacent to the SCARF site is influenced by releases from Friant Dam, with very slight contributions from agricultural and urban return flows. Water is generally of high quality, and the temperature of the water is dependent on the cold-water volume in Millerton Lake. Annual technical reports for the San Joaquin River sample total suspended solids, nutrients, total and dissolved organic carbon, bacteria, cations, anions, and trace metals. The data from Appendix C of the SJRRP 2012 Mid-Year Technical Report indicate that there are few contaminants of concern in the San Joaquin River in the vicinity of Friant Dam (SJRRP 2012).

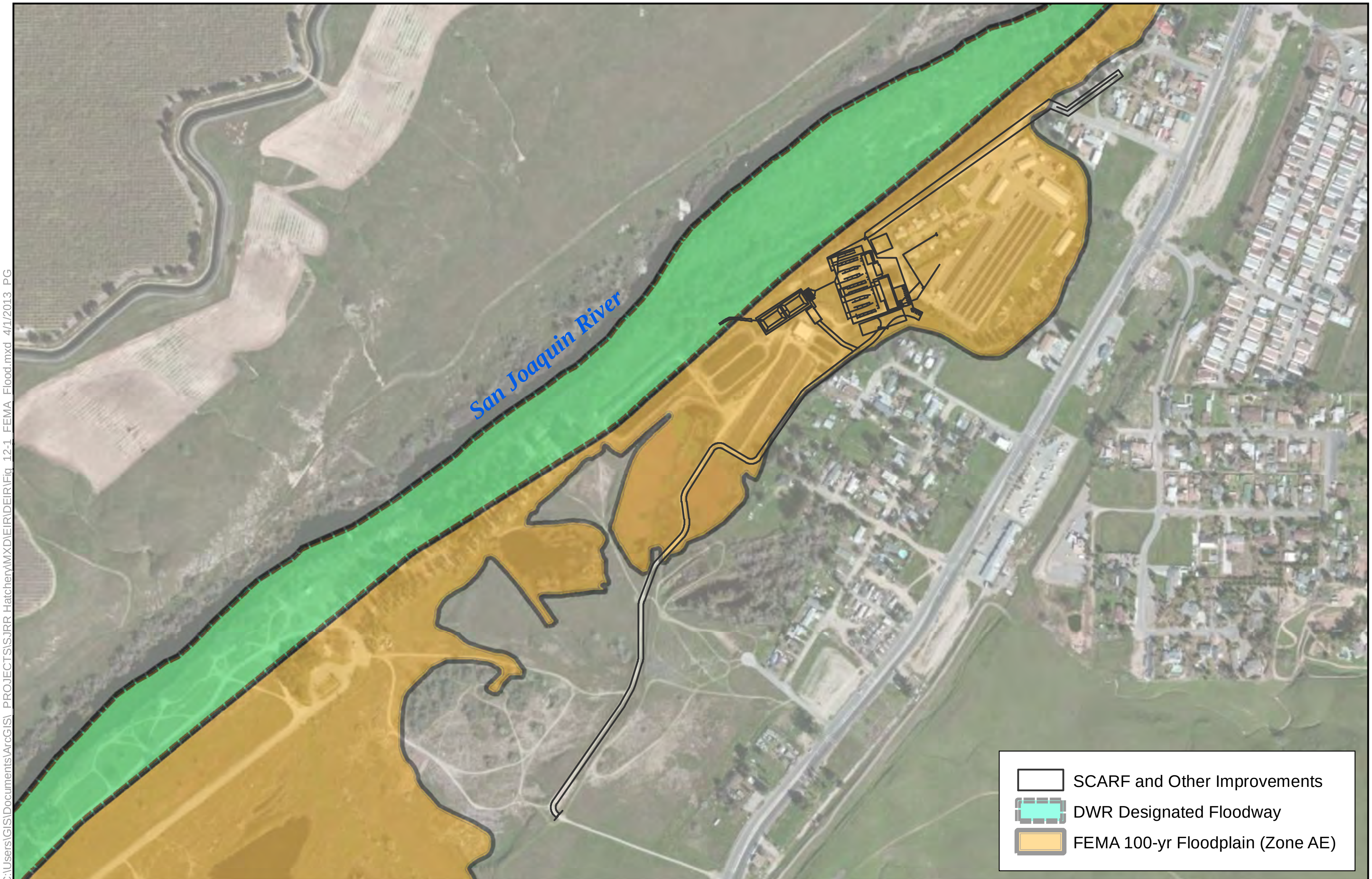
Groundwater

The San Joaquin Valley Groundwater Basin makes up the southern two-thirds of the 400-mile-long, northwest trending asymmetric trough of the Central Valley regional aquifer system in the southern extent of the Great Valley Geomorphic Province. The San Joaquin Valley is bound to the west by the Coast Ranges, to the south by the San Emigdio and

Tehachapi mountains, to the east by the Sierra Nevada, and to the north by the Delta and Sacramento Valley (DWR 2003).

The San Joaquin River Hydrologic Region, which includes all surface water basins draining into the San Joaquin River system, is heavily groundwater-reliant, with groundwater comprising approximately 30 percent of the annual supply for agricultural and urban uses. Aquifers in the San Joaquin Valley Groundwater Basin are thick and typically extend to a depth of up to 800 feet. In general, groundwater quality is suitable for most urban and agricultural uses (DWR 2003).

Groundwater conditions on the SCARF site were evaluated in a geotechnical investigation (Geocon 2012), which included a series of exploratory borings and test pits to sample soil conditions and groundwater levels. Groundwater was encountered in two of eight borings at depths ranging from 3 to 6 feet. Shallow groundwater was not encountered in the remainder of the borings. The borings in which groundwater was reached were located in the immediate vicinity of existing settling ponds. Groundwater encountered at the ponds was interpreted to be associated with seepage from the ponds (Geocon 2012).



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Prepared for:
California Department of Fish and Wildlife
California Department of General Services

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Sources: FEMA 2012; Bing Maps

Figure 12-1: Designated Flood Zones in the Vicinity of the SCARF Site

SCARF and Related Management Actions Project
Draft Environmental Impact Report

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12.4 Impact Analysis

12.4.1 Methodology

The methodology used to evaluate the potential environment impacts of the Proposed Project on hydrology, geomorphology, and water quality involved a review of reports and publications pertaining to hydrology, geomorphology, and water quality as well as reviewing available water quality data. The information used included reports from Reclamation, DWR, CDFW's Hatchery and Stocking Program EIR/EIS (ICF Jones & Stokes 2010), FEMA Flood Insurance Study (FEMA 2009), and a geotechnical investigation report (Geocon 2012).

Potential impacts to hydrologic conditions and geomorphic resources were evaluated based on how the Proposed Project could affect hydrologic or geomorphic functions by comparing baseline conditions to anticipated conditions after the implementation of Proposed Project activities. Potential impacts to water quality from the Proposed Project were assessed both quantitatively and qualitatively, based on the degree to which the Proposed Project could result in violations of water quality standards, impairment of beneficial uses, or water quality conditions that could be harmful to aquatic life or human health. Water quality data from CDFW's Hatchery and Stocking Program EIR/EIS and the SJFH were used to evaluate potential water quality impacts from SCARF operations (CDFW, unpublished data). The beneficial uses and water quality objectives established by the Central Valley RWQCB and the requirements set in the NPDES permits were used to establish thresholds for the impact analysis. The NPDES General Permit for CAAP facilities provides effluent limitation and discharge specifications, and requires the permittee to comply with the monitoring and reporting program requirements and provide a BMP and Pollution Prevention Plan. CDFW would operate the SCARF to be in compliance with the terms of the NPDES General Permit for CAAP facilities.

Note that the potential for SCARF operations to result in channel erosion has been considered in Chapter 9, *Geology, Soils and Seismicity*, and so is not discussed here.

12.4.2 Criteria for Determining Significance

Based on Appendix G of the CEQA Guidelines and professional expertise, the Proposed Project would result in a significant impact on hydrologic resources if it would:

A. Violate any water quality standards or waste discharge requirements or otherwise substantially degrade water quality;

B. Substantially deplete groundwater supplies or interfere with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level;

C. Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial flooding, erosion or siltation on- or off-site;

D. Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff;

E. Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map;

F. Place within a 100-year flood hazard area structures which would impede or redirect floodflows;

G. Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam;

H. Contribute to inundation by seiche, tsunami, or mudflow; or

I. Substantially deplete surface water supplies.

12.4.3 Environmental Impacts

Table 3-1 in Chapter 3, *Introduction to the Environmental Analysis,* identifies components of the Proposed Project with the potential to result in impacts to hydrology, geomorphology, and water quality. There would be potential impacts to hydrology, geomorphology, and water quality from all elements of the Proposed Project. Thus, each component is evaluated below. Each impact is discussed in further detail in the section below.

SCARF Construction

Impact HYD-CONSTRUCT-1: Violate Water Quality Standards or Waste Discharge Requirements or Otherwise Substantially Degrade Water Quality during SCARF Construction (Significance Criterion A, Project Level, Less than Significant with Mitigation)

SCARF construction will involve construction of structures, a parking area, an access road and other ancillary improvements. During construction activities, the removal of vegetation, grading and excavation would expose soils and increase susceptibility to erosion, which may impact water quality. The existing ponds on the site would be dewatered, and shallow groundwater may be encountered during construction, providing a direct means for contamination of groundwater or discharge of contaminated dewatering effluent. This is considered a potentially significant impact.

The construction activities associated with the SCARF site would be subject to construction-related stormwater permit requirements of the NPDES program. As required by the NPDES General Construction Permit (SWRCB 2009; Order No. 2009-0009-DWQ, NPDES NO. CAS000002), a Storm Water Pollution Prevention Plan (SWPPP) would be prepared that identifies BMPs to prevent or minimize the introduction of contaminants into surface waters from construction activities. In addition to the SWPPP, the Proposed Project has developed construction-related mitigation measures that would further protect water quality and minimize erosion (See Chapter 9, *Geology, Soils and Seismicity*). Dewatering of existing ponds would follow the provisions of the General Construction Permit or the General Dewatering Permit, which includes measures sufficient to prevent impacts to water quality. Shallow groundwater pumped during construction would either be stored and then transported offsite for treatment or be treated onsite and released as effluent. Compliance with the required NPDES construction permits and implementation of the **Mitigation Measures GEO-CONSTRUCT-1a: Implement Construction Best Management Practices to Minimize Erosion and the Loss of Topsoil** and **GEO-CONSTRUCT-1c: Design Cut-and-Fill Slopes to Minimize Erosion** listed in Chapter 9, *Geology, Soils, and Seismicity*, would reduce this impact to less than significant.

Impact HYD-CONSTRUCT-2: Substantially Deplete Groundwater Supplies or Interfere Substantially with Groundwater Recharge, Resulting in a Net Deficit in Aquifer Volume or Lowering of the Local Groundwater Table Level from SCARF Construction (Significance Criterion B, Project Level, Less than Significant)

The SCARF construction would not involve substantial groundwater withdrawals or other activities that could affect existing groundwater wells and pumping facilities, and no new wells or pumps would be installed as part of the Proposed Project. While new impervious surfaces associated with the SCARF could inhibit groundwater recharge, runoff from the site would be directed to the river where it would be able to recharge the aquifer through the river's porous sediments. Shallow groundwater found at the project site may be encountered during construction. Dewatering may be necessary, depending on the extent of the perched groundwater at the time of grading. The volume of perched groundwater to be dewatered is not anticipated to be substantial enough to affect aquifer storage or groundwater levels outside of the immediate project site. This impact is less than significant.

Impact HYD-CONSTRUCT-3: Substantially Alter the Existing Drainage Pattern of the Site or Area, Including through the Alteration of the Course of a Stream or Rivers, Resulting in Substantial Erosion or Siltation On-site or Off-site from SCARF Construction (Significance Criterion C, Project Level, Less than Significant with Mitigation)

Construction activities for the SCARF would disturb approximately 17 acres and create approximately 11 acres of impermeable surfaces (note that during final design and construction, these acreages could be somewhat larger or smaller). On-site runoff from the main building pad (i.e., the area for the hatchery building, fish culture tanks, and parking) would be collected and routed overland into catch basins and released into an existing 42-inch reinforced concrete pipe (RCP) that serves the SJFH. During periods of high runoff, this pipe discharges stormwater to the secondary channel of the San Joaquin River. Runoff from the main building pad would be pre-treated before entering the pipe with catch basin inserts to trap pollutants (e.g., sediment, hydrocarbons, trash). Runoff from other facilities, such as the access road and ancillary improvements, would follow existing stormwater drainage patterns, and be routed into an existing RCP that currently discharges stormwater into the secondary channel of the San Joaquin River.

The SCARF site also receives drainage from land to the south and east of the site. This drainage is currently routed into the four non-operational aquaculture ponds on the SCARF site via underground pipes. As part of the Proposed Project, the underground stormwater lines would be rerouted to the settling ponds of the SJFH. Drainage from the site and the land south and east of the site during construction activities could cause erosion or siltation. This is considered a potentially significant impact.

With the implementation of an SWPPP, **Mitigation Measures GEO-CONSTRUCT-1a and GEO-CONSTRUCT-1c**, and the proposed drainage management measures, the quantity and delivery of stormwater from the site would not appreciably change following construction, and therefore would not cause substantial erosion or siltation at the site or in the San Joaquin River. This impact is therefore less than significant with mitigation.

Impact HYD-CONSTRUCT-4: Substantially Alter the Existing Drainage Pattern of the Site or Area, Including Through the Alteration of the Course of a Stream or River, or Substantially Increase the Rate or Amount of Surface Runoff Resulting in Flooding On-site or Off-site from SCARF Construction (Significance Criterion C, Project Level, Less than Significant)

SCARF construction would alter the existing drainage pattern as described above in Impact HYD-CONSTRUCT-3, but would not appreciably increase the rate or amount of runoff. Flooding issues from construction of the Proposed Project are addressed below in Impact HYD-CONSTRUCT-6. This impact is less than significant.

Impact HYD-CONSTRUCT-5: Place Housing Within a 100-Year Flood Hazard Area, As Mapped on a Federal Flood Hazard Boundary or Flood Insurance Map or Other Flood Hazard Delineation Map from SCARF Construction (Significance Criterion E, Project Level, Less than Significant)

Up to two staff residences associated with the SCARF may be constructed within a 100-year flood hazard area. These residences may be located on empty residential lots in the northeast corner of the SCARF site (Figure 2-3). Friant Dam is operated to keep flows below 8,000 cfs below Cottonwood Creek, according to USACE regulations. However, when releases from the dam approach 12,000 cfs (DFG 2012; Appendix M, *Draft Emergency Evacuation Plan for the SCARF*), there would be the potential for the proposed residences to flood.

One of four alternative configurations for the design and construction of the two residences would be implemented to reduce potential flood damages and the possibility of the loss of human life or property, as described in Chapter 2, *Project Description*, and as follows:

1. *Single-story residences*. This option includes construction of single-story residences with living areas on the ground level. The living areas would be subject to inundation during the 100-year flood event. An Emergency Evacuation Plan would be implemented that prescribes protocols to protect the safety of residents in the event of a large flood. A Draft Emergency Evacuation Plan, adapted from the SJFH's plan, is provided in Appendix M, *Draft Emergency Evacuation Plan for the SCARF*.

2. *Two-story residences*. Under this option, the ground level of the residences would be used for storage and/or parking, and the living area would be constructed above the base flood elevation on the second story. The buildings would be designed and adequately anchored to resist flotation, collapse, and lateral movement of the structure resulting from hydrodynamic and hydrostatic loads, including the effects of buoyancy. The garage would be designed to allow for automatic entry of floodwaters.
3. *Off-site residences*. Residences may be located off of the SCARF site, but nearby. This option may include purchase or rental of existing homes in Friant, or purchase of vacant parcels and construction of new residences.
4. *Mobile housing*. CDFW may elect to provide mobile housing (e.g., trailers or modular homes) on the SCARF site. The living areas would be subject to inundation during the 100-year flood event. An Emergency Evacuation Plan would be prepared that prescribes protocols to protect the safety of residents in the event of a large flood.

While several of these options would result in housing being placed within the 100-year floodplain, any of the options would avoid substantial potential for injury or death as a result of flooding of these structures. Therefore, with implementation of any one of these approaches, this impact is less than significant.

Impact HYD-CONSTRUCT-6: Place Structures Within a 100-year Flood Hazard Area Resulting in Impeding or Redirecting Flood Flows from SCARF Construction (Significance Criterion F, Project Level, Less than Significant with Mitigation)

As shown in Figure 12-1, the Proposed Project would involve the construction of structures within the 100-year flood hazard area and designated floodway. While all such structures would be designed to flood, and would allow flood flows to pass through them, the potential remains for these structures to raise base flood elevations, generate erosion, or cause other flooding-related impacts. This is considered a potentially significant impact. Implementation of Mitigation Measure HYD-CONSTRUCT-6 would ensure that this impact is less than significant.

Mitigation Measure HYD-CONSTRUCT-6: Perform Flood Analysis and Conform to Standards in Fresno County Code

Prior to finalizing the SCARF design, CDFW will conduct an analysis of pre- and post-project flood conditions in the SCARF area. The analysis will include an assessment of the potential change in velocity, floodplain storage and Base Flood Elevation (BFE) for the pre- and post-project conditions. If the analysis determines that the SCARF would significantly decrease floodplain storage or result in a significant increase in the BFE, velocity, or cause erosion, then measures will be designed and implemented to reduce these potential effects to an acceptable level. This could include bank stabilization measures at erosional locations, development of increased floodplain storage, redesign to avoid increases in the BFE, etc. As a performance standard, the design and construction shall conform to the standards contained in the most current version of Fresno County Code Chapter 15.48; such standards are considered by CDFW to reduce this impact to a less-than-significant level.

Impact HYD-CONSTRUCT-7: Expose People or Structures to Significant Risk of Loss, Injury or Death Involving Flooding, Including Flooding Resulting from the Failure of a Levee or Dam during SCARF Construction (Significance Criterion G, Project Level, Less than Significant)

The SCARF site is directly downstream of Friant Dam. The SCARF site would be subject to inundation and substantial safety risk for construction workers onsite should Friant Dam fail catastrophically during construction. The potential magnitude of inundation at the SCARF site would depend on the time of the year and the base flow of the San Joaquin River, but would likely be extreme. However, according to a 2005 investigation of Friant Dam surface storage options, the risk of dam failure from seismic hazards is low (Reclamation 2005). Catastrophic failure of Friant Dam from other structural weaknesses is also exceptionally unlikely. In addition, since construction activities would take place for approximately one year, the chance that construction workers would be exposed to a catastrophic failure is even more unlikely. Therefore, this impact is less than significant.

Impact HYD-CONSTRUCT-8: Contribute to Inundation by Seiche, Tsunami, or Mudflow from SCARF Construction (Significance Criterion H, Project Level, No Impact)

The SCARF site is far removed from the risk of tsunamis. Nearby Millerton Lake may experience seiches, but none on the order that would subject the SCARF to inundation. The Proposed Project includes grading for the SCARF on areas that could be wet or unstable. However, BMPs would be used to maintain soil stability during construction, as described above. In addition, the site is located in a relatively flat area without large hillslopes that could be prone to mudflows. For these reasons, there would be no impact related to seiche, tsunami, or mudflow.

SCARF Operations

Impact HYD-OP-1 Create or Contribute Runoff Water Exceeding the Capacity of Existing or Planned Stormwater Drainage Systems or Provide Substantial Additional Sources of Polluted Runoff from SCARF Operations (Significance Criterion D, Project Level, Less than Significant)

The SCARF would increase the amount of impervious surfaces on the site. As described above in Impact HYD-CONSTRUCT-2, stormwater generated on-site would be routed to a collection system that would deliver runoff to an existing 42-inch RCP. This pipe has the capacity to handle the additional stormwater flows that would be generated by SCARF development. Stormwater from the main building pad would be pre-treated with catch basin inserts prior to discharge to the 42-inch RCP. This impact is less than significant.

Impact HYD-OP-2: Effects of SCARF Return Flows on Downstream Flooding and Flood Risk (Significance Criterion G, Project Level, Less than Significant)

The mean monthly discharge of the San Joaquin River at Friant over the period of record since the opening of Friant Dam has exceeded the operational threshold of 8,000 cfs only three times—once in June 1942, the year Friant Dam opened, again in May 1967, and a third time in June 1983 (USGS 2013b). While releases from Friant Dam exceeding operational thresholds are generally very rare, they have only occured historically during periods of high snowmelt in May and June. The estimated monthly return flow rates for the SCARF are shown in Table 2-2 and can be compared to the flood flows on the San Joaquin River to assess the potential for SCARF return flows to contribute to downstream flooding and flood risk. The estimated SCARF maximum discharge rate of 14.9 cfs would occur during May, which would coincide with periods of high flows on the San Joaquin River and the period in which flood flows have occurred historically. However, the maximum release from SCARF would constitute a very small percentage (0.2%) of the maximum flood control objective release of 8,000 cfs measured at Cottonwood Creek.

The SCARF discharges would incrementally contribute to downstream flooding when the San Joaquin River is flowing at or above flood stage. Stormwater flows from the main SCARF building pad also may contribute to increased flows of the San Joaquin River. However, these incremental contributions would not substantially increase downstream flood elevations or flood risk, and are therefore considered to be a less than significant impact.

Impact HYD-OP-3: Exposure of People and Structures to Flood Risk from SCARF Operations (Significance Criterion G, Project Level, Less than Significant with Mitigation)

As described in Impact HYD-CONSTRUCT-6, the Proposed Project would place structures within the 100-year flood hazard area and designated floodway. SCARF workers and their families would potentially be exposed to flood risk when San Joaquin River flows exceed 12,000 cfs (DFG 2012, Appendix M, *Draft Emergency Evacuation Plan for the SCARF*). This is considered a potentially significant impact.

The SCARF's Draft Emergency Evacuation Plan (Appendix M, *Draft Emergency Evacuation Plan for the SCARF*) describes the steps required if flooding at SCARF is imminent. If conditions for flooding exist, the Hatchery Manager will alert hatchery personnel and other residents and provide a notice to evacuate. Upon notice to evacuate, residents will evacuate, and if time permits prior to evacuation, remove fish from the premises, remove the Mobile Fish Lab and USFWS Tagging Trailer, and remove other mobile equipment that is prone to water damage. Hazardous materials will be secured to prevent spillage. In addition to the Emergency Evacuation Plan, **Mitigation Measure HYD-CONSTRUCT-6** (described above) would be implemented to reduce the impacts on project site flooding through design to reduce potential flooding effects to an acceptable level. With implementation of this mitigation measure, this impact would be less than significant.

Impact HYD-OP-4: Effects of Hatchery Diversions for SCARF Operations on Surface Water Supply (Significance Criterion I, Project Level, Less than Significant)

Millerton Lake would provide the water source for the SCARF through a planned 30-inch water line connecting to an existing 44-inch line that serves the SJFH. The water for SCARF operations would represent a portion of the water set aside under the SJRRP. Water diversions for operations would not measurably affect San Joaquin River flow downstream of Friant Dam. A small amount of consumptive use would be required for SCARF operations. The majority of water diverted for SCARF operations would return to the San Joaquin River (Table 2-2), or would percolate into the main channel of the river as shallow groundwater flow. Flows of the San Joaquin would essentially remain unchanged as a result of SCARF operations. Therefore, this impact is less than significant.

Impact HYD-OP-5: Effects on Groundwater Supplies from SCARF Operations (Significance Criterion B, Project Level, Less than Significant)

Water for SCARF operations would be provided from upstream surface water diversions, and no groundwater would be extracted for SCARF operations. A portion of the SCARF return flow would be sent to percolation ponds. Water sent to the percolation ponds would infiltrate into the shallow groundwater table, slightly raising the local groundwater levels, similar to the effect on shallow groundwater inferred in geotechnical studies of the site (Geocon 2012). Groundwater percolated in ponds that are hydrologically connected to the San Joaquin River would result in a very slight increase in flows. Since no groundwater would be extracted and SCARF operations would contribute slightly to the shallow groundwater table, this impact is less than significant.

Impact HYD-OP-6: Water Quality Effects of SCARF Operations to Total Suspended Solids and Turbidity (Significance Criterion A, Project Level, Less than Significant)

SCARF operations would result in an accumulation of organic solids from uneaten feed and biological waste in cultured fish rearing tanks and settling ponds. High water flows, fish activity and facility cleaning operations can disturb and re-suspend settled solids into the water column. Suspended solids in the water column in high levels can be a concern to aquatic life if concentrations reach levels that affect an organism's ability to sight-feed and obtain oxygen, or if high concentrations cause abrasion to fish tissues. Reduced water clarity can impair recreational uses and the aesthetic appeal of water bodies.

TSS and turbidity are parameters that reflect the effects of particulate matter in the aquatic environment. NPDES Permit #CAG135001 provides a limit of 5 mg/L on average per month for TSS and a maximum daily effluent limitation of 15 mg/L. The receiving water limitations for turbidity are no more than 2 NTU where natural turbidity is less than 1 NTU, more than 1 NTU where natural turbidity is between 1 and 5 NTU, more than 20 percent where natural turbidity is between 5 and 50 NTUs, more than 10 NTU where natural turbidity is between 50 and 100 NTUs, and more than 10 percent where natural turbidity is greater than 100 NTUs. Monitoring data from the SJFH indicates that these limits have not been exceeded at that facility.

Uneaten feed and biological waste are likely to settle in the bottom of rearing tanks. Return flow from the tank bottom drains and hatchery building would pass through drum filters to remove solids. This would greatly reduce the volume of solids discharged by SCARF operations. Water would exit the drum filters and move into a series of settling ponds, which would further reduce the amount of solids in the return flow. Water from rearing tank side drains that contains few solids would be discharged directly into settling ponds (no pretreatment with drum filters) or into the volitional release channel. Chinook salmon raised in the SCARF require low levels of TSS and turbidity in hatchery water, as high levels would be detrimental to the fish. SCARF employees would monitor the levels of TSS and turbidity regularly to ensure that high levels of these constituents would not harm Chinook salmon. Finally, the SCARF will be operated in compliance with NPDES requirements. Compliance with NPDES requirements and maintaining low levels of total suspended solids and turbidity for Chinook salmon health within the hatchery will ensure that the impact to water quality from TSS and turbidity is less than significant.

Impact HYD-OP-7: Water Quality Effects of SCARF Operations to Dissolved Oxygen, pH and Salinity (Significance Criterion A, Project Level, Less than Significant)

SCARF operations could affect pH, DO, and salinity through the use of chemicals, changes in flow velocity and temperature, introduction of fish wastes, metabolic processes, and as a result of algal and bacterial growth in hatchery and settling ponds. This impact evaluates the potential of SCARF operations to exceed Basin Plan water quality objectives. Chinook salmon raised in the SCARF are sensitive to elevated or depressed levels of pH, low levels of DO, and high levels of salinity. In order to maintain fish health, the water quality conditions within SCARF water must be tolerable to Chinook salmon. These conditions provide a baseline to evaluate the potential to exceed water quality objectives. Chapter 6, *Biological Resources-Fisheries* contains a further discussion of the water quality impact of SCARF operations on salmonids and other fish.

Support of aquatic life is the most sensitive beneficial use with respect to pH and changes in pH. In general, pH affects the ability of fish and other aquatic organisms to regulate basic life-sustaining processes, primarily the exchanges of respirator gases and salts within the water in which they live. The water quality objective under the Sacramento and San Joaquin Basin Plan for pH is that the pH of water shall not be below 6.5 or above 8.5.

Dissolved oxygen, a measure of the gaseous oxygen dissolved in water, is necessary in sufficient concentrations for the health of aquatic biota. Low levels of DO can lead to fish kills. Support of aquatic life is the most sensitive beneficial use with respect to DO concentrations. The DO requirement for the Sacramento and San Joaquin Basin Plan is that discharges shall not cause the monthly median of the mean daily DO concentration to fall below 85 percent of saturation in the main water mass; the 95 percentile DO concentration to fall below 75 percent of saturation; the DO concentration to be reduced below 7.0 mg/L for water designated COLD at any time; nor the DO concentration be reduced below 5.0 mg/L for water bodies designate WARM at any time.

Salinity is measured by TDS (total dissolved solids) and EC (electrical conductivity). High levels of salinity can affect the beneficial use of San Joaquin River water for agricultural and municipal supply. The Sacramento and San Joaquin River Basin Plan includes water quality objectives for TDS and EC. The EC shall not exceed 150 micromhos/cm (90^{th} percentile) along the San Joaquin River from Friant Dam to Gravelly Ford. EC measured in SJFH effluent is well below this threshold.

As part of the SCARF, an aeration tower would be constructed to oxygenate water to maintain high levels of dissolved oxygen. After passing through the aeration tower, water used for incubation will be treated through a primary filter and ultraviolet treatment system prior to entering the facility. SCARF employees would monitor hatchery water to ensure that levels of pH, dissolved oxygen, and salinity are maintained within levels acceptable for fish production and health, which would ensure that the beneficial uses downstream of SCARF are maintained.

Compliance with NPDES requirements and Sacramento and San Joaquin River Basin Plan limitations and regular monitoring of water quality within SCARF for fish health will ensure that the impact to water quality from pH, DO, and salinity is less than significant.

Impact HYD-OP-8: Water Quality Effects of SCARF Operations on Eutrophication of Receiving Waters (Significance Criterion A, Project Level, Less than Significant)

Eutrophication refers to the aquatic ecosystem response to excess amount of nutrients, which can cause nuisance algae blooms and aquatic plant growth, and related DO depletion, plant decay odors, and reduced water clarity. Eutrophication can affect aquatic life, recreational and aesthetic beneficial uses, and water supply uses. Nitrogen and phosphorous are key nutrients that control aquatic plant and algae growth, and eutrophication rates. Micronutrients, including silicon and potassium are also important to primary production.

Nutrients from SCARF waters would primarily be from uneaten commercial pelletized feed distributed to the cultured fish and from fish biological wastes that are deposited in the fish rearing tanks. Dissolved and total nutrients may then be discharged to SCARF settling ponds or directly discharged to receiving waters. Fish feed is the only major source of nutrients such as nitrogen and phosphorus in flow-through hatchery systems (U.S. EPA 2004). Use of high quality feeds and minimizing feed waste can reduce nutrients generated and released to the environment.

The Sacramento and San Joaquin Basin Plan does not contain any applicable numeric criteria for nitrogen or phosphorous compounds, nor has any other RWQCB adopted any criteria for the purpose of controlling eutrophication. Table 12-2 shows the nutrient concentrations in discharges measured at seven CDFW-run hatcheries. An evaluation of the nutrient concentrations of hatchery discharges shows that they often differ very little from the nutrient content of hatchery source water and do not contribute substantial amounts of nutrient loading. Visual observations from hatchery records indicate a low potential for eutrophication to occur to a level that would cause substantial adverse effects on beneficial uses (ICF Jones & Stokes 2010).

Table 12-2. Nutrient Concentrations Measured in CDFW Hatchery Discharges

Nutrient	Hatchery Name						
	Iron Gate	Feather River	Hot Creek	Fish Springs	Black Rock Rearing Ponds	Mojave River	Mt. Whitney
Nitrate (mg/L)							
No. of Samples	-	29	54	28	34	15	34
Max hatchery discharge	-	0.3	0.81	0.85	0.34	5.2	0.89
Min hatchery discharge	-	0.02	0.14	0.01	0.015	3.6	0.008
Max source water	-	0.2	1.2	0.90	-	-	-
Min source water	-	0.01	0.21	<0.01	-	-	-
Max receiving water	-	-	0.25	1.4	-	-	-
Total Nitrogen (mg/L)							
No. of Samples	19	2	27	28	22	15	20
Max hatchery discharge	2.06	0.53	1.19	1.21	0.81	5.6	0.78
Min hatchery discharge	-	-	<0.25	0.28	0.07	<1.7	<0.25
Max source water	-	0.16	0.46	0.29	-	-	-
Min source water	-	-	<0.24	-	-	-	-
Max receiving water	-	1.41	0.53	0.66	-	-	-
Orthophosphate (mg/L)							
No. of Samples	-	25	51	28	32	12	34
Max hatchery discharge	-	0.12	0.28	0.21	0.098	0.59	0.067
Min hatchery discharge	-	<0.01	0.15	0.09	0.014	0.21	<0.01
Max source water	-	0.11	0.27	0.19	-	-	-
Min source water	-	<0.01	0.14	0.078	-	-	-
Max receiving water	-	-	0.23	0.213	-	-	-
Total Phosphorous (mg/L)							
No. of Samples	19	28	-	-	-	-	-
Max hatchery discharge	0.25	0.18	-	-	-	-	-
Min hatchery discharge	-	0.02	-	-	-	-	-
Max source water	-	0.02	-	-	-	-	-
Min source water	-	0.11	-	-	-	-	-
Max receiving water	-	<0.01	-	-	-	-	-

Source: Table 3-10 (ICF Jones & Stokes 2010). Data from hatchery NPDES Discharge Monitoring Data

The potential increase in downstream receiving water nutrient concentrations upon full mixing is expected to be small for SCARF operations. Theoretically, the discharge of nitrogen and phosphorous compounds from SCARF should be lower than what is observed at most other CDFW hatcheries due to the lower densities that fish are reared at in conservation hatcheries and the use of solids filtration not used in other CDFW hatcheries and would be expected to have a lower potential for contributing to eutrophication. Therefore, this impact is less than significant.

Impact HYD-OP-9: Effects of SCARF Operations on Discharge Water Temperature (Significance Criterion A, Project Level, Less than Significant)

Water temperatures in the San Joaquin River at Friant Bridge near the proposed SCARF outfall range from 42.8°F to 60.8°F (6°C to 16°C), and average temperatures in the summer months is relatively stable around 51.8°F to 53.6°F (11°C to 12°C) (CDFW Temperature Monitoring Data). Water for SCARF operations would be supplied from Millerton Reservoir, and the temperature range of 42.1°F to 57.9°F (5.6°C to 14.4°C) would be comparable to that received by the SJFH (Börk and Adelizi 2010). The Sacramento and San Joaquin Basin Plan includes the objective that the natural receiving temperature shall not be altered unless it can be demonstrated that the alteration in temperature does not adversely affect beneficial uses. As a specific criterion, the temperature of COLD or WARM waters shall not be increased more than 5°F (15°C) above natural receiving water temperature.

As water passes through the SCARF, water temperatures could change as a result of exposure to ambient air temperatures and to direct sunlight as water travels through hatchery rearing tanks and settling ponds. If the return flow discharges from SCARF operations were to be sufficiently different from receiving waters in terms of temperature, and the volume discharged into the San Joaquin River were to be of a sufficient magnitude, temperatures of the fully mixed receiving water may also be affected. Substantial temperature alterations may adversely affect beneficial uses of the receiving water.

However, the water supplied from Millerton Lake to the influent at SJFH has been found to be cooler during the summer than ambient river temperatures, presumably due to the fact that the supply comes from below the thermocline in Millerton Reservoir, and travels in below-ground piping between Friant Dam and the hatchery, reducing the influence of ambient air temperatures. This effect moderates influent water temperatures and the potential for discharges from the hatchery to exceed the summer river temperature, and in fact the SJFH has been found to have little effect on river temperatures (SJFH Water Quality Monitoring data 2011, 2012). Water temperature effects for the SCARF operations will be comparable to those in from the SJFH. Therefore, any effect of SCARF discharge on river temperature during warmer months of the year is likely to have little impact on coldwater fish species. In addition, compliance with NPDES requirements and Sacramento and San Joaquin River Basin Plan limitations will ensure that the impact to water quality from discharge water temperature is less than significant.

Impact HYD-OP-10: Water Quality Effects of SCARF Return Flow Discharges Containing Aquaculture Chemicals and Drugs (Significance Criterion A, Project Level, Less than Significant)

SCARF managers may periodically use water treatment chemicals and treatments for specific parasite or disease conditions of the cultured fish or to prevent fungal and bacterial formation. Treatment chemicals have the potential to adversely affect the quality of receiving waters and beneficial uses if concentrations of treatment chemicals exceed drinking water standards, degrade the quality of drinking water supplies, or adversely affect aquatic biota such that indirect effects occur on aesthetic appeal or recreational opportunities.

Treatment methods prescribed by fish pathologists for disease outbreaks and treatment protocols would be carried out by SCARF staff. Depending on the nature of an outbreak, treatment methods may vary. NaCl, KMnO4, formalin, or hydrogen peroxide may be used, as allowed by the discharge permit. Other Investigational New Animal Drugs (INAD) such as ivermectin may be used in accordance to United States Food and Drug Administration guidelines. Treatment of bacterial infections could include the use of oxytetracycline, florfenicol or other approved antibiotics (Börk and Adelizi 2010). Treatment methods are applied on the order of minutes typically, or up to an hour long.

Table 12-3 lists common aquaculture treatment chemicals potentially used at SCARF, along with the purpose of application and the expected method of application or treatment. NPDES permit #CAG135001 authorizes the discharges for these aquaculture chemicals and drugs to surface waters in accordance with label directions, effluent limitations, BMPs, monitoring and reporting requirements and other conditions listed in the Order. The Order also has an approval process for use of chemicals not contained in the Order, which includes additional testing requirements to ensure that adverse effects would not occur.

Table 12-3. Common Treatment Chemicals Potentially Used at SCARF

Drug or Chemical	Purpose of Application	Expected Method of Application or Treatment
Acetic Acid	Control of external parasites	(1) Continuous flow bath: 1.5 to 2.2 gallons of glacial acetic acid as a bolus to top of raceway. Gives a treatment level of approximately 335 to 500 mg/L. (2) Bath: used at a rate of 500 to 2,000 mg/L for 1 to 10 minutes.
Amoxicillin trihydrate	Control and prevention of external and system bacterial infections	Injected intraperitoneally: into broodstock twice a week, prior to spawning, at a rate of 40 mg/kg of fish.
Carbon dioxide	Anesthetic	Bath: bubbled in water. Usually used in small volumes of water.
Chloramine-T (N-sodium-N-chloro-p-toluenesulphonamide)	Control of external gill bacteria	(1) Continuous flow bath: used at concentrations of 10 mg/L for 1 hour. (2) Bath: used at a concentration of 10 mg/L for 1 hour.
Copper sulfate	Control of external parasites and bacteria	Continuous flow bath: used at a rate of up to 0.5 pounds per cfs of raceway flow.
Erythromycin	Control and prevention of external and systemic bacterial infections	(1) Injected intraperitoneally: at a rate of 40 mg/kg of fish, at 30-day intervals. (2) Feed: used in medicated feed or fish pills at a rate of 100 mg/kg of fish.
Florfenicol (Nuflor)	Control and prevention of external and systemic bacterial infections	Feed: Purchased medicated feed is administered to fish at a rate of 10 mg/kg of fish per day, split into morning and afternoon feedings.
Formalin (37% formaldehyde solution)	(1) Control of external parasites (2) Fungus control on fish eggs	(1) Continuous flow bath: Low dose used at a concentration of 25 mg/L for 8 hours. High dose used at a concentration of 167 to 250 mg/L for 1 hour. (2) Bath: used at a concentration of 2,000 mg/L, or less, for 15 minutes.
Hydrogen peroxide	Control of external parasites and fungus	Continuous flow bath: (a) used on fish at a rate of 100 mg/L, or less, for 45 minutes to 1 hour (b) used on fish eggs at a concentration of 500 to 1,000 mg/L for 15 minutes
MS-222/tricane methane sulfonate (Finquel, Tricaine-S)	Anesthetic	Bath: used at a rate of 50 to 250 mg/L, usually in a small volume of water.
Oxytetracycline HCL (Terramycin)	Control and prevention of external and systematic bacterial infections	(1) Bath: used in tanks for 6 to 8 hours at a concentration of 100 mg/L or less. (2) Feed: fed at a rate of 3.75 grams of oxytetracycline per 100 pounds of fish per day.
Penicillin G potassium	Control and prevention of external and systemic bacterial infections	Bath: used in tanks for 6 to 8 hours at a concentration of 150 IU/ml (500,000,000 IU/311.8 g packet).

Drug or Chemical	Purpose of Application	Expected Method of Application or Treatment
Potassium permanganate	Control of external parasites and bacteria	(1) Flush: used at a rate of 2 ounces per cfs of raceway flow, poured in all at once, for a total of three treatments, spaced 10 to 15 minutes apart (2.32 mg/L for a 45-minute treatment, 3.48 mg/L for a 30-minute treatment). (2) Bath: used at a rate of 2 mg/L, or less, for 1 hour.
PVP iodine	Disinfect and control diseases on fish eggs	Bath: used at a concentration of 100 mg/L for 10 to 30 minutes.
Sodium bicarbonate	Anesthetic	Bath: used at a rate of 142 to 642 mg/L, usually in a small volume of water.
Sodium chloride (salt)	Fish cleansing, disease control, and stress reduction	Continuous flow bath: used at a rate of 150 to 700 pounds of salt per cfs of raceway flow.
Sulfadimethoxine-ormetoprim (Romet-30)	Control and prevention of external and systemic bacterial infections	Feed: used at a rate of 50 mg/kg of fish per day.
Notes: cfs = cubic feet per second g = gram IU/ml = international unites per milliliter mg/L = milligrams per liter mg/kg = milligrams per kilogram		

Table 12-4 shows common treatment chemicals, their dosages, and guidance concentrations for aquatic toxicity and drinking water, which were compared to measured hatchery discharge concentrations from CDFW-run hatcheries. A comparison between the guidance concentrations and the measured hatchery discharge concentrations shows a low potential for aquaculture treatment chemicals to exceed CDFW guidance values (ICF Jones & Stokes 2010). All treatment will follow veterinary guidance and will be used and monitored according to wastewater discharge requirements in the SCARF's NPDES permit. Diagnostic procedures for pathogen detection will follow American Fisheries Society professional standards (Börk and Adelizi 2010). Overall, compliance with the NPDES requirements and the low concentrations of common treatment chemicals found in existing hatchery discharges will ensure that the impact to water quality from return flows containing aquaculture chemicals and drugs is less than significant.

Table 12-4: Common Treatment Chemicals Potentially Used at SCARF Compared to CDFW Hatchery Discharge Concentrations

Chemical	Treatment Dose[1]	Guidance Concentrations		Hatchery Discharge Concentrations
		Aquatic Toxicity	Drinking Water	
Acetic Acid	335-2,000 mg/L	-	97 µg/L[2]	-
Chloramine-T	10 mg/L	86.3 mg/L[3] 187 mg/L[3]	-	-
Copper sulfate	240 µg/L Cu	7.9 µg/L[4]	1,000 µg/L[5] 1,300 µg/L[6]	1-122 µg/L Cu (36 samples)[a]
Formalin (37% formaldehyde solution)	25-2,000 mg/L	1.3 mg/L[7]	0.1 mg/L[8] 1.4 mg/L[9]	<0.005 mg/L (1 sample)[a] ND (3 samples)[a] 1.4/0.55 (1 sample)[a]
Hydrogen peroxide	100 mg/L	1.3 mg/L[10]	-	0.3-37 mg/L (5 samples)[a] 2.6-3.6 mg/L (2 samples)[a] 0.2-0.8 mg/L (5 samples)[a] 0.0 mg/L (1 sample)[a] 3 mg/L (2 samples)[a]
MS-222/tricane methane sulfonate	50-250 mg/L	70 mg/L[10]	-	0.01 – 0.29 mg/L (3 samples)[a]
Oxytetracycline HCL (Terramycin)	100 mg/L	40.4 mg/L[10]	-	-
Potassium permanganate	2-3.48 mg/L	0.038 mg/L[10] 0.20 mg/L[10] 0.25 mg/L[10]	-	0.1-5.0 mg/L (6 samples)[a] 0.03-0.06 mg/L (25 samples)[a] 0.06-0.36 mg/L (7 samples)[a] 0.004-0.084 mg/L (7 samples)[a]
PVP iodine	100 mg/L	0.86 mg/L[10]	-	0.00 mg/L (8 samples)[a] ND (5 samples)[a] ND (4 samples)[a]

Chemical	Treatment Dose[1]	Guidance Concentrations		Hatchery Discharge Concentrations
		Aquatic Toxicity	Drinking Water	

Notes:
- = No data available
ND = Not Detected

[1] Refer to Table 12-2
[2] Taste and odor thresholds (CVRWQCB 2010)
[3] 86.3 mg/L is No Observed Effect Concentration and 187 mg/L is Lowest Observed Effective Concentration from DFG Pesticide Unit C. *dubia* test (CVRWQCB 2010)
[4] Hardness-dependent chronic California Toxics Rule dissolved copper criteria used for derivation of NPDES permit limitations; based on hardness of 75 mg/L as calcium carbonate
[5] California Department of Public Health secondary drinking water maximum contaminant level.
[6] California Toxics Rule human health criterion for consumption of water and organisms
[7] Maximum daily limit of 1.3 mg/L based on 96-hour No Observed Effect Level from USEPA (CVRWQCB 2010)
[8] California Department of Public Health Drinking Water Action Level
[9] EPA Integrated Risk Information System dose as a drinking water level
[10] 96-hour acute No Observed Effect Level from DFG Pesticide Unit C. *dubia* test (CVRWQCB 2010)
[a] Discharge Monitoring Report data for Hot Creek, Mt. Shasta, Nimbus, American River, Crystal Lake, Mokelumne River, Moccasin Creek, and Iron Gate Hatcheries.

Source: Modified from Table 3-11 (ICF Jones & Stokes 2010)

Impact HYD-OP-11: Effects on Groundwater Quality from SCARF Operations (Significance Criterion A, Project Level, Less than Significant)

The SCARF would use unlined settling ponds to treat aquaculture return flows and a leach field for domestic wastewater. SCARF return flows would be pre-treated using microscreen drum filters prior to discharge to the settling ponds (Figure 2-3). As water flows through the settling ponds, constituents from SCARF operations, including nutrients from uneaten feed, fish biological waste, and aquaculture chemicals and drugs, would settle out and adhere to gravel and sediment lining the bottom of the settling pond. Percolation through the gravelly bottom of the ponds would treat and remove much of the constituents of concern prior to water transported to the shallow aquifer. Water infiltrated through the settling ponds would percolate into the secondary channel, where it would eventually augment the flow of the San Joaquin River. Domestic wastewater would also be treated as it percolates through the leach field. As the settling ponds and leach fields would further remove constituents of concern prior to reaching the groundwater tables, this impact is less than significant.

Fish Reintroduction

Impact HYD-REINTRO-1: Impacts of Turbidity from Broodstock Collection (Significance Criterion A, Project/Program Level, Less than Significant)

Potential source populations of broodstock include the FRFH and naturally spawning spring-run Chinook populations within the Feather River and on Butte, Deer and Mill creeks, and an opportunistic collection of other spring-run Chinook from the Stanislaus, Mokelumne, and Yuba Rivers, and Battle and Clear creeks.

Salmon eggs may be collected from rivers and creeks through either redd pumping or redd extraction, depending on site-specific conditions. Redd pumping consists of collecting eggs from redds using small portable backpack mounted water pump which injects water and air into the gravel and brings eggs to the surface, which are then collected. Redd excavation consists of carefully hand-digging into the tail spill of identified spring Chinook redds to obtain live fertilized eggs. Redd harvesting through either method has the potential to disturb and suspend sediment in the water column, creating localized turbidity, which could then propagate downstream.

Juvenile spring-run Chinook would be collected through stream seining, fyke nets, electrofishing and/or use of rotary screw traps. Juvenile collection using these methods has the potential to disturb and suspend sediment in the water column, creating localized turbidity, which could then propagate downstream.

The SCARF's HGMP specifies methods for extraction of eggs through redd pumping and redd excavation. Redd pumping would begin at the most downstream point of the tail spill and progress upstream to reduce the impact on the hydraulics of the redd. Redd excavation would be done by hand in areas of shallow water and gentle velocities. Once eggs are obtained from the redd, gravel would be replaced into the area until the pre-disturbance substrate contour was re-created (Börk and Adelizi 2010). Little turbidity would be generated by these collection activities, and it would quickly dissipate downstream. The use of the HGMP BMPs in redd extraction would ensure that the impact to water quality is less than significant.

The impact analysis and significance conclusion above is considered project-level for broodstock collection from FRFH and programmatic for all other broodstock collection. For further discussion of the approach to the project and programmatic analysis in this document, please see Chapter 3, *Introduction to the Environmental Analysis*.

Impact HYD-REINTRO-2: Water Quality Effects of Chinook Salmon Releases into the San Joaquin River (Significance Criterion A, Project Level, Less than Significant)

The primary modes of juvenile salmon release from the SCARF are a volitional release channel for direct release of salmon into the San Joaquin River and tanker trucks to nearby locations along the San Joaquin River as identified in Table 2-4. The water quality effects of releases of hatchery flows through the volitional release channel have been previously addressed in various impact discussions under the heading SCARF Operations, above. Release of salmonids into San Joaquin River can cause changes in nutrient levels, nutrient cycling dynamics, and aquatic ecology

Prior to release of salmon through tanker trucks, feed is withheld for 1 or 2 days in advance of transport to reduce fecal production and ammonia formation in transport water. Chinook salmon that are to be transported would be loaded into 150-gallon (gal), 450-gal or 500-gal transport tanks. The transport tanks would be filled with water at ambient river temperature, and treated with 0.6-1% NaCl (500-1,000 mg/L TDS) to minimize stress. Transport water would contain relatively low concentrations of TSS, turbidity, and nutrients compared to hatchery discharges which were already determined to be less than significant. Therapeutics will be withheld from fish according to the FDA guidelines to minimize presence of drugs during transportation and release to the wild. While TDS may be higher than receiving waters, the potential short-term water quality effects of releases are considered to be minimal based on the relative infrequency of the fish releases and the relatively small quantities of water involved in the transport operations compared with the volume and available dilution provided in the receiving waters. Discharge of transport water would not be expected to measurably increase constituent concentrations in receiving waters beyond initial mixing. Concentrations would rapidly decrease as a result of dispersion and dilution from the release location. In addition when adults return from the ocean, spawn, and die, their decaying carcasses release nutrients from fish tissues and bones. This return of nutrients is seen as having a beneficial effect to provide nutrients for the food chain. Overall, the addition of nutrients or other water quality constituents to the San Joaquin River from salmon reintroduction are unlikely to have substantial adverse effects on beneficial uses. This impact is considered less than significant.

Fisheries Management

Impact HYD-MANAGEMENT-1: Effects on Water Quality & Hydrology from Barrier Construction (Significance Criteria A and C, Program Level, Less than Significant with Mitigation)

Construction of the fish segregation weirs would take place during summertime low-flow periods to minimize water quality and biological impacts. Construction could require stream dewatering. Construction could include installation of a permanent concrete sill to stabilize erosion and provide a solid barrier foundation with suitable anchoring points. During construction, erosion could occur along the channel bed or slopes, which would cause turbidity and water quality impacts. This impact is considered potentially significant.

The Proposed Project has developed construction-related mitigation measures that would be used during instream construction. With the implementation of **Mitigation Measures GEO-CONSTRUCT-1a and GEO-CONSTRUCT-1c** listed in Chapter 9, *Geology, Soils and Seismicity,* slope protection and stabilization techniques and channel protection and stabilization techniques would be used. These include, but are not limited to, the use of silt fences, re-vegetation of slopes, reducing slope steepness, and redirecting surface drainage from the tops of slopes. With the implementation of these mitigation measures, this impact would be less than significant.

Impact HYD-MANAGEMENT-2: Effects on Water Quality & Hydrology from Barrier Operation and Trap and Haul Efforts (Significance Criterion A and C, Project/Program Level, Less than Significant)

Following construction, the segregation weirs would be used to redirect spring-run and fall-run Chinook salmon to prevent hybridization between the populations. During periods when the barriers are in use, material would be placed on the foundation to block fish passage. In addition, fyke nets or other similar fish traps might be temporarily utilized upstream of existing barriers, such as the HFB and Mendota Dam, in order to assist salmon with outmigration. Similarly, streamside rearing equipment would be placed at various locations in the river. Neither the barriers, traps or other instream equipment would impound or redirect flows, and would therefore not impact the flows of the San Joaquin at their location. The barriers would be designed to minimize downstream scour and erosion. The barriers and traps may temporarily capture trash, such as floating plastic or cardboard, and other detritus such as leaves or tree branches. Trash and detritus would be regularly removed to ensure proper operation of the barriers. As a result, this impact is considered to be less than significant.

The impact analysis and significance conclusion above is considered project-level for trap and haul activities and operation of the existing HFB, and programmatic for any new or reconstructed fish segregation weirs or barriers. For further discussion of the approach to the project and programmatic analysis in this document, please see Chapter 3, *Introduction to the Environmental Analysis*.

Fisheries Research and Monitoring

Impact HYD-MONITORING-1: Impacts on Turbidity from Installation of Fish Monitoring Equipment and Fish Monitoring Activities (Significance Criterion A, Project Level, Less than Significant with Mitigation)

Instream monitoring techniques, including screw traps, fry traps, and snorkel, redd, and carcass surveys, would be used in order to assess the effectiveness of the Proposed Project. Traps would need to be anchored either to the streambed or banks, and may disturb the stream bottom during installation activities, which could release sediment and cause turbidity. Snorkel, redd, and carcass surveys may cause similar disturbances that could increase turbidity.

However, as described in Chapter 6, *Biological Resources—Fisheries*, Impact FISH-MONITORING-2, **Mitigation Measures FISH-MONITORING-2b and -2c,** passive sampling and observational techniques may be used in place of active sampling techniques to reduce physical disturbance to the habitat. The reduction in the disturbance to the streambed and banks would reduce the potential for increased turbidity. Therefore, this impact is less than significant with mitigation.

Impact HYD-MONITORING-2: Water Quality Effects of Fish Research and Monitoring Activities (Significance Criterion A, Project Level, Less than Significant)

Fish research and monitoring activities could have potential for release of water quality constituents to streams. Impacts would be similar to those described above under Impact HYD-REINTRO-2, and are considered less than significant.

Recreation Management

Impact HYD-RECREATION-1: Effects on Water Quality & Hydrology from Construction of Improvements at Recreational Angling Sites (Significance Criteria A and C, Program Level, Less than Significant with Mitigation)

As part of the Proposed Project, CDFW may enhance recreational angling opportunities in off-channel ponds adjacent to the San Joaquin River. These enhancements may include ground-disturbing activities such as the removal of vegetation, grading, excavation or placement of fill. These activities would expose soils and increase the susceptibility to erosion, which may impact water quality.

The construction activities for recreational improvement are subject to the construction-related stormwater permits of the NPDES programs. A SWPPP would be required if construction activities would disturb one or more acres at a single site, or collectively would disturb one or more acres. The SWPPP would identify BMPs to prevent or minimize the introduction of contaminants into surface waters from construction activities. BMPs for the Proposed Project could include, but are not limited to, stabilization for soil stockpiles, establishment of perimeter silt fences, stabilized construction entrances, and storm drain inlet protection. The SWPPP will include site-specific structural and operational BMPs to ensure water quality standards and waste discharge requirements are met. These measures are described further in Chapter 9, *Geology, Soils and Seismicity*, in the **Mitigation Measures GEO-CONSTRUCT-1a and GEO-CONSTRUCT-1c**. These mitigation measures would still be applicable even if the acreage threshold requiring preparation of a SWPPP is exceeded. With preparation of a SWPPP, if required, and the incorporation of these mitigation measures, this impact is less than significant.

Impact HYD-RECREATION-2: Effects on Water Quality from Increased Foot Traffic of Anglers and Other Recreational Users (Significance Criterion A, Program Level, Less than Significant)

Providing access to new angling areas along the San Joaquin River may result in impacts to water quality. Anglers and others recreational users walking through these areas may compact the soil and potentially cause soil erosion, which would adversely affect water quality. However, anglers and other recreational users would likely not cause substantial soil loss that would impact water quality. Therefore, this impact is less than significant.

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Chapter 13
LAND USE AND PLANNING

13.1 Overview

This chapter presents the existing setting and potential impacts of the Proposed Project related to land use and planning. The chapter includes a review of existing conditions based on available literature; a summary of local, state, and federal policies and regulations related to land use; and an analysis of direct and indirect environmental impacts of the Proposed Project.

13.2 Regulatory Setting

The following section discusses the policies and regulations relevant to the Proposed Project. No specific federal land-use regulations apply to the land use resources associated with the Proposed Project.

13.2.1 State Laws, Regulations, and Policies

California State Lands Commission

The California State Lands Commission (CSLC) has jurisdiction and management authority over all ungranted submerged lands owned by the state; over the beds of navigable rivers, streams, lakes, bays, estuaries, inlets, and straits; as well as over submerged lands for which grants have been or may be made (Pub. Resources Code § 6301). A lease from CSLC is required for any portion of a project extending onto lands under CSLC's exclusive jurisdiction. Use of state lands and lands underlying the state's easement are limited to waterborne commerce, navigation, fisheries, open space, recreation, or other recognized Public Trust purposes. A lease from CSLC is required for any portion of a project extending onto lands which are under its exclusive jurisdiction.

The lands along the San Joaquin River between the ordinary high water marks are subject to CSLC jurisdiction (CSLC 2010). The landward boundaries of the state's sovereign interests are often based on the ordinary high water marks of these waterways as they existed before human-made influences, such as channelization, dams, and diversions. Such boundaries may not be readily apparent from present-day site inspections.

<u>Public Trust Doctrine</u>

In granting leases, CSLC considers and invokes the Public Trust Doctrine. The Public Trust Doctrine espouses the notion that title to lands under navigable waters up to the high water mark is held by the state in trust for the people (CSLC no date). The Submerged

Lands Act grants states sovereignty over their tide and submerged lands, and the Supreme Court established the states' duty to protect (in perpetuity) the public's interest in these areas. The California Supreme Court has interpreted the range of public interest values in these waterways to include general recreation activities, such as swimming and boating, and preservation of lands in their natural state as open space, as wildlife habitat, and for scientific study.[1,2]

13.2.2 Local Laws, Regulations, and Policies

General Plans are long-range comprehensive plans developed for cities and counties, which govern growth and development. The project area includes locations where physical actions that are part of the Proposed Project would take place, and is located in Fresno, Madera, and Merced Counties. This analysis focuses on those locations directly affected by the Proposed Project. The following section reviews key land-use policies for the counties listed above, as well as local policies such as that for the Community of Friant, which are relevant to the Proposed Project. Policies or regulations specifically associated with hydrology, biological resources, and other resources are analyzed in the corresponding chapters of this EIR.

Fresno County General Plan

The Fresno County 2000 General Plan (County of Fresno 2013) provides goals and policies to guide development while protecting prime agricultural lands, open space, recreational opportunities, and environmental quality. It is the primary planning document providing long-term guidance for unincorporated areas of Fresno County, including the Community of Friant. The Fresno County General Plan consists of a countywide general policy document and regional, community, and specific plans. According to the designations identified in the Fresno County General Plan, the SCARF site is within the San Joaquin River Corridor Overlay. Policy LU-C.2 of this General Plan states that allowed uses in the overlay include agricultural activities with incidental homesites, sand and gravel extraction, various recreational activities, and wildlife habitat and open areas. The overlay designation does not restrict uses set forth in the Friant Community Plan (County of Fresno 2011a).

The following policies are applicable to the Proposed Project within Fresno County.

Agriculture and Land Use Element

- *Policy LU-A.19:* The County shall adopt and support policies and programs that seek to protect and enhance surface water and groundwater resources critical to agriculture.

[1] *Marks v. Whitney. 1971. 6 Cal.3d 251*; *National Audubon Society v. Superior Court. 1983. 33 Cal.3d 419*; *People v. California Fish Co. 1913. 166 Cal. 576.*

[2] Frank, R. M. 1983. Forever Free: Navigability, Inland Waterways, and the Expanding Public Interest. *University of California, Davis Law Review:*16:579. California case law also establishes a link between navigation and recreation, and verges on treating the two as interchangeable public interests.

- *Policy LU-C-2:* Within the San Joaquin River Corridor Overlay, the County shall accommodate agricultural activities with incidental homesites, recreational uses, sand and gravel extraction, and wildlife habitat and open space areas.
- *Policy LU-C-6:* The County, in approving recreational facilities in the San Joaquin River Parkway adjacent to residential uses, shall require a buffer of at least 150 feet and screening vegetation as necessary to address river environment and land use compatibility issues.
- *Policy LU-C-7:* Fresno County shall take into consideration the presence of the regulatory floodway or other designated floodway, the FEMA-designated 100-year floodplain, estimated 250-year floodplain, the Standard Project Flood, and the FMFCD [Fresno Metropolitan Flood Control District] Riverine Floodplain Policy in determining the location of future development within the San Joaquin River Parkway area. Any development sited in a designated 100-year floodplain shall comply with regulatory requirements at a minimum and with the FMFCD Riverine Floodplain Policy criteria, or requirements of other agencies having jurisdiction, where applicable.
- *Policy LU-C-8:* The County shall administer its land use regulations in the San Joaquin River Corridor Overlay to preserve and protect identified wildlife corridors along the San Joaquin River. The County shall administer these regulations in consultation with the San Joaquin River Conservancy.
- *Policy LU-C-9:* The County shall administer its land use regulations in the San Joaquin River Corridor Overlay to protect natural reserve areas in the San Joaquin River Parkway, principally in those areas adjoining the wildlife corridor along the river where the largest acreages of highest quality habitat exist. The County shall administer these regulations in consultation with the San Joaquin River Conservancy.
- *Policy LU-C-10:* The County shall continue to work with the San Joaquin River Parkway and Conservation Trust, San Joaquin River Conservancy, City of Fresno, and other interested agencies and organizations to implement the San Joaquin River Parkway Master Plan.

Open Space and Conservation Element

- *Policy OS-A.19:* The County shall require the protection of floodplain lands and, where appropriate, acquire public easements for purposes of flood protection, public safety, wildlife preservation, groundwater recharge, access, and recreation.
- *Policy OS-A.20:* The County shall support the policies of the San Joaquin River Parkway Master Plan to protect the San Joaquin River as an aquatic habitat, recreational amenity, aesthetic resource, and water source.
- *Policy OS-C.1:* The County shall not permit incompatible land uses within the impact area of existing or potential surface mining areas.
- *Policy OS-C.2:* The County shall not permit land uses incompatible with mineral resource recovery within areas designated as Mineral Resource Zone 2 (MRZ-2).

- *Policy OS-C.8:* The County shall, where feasible along the San Joaquin River, site recreational trails, bikeways, and other recreation areas at least three hundred (300) feet from the edge of active aggregate mining operations and separate them by physical barriers. Recreational trail/bikeway crossings of active haul routes should be avoided whenever possible; if crossings of haul routes are necessary, separate where feasible.
- *Policy OS-C.9:* The County shall require that any proposed changes in land use within areas designated MRZ-2 along the San Joaquin and Kings Rivers comply with the provisions of the State Surface Mining and Reclamation Act (SMARA).
- *Policy OS-C.10:* The County shall not permit land uses that threaten the future availability of mineral resource or preclude future extraction of those resources.
- *Policy OS-D.1:* The County shall support the "no-net-loss" wetlands policies of the US Army Corps of Engineers, the US Fish and Wildlife Service, and the California Department of Fish and Game. Coordination with these agencies at all levels of project review shall continue to ensure that appropriate mitigation measures and the concerns of these agencies are adequately addressed.
- *Policy OS-D.2:* The County shall require new development to fully mitigate wetland loss for function and value in regulated wetlands to achieve "no-net-loss" through any combination of avoidance, minimization, or compensation. The County shall support mitigation banking programs that provide the opportunity to mitigate impacts to rare, threatened, and endangered species and/or the habitat which supports these species in wetland and riparian areas.
- *Policy OS-D.3:* The County shall require development to be designed in such a manner that pollutants and siltation do not significantly degrade the area, value, or function of wetlands. The County shall require new developments to implement the use of BMPs to aid in this effort.
- *Policy OS-D.4:* The County shall require riparian protection zones around natural watercourses and shall recognize that these areas provide highly valuable wildlife habitat. Riparian protection zones shall include the bed and bank of both low- and high-flow channels and associated riparian vegetation, the band of riparian vegetation outside the high-flow channel, and buffers of 100 feet in width as measured from the top of the bank of unvegetated channels and 50 feet in width as measured from the outer edge of the dripline of riparian vegetation.
- *Policy OS-D.6:* The County shall require new private or public developments to preserve and enhance existing native riparian habitat unless public safety concerns require removal of habitat for flood control or other purposes. In cases where new private or public development results in modification or destruction of riparian habitat for purposes of flood control, the developers shall be responsible for creating new riparian habitats within or near the project area. Adjacency to the project area shall be defined as being within the same watershed sub-basin as the project site. Compensation shall be at a ratio of three (3) acres of new habitat for every one (1) acre destroyed.

- *Policy OS-D.7:* The County shall support the management of wetland and riparian plant communities for passive recreation, groundwater recharge, nutrient storage, and wildlife habitats.
- *Policy OS-D.8:* The County should consider the acquisition of wetland, meadows, and riparian habitat areas for parks limited to passive recreational activities as a method of wildlife conservation.
- *Policy OS-E.1:* The County shall support efforts to avoid the "net" loss of important wildlife habitat where practicable. In cases where habitat loss cannot be avoided, the County shall impose adequate mitigation for the loss of wildlife habitat that is critical to supporting special-status species and/or other valuable or unique wildlife resources. Mitigation shall be at sufficient ratios to replace the function, and value of the habitat that was removed or degraded. Mitigation may be achieved through any combination of creation, restoration, conservation easements, and/or mitigation banking. Conservation easements should include provisions for maintenance and management in perpetuity. The County shall recommend coordination with the US Fish and Wildlife Service and the California Department of Fish and Game to ensure that appropriate mitigation measures and the concerns of these agencies are adequately addressed. Important habitat and habitat components include nesting, breeding, and foraging areas, important spawning grounds, migratory routes, migratory stopover areas, oak woodlands, vernal pools, wildlife movement corridors, and other unique wildlife habitats (e.g., alkali scrub) critical to protecting and sustaining wildlife populations.
- *Policy OS-E.2:* The County shall require adequate buffer zones between construction activities and significant wildlife resources, including both onsite habitats that are purposely avoided and significant habitats that are adjacent to the project site, in order to avoid the degradation and disruption of critical life cycle activities such as breeding and feeding. The width of the buffer zone should vary depending on the location, species, etc. A final determination shall be made based on informal consultation with the US Fish and Wildlife Service and/or the California Department of Fish and Wildlife.
- *Policy OS-E.12:* The County shall ensure the protection of fish and wildlife habitats from environmentally-degrading effluents originating from mining and construction activities that are adjacent to aquatic habitats.
- *Policy OS-E.13:* The County should protect to the maximum extent practicable wetlands, riparian habitat, and meadows since they are recognized as essential habitats for birds and wildlife.
- *Policy OS-E.14:* The County shall require a minimum 200-foot-wide wildlife corridor along particular stretches of the San Joaquin River and Kings River, whenever possible. The exact locations for the corridors should be determined based on the results of biological evaluations of these watercourses. Exceptions may be necessary where the minimum width is infeasible due to topography or other physical constraints. In these instances, an offsetting expansion on the opposite side of the river should be considered.

- *Policy OS-E.16:* The County should preserve in a natural state to the maximum possible extent areas that have unusually high value for fish and wildlife propagation.
- *Policy OS-E.17:* The County should preserve, to the maximum possible extent, areas defined as habitats for rare or endangered animal and plant species in a natural state consistent with State and Federal endangered species laws.
- *Policy OS-E.18:* The County should preserve areas identified as habitats for rare or endangered plant and animal species primarily through the use of open space easements and appropriate zoning that restrict development in these sensitive areas.
- *Policy OS-H.1:* The County shall promote the continued and expanded use of national forests, national parks, and other recreational areas to meet the recreational needs of County residents.
- *Policy OS-H.11:* The County shall support the policies of the San Joaquin River Parkway Master Plan to protect the San Joaquin River as an aquatic habitat, recreational amenity, aesthetic resource, and water source.
- *Policy OS-H.12:* The County shall in conjunction with the San Joaquin River Conservancy rehabilitate and improve existing recreation areas and facilities along the San Joaquin River at the earliest possible time, particularly Lost Lake and Skaggs Bridge Regional Parks.
- *Policy OS-H.13:* The County shall require that structures and amenities associated with the San Joaquin River Parkway be designed and sited to ensure that such features do not obstruct flood flows, do not create a public safety hazard, or result in a substantial increase in off-site water surface elevations, and that they conform to the requirements of other agencies having jurisdiction. For permanent structures, such as bridge overcrossings, the minimum level of flood design protection shall be the greater of the Standard Project Flood (which is roughly equivalent to a 250-year event) or the riverine requirements of other agencies having jurisdiction to ensure flood flows are not dammed and to prevent flooding on surrounding properties.

Friant Community Plan

The Friant Community Plan was adopted in 2011 by the County of Fresno's Board of Supervisors as an element of the Unincorporated Community Plans of the General Plan. Fresno County adopted the original Friant Community Plan in 1964 and has since updated the plan four times, most recently in 2010. The plan establishes goals and policies to guide land use and development decisions of the unincorporated Community of Friant. Sized at approximately 1,804 acres, the Friant Community Plan Area is bounded by the San Joaquin River and Madera County to the west, Friant Dam and Millerton Lake to the north, and the Friant-Kern Canal to the east.

The Friant Community Plan must remain consistent with the Fresno County General Plan and any inconsistencies created by a proposed Community Plan Update must be addressed by way of a General Plan amendment. The Friant Community Plan describes the SCARF site as 49 acres zoned for use as a public facility, specifically a fish hatchery. This area represents 2.7% of the total Friant Community Plan acreage (County of Fresno 2011a). Following are goals and policies of the Friant Community Plan applicable to the Proposed Project.

Land Use Element

- *Goal 2:* Enhance the Community of Friant's small-town character and image.
- *Policy 2.6:* When approving new development, encourage that new uses be compatible with the existing adjacent uses or support the provision of adequate buffers (e.g., landscape buffers, fences, walls, etc.) between the uses.
- *Policy 5.2:* Encourage the development of a trail system that provides linkages between Lost Lake Recreation Area and commercial and residential areas within the Friant Community Plan Area.
- *Goal 8:* Protect and preserve open spaces.
- *Policy 8.2:* Encourage preservation of sensitive open space areas and natural resources, including vernal pools and other types of wetlands.

Friant Redevelopment Plan

The Fresno County 2000 General Plan and the Friant Community Plan were written to be consistent with the *Friant Redevelopment Plan* of 1992 (County of Fresno 1992). The *Friant Redevelopment Plan* was created to address conditions of blight by revitalizing the community of Friant pursuant to Redevelopment Law. The goal of the Redevelopment Plan is to encourage the expansion and development of the commercial area of Friant by providing needed public improvements; encouraging rehabilitation and repair of deteriorated structures; facilitating land assembly and development that will result in housing opportunities, employment opportunities, and an expanded sales and property tax base; and promoting development in accordance with the Redevelopment Plan.

Lost Lake Recreation Area Master Plan

The *Lost Lake Park Master Plan* (Lost Lake Master Plan) (County of Fresno 2011b) is based on a vision for Lost Lake Recreation Area (also called Lost Lake Park) to be the hallmark park of the San Joaquin River Parkway where people can:

- Safely interact with the river's waters and environment;
- Begin their river experience along the Parkway's trails and the river itself;
- Learn about the river, its floodplain, its habitats, and its wildlife; and
- Recreate together in a shaded, green landscape where water is always nearby.

The Lost Lake Master Plan is a long-term plan that covers a 20- or 30-year horizon. It includes approximately 374 acres along approximately 1.8 miles of the San Joaquin River at the southern edge of Community of Friant. The park's land is owned by multiple agencies:

the County of Fresno, CDFW, California Wildlife Conservation Board, SJRC, and CSLC. The goals of the Master Plan are to reclaim a more natural river floodplain, enhance riparian, wetland, and upland habitats, and protect sensitive cultural resources. It strives to improve existing recreational and educational facilities, and create new ones. It includes trails and bikeways and habitat linkages through the park for wildlife movement. It is consistent with the Fresno County General Plan and the *San Joaquin River Parkway Master Plan*.

Specific components of the Lost Lake Master Plan include planting approximately 10,000 trees, increasing parking areas, improving canoe and kayak access, adding fish cleaning stations, increasing the number of camping sites, increasing the accessibility of trails, and connecting its trail system with the multi-use trail to the town of Friant. Additionally, the vision for Lost Lake Recreation Area includes enhancing the existing seasonal ponds by diverting water from the river into the ponds so they will provide year-round habitat for aquatic species.

Lost Lake Recreation Area is adjacent to the SCARF site. The following goal and guidelines from the Lost Lake Master Plan are relevant to the Proposed Project:

Land Use Compatibility

- *Goal:* To respect privacy and security of adjacent properties.
- *Guideline 1:* Provide a buffer with vegetative screening along common property lines.
- *Guideline 2:* Provide security fencing as necessary along common property lines.
- *Guideline 3:* Sign all park boundaries.

Madera County General Plan

The *Madera County General Plan Policy Document* (County of Madera 1995) was adopted in October 1995. It contains the goals, policies, standards, and implementation programs of the Madera County General Plan. In the project area, Madera County's land use jurisdiction lies north and east of the SCARF site. The Madera County General Plan shares many of the same components with the Fresno County General Plan. The plan prioritizes the maintenance and protection of land designated for agricultural use and directs urban uses to land designated as new growth areas, existing communities, and existing cities. It discourages the conversion of prime agricultural land to nonagricultural land uses unless an immediate and clear need can be demonstrated. The Madera County General Plan includes goals and policies for the protection and enhancement of Madera County's streams, creeks, and groundwater. Policies have been designed to curtail sedimentation and erosion of creeks and minimize damage to riparian habitat and wetland communities.

Merced County General Plan

Merced County is in the process of updating its General Plan (Merced County 2011). The Merced County Year 2000 General Plan was adopted in 1990 (Merced County 1990). Merced County is located north of Madera County in the project area. Similarly to the Fresno and Madera County General Plans, the Merced County General Plan contains goals and policies for the preservation of agricultural land and conservation of open space.

San Joaquin River Parkway Master Plan

The San Joaquin River Parkway Task Force (Task Force) was founded pursuant to AB 3121 (Chapter 1025 Statute of 1990) with the general goal of developing a linear park along the San Joaquin River from Friant Dam to Highway 99. Task Force members included representatives of state and local governmental agencies and various organizations with interest in and of the San Joaquin River and effects of the parkway. The legislature directed the planning process to attain a high degree of consensus among the members of the Task Force. The final draft of the San Joaquin River Parkway Task Force Plan (Task Force Plan) was issued in 1992. Through additional state legislation, the San Joaquin River Conservancy (Conservancy) was created to serve as a managing entity for and to promote and establish the proposed Parkway as envisioned in the 1992 Task Force Plan.

The *San Joaquin Parkway Master Plan* (Parkway Master Plan) was adopted by the Conservancy in 2000 to ensure the preservation, protection, and restoration of the river corridor and to provide public use of the river without adverse effects on these resources along 22 miles of the San Joaquin River, from Friant Dam to SR 99. The plan area varies in width from a narrow wildlife corridor where the river bluff is steep, to extensive areas of several hundred acres that may be suitable for a nature reserve or low-impact recreational use. The Parkway Master Plan is based on goals to preserve and restore the natural resource values of the river corridor and to provide public use of the river without adverse impacts on these resources (SJRC 2000). The fundamental goals of the Parkway Master Plan provide for a harmonious combination of low-impact recreational uses, education, and natural resource protection. The six fundamental goals of the Parkway Master Plan are:

- Preserve and restore a riparian corridor of regional significance along the San Joaquin River from Friant Dam to Highway 99 (Reach 1A).
- Protect wildlife species that depend on or prefer the river environment for at least part of their existence.
- Provide for conservation, education, and recreation, particularly a continuous trail, in a cooperative manner with affected landowners.
- Protect irreplaceable natural and cultural resources in a way that will also meet people's recreational and educational needs.
- Protect existing undeveloped areas of the river bottom, which should remain non-urbanized and be retained in open space or agriculture if feasible.
- Provide land use and management policies for the San Joaquin River and areas of the river bottom included in the San Joaquin River Parkway that will enhance the attractiveness of the Fresno-Madera metropolitan area and enhance the quality of life of its residents.

The Parkway Master Plan contains a fisheries component that encourages the use of existing ponds, as well as new ponds resulting from sand and gravel mining operations, for recreational use, including fishing. The fisheries component specifically supports anadromous fish restoration. Other specific goals, objectives, and policies are contained in the Natural Resources Element, Recreational Element, Mineral Resources Element, and Plan Implementation Element. The following are goals and policies applicable to the Proposed Project.

Natural Resources Objectives

- *NR01:* Protect the San Joaquin River as aquatic habitat and a water source. Enhance and protect fisheries in the river and in lakes in the Parkway.
- *NR05:* Revegetate with native species to close gaps in the wildlife corridor or enhance effectiveness of the buffer zone.

Natural Resources General Policies

- *NP1:* Provide a minimum width for the wildlife corridor of 200 feet on both sides of the river. Acquire a wider corridor whenever possible to provide greater habitat diversity and protect additional areas of native vegetation. Provide a buffer wider than 150 feet whenever more intensive uses on adjacent lands exist or are planned. Exceptions may be necessary where the minimum-width corridor or buffer or both is infeasible due to topography or other physical constraints. In those instances, provide an offsetting expansion on the opposite side of the river. Where steep bluffs drop directly into, or close to, the river, acquire the bluff face for incorporation in the corridor.
- *NP3:* Consistent with CEQA requirements, mitigate any unavoidable removal of native vegetation through the acquisition of additional habitat areas in the Parkway, restoration of vegetation in degraded areas in the Parkway, or a combination of both.
- *NP6:* Obtain updated floodplain maps, which reflect changed hydraulic characteristics of the river, to guide the siting of Parkway facilities and private development. In the interim, do not construct any Parkway facilities that would sustain anything more than slight damage from inundation in any area where is a potential flood risk. Engineer service roads, trails, and bridges to avoid/minimize significant flood damage.
- *NP7:* Do not construct levees in the Parkway.
- *NP8:* Implement site-specific protection through development entitlement of development permit conditions, or both, as follows:
    - *NP8.1:* Provide a buffer zone of a width appropriate to the intensity of the planned land use.
    - *NP8.2:* Preserve and incorporate natural features (e.g., wetlands, grasslands, woodlands, and other native vegetation) and supporting artificial features (e.g., lakes on reclaimed mined land) into the development’s site design such that those features can serve as a buffer for, and enhance the ecological

values of, the river, the wildlife corridor, a natural reserve, or the multipurpose trail.

- o *NP8.3:* Incorporate the site's natural topography with respect to the design and siting of all physical improvements in order to minimize grading.

Natural Resources Design Policies

- *NRD1.1:* New facilities shall be sited in restored or previously developed areas. Visitor overlooks and viewing areas shall be located so as to avoid intrusion into sensitive habitat areas to avoid habitat fragmentation.
- *NRD1*2: Whenever construction of project features is proposed within 100 feet of the riparian corridor, construction supervisors shall be made aware of the biological value of elderberry shrubs, and shall implement mitigation measures to avoid adversely affecting this species.

Natural Resources – Special Policies Relating to Flood Management

- *FP5:* Parkway lands will be managed to control and reduce erosion in the floodway.

The Natural Resources Education and Interpretive Programs of the Parkway Master Plan identifies the SJFH as a suitable site for an educational and interpretive program, particularly regarding fisheries management, hatchery operations, resource conservation, fishing regulation, and human interaction with the environment.

San Joaquin Hatchery Public Access and Trail Project

CDFW and SJRC have planned a paved universal accessible trail that begins at the corner of Friant Road and Flemming Avenue, traverses through the SCARF site, bridges the SCARF's effluent outfall, and then connects to the San Joaquin Parkway Trail at Lost Lake Park (CDFG 2011). The trail will be 1 mile long and 12 feet wide. The purpose of the trail is public access, education, and outreach. The future trail includes the placement of concrete benches to form an outdoor classroom for up to 200 students for educational demonstrations. The SJFH restrooms have been upgraded to accommodate additional public usage.

13.3 Environmental Setting

13.3.1 Potentially Affected Area

For the purposes of this chapter, the Potentially Affected Area is limited to the Restoration Area and the SCARF site. Each is described below.

13.3.2 Project Area

The Project Area relevant to land use is limited to the Restoration Area (Figure 2-1). Most of the land in the Restoration Area is privately owned. The primary land uses are open space and agriculture. Residential, commercial, and industrial uses account for a small percentage of land use along the San Joaquin River. The San Joaquin River is a historic navigable river and the bed of the river is subject to the jurisdiction of CSLC.

The upstream extent of the Restoration Area is Friant Dam in Reach 1 near the town of Friant. Reach 1A extends from Friant Dam to the Highway 41 Bridge. Reach 1B includes the river downstream of the Highway 41 Bridge to Skaggs Bridge, approximately 9 miles downstream of the SR 99 crossing of the San Joaquin River. The surrounding land uses are primarily agriculture (vineyards, orchards, and annual crops) and recreation/open space. Riverside Golf Course, a public facility, and Camp Pashayan are located in this area, as is the Herndon San Joaquin Power Company Yard. Camp Pashayan is a 31-acre property managed jointly by the CDFW and the SJRPCT as part of the San Joaquin River Ecological Reserve. Camp Pashayan has several picnic areas and a boat launch. A railroad bridge crosses the river and several roads run parallel to the river. Plans for the future California High-Speed Train include passing over the San Joaquin River adjacent to SR 99 on property that is a part of Camp Pashayan (HSR and DOT FRA 2012).

The downstream extent of the Restoration Area occurs at the San Joaquin River's confluence of the Merced River. It is slightly more than 3 miles east of Newman, California—a city in Stanislaus County with a population of about 10,224 (US Census 2012). The majority of land use surrounding the rivers' confluence is open space with a number of federal wildlife refuges, state wildlife management areas, and state parks (see Chapter 15, *Recreation*, for more details). The remaining area is mostly agriculture (annual crops). The San Joaquin River is bound by levees in many parts of this reach. Several bridges (Lander Avenue, SR 140, and Hills Ferry) cross the river and several roads run parallel to the river.

13.3.3 SCARF Site

The SCARF site currently consists of the CDFW's Interim Facility, non-operational aquaculture ponds that are part of the SJFH, operational polishing ponds for the SJFH's effluent, and a worm farm that operates in the effluent ponds. Undeveloped land cover on the SCARF site includes riparian forest on the banks of the San Joaquin River, emergent wetlands formed in non-operational hatchery ponds, and annual grassland.

Land uses adjacent to the SCARF site are a mixture of residential and open space. The residential neighborhoods consist of single-family detached homes. The Waldby Street neighborhood is located directly adjacent to the SCARF site and includes Granite Avenue and Granite Circle, Root Avenue (west of Friant Road), and Waldby Street. With approximately 50 dwelling units, the neighborhood density averages approximately six dwelling units per acre. The Wall Street neighborhood is located northeast of the SJFH along Wall Street, Fleming Avenue, and North Fork Road. Approximately 20 dwelling units exist in this neighborhood of varying residential densities. Several of the properties abut the San Joaquin River. Lost Lake Recreation Area is also directly neighboring the SCARF site. The park encompasses approximately 300 acres for day and overnight use. The park provides opportunities for fishing, hiking, picnicking, bird-watching, boating, camping, softball, and volleyball.

The future San Joaquin Hatchery Public Access and Trail will traverse through the property to connect the SJFH and the SCARF to Lost Lake Recreation Area. The trail will provide access to the SJFH during daytime operating hours and will have nighttime security lighting. Construction of the trail includes habitat restoration (i.e., removal of non-native plants and planting of drought resistant plants), where appropriate.

13.4 Impact Analysis

13.4.1 Methodology

This section describes the methods used to determine the Proposed Project's impacts and lists the thresholds used to conclude whether an impact would be significant. The analysis of land use and planning was generally qualitative, and included consideration of applicable land use policies, plans, and programs. Conflicts with land use policies would occur if the Proposed Project were to alter existing land uses either temporarily or permanently.

Because all construction of the SCARF would be contained within the SCARF site, impacts on land use and planning from construction of the SCARF have been included under SCARF Operations. Since broodstock collection would be located at existing facilities and would not involve construction or changes to operations, the sites for this activity are not described in this section. The fisheries research and monitoring component of the Proposed Project has no potential for impacts related to land use and planning, and so this element is not discussed further.

13.4.2 Criteria for Determining Significance

The Proposed Project would have a significant impact if it would:

A. Physically divide an established community;

B. Create substantial conflicts or incompatibility with existing and planned future land uses within or adjacent to the program area;

C. Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project; or

D. Conflict with any applicable habitat conservation plan, natural community conservation plan, or other land conservation plan.

13.4.3 Environmental Impacts

Table 3-1 in Chapter 3, *Introduction to the Environmental Analysis,* identifies components of the Proposed Project with the potential to result in impacts to land use and planning. Each impact is discussed in further detail in the section below.

SCARF Operations

Impact LU-OP-1: Potential for the SCARF to Divide an Established Community (Significance Criterion A, Project Level, No Impact)

All construction and operation of SCARF would be contained within the SCARF site. Construction and operation activities of the Proposed Project would not disrupt or divide an established community; therefore, there would be no impact.

Impact LU-OP-2: Potential for the SCARF to Conflict with Existing and Planned Land Uses within or adjacent to the SCARF Site or with Applicable Land Use Plans, Policies, and Regulations (Significance Criteria B and C, Project Level, No Impact)

The *Friant Community Plan* categorizes the SCARF site as land zoned for use as a fish hatchery. The SCARF would not encroach on neighboring properties or convert any mines, farmland or forest land. The Proposed Project would be consistent with the existing and future land uses identified adjacent to the site in the Friant Redevelopment Plan, Fresno County General Plan, San Joaquin River Restoration Program, San Joaquin Hatchery Public Access and Trail Project, Parkway Master Plan, and Lost Lake Master Plan. The future San Joaquin Hatchery Public Access and Trail will satisfy the Natural Resources Education and Interpretive Programs element of the Parkway Master Plan on the SCARF site. The Proposed Project would not conflict with existing or planned land uses on or near the SCARF site; therefore, there would be no impact.

Impact LU-OP-3: The SCARF Would Not Conflict with any Habitat Conservation Plans, Natural Community Conservation Plans, or other Local Habitat Conservation Plans (Significance Criterion D, Project Level, No Impact)

No formal Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local habitat conservation plan exists in the project area. There would be no impact.

Fisheries Management

Impact LU-MANAGEMENT-1: Potential for the Fish Segregation Weirs or Trap and Haul Efforts to Conflict with Existing and Planned Land Uses within or adjacent to the Weir, Trap, or Other Sites or with Applicable Land Use Plans, Policies, and Regulations (Significance Criteria B and C, Project/Program Level, Less than Significant with Mitigation)

The HFB may be relocated, removed, or repurposed. The relocation would most likely be downstream toward the confluence. The land uses downstream of the current location are identical to the existing land uses. The Reach 1A Separation Weir may be constructed on the San Joaquin River near Hwy 41. Additional weirs may be constructed near the entrance of the Salt and Mud Sloughs and other various locations. Also, fish traps might be placed in various locations within the Restoration Area in order to facilitate outmigration of Chinook salmon past existing barriers. The surrounding land uses are primarily agriculture and open space/recreation. It is anticipated that the activities associated with these fisheries management activities would not conflict with existing land uses or land use plans, policies or regulations; however, until the exact locations are determined, this is impossible to determine definitively, and it is therefore considered a potentially significant impact.

Because the riverbed in these locations is under CSLC jurisdiction, it would be necessary to obtain a lease from CSLC prior to construction of weirs and possibly the placement of fish traps. Issuance of such a lease would ensure consistency with CSLC's plans, policies, and regulations, and as such there would be no impact related to CSLC consistency.

Implementation of **Mitigation Measure LU-MANAGEMENT-1** would ensure that the impact on land use and planning from the fisheries management activities is less than significant.

The impact analysis and significance conclusion above is considered project-level for trap and haul activities and operation of the existing HFB, and programmatic for any new or reconstructed fish segregation weirs or barriers. For further discussion of the approach to the project and programmatic analysis in this document, please see Chapter 3, *Introduction to the Environmental Analysis*.

> **Mitigation Measure LU-MANAGEMENT-1: Ensure Consistency of Land Use.**
> As part of the design for removal or relocation of the two fish weirs, the California Department of General Services (DGS), CDFW or the contractor shall investigate land uses at and adjacent to potential sites, along with relevant plans, policies and regulations. The weirs, fish traps and other equipment shall not be sited in locations that create land use incompatibilities.

Recreation Management

Impact LU-RECREATION-1: Potential for Enhanced Recreational Ponds to Divide an Established Community between Friant Dam and State Route 99 (Significance Criterion A, Program Level, No Impact)

CDFW is currently assessing potential locations for enhancing recreational angling opportunities in off-channel ponds adjacent to the San Joaquin River between SR 99 and Friant Dam. There are a number of known gravel pit ponds in the area between Friant Dam and SR 99 that do not currently provide public fishing opportunities, such as some ponds within and south of Lost Lake Park and in some agricultural areas. These ponds are in former mining areas, open space, or agricultural land, so they are not located near residential communities. That being the case, there would be no impact to established communities from the enhancement of ponds under the Proposed Project.

Impact LU-RECREATION-2: Potential for Enhanced Recreational Ponds to Conflict with Land Use Plans, Policies, or Regulations or adjacent Existing and Planned Land Uses (Significance Criteria B and C, Program Level, Less than Significant with Mitigation)

Friant is characterized by geologic formations consisting of alluvial sand, silt, and gravel mixtures and bedrock consisting of sandstone or granite. Aggregate products (sand and gravel) are mined south of Lost Lake Recreation Area outside of the boundaries of the Community of Friant. Areas within Lost Lake Recreation Area and the adjacent agricultural land have been mined in the past and are currently depleted of reserves by mining (County of Fresno 2011a).

There is a possibility that CDFW would chose locations for enhancement of recreational fishing in areas that would conflict with existing or planned land uses and/or local land use policies. A few of the potential locations for pond enhancements are in areas zoned for agriculture or mining. CDFW would evaluate consistency with land use plans, policies, and regulations before enhancing off-channel ponds. Although a conflict is unlikely, there remains a possibility that the impact on land use plans and adjacent land uses could be potentially significant.

Mitigation Measure LU-RECREATION-2 would be implemented in the event of a land use conflict, resulting in a less-than-significant impact.

> **Mitigation Measure LU-RECREATION-2: Avoid Locations with Land Use Conflicts.**
> As part of the selection of recreational enhancement sites, CDFW shall investigate land uses at and adjacent to potential sites, along with relevant plans, policies and regulations. CDFW will choose locations for enhancement of recreational fishing that would not conflict with existing or planned land uses and/or local land use policies.

Impact LU-RECREATION-3: Potential for Enhanced Recreational Facilities to Conflict with Habitat Conservation Plans, Natural Community Conservation Plans, or Other Local Habitat Conservation Plans (Significance Criterion D, Program Level, No Impact)

No formal Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local habitat conservation plan exists in the project area. There would be no impact.

Chapter 14
Noise

14.1 Overview

This chapter describes the existing noise environment in the vicinity of the potentially affected area, presents relevant noise and vibration regulations, identifies sensitive noise and vibration receptors that could be affected by the Proposed Project, and evaluates the potential noise and vibration impacts of the Proposed Project. Mitigation measures to avoid or reduce impacts are identified, as appropriate.

14.2 Noise Concepts and Terminology

Noise can be defined as unwanted sound. Sound is characterized by various parameters that include the rate of oscillation of sound waves (frequency), the speed of propagation, and the pressure level or energy content (amplitude). In particular, the sound pressure level is the most common descriptor used to characterize the loudness of an ambient sound level or sound intensity. The decibel (dB) scale is used to quantify sound intensity. Because sound pressure can vary enormously within the range of human hearing, a logarithmic scale is used for convenience in presenting and discussing sound intensity metrics. The human ear is not equally sensitive to all frequencies in the entire audible spectrum, so noise measurements can be weighted to mimic average healthy human hearing sensitivity in a process called "A-weighting," written as "dBA."

Different types of measurements are used to characterize the time-varying nature of sound. Below are brief definitions of these measurements and other terminology used in this chapter.

- **Sound** is a vibratory disturbance created by a vibrating object that, when transmitted by pressure waves through a gaseous or fluid medium such as air, can be detected by a receiving mechanism, such as the human ear or a microphone.
- **Noise** is sound that is loud, unpleasant, unexpected, or otherwise undesirable.
- **Decibel (dB)** is a dimensionless measure of sound on a logarithmic scale, which indicates the squared ratio of sound pressure amplitude to a reference sound pressure amplitude. The reference pressure is 20 micro-Pascals.
- **A-weighted decibel (dBA)** is an overall frequency-weighted sound level in decibels that approximates the frequency response of the human ear.

- **Maximum sound level** (L_{max}) is the maximum sound level measured during the measurement period.
- **Minimum sound level** (L_{min}) is the minimum sound level measured during the measurement period.
- **Equivalent sound level (L_{eq})** is the equivalent steady-state sound level that, in a stated period of time, would contain the same acoustical energy as a time-varying sound level during that same period of time.
- **Percentile-exceeded sound level (L_x)** is the sound level exceeded *x*% of a specific time period. L_{10} is the sound level exceeded 10% of the time.
- **Day-night level (L_{dn})** is the energy average of the A-weighted sound levels occurring during a 24-hour period, with 10 dB added to the A-weighted sound levels during the period from 10:00 p.m. to 7:00 a.m.

In general, human sound perception is such that a change in sound level of 3 dB is just noticeable, a change of 5 dB is clearly noticeable, and a change of 10 dB is perceived as doubling or halving the sound level. Table 14-1 presents examples of noise levels for common noise sources; the levels are measured adjacent to the source.

Vibration Fundamentals

Ground-borne vibration propagates from the source through the ground to adjacent buildings by surface waves. Vibration may be composed of a single pulse, a series of pulses, or a continuous oscillatory motion. The frequency of a vibrating object describes how rapidly it is oscillating, measured in Hertz (Hz). Most environmental vibrations consist of a composite, or “spectrum,” of many frequencies. The normal frequency range of most ground-borne vibrations that can be felt generally starts from a low frequency of less than 1 Hz to a high of about 200 Hz. Vibration information for this analysis has been described in terms of the peak particle velocity (PPV), measured in inches per second, or of the vibration level measured with respect to root-mean-square vibration velocity in decibels (VdB), with a reference quantity of 1 micro-inch per second.

Vibration energy dissipates as it travels through the ground, causing the vibration amplitude to decrease with distance away from the source. High-frequency vibrations reduce much more rapidly than do those characterized by low frequencies, so that in a far-field zone distant from a source, the vibrations with lower frequency amplitudes tend to dominate. Soil properties also affect the propagation of vibration. When ground-borne vibration interacts with a building, a ground-to-foundation coupling loss usually results but the vibration also can be amplified by the structural resonances of the walls and floors. Vibration in buildings is typically perceived as rattling of windows, shaking of loose items, or the motion of building surfaces. In some cases, the vibration of building surfaces also can be radiated as sound and heard as a low-frequency rumbling noise, known as ground-borne noise.

Ground-borne vibration is generally limited to areas within a few hundred feet of certain types of industrial operations and construction/demolition activities, such as pile driving.

Road vehicles rarely create enough ground-borne vibration amplitude to be perceptible to humans unless the receiver is in immediate proximity to the source or the road surface is poorly maintained and has potholes or bumps. Human sensitivity to vibration varies by frequency and by receiver. Generally, people are more sensitive to low-frequency vibration. Human annoyance also is related to the number and duration of events; the more events or the greater the duration, the more annoying it becomes.

Table 14-1. Examples of Common Noise Levels

Common Outdoor Activities	Sound Pressure Level (dBA)
Jet flyover at 1,000 feet	110
Gas lawnmower at 3 feet	100
Diesel truck at 50 feet at 50 miles per hour	90
Noisy urban area, daytime	80
Gas lawnmower at 100 feet or commercial area	70
Heavy traffic at 300 feet	60
Quiet urban daytime	50
Quiet urban nighttime	40
Quiet suburban nighttime	30
Quiet rural nighttime	20

Notes: dBA = A-weighted decibels
Source: Caltrans 2009.

14.3 Regulatory Setting

14.3.1 Federal Laws, Regulations, and Policies

The Noise Control Act of 1972

The Noise Control Act (42 United States Code Chapter 4901, et seq.) directs EPA to develop noise level guidelines, which would protect the population from the adverse effects of environmental noise. EPA published a guideline (EPA 1974) recommending that the acceptable noise level limits affecting residential land use be 55 dBA L_{dn} for outdoors and 45 dBA L_{dn} for indoors. The agency is careful to emphasize that these recommendations contain a factor of safety and do not consider technical or economic feasibility issues, and thus should not be construed as standards or regulations.

Federal Transit Administration Guidelines

The Federal Transit Administration (FTA) has published guidance for assessment of noise and vibration impacts for transit projects, including construction activity and operation

(FTA 2006). Where no guidance or standards are otherwise provided by the local jurisdiction to evaluate noise impacts, the FTA criteria would apply to the Proposed Project.

FTA has developed three “sensitive” land use categories to evaluate the compatibility of predicted noise levels, as described below.

- Category 1 includes land where quiet is an essential element, such as outdoor amphitheaters.
- Category 2 includes residences where people sleep.
- Category 3 includes institutional buildings where quiet is important, such as schools, libraries, and churches.

Categories 1 and 3 use the hourly L_{eq}, whereas Category 2 uses L_{dn}. Such criteria recognize the heightened community annoyance caused by late night or early morning operations, and respond to the varying sensitivities of communities to projects under different ambient noise conditions. The noise criteria are to be applied outside building locations for residential land use and at the property line for parks and other significant outdoor uses (FTA 2006). For residential land uses, the FTA daytime noise standard during construction is 90 decibels (dBA) over a 1-hour period.

For vibration impacts, the FTA standard is 0.5-inch PPV or a vibration level (Lv) of 102 VdB (FTA 2006) with respect to reinforced-concrete building damage risk. For “non-engineered timber and masonry” structures, the threshold is only 0.2 PPV inch/second or 94 VdB. For assessing human annoyance, FTA guidance indicates 80 VdB for “infrequent” (i.e., less than 30 per day) vibration events.

14.3.2 State Laws, Regulations, and Policies

Noise Insulation Standards

Part 2 of Title 24 of the California Code of Regulations establishes 45 dBA L_{dn} as the limit for interior community noise level for multi-family dwellings, hotels, motels, dormitories, and long-term care facilities. The state’s regulation may be extended by local legislative action to include single-family dwellings.

14.3.3 Local Laws, Regulations, and Policies

Fresno County General Plan

The Fresno County General Plan Health and Safety Element, which includes a Noise section, specifies locational restrictions for different land uses. With regard to specific surrounding land uses for the project area (residential, schools, and playgrounds), average day-night noise levels (community noise equivalent or L_{dn}) in the range of 60 dBA, or less, are considered to be “normally acceptable” without any special construction or noise attenuation.

The following polices obtained from the Fresno County General Plan are relevant to the Proposed Project.

Policy HS-G.1: The County shall require that all proposed development incorporate design elements necessary to minimize adverse noise impacts on surrounding land uses.

Policy HS-G.4: So that noise mitigation may be considered in the design of new projects, the County shall require an acoustical analysis as part of the environmental review process where:

a. Noise-sensitive land uses are proposed in areas exposed to existing or projected noise levels that are "generally unacceptable," or higher, according to the Chart HS-1: "Land Use Compatibility for Community Noise Environments."

b. Proposed projects are likely to produce noise levels exceeding the levels shown in the County's noise control ordinance at existing or planned noise-sensitive uses.

Policy HS-G.6: The County shall regulate construction-related noise to reduce impacts on adjacent uses in accordance with the County's noise control ordinance.

a. Where existing noise levels are less than 60 dB L_{dn} at outdoor activity areas of noise-sensitive uses, a 5 dB L_{dn} increase in noise levels will be considered significant.

b. Where existing noise levels are between 60 and 65 dB L_{dn} at outdoor activity areas of noise-sensitive uses, a 3 dB L_{dn} increase in noise levels will be considered significant.

c. Where existing noise levels are greater than 65 dB L_{dn} at outdoor activity areas of noise-sensitive uses, a 1.5 dB L_{dn} increase in noise levels will be considered significant.

Fresno County Municipal Code

Applicable noise regulations are found in the Fresno County Ordinance Code. Chapter 8.40, "Noise Control," states that noise sources associated with construction are exempt from the noise standards, provided that such activities do not take place before 6:00 a.m. or after 9:00 p.m. on any day except Saturday or Sunday, or before 7:00 a.m. or after 5:00 p.m. on Saturday or Sunday (County of Fresno 2012).

The Fresno County Noise Ordinance (Chapter 8.40 of the Fresno County Ordinance Code) is applied to operational noise sources, such as equipment related to commercial and industrial land uses. Table 14-2 reproduces the table of allowable noise levels as appearing in Section 8.40.040 of this ordinance.

Table 14-2. Fresno County Noise Standards

Category	Cumulative Min./Hour (L_x)	Daytime (7 a.m.–10 p.m.)	Nighttime (10 p.m.–7 p.m.)
1	30 (L_{50})	50	45
2	15 (L_{25})	55	50
3	5 ($L_{8.3}$)	60	55
4	1 ($L_{1.7}$)	65	60
5	0 (L_{max})	70	65

Notes: L = measured or statistical sound level in A-weighted decibels (dBA), L_{max} = maximum sound level
Source: Fresno County Noise Ordinance, Chapter 8.40 of the Fresno County Ordinance Code

14.4 Environmental Setting

14.4.1 Potentially Affected Area

For the purposes of noise and vibration, the Potentially Affected Area consists of the project area and the SCARF site. Each of these locations is discussed in detail below.

14.4.2 Project Area

The Project Area includes areas in which physical actions that are part of the Proposed Project would take place. This includes broodstock collection sites, quarantine sites, Chinook salmon production and reintroduction sites, and fisheries management and research areas. As indicated in Figure 2-1, physical actions would take place at several different sites: FRFH, CABA, the Silverado Fisheries Base, and the numerous potential broodstock collection streams.

The Feather River Fish Hatchery is in Oroville, which is in a semi-rural area with residential homes and commercial and industrial developments in the area. CABA is in the city of Davis, on the campus of the University of California, Davis, in an urbanized environment. The Silverado Fisheries Base is in Yountville, which is a relatively rural area in Napa County. The noise environment for the project area varies greatly from site to site.

14.4.3 SCARF Site

The SCARF site is in the city of Friant, immediately west of CDFW's SJFH. Aside from the existing SJFH, the project vicinity is generally categorized as a residential and rural environment. Outdoor ambient sound measurements were conducted on February 26 and 27, 2013, to get a better understanding of the existing noise environment. Noise monitoring locations are shown in Figure 14-1. Table 14-3 includes a summary of the noise measurement locations, as well as the noise levels associated with each site. Noise measurement data are provided in Appendix N, *Noise Data and Photographs*, of this document.

Table 14-3. Noise Monitoring Locations

Site No.	Site Description	Date Time (hh:mm)	L_{eq}	L_{10}	L_{50}	L_{90}
LT1	Backyard at single-family home closest to SCARF site along Brook Trout Road. Adjacent to currently operating Interim Facility.	2/26/13 to 2/27/13 14:45–14:45	46	46	43	42
ST1	Front yard of residential home at the existing SJFH along Brook Trout Road.	2/26/13 15:10–15:30	43	45	41	38
ST2	Adjacent to existing aeration tanks on existing SJFH. Approximately 115 feet from rooftop mechanical equipment and approximately 20 feet from the aeration tanks.	2/26/13 15:45–16:00	53	54	52	51
ST3	Adjacent to proposed access road and planned trail outside existing chain-link fence. Approximately 130 feet from existing worm farm facility.	2/26/13 16:25–16:45	44	41	45	43
ST4	Residential home at the intersection of Waldby Street/Flemming Road in front of the SJFH welcome sign.	2/27/13 10:30–10:50	55	55	55	54
ST5	Residential area off Granite Road on hilltop of vacant lot overlooking the SCARF site.	2/27/13 11:05–11:25	48	49	47	45
ST6	Campground at Lost Hill Park between spaces 19 and 20.	2/27/13 12:00–12:20	38	41	34	32
ST7	Residential area at the end of Bugg Road. The nearest cross street is North Waldby Street.	2/27/13 12:45–1:10	41	44	39	35

Notes: hh:mm = hour:minutes, L_x = measured or statistical sound level in A-weighted decibels (dBA), L_{eq} = equivalent sound level, LT = Long Term, SJFH = San Joaquin Fish Hatchery, ST = Short Term

Source: Noise Monitoring Results, Conducted by URS, February 26-27, 2013

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Prepared by:

Horizon WATER and ENVIRONMENT

Prepared for:
California Department of Fish and Wildlife
California Department of General Services

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Feet

Imagery Source: Bing Maps

Figure 14-1: Noise Monitoring Locations and Sensitive Noise Receptors

SCARF and Related Management Actions Project
Draft Environmental Impact Report

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14.5 Impact Analysis

14.5.1 Criteria for Determining Significance

Appendix G of the CEQA Guidelines and professional expertise indicate that the Proposed Project would result in a significant impact on noise if the following occurs:

A. Exposure of persons to or generation of noise levels in excess of standards established in a local general plan or noise ordinance or in the applicable standards of other agencies.

B. Exposure of persons to or generation of excessive ground-borne vibration or ground-borne noise levels.

C. A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project.

D. A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project.

E. For a project located within an airport land use plan area, or, where such a plan has not been adopted, within 2 miles of a public airport or public-use airport, would the project expose people residing or working in the project area to excessive noise levels?

F. For a project within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels?

14.5.2 Methodology

Impacts were assessed for SCARF construction activities by applying the FTA's *Transit Noise and Vibration Impact Assessment* methodology (FTA 2006). This methodology assumes that the two loudest pieces of construction equipment would operate simultaneously at the same location under full power. A qualitative approach has been used for analyzing impacts associated with SCARF operational noise for the Proposed Project. A qualitative analysis also was used for other components of the Proposed Project. The qualitative analysis uses noise measurement data, distances to sensitive receptors, project information and design, and information provided by SJFH staff regarding hatchery noise.

Potential impacts with respect to the CEQA checklist, Criteria E and F, have been eliminated from the analysis. Although the proximity of airports is not known for all components of the Proposed Project, it is anticipated that the as-yet-undefined components of the Proposed Project, such as additional recreational facilities, would not place sensitive receptors within the vicinity of airports. Therefore, noise impacts associated with airports or private airstrips would not occur. This topic is not discussed further.

14.5.3 Environmental Impacts

Table 3-1 in Chapter 3, *Introduction to the Environmental Analysis,* identifies components of the Proposed Project with the potential to impact noise and vibration. Table 14-4 summarizes the potential impact to noise and vibration from the Proposed Project. Each impact is discussed in further detail in the section below.

SCARF Construction

Impact NOISE-CONSTRUCT-1: Potential for SCARF Construction to Expose Persons to or Generate Noise Levels in Excess of Standards Established in a Local General Plan or Noise Ordinance or in the Applicable Standards of Other Agencies (Significance Criteria A, C, and D, Project Level, Less than Significant)

Residential homes are located in various locations adjacent to the existing SJFH and the SCARF site. Noise levels were analyzed at the three nearest sensitive receptors (refer to Figure 14-1 for specific locations). The site plan shows that sensitive receptors are located at a distance that ranges from 50 to 75 feet from the project components. Table 14-4 includes a summary of the receptor locations, proposed construction activities closest to the receptor, and the distances used for the construction noise analysis.

Table 14-4. Sensitive Receptor Locations

Sensitive Receptor[1]	Description of Receptor Location	Nearest Construction Activity to Occur	Approximate Distance to Project Components (feet)[2]
R1	Single-family residential home on the north side of Brook Trout Road at the existing SJFH. Housing provided for staff.	Construction of facility water supply pipes	71
		Construction of employee residence	52
R2	Single-family home on the eastern side of Granite Avenue, overlooking the SCARF site.	Construction of access road	66
R3	Single-family home on the northern side of Granite Court, overlooking the SCARF site.	Construction of access road	68

Notes: SJFH = San Joaquin Fish Hatchery

1 Nearest construction activities and the approximate distances between these activities and sensitive receptors are based on Figure 2-3 of this DEIR.

2 Google Earth was used to determine the approximate distances between construction activities and sensitive receptors.

Table 14-5 shows the noise levels of typical pieces of equipment that would be used during different phases of the construction of the Proposed Project. As shown in Table 14-4, the typical noise from a paver generates the highest noise levels at 89 dBA at 50 feet. Of the equipment anticipated to be used for the Proposed Project, the backhoe would generate the lowest noise levels at 80 dBA at 50 feet.

Table 14-5. Construction Equipment Noise Emissions Levels

Equipment	Typical Noise Level (dBA) 50 feet from Source[1]
Air compressor	81
Backhoe	80
Compactor	82
Dozer	85
Grader	85
Loader	85
Paver	89
Truck	88

Notes: dBA = A-weighted decibels

[1] The FTA's *Transit Noise and Vibration Impact Assessment* manual (2006) provided a list of reference levels in Table 12-1 of standard construction equipment at 50 feet from the source.

Source*:* FTA 2006.

Noise levels for the three sensitive receptors adjacent to the Proposed Project were calculated at the approximate distances listed in Table 14-5. Predicted noise levels at the sensitive receptors were calculated based on the type of construction taking place. During each of the proposed activities, this analysis assumed that two pieces of the loudest generating construction equipment would operate for one hour. The two pieces of equipment were selected based on the description of construction activities provided in Chapter 2, *Project Description*.

Table 14-6 indicates the type of equipment chosen for the noise analysis and also the noise levels generated by the operation of the two loudest pieces of equipment during construction. As shown below in Table 14-7, noise levels at receptors R1, R2, and R3 are not anticipated to exceed the FTA construction noise standard of 90 dBA for residential properties, but would appear to exceed the EPA outdoor level guideline of 55 dBA.

Table 14-6. Noise Levels at Sensitive Receptors

Sensitive Receptor	Equipment Used	Approximate Distance to Project Components (feet)	Noise Levels at Approximate Distance to Receptor Locations (dBA)[1, 2]
R1	Truck Backhoe	71	86
	Truck Grader	52	89
R2	Pavers Compactor	66	87
R3	Pavers Compactor	68	87

Notes: dBA = A-weighted decibels

[1] The FTA's *Transit Noise and Vibration Impact Assessment* manual (2006) was used to derive the dBA levels of the construction equipment at stated distances from sensitive receptors.

[2] Calculations on which this table is based are provided in Appendix N, *Noise Data and Photographs*.

However, the Proposed Project would be permitted to generate construction noise (exempt from the limits shown in Table 14-2) per the Fresno County's noise regulations, which state allowable construction activities cannot occur before 6:00 a.m. or after 9:00 p.m. on weekdays or before 7:00 a.m. or after 5:00 p.m. on Saturday or Sunday. As stated in Chapter 2, *Project Description*, construction activities would be limited to daytime hours and would be temporary. Therefore, the impact would be less than significant.

Impact NOISE-CONSTRUCT-2: Potential for SCARF Construction to Expose Persons to Excessive Ground-borne Vibration or Ground-borne Noise Levels (Significance Criterion B, Project Level, Less than Significant)

As previously mentioned in Section 14.3.1, *Federal Laws, Regulations, and Policies*, above, the standard established to assess non-engineered timber and masonry building damage risk from ground-borne vibration is 0.2 PPV inch per second, or 94 VdB. The vibration velocity level (Lv) to assess human annoyance is 80 VdB. Although the construction activities and associated anticipated equipment to be used are not commonly associated with generating significant vibration impacts, Table 14-7 shows the LV and PPV associated with the construction equipment anticipated for the Project. Vibration levels were calculated at the approximated distances from sensitive receptors to project components. As shown in Table 14-7, vibration levels would be below the FTA vibration standards for both building damage risk and human annoyance, and thus would be expected to result in a less-than-significant impact.

Table 14-7. Construction Equipment Vibration Levels

Equipment	Reference PPV/L_v (25 feet)[1, 2]	Approximate PPV/L_v R1 (52 feet)	Approximate PPV/L_v R2 (66 feet)	Approximate PPV/L_v R3 (68 feet)
Large bulldozer	0.089/87	0.029/77	0.021/75	0.019/74
Loaded trucks	0.076/86	0.025/76	0.017/74	0.016/73
Small bulldozer	0.003/58	0.0009/49	0.0006/46	0.0006/45

Notes: L_v = vibration velocity level decibels (VdB), PPV = peak particle velocity (inches per second)
[1] The FTA's *Transit Noise and Vibration Impact Assessment* manual (2006) was used to derive the PPV/L_v levels of the construction equipment at stated distances (feet) from sensitive receptors (R1–R3).
[2] Calculations on which this table is based are provided in Appendix N, *Noise Data and Photographs*

SCARF Operation

Impact NOISE-OP-1: Potential for SCARF Operations to Result in a Substantial Permanent Increase in Ambient Noise Levels in the Project Vicinity above Levels Existing without the Project or Result in the Generation of Noise Levels in Excess of Standards Established in a Local General Plan or Noise Ordinance or in the Applicable Standards of Other Agencies (Significance Criteria A, C, and D, Project Level, Less than Significant with Mitigation)

As indicated in Table 14-3, noise levels within the SCARF site are relatively low, ranging from 38 dBA to 55 dBA, and are characteristic of a rural environment. The noise-monitoring data, field observations conducted on the site, and information provided by SJFH staff indicate that the majority of the noise at the existing SJFH is generated from mechanical equipment and running water. Noise-monitoring locations ST2 and ST4 were recorded to have the highest source of noise. Noise sources at these sites were generated from the existing aeration system and the rooftop mechanical equipment.

The proposed SCARF would operate in a manner similar to the existing SJFH. SCARF facilities that could potentially generate noise would include mechanical equipment at the hatchery building. Some of the noted noise-generating operations could include the following:

- Intermittent operation of trucks on-site and forklifts for transporting equipment;
- Use of mechanical equipment, such as pumps; heating, ventilation, and air conditioning (HVAC) and refrigeration units; and feeding equipment; and
- Operation of the aeration system.

SCARF components include the aeration tower and primary filtration system. The filtration system would operate under gravity feed; no pumps or mechanized equipment would be required. However, as recorded during noise monitoring, the existing aeration tanks at the SJFH produce the constant sound of running water, which may produce some annoyance to sensitive receptors. Noise levels at existing aeration tanks were measured as 55 dBA at a distance of approximately 40 feet. However, the location of this component for the Proposed Project would be approximately 200 feet from any sensitive receptor. Therefore, because of the greater distance between the aeration tower equipment and anticipated sensitive receptors, the resulting sound at the receptors would be less than 55 dBA and the increases over current ambient sound levels are anticipated to be less than significant.

The hatchery building would be constructed of metal or a CMU/metal combination. This building would house staff rooms, a freezer, dry-feed storage, pump room, and tanks. The hatchery building would be approximately 150 feet west of the nearest residential area. The exact specification of mechanical equipment is not available currently, but it is possible that sound pressure levels at a distance of 150 feet could exceed the Fresno County threshold of 45 dBA L_{50} (as shown in Table 14-2). This is considered a potentially significant impact. **Mitigation Measure NOISE-OP-1** contains measures that would reduce impacts associated with mechanical equipment to less-than-significant levels.

Mitigation Measure NOISE-OP-1: Implement Noise Control Measures to Reduce Noise Generated by Mechanical Equipment.
To reduce potential noise impacts from mechanical equipment, CDFW shall locate mechanical rooftop equipment for HVAC and refrigeration units as far from residential homes as possible. If such functioning rooftop equipment were unavoidably as close as 150 feet to the nearest sensitive receptor, then equipment will be selected that features lower-speed rotating components (e.g., fans, pumps, compressors), factory-approved acoustically-insulated housings or enclosures, and other typical means of noise control or sound abatement so that its resulting sound pressure level at a distance of 150 feet does not exceed the Fresno County threshold of 45 dBA L_{50} as shown in Table 14-2.

Impact NOISE-OP-2: Potential for SCARF Operations to Expose Persons to Excessive Ground-borne Vibration or Ground-borne Noise Levels (Significance Criterion B, Project Level, Less than Significant)

Operational noise would be generated from mechanical equipment and the vehicles on-site. This type of activity is anticipated to generate vibration levels that are less than the levels generated during construction. Additionally, sensitive receptors would be located 50 to 75 feet away. Because of the distance between the operating equipment and processes associated with the SCARF facilities and the anticipated nearby sensitive receivers, vibration levels are expected to result in a less-than-significant impact.

Fish Reintroduction

Impact NOISE-REINTRO-1: Potential for Truck Transport of Fish Stock to Substantially Increase Noise Levels within the Project Area (Significance Criteria A, C, and D, Project Level, Less than Significant)

The fish reintroduction component of the Proposed Project could potentially require the physical transport of fish stock. These locations vary and include structures and areas such as bridges, access points, islands, and parks. For this analysis, it is anticipated that noise generated during this part of the Proposed Project would primarily be generated from the use of trucks for potential transport of fish stock. As discussed in Chapter 16, *Transportation*, the traffic associated with this process is not anticipated to significantly increase the number of vehicles on any given roadway. Putting this in perspective, to create a 3 dBA increase in the ambient noise level that is detectible to the human ear, the truck traffic associated with the Project would have to be double the current truck traffic volumes on the nearby roadways. Therefore, noise impacts from these project transport vehicles would be expected to result in imperceptible noise increases that are less than significant.

Impact NOISE-REINTRO-2: Potential for Truck Transport of Fish Stock to Expose Persons to Excessive Ground-borne vibration or Ground-borne Noise Levels (Significance Criterion B, Project Level, Less than Significant)

Assuming that a truck transporting fish stock is similar to a "loaded truck" referred to in Table 14-7, then up to 30 truck pass-bys per day at a distance of no less than 40 feet between the road and the receptor would be considered a less-than-significant vibration impact with respect to human annoyance. For potential damage to timber and masonry buildings, this distance would need to be less than 16 feet. Since receptors are anticipated to be more distant from the trucks, and truck trips fewer than this number, vibration impacts would be less than significant.

Fisheries Management

Impact NOISE-MANAGEMENT-1: Potential for Construction of Fish Segregation Weirs to Substantially Increase Noise Levels (Significance Criteria A, C, and D, Program Level, Less than Significant with Mitigation)

Construction of weirs or the structural modification to the HFB or a proposed similar structure along the San Joaquin River or at other locations would have the potential to result in an impact on surrounding sensitive receptors. If noise were to exceed applicable thresholds, a significant impact would result.

Implementation of **Mitigation Measure NOISE-MANAGEMENT-1** would reduce impacts associated with weir construction. This measure includes, but is not limited to, using available noise control and abatement techniques (including mufflers, intake silencers, ducts, engine enclosures, and acoustically attenuating shields or shrouds) on the equipment and vehicles involved in the activity. Construction of weirs would be a short-term temporary noise impact, and would be reduced using this mitigation measure. Therefore, with implementation of **Mitigation Measure NOISE-MANAGEMENT-1**, this impact would be less than significant after mitigation.

Mitigation Measure NOISE-MANAGEMENT-1: Implement Noise Control Measures for Construction Activities.

Before engaging in noise-generating activity associated with the construction of weirs, structural modification of the Hill's Ferry Barrier, or other construction activity, CDFW will evaluate how close sensitive receptors are located to the construction site, and whether the construction activity would exceed applicable noise thresholds. This evaluation will utilize the same FTA-based general assessment methodology that was used to predict the noise that would be generated during SCARF construction. Should the noise levels be anticipated to exceed the threshold for any sensitive receptors, CDFW will implement specific noise control measures to mitigate impacts associated with construction. These measures may include, but are not limited to, the following:

a. Best available noise control techniques (including factory-approved mufflers, intake silencers, ducts, engine enclosures, and acoustically attenuating shields or shrouds) will be used for all equipment and trucks to minimize construction noise impacts.

b. If impact equipment (e.g., concrete/rock breaker, rock drill) is used during project construction, hydraulic- or electric-powered equipment will be used to avoid the noise associated with compressed-air exhaust from pneumatically powered tools. However, where use of pneumatically powered tools is unavoidable, an exhaust muffler on the compressed-air exhaust will be used (a muffler can lower noise levels from the exhaust by up to 10 dBA). External jackets on the tools themselves will be used, which could achieve a reduction of 5 dBA. Where considered practical, quieter procedure alternatives, such as drilling or vibratory methods, will be used instead of impact equipment.

c. Stationary noise sources will be located away from sensitive receptors. If the sources must be located near sensitive receptors, adequate sound abatement (with enclosures and mufflers, where appropriate) will be used to ensure performance standards are met. Enclosure openings or vents will face away from sensitive receptors. If any stationary equipment (e.g., pumps, ventilation fans, generators) is operated beyond the ordinance time limits, this equipment will conform to the affected jurisdiction's noise limits.

In addition, CDFW will designate a project liaison to be responsible for responding to noise complaints during construction. The name and phone number of the liaison will be conspicuously posted at construction areas and on all advanced notifications. The liaison will take steps to resolve complaints, including the arrangement of periodic noise monitoring, if necessary. Results of noise monitoring will be presented at regular project meetings with the project contractor, and the liaison will coordinate with the contractor to modify any construction activities that generate excessive noise levels.

Impact NOISE-MANAGEMENT-2: Potential for Construction of Fish Segregation Weirs to Expose Persons to Excessive Ground-borne Vibration or Ground-borne Noise Levels (Significance Criterion B, Program Level, Less than Significant)

Construction activity associated with building fish segregation weirs would produce temporary vibration levels that could result in a significant impact only if the source amplitudes are relatively large and the distances between the activity and nearby receptors are sufficiently small. Impact NOISE-CONSTRUCT-2 illustrates that equipment, such as a large bulldozer, could operate as close as 50 feet to a receptor and still, with respect to 80 VdB for human annoyance, be below significance thresholds. Construction is not anticipated to occur within 50 feet of a receptor. Therefore, this is considered a less-than-significant impact.

Fisheries Research and Monitoring

Impact NOISE-MONITORING-1: Potential for Research and Monitoring Activities to Expose Persons to Noise and Vibration Levels that Exceed Applicable Standards Established by a Local General Plan or Noise Ordinance or by Agencies with Jurisdiction (Significance Criteria A, B, C, and D, Project Level, Less than Significant)

As discussed in Chapter 2, *Project Description*, under the fisheries research and monitoring component of the Proposed Project, studies would include laboratory-based activities that could be conducted at the SCARF, as well as field-based activities in the Restoration Area. This phase is not anticipated to introduce new noise or vibration sources within the project area. Use of no additional noise- or vibration-generating mechanical equipment is anticipated. Although some travel may be required for field visits to locations within the Restoration Area, these mobile sources would not appreciably increase noise and vibration levels along roadways. Therefore, noise and vibration impacts resulting from the fisheries research and monitoring component of the Proposed Project would be less than significant.

Recreation Management

Impact NOISE-RECREATION-1: Potential for Recreation Management Activities to Expose Persons to Noise and Vibration Levels that Exceed Applicable Standards Established by a Local General Plan or Noise Ordinance or by Agencies with Jurisdiction (Significance Criteria A, B, C, and D, Program Level, Less than Significant with Mitigation)

In general, activities associated with recreation management are not anticipated to result in significant changes to the existing noise and vibration environment. However, construction activities associated with recreational fishing enhancements would have the potential to result in an impact on surrounding sensitive receptors. If noise were to exceed applicable thresholds, a significant impact would result.

Implementation of **Mitigation Measure NOISE-MANAGEMENT-1** would reduce impacts associated with construction. This measure includes, but is not limited to, using available noise control and abatement techniques (including mufflers, intake silencers, ducts, engine enclosures, and acoustically attenuating shields or shrouds) on the equipment and vehicles involved in the activity. Construction would be a short-term temporary noise impact, and would be reduced using this mitigation measure. Therefore, with implementation of **Mitigation Measure NOISE-MANAGEMENT-1**, this impact would be less than significant after mitigation.

Chapter 15
RECREATION

15.1 Overview

This chapter presents an overview of recreational activities in and adjacent to the SCARF site, the Project Area, and the Potentially Affected Area, and summarizes the overall federal, state, and local regulatory framework related to recreation. It includes an analysis of the potential impacts of the Proposed Project on recreational resources.

15.2 Regulatory Setting

15.2.1 Federal Laws, Regulations, and Policies

U.S. Bureau of Reclamation

The mission statement 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." Reclamation manages the CVP, which is a system of 20 reservoirs and more than 500 miles of major canals and aqueducts that encompass 35 counties in California's vast semi-arid Central Valley. Deliveries by CVP provide water for agricultural, municipal, and industrial uses, and water for wildlife refuges. Its reservoirs are also used for recreational purposes. One of its reservoirs, Millerton Lake, is located near the Proposed Project and is described further below.

<u>Millerton Lake Resource Management Plan and General Plan</u>

Reclamation owns Millerton Lake and most of the lands around it. The Millerton Lake State Recreation Area (SRA), located opposite of Friant Dam from the Project Area, slightly more than one mile from the SCARF site, is managed by the California Department of Parks and Recreation (State Parks) through an agreement with Reclamation. Reclamation and State Parks have developed the *Millerton Lake Resource Management Plan and General Plan* (RMP/GP) (Reclamation and State Parks 2010). The purpose of the Millerton Lake RMP/GP is to provide a program and set of policy guidelines to encourage orderly use, development, and management of the reservoir and the surrounding lands. The plan promotes outdoor recreational opportunities, enhanced by the lake, the river, and their shorelines, and compatible with the surrounding scenic, environmental, and cultural resources. In addition, the plan proposes uses that are compatible with Reclamation's obligation to operate the reservoir for water delivery. It includes the following objectives that are relevant to the Proposed Project:

- Determine the opportunities and need for new or enhanced recreation facilities based on demand and resource limits.
- Manage for a balance between fish and wildlife resources and recreational opportunities.
- Identify opportunities to develop partnerships, where appropriate, for managing recreational and natural resources.

U.S. Fish and Wildlife Service

USFWS implements the mandates of the National Wildlife Refuge Improvement Act of 1977 by directing the National Wildlife Refuge System. USFWS is developing comprehensive conservation plans to guide the management and resources of each individual refuge. All together, the more than 500 refuges form the largest network of public lands in the world. The mission of the National Wildlife Refuge System is to conserve a network of lands and water for the conservation and management of fish, wildlife, and plant resources of the United States for the benefit of present and future generations. The San Luis National Wildlife Refuge (NWR) complex consists of the San Joaquin River, San Luis, and Merced NWRs. The San Luis NWR, which is located near the downstream end of the Restoration Area in Los Banos, and the Merced NWR, which is located slightly east of the Project Area in Merced, are discussed in more detail in section 15.3.2, *Project Area*.

San Joaquin River National Wildlife Refuge Comprehensive Conservation Plan

The San Joaquin River NWR, located in the Potentially Affected Area, is 9 miles west of the city of Modesto and straddles western Stanislaus and San Joaquin Counties. This NWR was established in 1987 primarily to protect wintering habitat for Aleutian Canadian goose (*Branta canadensis leucopareia*), a then-federally listed endangered species. The refuge also serves to protect other threatened and endangered species that depend on wetlands and riparian floodplain habitat. The refuge had a pivotal role in the removal of the Aleutian Canada goose from the federal Threatened and Endangered Species List in 2001.

The San Joaquin River NWR Comprehensive Conservation Plan (CCP) (USFWS 2006) was developed to guide the management of the San Joaquin River NWR for the next 15 years. The San Joaquin River NWR provides protection for both wetland- and upland-dependent wildlife species of California's Central Valley.

The goals of the San Joaquin River NWR CCP include providing opportunities for environmental education about native California habitats and wildlife and their conservation and restoration, providing the public with wildlife viewing and photographic opportunities, and providing other recreational activities such as waterfowl hunting and fishing.

15.2.2 State Laws, Regulations, and Policies

California Department of Fish and Wildlife

CDFW's mission is "to manage California's diverse fish, wildlife, and plant resources, and the habitats upon which they depend, for their ecological values and for their use and enjoyment by the public."

San Joaquin River Ecological Reserve

The CDFW manages approximately 800 acres widely dispersed along the San Joaquin River within the Restoration Area for the purpose of preserving riparian habitat. Access to these areas is by permit only and allowable uses are primarily hiking and wildlife viewing. One exception is Camp Pashayan, which is managed jointly by CDFW and the San Joaquin River Parkway and Conservation Trust (SJRPCT) for the purpose of outdoor education.

California State Parks

The mission of State Parks is "to provide for the health, inspiration and education of the people of California by helping to preserve the state's extraordinary biological diversity, protecting its most valued natural and cultural resources, and creating opportunities for high-quality outdoor recreation." State Parks manages the Great Valley Grasslands State Park (SP), which is in the Restoration Area, (see Section 15.3.2, "Project Area," for more details), as well as the Millerton Lake SRA (see Section 15.2.1, "Federal Laws, Regulation, and Policies," above), which is near the SCARF site.

California State Parks Central Valley Vision Implementation Plan

The *Central Valley Vision Implementation Plan* (State Parks 2009a) is a 20-year roadmap for improving state parks in the Central Valley. Its focus is to meet the public's recreation needs in the Central Valley. AB 1426, a 2007 law, required State Parks to produce "The Central Valley Vision Implementation Plan", which State Parks completed in 2009. The Plan found that, compared with other California regions, the Central Valley lacks sufficient parks for residents and visitors. Major trends—including significant population growth, shifting ethnic composition, and increasingly sedentary lifestyles—all drive the need for more parks. The Central Valley Vision Implementation Plan is a catalog of proposed initiatives to be implemented over the next 20 years with the aim of improving recreation and resource protection in the Central Valley. The Plan resulted from analysis by State Parks with input from Central Valley residents and partners, including public agencies and non-profit organizations. The Plan includes new and improved facilities at existing parks, 11 new state parks, designation for five heritage corridors, new boating trails to link outdoor recreation areas along rivers, and extensive use of partnerships for funding and volunteers.

Of the 11 new parks, five are proposed for the San Joaquin River Valley and the adjacent Tulare Basin to provide recreation for rapidly growing and underserved populations and to protect special resources. One of the proposed high-priority new parks is the San Joaquin

River Parkway. More details are provided below in this section under the *San Joaquin River Parkway Conservancy Act*.

The Central Valley Vision Implementation Plan also includes a proposal to add about 75 campsites, trails, and boating facilities to the Millerton Lake SRA, and to enhance the existing campsites and create new trails and fishing access on Kings River—both of which are in the vicinity of the Project Area.

California Fish and Game Commission

The California Fish and Game Commission (Commission) is a constitutionally-created, five-member body with duties established by the Legislature. The Legislature, in turn, delegated to the Commission power to regulate the taking or possession of birds, mammals, fish, amphibian, and reptiles as set forth in the Fish & Game Code. Among the Commission's responsibilities is the adoption of hunting and sportfishing regulations.

Fishing Regulations

Freshwater sport fishing is subject to restrictions imposed by the Commission under its regulatory authority. The Commission's fishing regulations are listed on CDFW's website and are periodically updated (CDFW 2013). For the 2013–2014 season, fishing is allowed year round in the San Joaquin River from Friant Dam to the Interstate 5 bridge at Mossdale. There is a daily bag limit of two hatchery trout or hatchery steelhead. The possession limit is four hatchery trout or hatchery steelhead. Hatchery trout or steelhead in anadromous waters are those showing a healed adipose fin clip (the adipose fin is absent). All other trout and steelhead must be immediately released. Wild trout or steelhead are those not showing a healed adipose fin clip (the adipose fin is present). Regulations for many of the tributaries of the San Joaquin River are generally the same or slightly more restrictive, including such requirements as the use of barbless hooks during part of the year.

Fisheries Policies

The Commission has adopted the following policies.

Salmon

It is the policy of the Fish and Game Commission that:

> I. Salmon shall be managed to protect, restore, and maintain the populations and genetic integrity of all identifiable stocks. Naturally spawned salmon shall provide the foundation for the Department's management program.
>
> II. Salmon populations shall be periodically inventoried by the Department, or its agents, as necessary for management and protection of salmon stocks and their habitat, as outlined in this policy.
>
> III. Salmon streams shall be inventoried for quantity and quality of habitat, including stream flow conditions. Restoration and acquisition plans shall be developed and implemented to safeguard such critical habitats as estuaries, coastal lagoons, and

spawning and rearing areas, and to protect or guarantee future instream flows. Fisheries restoration grants and other funding may be directed to implement the plans.

IV. Existing salmon habitat shall not be diminished further without offsetting the impacts of the lost habitat. All available steps shall be taken to prevent loss of habitat, and the Department shall oppose any development or project that will result in irreplaceable loss of fish. Artificial production shall not be considered appropriate mitigation for loss of wild fish or their habitat.

V. The Department shall strive to improve habitat conditions, alleviate threats, and renegotiate mitigation requirements at appropriate opportunities to eliminate the need for fish rescue operations. Salmon rescue will not be considered as mitigation for proposed water development. Only under the following circumstances shall salmon be rescued:

A. When they will be returned to the stream system of origin; and

B. When fish can be held until habitat conditions in the place where they were collected improve, or when fish can be immediately released in nearby areas of the same stream and the Department has determined that no adverse impacts would occur to existing salmonid populations; and

C. When, in the opinion of the Department, habitat conditions are temporarily inadequate or when conducted pursuant to a permitted in-stream construction or restoration activity.

VI. Hatchery releases of Chinook salmon in anadromous waters will be externally marked and coded-wire tagged at the current Department standard.

VII. New programs that propose to propagate state-or federally-listed salmon shall conform to the Department's guidelines for establishment and operation of recovery hatcheries found in the Recovery Strategy for California Coho Salmon, Appendix H. In coastal streams without Department hatcheries, artificial rearing shall be limited to areas where the Department determines it would be beneficial to supplement natural production to re-establish or enhance the depleted wild population. In the Sacramento, American, Feather, San Joaquin, Klamath and Trinity River systems, hatchery production shall be used to meet established mitigation goals. At the discretion of the Department, excess eggs from non-listed salmon from the State, Federal, or cooperative hatcheries may be used to provide additional fish for the commercial and sport fisheries. Because of potential adverse impacts, all salmon reared from excess eggs that are intended to be released into estuaries, bays, or the ocean for fisheries enhancement must be marked so that potential impacts and efficacy of the project can be evaluated. Specifically, the projects must provide to the Department, within five years of the adoption of this policy, a written evaluation of their operations that specifically addresses: 1) potential impacts to nearby stream environments; 2) potential impacts to ESA [Endangered Species Act] or CESA [California Endangered Species Act] listed salmonid populations; and 3) efficacy of the project in meeting project goals and objectives. The Department will assess the evaluations and will provide a recommendation to the Commission on whether this section of the policy should be continued.

VIII. Domesticated or non-native fish species will not be planted, or fisheries based on them will not be developed or maintained, in drainages of salmon waters, where, in the opinion of the Department, they may adversely affect native salmon populations by competing with, preying upon, or hybridizing with them. Exceptions to this policy may be made for stocking drainages that are not part of a salmon restoration or recovery program.

IX. The best available scientific information will be used by the Department to assess the salmon resource and to develop management strategies and recommendations. (Amended: 06/18/93; 06/18/05; 05/09/08)

Stocking Fish in Waters Where Anglers Pay Access Fees

It is the policy of the Fish and Game Commission to:

Recognize there is a tremendous demand for fishing in reservoirs, lakes and streams. The Department of Fish and Game cannot meet all of the demands for catchable-sized hatchery fish for such waters. Therefore, to the extent possible it should encourage the involvement of the private aquaculture industry.

The Department shall not stock fish in (1) private waters that are closed to the public and (2) fee-fishing lakes operated by registered aquaculturists privately for profit. As long as they are open to the general public, the Department shall stock two types of waters: (1) those in which most, if not all, fish are reared and stocked by the Department, and (2) those in which the reservoir or recreation operator, under a Cooperative Stocking Program, plants an equal or greater weight of catchable-sized fish than does the Department.

The Department alone cannot plant enough fish nor improve enough habitat to develop the full recreational potential of many waters. Although the Commission recognizes the prerogative of a local entity to rely on a fishing program of this type, it also recognizes the resulting loss in recreation fishing opportunities in areas where the demand is so great. It, therefore, directs the Department to encourage local entities to shift to the more successful Cooperative Stocking Program.

I. Waters Where Anglers Pay Small Fees to Defray Only Costs of Essential Services:

A. The Department may stock public and private waters where a nominal fee is charged to defray the costs of maintaining sanitary and safety services, roads, parking, gatekeeping and patrol services, liability insurance, licenses and taxes, and fish habitat improvement projects, providing all revenues are used to pay for these costs only. Access fee revenues may be used also to purchase fish to supplement the state allotment, at the discretion of the recreation operator.

B. The recreational operator will be required to demonstrate that their access fee revenues are necessary for recovery costs of essential services or additional supplemental stocking upon request by the Department. The Department may stop stocking public and private waters that charge access fees that are determined to be unusual or unreasonable for recovery of costs of essential services or additional supplemental stocking.

C. Access fees charged by state parks are not covered by this policy. State park fees are established and set by the California Department of Parks and Recreation.

II. Waters With Cooperative Stocking Programs:

Cooperative programs may be entered into by the Department with public and private entities. In these instances, the cooperator supplements the Department fish planting allotment by purchasing additional fish, and generally charges daily fees greater than those outlined in paragraph I above. The Commission encourages the Department to enter into such cooperative stocking programs, provided they conform to the following requirements:

A. Each proposed cooperative stocking program will be in the form of a Memorandum of Understanding; and

B. Each year the cooperator shall purchase and stock at least as many pounds of fish as the Department stocks, and hopefully, considerably more as the program develops and the annual income from fees increases.

However, to facilitate the starting of a new program, the cooperator may delay the matching commitment until the second year of the agreement when fee revenue from the first year will become available for purchasing fish.

If any cooperator does not match or exceed by weight the fish stocked by the state in the second year of the cooperative program, no additional Department fish shall be delivered until the commitment is met.

C. In order to generate revenue to finance the cooperator's share of fish and fish habitat improvements, daily fees higher than those required to pay actual costs of necessary sanitary and other essential services required for fishermen at a water stocked by the state may be charged, provided that all resulting revenues in excess of those needed for such necessary services be used to purchase fish for stocking or to implement habitat improvement projects in the water.

D. The cooperator shall not divert any profits resulting from daily access fees to support any other operation. The cooperator shall keep separate financial records for each water stocked by the Department under a matching program in such a manner that costs of sanitation and other necessary services for fishermen and costs of stocked fish and habitat improvement can be readily determined. These records shall be made available to the Department upon request.

E. To the extent of its ability, when requested, the Department will assist any cooperator with advice on technical, procedural and business policies to help in developing a financially self-sustaining operation.

III. Davis-Grunsky Waters:

The Department will not stock fish in place of those which the local water agency is required to stock by its Davis-Grunsky contract in order to realize the anticipated recreational benefits from the project (Amended 8/26/93, 12/4/97, 01/07/99, 12/08/00, 12/07/01, 12/20/02, 12/5/03, 12/9/05, 12/7/07, 06/30/11).

Trout

It is the policy of the Fish and Game Commission that:

I. Natural reproduction and rearing of trout will be encouraged to the greatest extent possible by protecting and improving habitat and by affording protection from disease, predators and competing fish species.

II. Populations of wild trout shall be sustained in suitable waters to provide a diversity of angling opportunities. In some waters it may be necessary to restrict angler harvest to the extent that such harvest has virtually no long-term effect on numbers and sizes of fish in the populations.

III. Artificial propagation and rearing of trout is a major Department program, but will be utilized only when necessary to augment natural production. Stocking fingerling and sub-catchable-sized trout shall take priority over planting catchable-sized trout in the hatchery stocking program when the smaller fish will maintain satisfactory fishing. Hatchery trout shall not be stocked in waters where they may compete or hybridize with trout which are threatened, endangered or species of special concern. Exceptions may be made for stocking waters which are not part of a species recovery program.

IV. Catchable-sized trout shall be stocked only:

A. In lakes, reservoirs and streams where natural reproduction and growth are inadequate to maintain populations capable of supporting fishing; and

B. When it is reasonable to expect at least 50% by number or weight will be taken by anglers.

In stocking catchable-sized trout, lakes and larger streams shall have priority over smaller streams. Suitable waters with heavy fishing pressure compared to the size of planting allotments shall have priority. Trophy fish, weighing one pound or more may constitute up to 10% by weight of each load of catchables stocked, if they replace an equivalent poundage of catchables in the allotment for the water stocked.

V. Subcatchable-sized trout may be stocked in lakes, reservoirs and streams where appropriate to augment trout populations in such waters, and to increase fishing opportunities and success. Fingerlings shall be stocked primarily in waters where reproduction is limiting and satisfactory angling can be supported with fingerling stocking, where the population has been destroyed, and in lakes where they will establish a new fishery or augment the existing fishery.

VI. Water companies, utility districts and other public or private agencies in control of urban lakes shall be encouraged to finance put-and-take trout fishing in such waters when suitable for such purposes. The Department shall provide technical advice and otherwise assist in the development and maintenance of such programs (Amended 1/4/94).

Wild Trout Waters

There are no designated wild trout waters in the Potentially Affected Area; however, portions of the Kings, San Joaquin, Merced, and Stanislaus Rivers east of the study area are designated as wild trout water by the Commission. The Commission has adopted a policy for Commission Designated Wild Trout Waters stating:

It is the policy of the Fish and Game Commission to:

I. Designate certain state waters to be managed exclusively for wild trout. Commission designated wild trout waters should provide a quality experience by providing the angler with an opportunity to fish in aesthetically pleasing and environmentally productive waters with trout populations whose numbers or sizes are largely unaffected by the angling process.

Waters designated by the Commission for wild trout management shall meet the following criteria:

A. Angler Access:

1. Open for public angling with unrestricted access when of sufficient dimensions to accommodate anglers without over crowding, or

2. Open for public angling with controlled access under a plan approved by the Commission setting forth the number of anglers and the method of distribution.

B. Able to support, with appropriate angling regulations, wild trout populations of sufficient magnitude to provide satisfactory trout catches in terms of number or size of fish.

II. Wild trout waters shall be managed in accordance with the following stipulations:

A. Domestic strains of catchable-sized trout shall not be planted in designated wild trout waters.

B. Hatchery-produced trout of suitable wild and semi-wild strains may be planted in designated waters, but only if necessary to supplement natural trout reproduction.

C. Habitat protection is of utmost importance for maintenance of wild trout populations. All necessary actions, consistent with State law, shall be taken to prevent adverse impact by land or water development projects affecting designated wild trout waters.

III. The Department shall prepare and periodically update a management plan for each water designated as a wild trout water.

IV. Certain designated wild trout waters may be further designated by the Commission as "Heritage Trout Waters", to recognize the beauty, diversity, historical significance, and special values of California's native trout. Heritage Trout Waters shall meet the following additional criteria:

A. Only waters supporting populations that best exemplify indigenous strains of native trout within their historic drainages may qualify for designation.

B. Heritage Trout Waters shall be able to provide anglers with the opportunity to catch native trout consistent with the conservation of the native trout present.

V. Recognize the importance of native trout to California's natural heritage, the Department shall emphasize education and outreach efforts to inform the public about our native trout, their habitats, and the activities for restoration of native trout when implementing the Heritage Trout Program.

A. Implement a Heritage Trout Angler Recognition Certificate through which anglers will have the opportunity to have their catches of California native trout recognized by the Commission. The criteria for receiving the formal recognition shall be maintained by the Department's Heritage and Wild Trout Program. To receive a certificate of recognition, anglers shall submit an application with supporting materials to the Department for review.

California State Lands Commission

The Regulatory Setting section in Chapter 13, *Land Use and Planning*, provides a discussion of the relevant regulations and policies of the CSLC.

San Joaquin River Parkway Conservancy Act

The San Joaquin River Parkway Conservancy Act (Pub. Resources Code § 32500-32520) established the San Joaquin River Conservancy (SJRC) in 1992 to provide leadership and acquire, preserve, manage, and promote access to lands within the floodplain on both sides of the San Joaquin River from the Friant Dam to SR 99. The SJRC is governed by a Board representing local agencies, state agencies, and local citizens to coordinate and mediate diverse public interests.

San Joaquin River Parkway Master Plan

The SJRC created the Parkway Master Plan (SJRC 2000) in 2000. The overarching goal of the Parkway Master Plan is to provide guidance for a harmonious combination of low-impact recreational uses, education, and natural resource protection along 22 miles of the San Joaquin River from the Friant Dam to SR 99.

The Parkway Master Plan includes a recreational element that guides the improvement and expansion of existing facilities to minimize impacts by using existing access routes, sharing support facilities, and concentrating uses away from environmentally and archaeologically sensitive areas. The plan proposes a continuous multipurpose trail to link together a system of recreation components. In addition to the land-based trails, the river itself will serve as a canoe trail. Canoe facilities will include put-in and take-out areas, spaced to provide opportunities for canoe trips of varying lengths. Canoe rest areas with vault toilets will be located so as to reduce trespass problems on private land adjacent to the river. To the extent possible, recreational areas should capitalize on opportunities associated with the reclamation of existing and future sand and gravel operations. The Parkway Master Plan encourages the use of existing ponds, as well as new ponds resulting from sand and gravel mining operations, for recreational fishing. Only uses that depend on the river should be located on the river. High-activity recreation and the associated facilities should be located as far from the river as possible. The Parkway Master Plan contains numerous policies concerning recreation area and facility development, construction, traffic, and operation.

15.2.3 Local Laws, Regulations, and Policies

The Project Area includes locations where physical actions that are part of the Proposed Project would take place, and is located in Fresno, Madera, and Merced Counties. This analysis focuses on those locations directly affected by Proposed Project. The following section reviews key recreational policies for the counties listed above, as well as local policies such as that for the Community of Friant and City of Fresno, which are relevant to the Proposed Project.

City of Fresno

The City of Fresno manages nearly 80 city and regional parks, including baseball and softball fields, basketball courts, football and soccer fields, dog parks, picnic areas, swimming pools, tennis and volleyball courts, and golf courses. The 300-acre Woodward Regional Park, which is located in Reach 1, is one of its most prominent parks.

Fresno County General Plan

The Fresno County 2000 General Plan's parks and recreation policies in the Open Space and Conservation element are based on the goal to enhance recreational opportunities in the county by encouraging the further development of public and private recreation lands, and requiring development to help fund additional parks and recreation facilities (County of Fresno 2013). Relevant details from the General Plan are discussed in the "Regulatory Setting" section of Chapter 13, *Land Use and Planning*.

Fresno County Parks

Fresno County operates a variety of regional parks and landscaped areas, including 13 parks, four fishing access areas, and a boat launch at Shaver Lake. These areas provide opportunities for picnicking, fishing, hiking, jogging, bird watching, nature study, softball, soccer, volleyball, camping, and more. Fresno County Parks in the SCARF vicinity include Lost Lake Recreation Area and Skaggs Bridge Park.

Friant Community Plan

Following are goals and policies of the Friant Community Plan (County of Fresno 2011a) that are applicable to the Proposed Project.

<u>Land Use Element</u>

- *Goal 1:* Enhance Friant's position as the "Regional Recreational Center."

- *Policy 1.5*: Recommend, if appropriate, that new projects connect with established or planned trails to access the San Joaquin River Parkway and Lost Lake Recreation Area as new development projects are submitted for Site Plan Review.

Madera County General Plan

Section 4, "Recreational and Cultural Resources," of the *Madera County General Plan* (County of Madera 1995) includes goals and policies to promote the development and expansion of public and private land for recreational use.

Merced County General Plan

Merced County contains approximately 114,000 acres of county, state, and federal parks and recreation areas and public open space areas. The Merced County Year 2000 General Plan was adopted in 1990 (Merced County 1990). Merced County is in the process of updating its General Plan. The 2030 Merced County General Plan Planning Commission Review Draft (Merced County 2011) Recreation and Cultural Resources Element recognizes that recreational resources provide economic, health, and open space benefits. The updated 2030 General Plan provides guidelines for the preparation of a Regional Parks and Recreation Facilities Master Plan.

San Joaquin River Parkway and Conservation Trust

The SJRPCT is a 501(c)3 non-profit organization that was created in 1988 to establish a continuous greenway along the San Joaquin River in the rapidly urbanizing Fresno and Madera counties. The SJRPCT partners with state and federal agencies and local governments to protect land through fee title acquisition and habitat restoration. In 1989, the SJRPCT developed the *San Joaquin River Parkway and Environs Conceptual Plan*, which became the basis for the Parkway Master Plan.

15.3 Environmental Setting

15.3.1 Potentially Affected Area

The Potentially Affected Area includes all locations accessible to salmon released under the Proposed Project, including the Pacific Ocean (see Figure 2-1). Within the state, the Potentially Affected Area encompasses all waterways draining to San Francisco Bay Estuary that do not have barriers to passage. This includes public recreational areas managed by Reclamation, State Parks, and county/municipal park agencies. Recreational opportunities in the Potentially Affected Area include fishing, hiking, biking, horseback riding, boating (motorized and non-motorized boats), hunting, camping, picnicking, and wildlife viewing. Fishing and boating occur on rivers, creeks, lakes, bays, and the ocean, including those that would be accessible to salmon released under the Proposed Project. This section focuses primarily on fishing in the Potentially Affected Area. Other water-based recreational activities, such as boating and wildlife viewing, are discussed in more detail below in Section 15.3.2, *Project Area* and Section 15.3.3, *SCARF Site*.

Fishing is a moderately popular sport in California. Although there are no known studies specifically for the Potentially Affected Area, according to a statewide study conducted by USFWS in 2011, 1.7 million people 16 years old and older fished in California. Of this total, 1.6 million anglers (94%) were state residents and 98,000 anglers (6%) were nonresidents. Anglers fished an average of 14 days per person. All fishing-related expenditures, including equipment, bait, lodging, food, and transportation, in California totaled $2.3 billion in 2011; approximately 59% of the total expenditures were for freshwater fishing (USFWS 2013).

As discussed above in Section 15.2.2, *State Laws, Regulations, and Policies*, sport fishing is regulated by the Commission. Stocked fish commonly caught by anglers in the Potentially Affected Area include trout (rainbow, brook, brown, lake, golden, and Lahontan cutthroat), steelhead (anadromous rainbow trout), and kokanee, Coho, and Chinook salmon—all of which are stocked by CDFW. All of these species are native to California except brook, brown, and lake trout. Wild, or natural-origin, fish may not be harvested.

CDFW has stocked California's water with fish from hatcheries it operates for more than 100 years to enhance sport fishing by increasing catchable fish abundance (CDFG 2011). Fish planted by CDFW are cold water fish — trout, steelhead, and salmon. CDFW plants fish in creeks and rivers, reservoirs, low-elevation lakes, and high mountain lakes. Each of these three types of fish offers a distinctly different fishing experience.

Some lakes and streams are stocked with fish from private hatcheries by local agencies or private organizations. Some private organizations stock ponds on private land that are hydrologically disconnected from public waters. Fish produced in private hatcheries include rainbow trout, black bass (e.g., largemouth bass and smallmouth bass), sunfish (e.g., bluegill and redear sunfish), crappie (e.g., black crappie and white crappie), catfish (e.g., channel catfish and blue catfish), Sacramento perch, and white sturgeon (CFDG 2011). Private ponds throughout many counties in California are exempt from fish-stocking permit requirements, and almost no information is available on the extent of stocking or fishing in these waters.

15.3.2 Project Area

Few public recreational facilities exist in the Project Area outside of the vicinity of the SCARF site, which is discussed separately below. As noted in Chapter 13, *Land Use and Planning*, almost 60% of the Project Area is currently used for agriculture. Much of the remaining land is privately owned idle agricultural land or pasture (Reclamation and DWR 2012). The San Joaquin Valley in general has few state parks to serve its growing population. While the San Joaquin Valley comprises 19% of California's land, it contains only 4% of California's public land. The region's residents travel an average of 50 minutes to reach favorite recreation areas—up to twice as long as residents of southern California or the Bay Area (State Parks 2009b).

Amid the agricultural land, there are a number of federal wildlife refuges, state wildlife management areas, and state parks in and near the Restoration Area. The majority of these are in Merced County. Some are inland; others are adjacent to the San Joaquin River.

San Luis National Wildlife Refuge Complex

The San Luis NWR Complex (comprised of the San Luis NWR, Merced NWR, San Joaquin River NWR, and the Grasslands Wildlife Management Area) is mostly in or near the San Joaquin River in the downstream reaches of the Restoration Area in Reaches 4 and 5 of the Project Area. The Complex consists of nearly 45,000 acres of wetlands, grasslands, and riparian habitats, as well as more than 90,000 acres of conservation easements on private lands for the protection and benefit of wildlife. These refuges have been established to provide habitat for endangered or sensitive species, particularly the Aleutian Canada goose, bald eagle, San Joaquin kit fox, fairy/tadpole shrimp, California tiger salamander, tricolored blackbird, white-faced ibis, and Swainson's hawk, and to protect some of the region's unique natural communities including vernal pools and wetlands. Hunting for waterfowl, fishing, and boating are allowed in some of the protected and managed areas.

State Wildlife Areas

A number of wildlife areas are managed by CDFW in the Project Area and provide some recreational opportunities.

Northgrasslands Wildlife Area

This CDFW Wildlife Area, comprised of several separate units (China Island, Galdwall, and Salt Slough), is adjacent to the San Luis National Wildlife Area and the San Joaquin River in Reaches 4 and 5. The 7,069 acres of wetlands, riparian habitat and uplands provide habitat for Swainson's hawk, sandhill crane, and numerous other wildlife species. Allowable uses include camping, hunting, fishing, boating, and wildlife viewing.

Volta Wildlife Area

Volta Wildlife Area is located south of the Northgrasslands Wildlife Area, east of Hwy 65, and north of Hwy 152 in Reach 4. The 2,891 acres of managed marsh and valley alkali shrub are accessible by foot only, except for permitted hunters during waterfowl season. Shotguns and archery equipment are allowed.

Los Banos Wildlife Area

Los Banos Wildlife Area, located north of Hwy 152, is situated between units of the North Grasslands Wildlife Area in Reach 4. The 6,217 acres of wetland habitat includes lakes, sloughs and managed marsh. The primary recreational use is hunting; however, hiking, biking, and bird watching are allowed with a CDFW-issued Land Pass.

San Luis Reservoir Wildlife Area/ Cottonwood Creek Wildlife Area

These Wildlife Areas surround the northern edge of the San Luis Reservoir and east of Reach 4. The 902 acres of steep oak-grassland habitat, typical of the inner coastal range are accessible by foot only. Several mammals are found in the Area, including gray fox, black-tailed deer and wild pigs. Wildlife viewing and hunting are allowed.

Mendota Wildlife Area

Mendota Wildlife Area is located in Reach 2 south of the Mendota Dam. The 11,802 acres consist of flatlands and floodplain. Allowable uses include camping, hunting, fishing, and wildlife viewing.

Alkali Sink Ecological Reserve

This Ecological Reserve is adjacent to the Mendota Wildlife Area in Reach 2. Seasonal hunting and wildlife viewing are allowed.

Kerman Ecological Reserve

Slight east of Alkali Sink Ecological Reserve, Kerman Ecological Reserve provides seasonal hunting opportunities in addition to wildlife viewing.

Great Valley Grasslands State Park

Great Valley Grasslands SP is situated in Merced County between two units of the San Luis NWR near the intersection of Highways 140 and 165 in Reach 5. The park preserves one of the few intact examples of native grasslands in the Central Valley. Several rare and endangered plant and animal species inhabit the park, including alkali sacaton, a native bunch grass, and the Delta button celery (*Eryngium racemosum*), a state listed endangered species found in the flood plain of the San Joaquin River. Biologists have also reported occurrences of the California tiger salamander and endangered vernal pool fairy shrimp and tadpole shrimp. Springtime wildflower displays, fishing and wildlife watching attract visitors to this undeveloped park, which also encompasses the former Fremont Ford State Recreation Area (State Parks 2013). Great Valley Grasslands SP seems even larger than its 2,700-acres because it is bordered by state and federal wildlife refuges (McKinney 2012a). The remote park is visited mostly by locals who come to fish for bass and catfish from the banks and sand bars of the San Joaquin River. Hikers can take a 6 mile dirt trail through the great grassland by crossing levees that wind through a series of sloughs and oxbows.

San Luis Reservoir State Recreational Area

East of Reach 4 on Hwy 152, San Luis Reservoir SRA is noted for boating, board sailing, camping, fishing, and picnicking. San Luis Reservoir was constructed as a storage reservoir for runoff from the Delta for the federal Central Valley Project and the California State Water Project.

Mendota Pool

Mendota Pool is a 1,200 acre reservoir and popular fishing spot located about 2 miles east of Fresno, at the confluence of the San Joaquin River and Fresno Slough in Reach 2. Fresno Slough connects the San Joaquin River to the Kings River. The pool behind the dam redistributes water delivered by the Delta-Mendota Canal to canals that convey water for agricultural use. Mendota Pool is one of the few areas downstream of Reach 1 that provides public access to the San Joaquin River other than the state and federal Wildlife Areas described above.

15.3.3 SCARF Site

Friant is known as Fresno County's "Gateway to Recreation" (County of Fresno 2011a). The *Friant Community Plan* identifies miles of trails and bikeways to facilitate access to recreational opportunities in the region. CDFW, in cooperation with the SJRC, is planning the San Joaquin Hatchery Public Access and Trail Project, to develop a paved universal accessible trail to connect Lost Lake Park, immediately downstream of the SCARF site, with the SJFH. It will be approximately 1 mile in length and 12 feet in width. There will be a parking area located on the corner of Friant Road and Fleming Avenue on land owned by SJRC. The SJFH attracts approximately 20,000 visitors annually, including school field trips (CDFG 2011). The public can view and feed trout in the hatchery raceways (Reclamation and DWR 2012).

The SCARF site is situated on the San Joaquin River, along the northern boundary of Fresno County, directly across the river from Madera County. Currently, the two counties have lower population densities and median age than the California average. Nonetheless, urban developments on both sides of the river are gradually growing toward the river, and population increases in both counties are expected to be much higher than the state average in the coming years. The combined population of Fresno and Madera Counties is projected to increase by over 50% by 2040 and almost double today's population by 2060, to approximately 1,989,330 people (DOF 2013). An increase in population is likely to result in more demand for recreational opportunities and facilities over time. State Parks has proposed to increase campsites, trails, and boating facilities at Millerton Lake SRA and to enhance the existing campsites and create new trails and fishing access on the Kings River, which is southeast of the SCARF site (State Parks 2009a).

Fishing is among the more popular outdoor activities in the area. There are a number of parks near the SCARF site, many of which provide access to the river: Sycamore Island Ranch, Woodward Park, Jensen River Ranch, Lost Lake Park, Fort Washington Beach, Wildwood Native Park, and Friant Cove. Additionally, Millerton Lake SRA is a popular destination for fishing and boating. There are numerous other lakes, rivers, and ponds for fishing; local conditions are available in the Fresno Bee's weekly fishing report. Following are descriptions of a few of the existing water-based recreational opportunities near the SCARF site.

San Joaquin River Upstream from Friant Dam

<u>Millerton Lake State Recreation Area</u>

Millerton Lake SRA is upstream of Friant Dam. The lake itself is more than 15 miles long and was formed by the construction of Friant Dam in 1944. There are three entrances to Millerton Lake SRA: Winchell Cove Road, Sky Harbor Road, and the main park entrance approximately 1.6 miles east of the Town of Friant. Millerton Lake SRA has six boat ramps with more than 500 boat slips, six camping areas with a total of 149 campsites, and extensive day-use facilities. Annual visitation for fiscal year 2007–2008 was 292,807 people. In previous years, the annual number of visitors has been as high as 633,889. Many factors may influence the number of visitors, including entrance fees, weather, economic conditions, and gasoline prices (Reclamation and State Parks 2010).

Millerton Lake has a storage capacity of 520,500 af. Friant Dam controls the water level within Millerton Lake. Millerton Reservoir supplies water for irrigation and some potable use, and serves as a flood control structure. Water levels fluctuate greatly between summer and winter. During summer months, the water level can drop as much as 1 foot per day. Snowmelt in the winter and spring can cause the water level to rise 10–15 feet per day (Reclamation and State Parks 2010).

San Joaquin River Trail

The San Joaquin River Trail traverses the south side of Millerton Reservoir for more than 12 miles. It is a backcountry trail that connects to trails in the San Joaquin River Gorge Management Area, administered by the Bureau of Land Management. There are primitive camping facilities, interpretive displays, and river access for boaters and anglers. The trail is still undergoing expansion. Once complete, it will reach approximately 73 miles, from the Friant Dam to the Pacific Crest Trail in the High Sierra near Devils Postpile National Monument (San Joaquin River Trail Council 2012).

San Joaquin River from Friant Dam to Gravelly Ford

Between Friant Dam and Gravelly Ford (west of SR 145), including immediately adjacent to the SCARF site, the San Joaquin River flows year-round. Summer flows are generally low and calm, and provide ample opportunities for swimming, fishing, rafting, and canoeing; during winter, the flows are higher and more swift, providing whitewater canoeing and kayaking opportunities (Reclamation and DWR 2012). Downstream of Gravelly Ford was almost entirely dry year-round, except during high-flow events, until flows were restored recently under the San Joaquin River Restoration Program.

CDFW regularly stocks the San Joaquin River below Friant Dam with rainbow trout (*Oncorhynchus mykiss*), providing ample trout fishing opportunities year-round. Non-native brook trout (*Salvelinus fontinalis*) also can be found in the Lost Lake area. A 2010-2012 survey by the California State University, Fresno (CSUF) estimated that approximately 138,000 individual recreational visits occur in this reach of the San Joaquin River each year (California State University, Fresno 2012). Multiple ponds that were created in abandoned mining gravel pits are located in this reach and stocked with game fish.

Friant Cove

Friant Cove is located slightly upstream of the SCARF site, at the corner of Road 206 and Millerton Road. The site provides a boat launch facility, restrooms, and a park-and-ride facility. The park is owned by the SJRC. Friant Cove is a very popular fishing site on the San Joaquin River, due to its year-round cold water and trout stocking by CDFW. During the

CSUF study, angling pressure was consistently high at the site. Ninety-six percent of anglers surveyed at Friant Cove and Lost Lake Park indicated that they were targeting rainbow trout. Based on those surveys, anglers kept 81-85% of fish caught at Friant Cove (California State University, Fresno 2012), suggesting that this location provides both recreation and a source of food for anglers.

Lost Lake Recreation Area

Lost Lake Recreation Area, otherwise known as Lost Lake Park, is a Fresno County park. It encompasses approximately 300 acres along 1.8 miles of the southern bank of the San Joaquin River, immediately downstream of the SCARF site. Lost Lake Park provides opportunities for camping, fishing, wildlife viewing, hiking, and picnicking. There are multiple access points to the river, several seasonal and perennial ponds, multi-use trails, and currently 40 campsites. The *Lost Lake Park Master Plan* (County of Fresno 2011b) includes goals of increasing the facilities and number of campgrounds in the park. A survey in 2000 found that approximately 60% of the visitors to Lost Lake Park participated in fishing, amounting to approximately 1,600 anglers per year. Many of those anglers visited the park multiple times, totaling about 18,000 fishing days (Reclamation and DWR 2012). The CSUF study found that as many as 50 anglers may fish at Lost Lake Park on one weekend day. Surveyed anglers kept 81-87% of fish caught at Lost Lake Park. Non-fishing recreation during the summer was observed to draw crowds of more than 2,000 people per day to the park (California State University, Fresno 2012).

Ball Ranch

Ball Ranch, which is on the Fresno side of the San Joaquin River near Willow Avenue, slightly downstream of Lost Lake Park, contains a former gravel mining pit that was popular with anglers until developers prohibited public access in the 1980s. The SJRC acquired the 358 acres in order to preserve it from development. Initially, the SRJC leased the land for cattle grazing and outdoor education; however, they reopened the area to the public for fishing and hiking during some weekend days in February 2013.

Sycamore Island Park

Sycamore Island Park is owned by the SRJC and managed by the SJRPCT. The park is located on the Madera County side of the San Joaquin River near Fresno and includes a number of ponds in retired gravel mining pits. Some ponds at Sycamore Island Park are hydraulically connected to the river, while others are isolated except during extreme flood flows. Visitors to the park enjoy canoeing, picnicking, hiking, and fishing for warm-water species such as black bass, catfish, blue gill, and crappie. In 2012, CDFW began stocking an isolated pond with rainbow trout during the winter and early spring to enhance trout fishing opportunities in the San Joaquin River corridor.

Camp Pashayan

Camp Pashayan is a 31-acre Ecological Reserve managed jointly by the SJPPCT and CDFW and located at the downstream end of Reach 1, north of Herndon Avenue and east of SR 99. Camp Pashayan has several picnic areas as well as a picnic shelter, and a boat launch appropriate for hand-carried boats such as canoes and kayaks. Until recently, it was only open to organized and permitted groups, mostly school groups. As of March 2013, it is open to the public for fishing and boating.

Skaggs Bridge Park

Skaggs Bridge County Park along the San Joaquin River near SR 145 is the second-most popular public access recreation site on the river, according the CSUF study. Crowds in excess of 1,500 people were observed on a few occasions in the summers of 2011 and 2012. Recreational activities at Skaggs Bridge Park are primarily picnicking, swimming, and land-based sports. Fishing is not known to be one of the primary activities at the park, although some anglers were observed during surveys (California State University, Fresno 2012).

15.4 Impact Analysis

15.4.1 Methodology

This impact analysis describes the impacts on recreation associated with implementation of the Proposed Project. Impacts of the Proposed Project were evaluated qualitatively, based on the potential for the Project to disrupt existing recreational facilities, access, and uses. Generally, construction activities may result in a short-term loss of recreational opportunities by disrupting use of or access to recreation areas or facilities. A long-term effect could occur if a recreational opportunity is eliminated as a result of implementation and/or operation of the Proposed Project.

15.4.2 Criteria for Determining Significance

The Proposed Project would result in a significant impact on recreation if it would:

A. Increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated, or

B. Include recreational facilities or require the construction or expansion of recreational facilities that might have an adverse physical impact on the environment.

15.4.3 Environmental Impacts

Table 3-1 identifies components of the Proposed Project with the potential to result in impacts to recreational resources. There are potential impacts on the physical environment of recreational facilities from the construction, operation, fish reintroduction, and recreation management components of the Proposed Project. Table 15-1 summarizes the potential impact to recreation resources from the Proposed Project. Each impact is discussed in further detail in the section below.

SCARF Construction

Impact REC-CONSTRUCT-1: Temporary Closure of the San Joaquin Hatchery Public Access and Trail Project Could Result in an Increase in Recreational Use at Neighboring Facilities during SCARF Construction, such that a Substantial Deterioration of Facilities Would Occur (Significance Criterion A, Project Level, Less than Significant with Mitigation)

The SCARF site is situated between the existing SJFH and Lost Lake Park. Both sites are popular with recreationists, tourists, and school groups. Construction activities of the Proposed Project would not interfere with the use of the existing SJFH or Lost Lake Park. Construction traffic would enter the project site from East Belcher Avenue, a road that is not used by either of the neighboring facilities, and staging areas for construction equipment would not reduce parking areas for the other facilities.

The San Joaquin Hatchery Public Access and Trail Project is still in development. If it is completed before the construction of the SCARF, the Proposed Project might temporarily limit use of the new trail by the public for safety reasons or damage the trail. Implementing Mitigation Measures REC-CONSTRUCT-1a, REC-CONSTRUCT-1b, and REC-CONSTRUCT-1c would reduce this impact to less than significant.

Mitigation Measure REC-CONSTRUCT-1a: Reroute the Trail during Construction.
CDFW will coordinate construction activities with the SJRC to minimize to the extent and duration of rerouting of the newly built San Joaquin Hatchery Public Access and Trail during construction of the SCARF.

Mitigation Measure REC-CONSTRUCT-1b: Provide Signage during Construction.
CDFW or its contractor shall provide signage during construction of the SCARF to notify those using the San Joaquin Hatchery Public Access and Trail of trail and access disruptions.

Mitigation Measure REC-CONSTRUCT-1c: Rebuild the Trail if Damaged during Construction.
If the San Joaquin Hatchery Public Access and Trail becomes damaged during construction of the SCARF, CDFW or its contractor shall re-construct damaged trail and public access points within 2 years of the damage.

SCARF Operations

Impact REC-OP-1: SCARF On-site Operations Would Not Increase Use of Existing Recreational Facilities such that Substantial Deterioration of Existing Facilities Would Occur (Significance Criterion A, Project Level, Less than Significant)

As noted in Chapter 3, Section 3.3.3, *Population and Housing*, the Proposed Project would not induce significant population growth in or near the Community of Friant. As such, operation of the SCARF would have little impact on recreational demand related to population growth. Furthermore, the operation of the SCARF would not remove any existing recreational facilities. Therefore, the operation of the SCARF will not affect demand for, or result in accelerated deterioration of, recreational facilities. This impact is considered less than significant.

Impact REC-OP-2: Operation of SCARF Would Provide New Recreational Facilities (Significance Criterion B, Project Level, Beneficial)

The design of SCARF allows for public use of the planned San Joaquin Hatchery Public Access and Trail Project. Temporary adverse impacts on the trail from construction are discussed above, under Impact REC-CONSTRUCT-1. Once construction is complete, there would be no potential adverse impacts. Moreover, operation of the SCARF would provide educational opportunities and public viewing areas for the SCARF operations. Therefore, this impact would be beneficial.

Fish Reintroduction

Impact REC-REINTRO-1: An Increase in Recreational Opportunities Would Occur in the Potentially Affected Area from the Reintroduction of Chinook Salmon (Criteria A and B, Project Level, Beneficial)

The Proposed Project would reintroduce Chinook salmon into the San Joaquin River between Friant Dam and the Merced River. An increase in the population of Chinook salmon—a highly valued game fish—would result in a greater number of migrating salmon downstream of the Merced River confluence all the way to the Pacific Ocean. This may result in enhanced fishing opportunities within the Potentially Affected Area should populations become sufficient to sustain recreational harvest and regulatory processes are in place to protect populations. This is not anticipated to increase demand for recreational fishing facilities in any location to such a degree that deterioration of these facilities would be likely to result, or create a need for new or expanded facilities. Therefore, this impact would be beneficial.

Fisheries Management

Impact REC-MANAGEMENT-1: Operation of Fish Segregation Weirs and/or Equipment Associated with Trap and Haul Activities Could Interfere with Recreational Boat Traffic such that Substantial Physical Deterioration of Existing Facilities Would Occur or New Facilities Would Need to Be Built that Could Have an Adverse Impact on the Environment (Significance Criteria A and B, Project/Program Level, Less than Significant)

Fish segregation weirs could be utilized for the purposes of separating spring- and fall-run Chinook salmon and to block access of salmonids to certain areas in the Restoration Area. The necessity for and exact location of weirs will be determined once spring- and fall-run Chinook salmon are established in the Project Area and the quantity and quality of spawning habitat available to the salmon runs are better understood One existing barrier, HFB, may be moved, and others might be built. Fyke nets or other fish traps may also be used for trap and haul operations during periods of Chinook salmon migration, as well as equipment associated with streamside rearing. As with the current HFB, signs and/or buoys would be placed both upstream and downstream of the nets or weirs to instruct boaters on how to safely avoid them. Traps and other instream equipment would include flagging on all cables that anchor equipment to the riverbank, making cables visible to boaters. Similarly, RSTs will be marked with brightly colored flagging and solar- or battery-powered flashing lights to alert boaters. Signage and/or buoys will be placed in the river channel upstream and downstream of each trap to instruct boaters on how to safely avoid or navigate past the RSTs. Metal or plastic signs not greater than 2 feet by 3 feet by 1/2-inch thick will be attached to buoys and floated in the center of the channel. While traps and/or weirs may present an obstacle to boat passage, this would only occur seasonally, and may coincide with periods when boating is not prevalent (e.g., winter months). These circumstances are not anticipated to result in substantial physical deterioration of any existing recreational facilities or require construction of new facilities. For this reason, this impact is considered to be less than significant.

The impact analysis and significance conclusion above is considered project-level for trap and haul activities and operation of the existing HFB, and programmatic for and new or reconstructed weirs or barriers. For further discussion of the approach to the project and programmatic analysis in this document, please see Chapter 3, *Introduction to the Environmental Analysis*.

Fisheries Research and Monitoring

Impact REC-MONITORING-1: Potential for Research and Monitoring Activities to Affect Boating in the Restoration Area such that Substantial Physical Deterioration of Existing Facilities Would Occur or New Facilities Would Need to Be Built that Could Have an Adverse Impact on the Environment (Significance Criteria A and B, Project Level, Less than Significant)

Field-based research and monitoring activities in the Restoration Area could include the use of rotary screw traps, fry traps, and a variety of nets. All wires and cables anchoring such devices would be marked with brightly colored flagging and flashing lights as to be easily seen. Signage and/or buoys will then be placed both upstream and downstream of traps to instruct boaters on how to safely avoid the trap. Traps will be configured in such a way as to permit boat passage on one side of the river channel. As a result, boaters would be able to safely bypass these features. This is not anticipated to increase demand for recreational fishing facilities in any location to such a degree that deterioration of these facilities would be likely to result, or create a need for new or expanded facilities. This impact is considered to be less than significant.

Recreation Management

Impact REC-RECREATION-1: Restriction of Angling Opportunities Could Occur in Spawning Areas, Resulting in Substantial Physical Deterioration of Existing Recreational Facilities (Significance Criterion A, Program Level, Less than Significant)

Reintroduced salmon may be vulnerable to poaching in the San Joaquin River, especially because adult salmon will be holding and spawning in reaches of the river that provide angling opportunities. Spring-run Chinook salmon will be especially vulnerable to poaching because they tend to group in high densities and have long exposure time to poaching opportunities during their holding phase (all summer); also, multiple public access points on the San Joaquin River channel between Friant Dam and SR 99 exist (FWUA and NRDC 2002). To the extent that the Proposed Project could have angling-related impacts to fish in the Restoration Area, those impacts are addressed in Chapter 6, *Biological Resources - Fisheries*. It is anticipated that the Commission will adopt new regulations in the Restoration Area to prevent disturbance or destruction of salmon redds by wading anglers, accidental take of salmon, and poaching of reintroduced salmon in holding habitat. Although CDFW provides the Commission with guidance for fishing regulations, the adoption of such regulations is not under the jurisdiction of CDFW, and as such is not an action that is part of the Proposed Project. However, as part of the Proposed Project, CDFW may increase enforcement of any such regulations adopted by the Commission. In addition, CDFW would cease stocking trout in the Restoration Area. Enforcement may increase in response to regulation changes; and changes in trout stocking could displace angling opportunities in the reach of the San Joaquin River between Friant Dam and the Merced River. To the extent that the Proposed Project could result in a shift in angling activity from the Restoration Area to other areas, with resulting physical deterioration of the existing areas due to loss of use those impacts are addressed here.

The 2011-2012 CSUF study found that approximately 15% of visitors to Lost Lake Park each year were fishing. However, non-fishing recreation was concentrated in spring and summer (April through August). More than half of park visitors during the months of October through March were anglers (California State University, Fresno 2012). Implementation of new fishing regulations could reduce attendance and adversely affect revenues at Lost Lake Park and other local facilities; this could cause deterioration of the facilities. Some anglers would choose not to fish or would choose other fishing opportunities, such as warm-water fishing in former gravel pits and ponds in the vicinity or reservoirs such as Pine Flat, Shaver, Bass, Hensley, and Millerton Lakes.

In addition, the Proposed Project includes actions to enhance angling opportunities in the San Joaquin River Corridor. These actions potentially include restoring or enhancing off-channel ponds (i.e., ponds or abandoned gravel mining pits without river connectivity) for recreational fishing; providing access to facilities for additional fishing opportunities in or near the Restoration Area; stocking trout for recreational fishing in off-channel ponds near the San Joaquin River; changing stocking practices in the San Joaquin River below Friant Dam to protect reintroduced Chinook salmon; and/or increasing monitoring of recreational activities within the Restoration Area. CDFW has begun planning activities for this action, including identification of potential off-channel ponds, study of current hydrologic and habitat conditions, and conceptual design of improvements. The target for fish stocking in off-channel ponds would be the amount currently stocked in the San Joaquin River near Friant Cove and at Lost Lake Park. Trout allotments for SJFH vary annually and are set in August or September for the following year, but a typical annual allotment for the San Joaquin River is 18,000-20,000 pounds of trout. As stocking ceases in the San Joaquin River, those fish would be planted instead in off-channel ponds that would be enhanced for recreational fishing. It is anticipated that three to four off-channel ponds could support the number of trout expected to be stocked, and that fish could be stocked in approximately November through April each year, depending on pond conditions (e.g., water temperature). Angling opportunities are therefore not expected to decrease due to changes in trout stocking in the Restoration Area, except during summer months when water temperatures in the pond would not support trout. Consequently, it is not anticipated that changes in angling opportunities in the Restoration Area would displace anglers in such a way that it would result in the physical deterioration of other angling locations. Impacts are therefore considered less than significant.

Impact REC-RECREATION-2*:* Construction or Altering of Fishing Ponds Could Have an Adverse Physical Impact on the Environment (Significance Criterion B)

As discussed above under Impact REC-RECREATION-1, as part of the Proposed Project, CDFW is assessing locations for enhancing recreational angling opportunities in off-channel ponds adjacent to the San Joaquin River between SR 99 and Friant Dam. Although unlikely, depending on the locations chosen by CDFW, construction, operations, and maintenance of recreational fishing ponds could potentially result in adverse impacts to the physical environment. The adverse impacts of pond and other recreational enhancements have been discussed elsewhere in other topical sections of this DEIR, along with the relevant impact conclusions, which range from “no impact” to “significant and unavoidable,” and are summarized below in Table 15-1. Accordingly, this impact discussion does not make a significance conclusion, but rather defers to those other analyses.

Table 15-1. Impacts Related to Construction of Enhanced Recreation Facilities

Impact	Significance Conclusion
Impact AQ-RECREATION-1: Potential for Construction Activities Related to Enhancing Recreational Fishing Opportunities to Conflict with or Obstruct Implementation of SJVAPCD's Air Quality Plans; Exceed the SJVAPCD's ROG, NO_x, PM_{10}, $PM_{2.5}$, CO, and SO_x Significance Thresholds; or Expose Sensitive Receptors to Substantial Pollutant Concentrations	Less than Significant with Mitigation
Impact AQ-RECREATION-2: Potential for Operational Activities Related to Enhancing Recreational Fishing Opportunities to Conflict with or Obstruct Implementation of SJVAPCD's Air Quality Plans; Exceed the SJVAPCD's ROG, NO_x, PM_{10}, $PM_{2.5}$, CO, and SO_x Significance Thresholds; or Expose Sensitive Receptors to Substantial Pollutant Concentrations	Less than Significant
Impact AQ-RECREATION-3: Recreation Management Construction Activities Could Create Objectionable Odors Affecting a Substantial Number of People	Less than Significant
Impact FISH-RECREATION-1: Impacts on Special-Status Fish Species during Construction of Improvements at Recreational Angling Sites	Less than Significant with Mitigation
Impact FISH-RECREATION-2: Spread of Disease between Stocked and Natural Fish from Stocking Fish in Off-Channel Ponds for Recreational Fishing	Less than Significant
Impact FISH-RECREATION-3: Inadvertent Harvesting of Listed Salmonids as a Result of Improved Access for Recreational Fishing Enhancements	Less than Significant
Impact FISH-RECREATION-4: Riparian or Instream Habitat Degradation or Spread of Invasive Species or Pathogens from Recreational Fishing Enhancements	Significant and Unavoidable
Impact BIO-RECREATION-1: Impacts to Special-Status Plant Species during Construction of Improvements at Recreational Angling Sites	Less than Significant with Mitigation
Impact BIO-RECREATION-2: Impacts to Special-Status Plant Species by Increased Traffic of Anglers and Other Recreational Users	Less than Significant with Mitigation
Impact BIO-RECREATION-3: Impacts to Special-Status Wildlife Species during Construction of Improvements at Recreational Angling Sites	Less than Significant with Mitigation
Impact BIO-RECREATION-4: Impacts to Special-Status Wildlife Species by Increased Traffic of Recreational Anglers	Less than Significant
Impact BIO-RECREATION-5: Construction of Angling Enhancements May Impact Riparian Habitat and Other Sensitive Natural Communities	Less than Significant with Mitigation
Impact BIO-RECREATION-6: Impacts to Federally Protected Wetlands Associated With Construction of Angling Enhancements	Less than Significant with Mitigation
Impact BIO-RECREATION-7: Construction of Angling Enhancements Could Interfere With Wildlife Movement, Established Wildlife Corridors, or the Use of Native Wildlife Nursery Sites	Less than Significant with Mitigation
Impact CR-RECREATION-1: Impacts on CRHR-eligible Archaeological Resources from Recreation Enhancement Actions	Less than Significant with Mitigation
Impact CR-RECREATION-2: Impacts to CRHR-eligible Structures from Recreation Enhancements	Less than Significant with Mitigation
Impact CR-RECREATION-3: Disturb Human Remains, Including Those Interred outside of Formal Cemeteries, from Recreation Enhancement	Less than Significant with Mitigation
Impact GEO-RECREATION-1: Required Geotechnical Investigation as a Result of Additional Structural Improvements before Initiation of Recreation Management Activities	Less than Significant with Mitigation
Impact GEO-RECREATION-2: Potential Loss of Soil Productivity and Potential Degradation of Receiving Waters Resulting from Soil Erosion or the Loss of Topsoil Caused by Construction Activities Associated with Enhancing Fishing Opportunities in or Near the Recreation Area	Less than Significant with Mitigation
Impact GHG-RECREATION-1: Potential for Construction Activities Related to Enhancing Recreational Fishing Opportunities to Generate Substantial GHG Emissions or Conflict with the CARB's Applicable Plans, Policies, or Regulations Adopted for the Purpose of Reducing the Emissions of GHGs	Significant and Unavoidable
Impact GHG-RECREATION-2: Potential for Operational Activities Related to Enhancing Recreational Fishing Opportunities to Generate Substantial GHG Emissions or Conflict with the CARB's Applicable Plans, Policies, or Regulations Adopted for the Purpose of Reducing the Emissions of GHGs	Less than Significant
Impact HAZ-RECREATION-1: Potential Risk to the Public or Environment, including Nearby Sensitive Receptors, from an Accidental Spill during Transport, Use, and Disposal of Hazardous Materials during Construction and Operational Activities Associated with Enhancing Recreational Fishing Opportunities	Less than Significant
Impact HAZ-RECREATION-2: Potential for Construction and Operations Activities Related to Enhancing Recreational Fishing Opportunities to Take Place on a Site that Is Included on a List of Hazardous Materials Sites Compiled pursuant to California Government Code Section 65962.5	Less than Significant with Mitigation

Impact	Significance Conclusion
Impact HAZ-RECREATION-3: Potential for Recreation Management Activities to Take Place within Two Miles of a Public Airport or Private Airstrip	Less than Significant with Mitigation
Impact HAZ-RECREATION-4: Potential for Construction Activities Related to Enhancing Recreational Fishing Opportunities to Impair Implementation of, or Physically Interfere with, an Adopted Emergency Response Plan or Emergency Evacuation Plan	Less than Significant with Mitigation
Impact HAZ-RECREATION-5: Potential for Operational Activities Related to Enhancing Recreational Fishing Opportunities to Impair Implementation of, or Physically Interfere with, an Adopted Emergency Response Plan or Emergency Evacuation Plan	Less than Significant
Impact HAZ-RECREATION-6: Potential Fire Hazard from the Use of Equipment within or near Vegetated Areas	Less than Significant
Impact HYD-RECREATION-1: Effects on Water Quality & Hydrology from Construction of Improvements at Recreational Angling Sites	Less than Significant with Mitigation
Impact HYD-RECREATION-2: Effects on Water Quality from Increased Foot Traffic of Anglers and Other Recreational Users	Less than Significant
Impact LU-RECREATION-1: Potential for Enhanced Recreational Ponds to Divide an Established Community between Friant Dam and State Route 99	No Impact
Impact LU-RECREATION-2: Potential for Enhanced Recreational Ponds to Conflict with Land Use Plans, Policies, or Regulations or adjacent Existing and Planned Land Uses	Less than Significant with Mitigation
Impact LU-RECREATION-3: Potential for Enhanced Recreational Facilities to Conflict with Habitat Conservation Plans, Natural Community Conservation Plans, or Other Local Habitat Conservation Plans	No Impact
Impact NOISE-RECREATION-1: Potential for Recreation Management Activities to Expose Persons to Noise and Vibration Levels that Exceed Applicable Standards Established by a Local General Plan or Noise Ordinance or by Agencies with Jurisdiction	Less than Significant with Mitigation
Impact TR-RECREATION-1: Potential Impacts on Roadway and Intersection Operations from Trips Associated with Recreation Management Activities	Less than Significant
Impact TR-RECREATION-2: Potential Impacts on Transit, Bicycle, and Pedestrian Facilities from Trips Associated with Recreation Activities	Less than Significant
Impact UTL-RECREATION-1: Domestic Wastewater Generation and Disposal during Construction of Recreational Fishing Enhancements	No Impact
Impact UTL-RECREATION-2: Use of Water for Construction of Recreational Fishing Enhancements	Less than Significant
Impact UTL-RECREATION-3: Disposal of Solid Waste Generated during Construction of Recreational Fishing Enhancements	Less than Significant
Impact UTL-RECREATION-4: Disposal of Hazardous Materials Generated during Construction of Recreational Fishing Enhancements	Less than Significant
Impact UTL-RECREATION-5: Energy Consumption during Construction of Recreational Fishing Enhancements	Less than Significant

Chapter 16
TRAFFIC AND TRANSPORTATION

16.1 Overview

This chapter summarizes the environmental and regulatory settings related to traffic and transportation, the findings of the traffic and transportation analysis, and presents impact analysis methodology and thresholds. On this basis, the section evaluates the potential traffic impacts associated with the Proposed Project.

16.2 Regulatory Setting

16.2.1 State Laws, Regulations, and Policies

California Government Code Section 65080

The State of California requires each transportation planning agency to prepare and adopt a regional transportation plan (RTP) directed at achieving a coordinated and balanced regional transportation system.

California Streets and Highways Code Section 1 et seq.

This code provides the standards for administering the statewide system of streets and highways. Designated state route and interstate highway facilities are under the jurisdiction of Caltrans, except where facility management has been delegated to the county transportation authority.

16.2.2 Local Laws, Regulations, and Policies

Fresno County General Plan

The Fresno County General Plan includes a Transportation and Circulation Element, which provides the County's policy guidance on transportation issues (County of Fresno 2013). The Transportation and Circulation Element addresses the circulation improvements needed to provide adequate capacity for future land uses and establishes transportation routes with typical development standards. Policy TR-A.2 states that the County shall plan and design its roadway system in a manner that strives to meet Level of Service (LOS) D on urban roadways within the spheres of influence of the Cities of Fresno and Clovis and LOS C on all other roadways in the county (County of Fresno 2013).

Fresno County Regional Transportation Plan

The 2011 RTP of the Council of Fresno County Governments (Council of Fresno County Governments 2010) comprehensively assesses all forms of transportation available in

Fresno County and the need for travel and goods movement projected into the future (to the year 2035).

Fresno County Regional Bikeways Plan

The Fresno County Department of Public Works and Planning, through coordinated efforts with the Council of Fresno County Governments and various government and non-profit agencies, recently prepared and adopted the *Fresno County Regional Bicycle & Recreational Trails Master Plan* (Regional Bicycle Plan) to be eligible to receive funding from the State of California Bicycle Transportation Account (County of Fresno 2012). The Regional Bicycle Plan provides a coordinated plan for the continued development of a system of bikeways that connects bikeways within Fresno County and connects these bikeways to adjoining counties. The Regional Bicycle Plan also includes non-motorized transportation route planning in conjunction with transportation planning on streets, roads, highways, and public transit and serves as the basis for the Bicycle Facilities Element of the Transportation and Circulation Element of the Fresno County General Plan (County of Fresno 2013).

16.3 Environmental Setting

16.3.1 Potentially Affected Area

The only portions of the Potentially Affected Area that are relevant to traffic and transportation in the context of the Proposed Project are the Project Area and the SCARF site. These locations are described further below.

16.3.2 Project Area

The Project Area may include activities and truck trips conducted to and/or through the Central Valley, including Fresno, Shasta, Tehama, Glenn, Butte, Yuba, Colusa, Sutter, Placer, Yolo, and eastern Solano and Sacramento Counties. Specific roads or highways potentially used or affected by the Proposed Project activities have not been identified or described in detail because certain programmatic elements of the Proposed Project, including potential locations of Proposed Project activities, have not yet been detailed. However, information about potential roads and routes in Fresno County, in the vicinity of the SCARF site, are described.

There are numerous local and county roadways and state routes in the vicinity of the SCARF site. County roads and streets include North Friant Road, Road 206, Road 145, Avenues 12 and 15, Millerton Road, East Belcher Road, Parker Road, and Granite Road. State routes in the Project Area include SR 41. The transportation agencies with jurisdiction over roadway operating conditions in the SCARF site vicinity include the City of Fresno, Fresno County, Madera County, and Caltrans.

The major SR roadways providing vehicular access to the SCARF site are SR 41, SR 99, and SR 145. The SCARF site is approximately 5 miles southeast of SR 41 and SR 145 and 10 miles east of SR 99. SR 41 (running north out of the Fresno-Clovis Metropolitan Area) is the primary corridor to Yosemite National Park, one of the two most-visited national parks in the nation (Council of Fresno County Governments 2010). SR 145 generally runs east-west and connects the local Millerton Lake vicinity, including the Town of Friant, to the city of Madera. SR 99 is the primary state highway that extends in a north-south direction along the west side of the Sierra Nevada mountains. SR 99 connects multiple cities in the Central Valley, including Fresno and Madera. Both SR 41 and SR 145 connect to SR 99 in the cities of Fresno and Madera, respectively.

In 2011, the annual average daily traffic (AADT) volumes on SR 41, at the SR 145 intersection, ranged from 13,500 to 14,500, and the AADT for trucks at this location was approximately 10% (Caltrans 2012a, 2012b). At the intersection with Friant Road in Fresno, the AADT volumes on SR 41 ranged from approximately 42,000 to 62,000 (Caltrans 2012b). Trucks composed approximately 6% of the SR 41 AADT volumes at the intersection with Friant Road (Caltrans 2012a). The AADT for SR 145 was approximately 5,300 at the intersection with SR 41 and consisted of approximately 9% trucks (Caltrans 2012a).

The transportation analysis for the SCARF site encompasses the likely travel corridors to and from the following facilities: the SCARF (construction and operations), the Feather River Hatchery, the Quarantine Sites, and Fish Research & Monitoring Facilities. The major local and arterial roadways in the SCARF site vicinity are Road 206, North Friant Road, and Millerton Road. Road 206 connects Madera and Fresno Counties and provides a link between North Friant Road, Millerton Road, and Road 145, which becomes SR 145 east of the intersection with SR 41. North Friant Road is an arterial roadway within Friant until it intersects with the Lost Lake Park entrance road, where it becomes an expressway that eventually connects to SR 41 in the city of Fresno (County of Fresno 2013a). Millerton Road provides access to Table Mountain Casino, recreational facilities on the south side of Millerton Lake, and the rural community of Auberry. Other local roads near the SCARF site include North Waldby Avenue, Brooktrout Drive, Flemming Avenue, and East Belcher Avenue, which is an unpaved access road. Both Flemming Avenue and East Belcher Avenue provide access to the existing San Joaquin Fish Hatchery from North Friant Road. Currently, the SCARF site is generally accessed from North Friant Road via Flemming Avenue; however, the construction of the SCARF would include improvements to East Belcher Avenue, which, when complete, would serve as the primary point of access to the SCARF.

The existing LOS conditions and minimum LOS requirements for intersections are shown in Table 16-1, and traffic volumes, existing LOS conditions, and minimum LOS requirements are shown for roadway segments in the SCARF site vicinity in Table 16-2. These intersections meet the minimum LOS during traffic peak hours, with three exceptions. SR 41 experiences traffic delays during peak hours at intersections with Avenues 12 and 15, between the SR 41 and SR 145 intersection and the city of Fresno. In the city of Fresno, Friant Road experiences delays in the p.m. peak hours at its intersection with Audubon Drive. Traffic volumes during both a.m. and p.m. peak hours on the local arterial roads (Friant Road, Road 206, and Millerton Road) in the immediate SCARF site vicinity are above the lowest acceptable LOS (i.e., LOS D).

Table 16-1. Existing Peak-Hour Intersection Operations in the SCARF Site Vicinity

Intersection	Control	Peak Hour	LOS Conditions	Minimum LOS Required
Road 145/SR 41*	Signal	a.m. p.m.	B B	C
Road 145/Road 206*	TWS	a.m. p.m.	A A	D
SR 41/Avenue 15*	OWS	a.m. p.m.	**E** **F**	C
SR 41/Avenue 12*	Signal	a.m. p.m.	C **D**	C
Friant Road/Road 206	TWS	a.m. p.m.	B C	C
Friant Road/Parker Avenue	OWS	a.m. p.m.	B B	C
Friant Road/ Granite Avenue	OWS	a.m. p.m.	B B	C
Friant Road/Root Avenue	OWS	a.m. p.m.	A B	C
Friant Road/Lost Lake	OWS	a.m. p.m.	B B	C
Friant Road/Audubon Drive**	Signal	a.m. p.m.	B E	D
Friant Road/SR 41 North-Bound Off-Ramp**	Signal	a.m. p.m.	B B	C
Friant Road/SR 41 South-Bound Off-Ramp**	Signal	a.m. p.m.	C B	C

Notes: LOS = Level of Service, OWS = one-way stop, Signal = signalized intersection, SR = State Route, TWS = two-way stop.
Bold and underlined = deficient operation
* Intersection is in Madera County. All other intersections are in Fresno County.
** Indicates an intersection within the city of Fresno.
Source: County of Fresno 2009.

Table 16-2. Existing Peak-Hour Road Segment Conditions in the SCARF Site Vicinity

Road Segment	Peak Hour	Traffic Volumes*	LOS Conditions	Minimum LOS Required
Friant Road, 206 to Lost Lake	a.m. p.m.	343–399 557–560	C C	C
Friant Road, Shepherd Avenue to Audubon Drive**	a.m. p.m.	4,247 4,742	**<u>F</u>**/D **<u>F/F</u>**	D
Friant Road, Audubon Drive to N. Fresno Street**	a.m. p.m.	3,693 4,234	D D	D
Friant Road, N. Fresno Street to SR 41**	a.m. pm.	4,344 4,412	D D	D
Road 206, Friant Road to Road 145	a.m. p.m.	216 273	A A	C
Millerton Road, Road 206 to Table Mountain Rancheria & Casino	a.m. p.m.	351–363 558–605	B B	C

Notes: LOS = Level of Service, SR = State Route
<u>Bold and underlined</u> = deficient operation
* Measured as annual average daily traffic (AADT).
** Indicates a road segment within the City of Fresno.
Source: County of Fresno 2009

Specific access routes to the SCARF site as part of the Proposed Project's construction would involve the use of North Friant Road and East Belcher Avenue.

Existing Transit Service

The Fresno County Rural Transit Agency (FCRTA) provides local and regional bus service in Fresno County's rural areas (FCRTA 2012). The Auberry transit line provided transport services to Friant area residents (FCRTA n.d.), although this service has been discontinued owing to lack of usage (County of Fresno 2009). Other transit providers in Fresno County include Fresno Area Express and Clovis Stage Line, but these do not offer service to the Friant area (County of Fresno 2009).

Existing Bicycle and Pedestrian Facilities

In the SCARF site vicinity, Friant Road and Millerton Road include Class II bikeways, which are bike lanes along streets that separate cyclists from traffic by a white, 6-inch-wide painted stripe (County of Fresno 2012). Near the SCARF site, Friant and Millerton Roads are rural arterials with no pedestrian facilities (County of Fresno 2009). Within the town of Friant, Friant Road provides minimal pedestrian facilities, including crosswalks across Friant Road. The existing crosswalks generally connect to private parking lots without sidewalks (County of Fresno 2009).

16.3.3 SCARF Site

The proposed SCARF site is northwest of North Friant Road, near the city of Friant, within Fresno County. Figure 16-1 shows the potentially affected roadways near the SCARF site. The roadways in and around the SCARF site that provide access for the SCARF activities include Road 206, North Friant Road, and Millerton Road. Intersections that could potentially be affected by the Proposed Project include North Friant Road/East Belcher Avenue and North Friant Road/Flemming Avenue.

Prepared by:

Horizon WATER and ENVIRONMENT

Prepared for:
California Department of Fish and Wildlife
California Department of General Services

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Feet

Imagery Source: Bing Maps

Figure 16-1: Potentially Affected Intersections near the SCARF Site

SCARF and Related Management Actions Project
Draft Environmental Impact Report

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16.4 Impact Analysis

16.4.1 Methodology

The traffic and transportation analysis methodology and requirements are specified in the *Guidelines for the Preparation of Traffic Impact Studies within the County of Fresno* (Guidelines) (County of Fresno Department of Public Works and Planning 2012). The analysis methodologies used for analyzing traffic capacity and LOS are consistent with those specified in Appendix G of the CEQA Guidelines. For the project-level analysis, project trip estimates will be qualitatively evaluated and compared with the existing operational condition of the roadways and intersections as well as the existing transit, bicycle, and pedestrian facilities.

The exact locations of many of the programmatic activities associated with the Proposed Project have not been defined; therefore, the potential roadways used for these activities and the detailed generated truck-trip quantities associated with these programmatic activities cannot be determined. Therefore, for these programmatic activities, a qualitative analysis was performed.

16.4.2 Criteria for Determining Significance

The threshold of significance for impacts is based on the environmental checklist in Appendix G of the CEQA Guidelines. In the description of thresholds of significance below and in other sections of the Fresno County Guidelines, the following definitions apply:

Acceptable levels of service	LOS A, B, and C. LOS D is considered acceptable on urban roadways within the sphere of influence of the Cities of Fresno and Clovis; LOS C is considered acceptable on all other roadways in Fresno County.
Unacceptable levels of service	LOS D, E, and F, are unacceptable except on urban roadways within the sphere of influence of the Cities of Fresno and Clovis, where LOS D is acceptable.
Volume-to-capacity ratio	Volume-to-capacity (V/C) ratio is the projected vehicle volume divided by the calculated maximum volume (threshold between LOS E and LOS F) that the roadway or intersection can accommodate in a given time period (either per hour or per day).

Significance Criterion A: A project would be considered to have a significant impact if the project's traffic, when added to the traffic of the "without-project" condition, would cause any of the changes in traffic conditions described below. These sub-criteria are quantitatively used to evaluate level of significance by using traffic developed for project-specific analyses and are qualitatively used for programmatic Proposed Project elements.

1) On roadway segments:

a. Cause a roadway that is operating at an acceptable LOS to deteriorate to an unacceptable LOS; or

b. Cause the V/C ratio (on a directional peak-hour basis) to increase by more than 0.05 on a roadway that is already operating at an unacceptable LOS. It should be noted that a decrease from an unacceptable LOS to a lesser LOS (e.g., from LOS D to LOS E in County areas) is not considered an impact unless the corresponding V/C ratio increase is greater than 0.05.

2) At signalized intersections:

a. Cause an intersection that is operating at an acceptable LOS to deteriorate to an unacceptable LOS; or

b. Cause the average delay to increase by more than 5.0 seconds at a signalized intersection that is operating at an unacceptable LOS. It should be noted that a decrease from an unacceptable LOS to a lesser LOS (e.g., from LOS D to LOS E in County areas) is not considered an impact unless the corresponding delay increase is greater than 5.0 seconds.

3) At unsignalized intersections, including all-way stops, minor-approach stops, and roundabouts:

a. Cause a movement or approach that is operating at an acceptable LOS to deteriorate to an unacceptable LOS; or

b. Cause the average delay to increase by more than 5.0 seconds on a movement or approach that is operating at an unacceptable LOS. It should be noted that a decrease from an unacceptable LOS to a lesser LOS (e.g., from LOS D to LOS E in County areas) is not considered an impact unless the corresponding delay increase is greater than 5.0 seconds.

4) On roadways with traveled way width of less than 18 feet (essentially one-lane roadways, assuming a minimum of 8 feet per travel direction for vehicle width and edge-of-traveled-way clearance, plus 2 feet clearance between vehicles traveling in opposite directions.)

a. Cause a roadway that already carries 100 vehicles per day (vpd) or less to carry more than 100 vpd; or

b. Cause a roadway that already carries more than 100 vpd to carry any additional traffic.

5) On roadways that require analysis based on the traffic volume criteria described above, cause an increase in the traffic index of 0.5 or more, *except* on roadways that

have been resurfaced within the last 5 years and for which the design traffic index at the time of the resurfacing exceeded the calculated traffic index with the project. If the design traffic index is not available, then the exception shall not apply.

Significance Criterion B: The roadways and intersections designed before adoption of current road standards may have conditions that may pose an increased risk if traffic volumes, pedestrian volumes, or bicycle volumes increase along a road segment or at an intersection as a result of the Proposed Project. Increased traffic generated or redistributed by a proposed project may cause significant traffic operational impacts to pedestrians or bicyclists. This qualitative criterion of significance is used for the Proposed Project's programmatic elements.

This assessment is generally qualitative in nature, and impacts are identified based on the Proposed Project's consistency with the applicable goals and policies of the Transportation and Circulation Element of the Fresno County's General Plan and the Regional Bicycle Plan. It should be noted that trips from the Proposed Project have origins and destinations that may encompass roadways in Fresno County as well as Madera, Shasta, Tehama, Glenn, Butte, Yuba, Colusa, Sutter, Placer, Yolo, and eastern Solano and Sacramento Counties.

16.4.3 Environmental Impacts

Table 3-1 in Chapter 3, *Introduction to the Environmental Analysis,* identifies the components of the Proposed Project that have the potential to affect traffic and transportation. There would be potential impacts to traffic and transportation from all elements of the Proposed Project. Each component is discussed separately below.

SCARF Construction

Impact TR-CONSTRUCT-1: Potential Impacts on Roadway and Intersection Operating Conditions from SCARF Construction-related Traffic (Significance Criterion A, Project Level, Less than Significant with Mitigation)

Construction activities for the SCARF are expected to last for 11 months. These activities (including the staging area activities) would generally be limited to the SCARF site. However, the paving of the SCARF access road may require limited construction activities on North Friant Road. Also, trenching-related activities for SCARF's new water supply pipeline may affect Brooktrout Drive, Flemming Avenue, and/or Waldby Street.

The worker vehicles and/or haul trucks associated with the Proposed Project may potentially contribute to traffic delays on North Friant Road and other local roadways, particularly during peak a.m. or p.m. hours. The Proposed Project's construction activities would require up to approximately 10 workers (with up to an assumed total of 25 roundtrips per day). Also, the grading activities for the Proposed Project would require approximately 1,438 haul-truck trips over an approximately 66-day period, which averages to approximately 22 haul-truck trips spread throughout the day. The anticipated primary access routes used for ingress/egress to the Proposed Project's construction site would be North Friant Road and the unpaved access road, East Belcher Avenue.

Impacts on transportation and traffic during SCARF construction include the potential to disrupt traffic flows, block lanes in area roadways, and contribute to deterioration of LOS and/or increased volumes of traffic in fewer lanes. Emergency access would be available to the SCARF site via Flemming Avenue or East Belcher Avenue at all times. Construction activities on North Friant Road, Brooktrout Drive, Flemming Avenue, and/or Waldby Street would be temporary. Although the activities would be temporary, the SCARF construction activities would result in a potentially significant impact. However, implementing **Mitigation Measure HAZ-CONSTRUCT-3**, which requires preparation and implementation of a Traffic Management Plan (TMP) as described in Chapter 11, *Hazards and Hazardous Materials*, would reduce this impact to a less-than-significant level.

Impact TR-CONSTRUCT-2: Potential Impacts on Transit, Bicycle, and Pedestrian Facilities from SCARF Construction-related Traffic (Significance Criterion B, Project Level, Less than Significant with Mitigation)

Traffic impacts during SCARF construction can include disruption of alternative modes of transportation, such as blocking bicycle or pedestrian pathways on area roadways. Impacts on transportation and traffic would be temporary in nature but could significantly conflict with an applicable plan, ordinance, or policy establishing measures of effectiveness for the performance of the circulation system, taking into account all modes of transportation. However, implementing **Mitigation Measure HAZ-CONSTRUCT-3** would reduce this impact to a less-than-significant level.

SCARF Operation

Impact TR-OP-1: Potential Impacts on Roadway and Intersection Operating Conditions from SCARF Operational Traffic (Significance Criterion A, Project Level, Less than Significant)

Once constructed, the SCARF would house four full-time and two part-time workers. Using Institute of Transportation Engineers (ITE) trip generation rates for a Research and Development Center (ITE 2012), the estimated trip generation from SCARF is calculated to be approximately 16 trips in the daily condition, three trips each during the a.m. and p.m. peak hours. In addition, the SCARF would require truck deliveries twice a month for hatchery-related supplies, such as fish food, chemicals, and therapeutics as well as miscellaneous travel for SCARF operations, meetings, and training estimated by CDFW to be less than two trips per day. Truck trips associated with reintroduction of fish is addressed below under Fish Reintroduction. It is expected that, when SCARF operational traffic is added to the traffic of the "without-project" condition, operating conditions of surrounding roadways and their intersections (North Friant Road, East Belcher Avenue, Flemming Avenue, and Brooktrout Avenue) would not deteriorate to an unacceptable LOS. Therefore, this impact would be less than significant.

Impact TR-OP-2: Potential Impacts on Transit, Bicycles, and Pedestrian Facilities from SCARF Operational Traffic (Significance Criterion B, Project Level, Less than Significant)

The SCARF is not expected to increase or affect bicycle traffic or pedestrian traffic within the Project Area. As previously stated, total daily traffic from SCARF totals 16 trips, and peak-hour traffic is three trips in the a.m. and three trips in the p.m. As mentioned above, the SCARF would also require truck deliveries twice a month for hatchery-related supplies, and miscellaneous travel estimated to be less than two trips per day. This traffic is not expected to deteriorate the operating LOS of the surrounding roadway and intersection. Therefore, SCARF operations would have a less-than-significant impact on transit, bicycle, and pedestrian facilities.

Fish Reintroduction

Impact TR-REINTRO-1: Potential Impacts on Roadway and Intersection Operating Conditions from Fish Reintroduction-related Trips (Significance Criterion A, Project/Program Level, Less than Significant)

The fish reintroduction activities would require trucks and vehicle trips for collection, transport, and/or release of Chinook salmon (eggs, juveniles, or adults) from the FRFH, or from the wild stock areas shown in Figure 2-1, to quarantine facilities and then transport to the SCARF site. These trucks and vehicle trips could originate in or pass through the Central Valley region, including Shasta, Tehama, Glenn, Butte, Yuba, Colusa, Sutter, Placer, Yolo, and eastern Solano and Sacramento Counties. These activities are estimated to be seasonal, likely spanning from early fall to late spring of each year. The frequency of delivery trips from the FRFH to the quarantine facilities is assumed to be a maximum 4 times per week, but would likely not exceed 20 trips per year. The frequency of delivery trips from the quarantine facility to SCARF is also assumed to be a maximum of 4 times per week, but would likely not exceed 10 trips per year. These trips are not expected to cause a deterioration of the surrounding roadway and intersection operating LOS. Therefore, fish reintroduction is expected to have a less-than-significant impact on roadways and intersection operating conditions.

During the first 5 years of spring-run Chinook translocations, which may begin in 2014, up to 80,000 eyed eggs or up to 54,400 juveniles (dependent upon FRFH's own production goals – see *Feather River Fish Hatchery Stock* under Section 2.4.4, *Salmon Reintroduction* in Chapter 2, *Project Description*) would be collected annually from the FRFH for translocation into San Joaquin River holding pens. This operation is assumed to generate delivery trips at a frequency of once or twice per week on a yearly basis. These trips are not expected to cause a deterioration of the surrounding roadway and intersection operating LOS. Therefore, fish reintroduction activities would be expected to have a less-than-significant impact on roadways and intersection operating conditions.

The impact analysis and significance conclusion above is considered project-level all activities except wild broodstock collection, for which the analysis is considered programmatic. For further discussion of the approach to the project and programmatic analysis in this document, please see Chapter 3, *Introduction to the Environmental Analysis*.

Impact TR-REINTRO-2: Potential Impacts on Transit, Bicycle, and Pedestrian Facilities from Fish Reintroduction-related Trips (Significance Criterion B, Project/Program Level, Less than Significant)

The seasonal trips resulting from deliveries of eggs and/or fish for quarantine or release are not expected to increase or affect bicycle traffic or pedestrian traffic within the Project Area. As previously stated, the estimated frequencies of fish reintroduction-related trips of a maximum of 4 times per week during a 10-month period, not to exceed 20 trips per year for deliveries from FRFH and 10 trips per year from the quarantine facility, are not expected to cause a deterioration of the surrounding roadway and intersection operating LOS. Therefore, the transport of eggs between facilities for on- or off-site release would be expected to have a less-than-significant impact on transit, bicycle, and pedestrian facilities.

The impact analysis and significance conclusion above is considered project-level all activities except wild broodstock collection, for which the analysis is considered programmatic. For further discussion of the approach to the project and programmatic analysis in this document, please see Chapter 3, *Introduction to the Environmental Analysis*.

Fisheries Management

Impact TR-MANAGEMENT-1: Potential Impacts on Roadway and Intersection Operating Conditions from Fish Segregation Weir Construction and Operation (Significance Criterion A, Program Level, Less than Significant)

The Proposed Project includes management actions that could include installation and operation of fish segregation weirs. Construction of the fish segregation weirs would generate trips relating to construction activities that could potentially affect roadway and intersection operation conditions. Specific project-level data regarding the construction-generated trips and the current operating conditions of the roadways or intersections that could be affected are not defined at this time. However, these trips are not anticipated to be so numerous that they would cause a deterioration of the surrounding roadway and intersection operating LOS.

In addition, operation of the weir(s) may involve infrequent truck or vehicle trips by SCARF employees to perform minor maintenance or operation activities on the weir(s), such as minor patchwork or temporary removal of portions of the weir (barriers). Although the exact quantity of vehicle trips is unknown, for the management of fish segregation weirs, it can reasonably be assumed that these activities would average less than two vehicle trips daily and would occur seasonally. This amount of traffic is not expected to cause deterioration of the surrounding roadway and intersection LOS. Therefore, trips associated with installation of fish segregation weirs and their operation and maintenance would be expected to have a less-than-significant impact on roadways and intersection operating conditions.

Impact TR-MANAGEMENT-2: Potential Impacts on Roadway and Intersection Operating Conditions from Trap and Haul Efforts during Fisheries Management (Significance Criterion A, Project Level, Less than Significant)

Trap and haul efforts would involve daily trips to the trap locations at several locations in the lower San Joaquin River. Staff would pull adult Chinook from the traps and transport them in a tank truck to locations below Friant Dam. From past experience with fish study trap and haul efforts, typically only one vehicle trip per day would be needed, with occasionally two trips per day when traps are more full than expected. This relatively small number of trips is not anticipated to cause a deterioration of the surrounding roadway and intersection operating LOS. Impacts are therefore considered less than significant.

Impact TR-MANAGEMENT-3: Potential Impacts on Transit, Bicycle, and Pedestrian Facilities from Fish Segregation Weir Construction and Operation and Trap and Haul Activities (Significance Criterion B, Project/Program Level, Less than Significant)

The trips resulting from construction and operation of the fish segregation weirs and trap and haul activities are not expected to substantially affect transit, bicycle, and pedestrian facilities within the Project Area. As stated, the estimated frequency of trips for construction on the weir(s) is not anticipated to be numerous, the frequency of trips for seasonal operation and maintenance is anticipated to be twice a day, and the frequency of trips for trap and haul efforts would be one to two trips per day. This is not expected to cause a deterioration of the surrounding roadway and intersection operating LOS. Therefore, the transport of eggs between facilities for on- or off-site release would be expected to have a less-than-significant impact on transit, bicycle, and pedestrian facilities.

The impact analysis and significance conclusion above is considered project-level for trap and haul activities and operation of the existing HFB, and programmatic for any new or reconstructed weirs or barriers. For further discussion of the approach to the project and programmatic analysis in this document, please see Chapter 3, *Introduction to the Environmental Analysis*.

Fisheries Research and Monitoring

Impact TR-MONITORING-1: Potential Impacts on Roadway and Intersection Operations from Trips Associated with Fisheries Research and Monitoring Activities (Significance Criterion A, Project Level, Less than Significant)

The vehicle trips generated from fisheries research and monitoring activities are expected to be seasonal, with an estimated frequency of 2 trips per day, but an occasional need for up to 4 trips per day. These trips are not expected to cause deterioration of the operating LOS of the surrounding roadway and intersection. Therefore, trips generated from fisheries research and monitoring activities are expected to have a less than significant impact on roadways and intersection operating conditions.

Impact TR-MONITORING-2: Potential Impacts on Transit, Bicycle, and Pedestrian Facilities from Trips Associated with Fisheries Research and Monitoring Activities (Significance Criterion B, Project Level, Less than Significant)

The seasonal trips resulting from fisheries research and monitoring activities are not expected to increase or affect bicycle or pedestrian traffic within the Project Area. As previously stated, the trips generated from these activities are estimated to occur twice daily, with an occasional need for up to 4 trips per day, and this frequency is not expected to cause a deterioration of the operating LOS of the surrounding roadway and intersection. Therefore, the research and monitoring activities are expected to have a less than significant impact on transit, bicycle, and pedestrian facilities in Project Area.

Recreation Management

Impact TR-RECREATION-1: Potential Impacts on Roadway and Intersection Operations from Trips Associated with Recreation Management Activities (Significance Criterion A, Program Level, Less than Significant)

Enhancement of recreational fishing opportunities on the San Joaquin River may result in increased recreation-related or maintenance and enforcement vehicle trips. Although the exact quantity of vehicle trips is unknown for the recreational activities, it can reasonably be assumed that these activities would average less than one vehicle trip daily for recreation management activities associated with stocking and other enhancements. These limited trips are not expected to cause deterioration of the operating LOS of the surrounding roadway and intersection. Therefore, trips generated from enhancement of recreational fishing opportunities are expected to have a less than significant impact on roadways and intersection operating conditions.

Impact TR-RECREATION-2: Potential Impacts on Transit, Bicycle, and Pedestrian Facilities from Trips Associated with Recreation Activities (Significance Criterion B, Program Level, Less than Significant)

The seasonal trips resulting from enhancement of recreational fishing opportunities are not expected to increase or affect bicycle or pedestrian traffic within the Project Area. As previously stated, the trips generated from these activities are estimated to occur on average 1 time a day or less, and this frequency is not expected to cause a deterioration of the operating LOS of the surrounding roadway and intersection. Therefore, enhancement of recreational fishing opportunities are expected to have a less than significant impact on transit, bicycle, and pedestrian facilities in Project Area.

Chapter 17
UTILITIES AND SERVICE SYSTEMS

17.1 Overview

This chapter describes the setting and potential impacts on utilities, services and energy resources from the Proposed Project. Information used to prepare this section includes the Fresno County General Plan and the Friant Community Plan.

17.2 Regulatory Setting

17.2.1 Federal Laws, Regulations and Policies

No specific federal regulations apply to utilities and energy use associated with the Proposed Project.

17.2.2 State Laws, Regulations and Policies

State Water Resources Control Board Water Rights

In order to implement flow releases from Friant Dam stipulated in the 2006 Settlement, the SWRCB began to institute temporary transfer and change orders, pursuant to Sections 1707 and 1725 of the Water Code. Interim restoration flows began in 2009, and yearly orders were issued in 2009, 2010 and 2011 to provide temporary authorization to the interim flow program. The interim flow program will be terminated in 2013 when the long-term restoration flow program begins. The 2011 Temporary Transfer and Change Order lists the flow requirements and locations where river stage and flow conditions are monitored. In approving the transfer, the SWRCB concluded that the temporary changes would not injure or unreasonably affect any legal users of water, may be made without unreasonable effect upon fish, wildlife, or other instream beneficial use, will not increase the amount of water the Bureau of Reclamation is entitled to use, and involves only the amount of water that would have been consumptively used or stored in the absence of the temporary change (SWRCB 2011).

National Pollutant Discharge Elimination System Permits

Discharges to surface waters (other than dredge or fill material) are regulated by Section 402 of the Clean Water Act, through the NPDES permitting program. Applicable NPDES Permits, administered by the RWQCB, including discharges from aquatic animal production facilities, construction activities, and dewatering activities, are discussed in Chapter 9, *Geology, Soils, and Seismicity* and Chapter 12, *Hydrology, Geomorphology and Water Quality.*

Integrated Waste Management Act

California's Integrated Waste Management Act of 1989 (AB 939) set a requirement for cities and counties throughout the state to divert 50 percent of all solid waste from landfills by January 1, 2000, through source reduction, recycling, and composting. To help achieve this goal, the Act requires that each city and county prepare and submit a Source Reduction and Recycling Element. AB 939 also establishes the goal for all California counties to provide at least 15 years of ongoing landfill capacity.

California Solid Waste Reuse and Recycling Access Act of 1991

The California Solid Waste Reuse and Recycling Access Act of 1991 (Pub. Resources Code, §§ 42900-42911) requires that any development project for which an application for a building permit is submitted include adequate, accessible areas for collecting and loading recyclable materials.

17.2.3 Local Laws, Regulations and Policies

General plans are long-range comprehensive plans developed for cities and counties that govern growth and development. The planned SCARF facility is located in Friant, an unincorporated census-designated place in Fresno County. The following section reviews key utilities policies from the Fresno County General Plan and the Fresno County Resources Division, which are relevant to the Proposed Project.

Fresno County General Plan

The Public Facilities and Services Element of the Fresno County General Plan contains the following policies that are applicable to the Proposed Project (County of Fresno 2010).

- *GOAL PF-A:* To ensure the timely development of public facilities and to maintain an adequate level of service to meet the needs of existing and future development.
    - *Policy PF-A.5:* Underground Utilities: The County shall encourage the placement of irrigation canals and utility lines underground as urban residential, commercial and industrial development takes place.
- *GOAL PF-C:* To ensure the availability of an adequate and safe water supply for domestic and agricultural consumption.
    - *Policy PF-C.1:* Retain Existing Water Supplies: The County shall actively engage in efforts and support the efforts of others to retain existing water supplies within Fresno County.

- *Policy PF-C.3:* Surface Water Use: To reduce demand on the county's groundwater resources, the County shall encourage the use of surface water to the maximum extent feasible.

- *GOAL PF-D:* To ensure adequate wastewater collection and treatment and the safe disposal of wastewater.
  - *Policy PF-D.6:* On-Site Sewage Disposal Systems: The County shall permit individual on-site sewage disposal systems on parcels that have the area, soils, and other characteristics that permit installation of such disposal facilities without threatening surface or groundwater quality or posing any other health hazards and where community sewer service is not available and cannot be provided.
- *GOAL PF-E*: To provide efficient, cost-effective and environmentally-sound storm drainage and flood control facilities that protect both life and property and to divert and retain stormwater runoff for groundwater replenishment.
  - *Policy PF-E.6:* Drainage Facility Construction: The County shall require that drainage facilities be installed concurrently with and as a condition of development activity to ensure the protection of the new improvements as well as existing development that might exist within the watershed.
  - *Policy PF-E.20:* Best Management Practices: The County shall require the use of feasible and practical BMPs to protect streams from the adverse effects of construction activities, and shall encourage the urban storm drainage systems and agricultural activities to use BMPs.
- *GOAL PF-F*: To ensure the safe and efficient disposal or recycling of solid waste generated in the county in an effort to protect the public health and safety.
  - *Policy PF-F.1:* Solid Waste Source Reduction: The County shall continue to promote maximum use of solid waste source reduction, reuse, recycling, composting, and environmentally-safe transformation of wastes.
  - *Policy PF-F.2:* Onsite Recycling Storage and Collection: The County shall require new commercial, industrial, and multi-family residential uses to provide adequate areas on-site to accommodate the collection and storage of recyclable materials.
  - *Policy PF-F.8:* Existing Public Landfills: The County has designated the American Avenue Landfill as the regional landfill to serve the incorporated and unincorporated areas of the county. The publicly-operated Coalinga and Clovis landfills may continue to operate provided the sites are operated economically and in compliance with all environmental laws and regulations. Existing publicly-operated landfills may be expanded.
- *GOAL PF-J*: To provide efficient and cost-effective utilities that serve the existing and future needs of people in the unincorporated areas of the county.

- *Policy PF-J.1:* Existing and Future Utility Demands: The County shall encourage the provision of adequate gas and electric, communications, and telecommunications service and facilities to serve existing and future needs.
- *Policy PF-J.2:* Gas and Electric Systems: The County shall work with local gas and electric utility companies to design and locate appropriate expansion of gas and electric systems, while minimizing impacts to agriculture and minimizing noise, electromagnetic, visual, and other impacts on existing and future residents.

Fresno County Solid Waste Management

The County of Fresno's Resources Division is responsible for planning and implementing a variety of county-wide solid waste management programs with the goal of providing proper management and disposal of trash, recyclable materials, and household hazardous waste (County of Fresno 2000). The Fresno County Solid Waste Management Plan issues an exclusive service area program, identifies solid waste collection and disposal facilities, and identifies waste reduction services available to commercial and residential waste generators. The exclusive service area program divides the County into smaller areas and then designates solid waste responsibilities for these areas to specific waste haulers (Lopez pers. comm.).

17.3 Environmental Setting

17.3.1 Potentially Affected Area

For the purposes of this chapter, the Potentially Affected Area consists of the Feather River Fish Hatchery and the SCARF site and its surroundings. These locations are described further under "Project Area" and "SCARF Site" below.

17.3.2 Project Area

Feather River Fish Hatchery

The FRFH, located on the Feather River in Oroville, would be used to provide broodstock for the SCARF, along with other broodstock sources. The FRFH includes raceways, tanks, a fish ladder, two hatchery buildings, a freezer, an aeration tower, an ultraviolet treatment building, storage buildings, settling ponds, and two office buildings. A 54-inch pipe transports water from the Thermalito Diversion Dam to the hatchery in a flow-through system. Flow-through wastewater from the FRFH is percolated in settling basins adjacent to the Feather River. Domestic wastewater is processed in the City of Oroville septic system (ICF Jones & Stokes 2010).

17.3.3 SCARF Site

Water Supply

Both potable and non-potable water sources are supplied to the SJFH. The Fresno County Waterworks District (WWD) No. 18 provides potable water to the SJFH site, the Interim Facility and the surrounding community of Friant. Fresno County WWD No. 18 supplies were evaluated in a water supply assessment in the Friant Community Plan, which found that the average annual supply for the next 20 years, assuming a 2 to 3 percent rate of annual growth, would be able to satisfy the projected 20-year demands within the service area (County of Fresno 2000). Non-potable water for the SJFH and Interim Facility is provided from releases from the Friant Dam penstocks, through the Fishwater Release Powerplant, owned by Orange Cove Irrigation District. The water travels through a mile-long, 44-inch pipeline which is capable of handling approximately 65 cfs.

Wastewater

A septic system within the existing SJFH site processes domestic wastewater from the existing SJFH facilities. This septic system was recently upgraded, in part to accommodate the anticipated domestic wastewater generation from the Proposed Project. Process water from the existing SJFH's operations is treated in on-site settling ponds. From these ponds, the treated flow-through process water is discharged to the San Joaquin River at an existing outfall located immediately upstream from Lost Lake Park.

Stormwater

The project site is partially covered by impermeable surfaces associated with the existing SJFH. Stormwater runoff flows from the impermeable surfaces are captured in an existing 42-inch RCP that currently discharges stormwater to the secondary channel of the San Joaquin River. In addition, the project area receives drainage from land to the south and east of the site. This drainage is currently routed into the four non-operational aquaculture ponds via underground pipes. A portion of the drainage travels through the settling ponds, while the remainder travels through a system of constructed wetlands. Both the settling ponds and the constructed wetlands flow to the existing hatchery outfall, which then flows into the San Joaquin River.

Solid Waste Disposal Sites

The County of Fresno operates the regional American Avenue Landfill and a small transfer station at Shaver Lake. American Avenue Landfill began operations in 1992 and is owned and operated by Fresno County, and serves the public and commercial solid waste haulers. It is estimated that the landfill will be able to continue operation until approximately 2031 when it is anticipated to reach capacity (CalRecycle 2010).

Hazardous Waste Disposal Sites

Industries, businesses, public and private institutions, and households generate hazardous wastes in Fresno County. Waste oil is the largest portion of industrial hazardous waste generated in Fresno County. Other hazardous wastes include nonhalogenated solvents, pesticides, polychlorinated biphenyls (PCBs), dioxins, and nonhalogenated organic sludges and solids. Fresno County has two operating treatment, storage, and disposal facilities that can receive these substances, permitted by the Department of Toxic Substances Control. The Safety Kleen Corporation operates the two facilities, one of which is in Reedley, and the other is in Fresno. The facilities are permitted to receive used oil, anti-freeze, paint thinners, paint wastes, dry cleaning solvents and industrial solvents, and other aqueous wastes (County of Fresno 2000).

Energy Sources & Consumption

Sources of energy in Fresno County include oil, natural gas and hydroelectric. In the Coalinga area of western Fresno County, oil and natural gas production has been a major industry. Southern California Edison (SCE) and Pacific Gas & Electric (PG&E) provide electrical services to Fresno County. The SCE serves northeast Fresno County, in Shaver Lake and Big Creek. PG&E serves the majority of the Fresno County, including the valley area and the foothills. A number of hydroelectric facilities exist within the County. PG&E operates Courtright Lake and Wishon Dam for the production of hydroelectric energy. Friant Dam is used to produce up to 25 megawatts of hydroelectric power (County of Fresno 2000).

In 2011, Fresno County used 2.6 billion kWh (kilowatt-hours) for residential electrical use and 4.2 billion kWh for non-residential electrical use, for a total usage of 6.8 billion kWh. In the same year, the county used 118 million therms of natural gas for residential uses and 178 million therms of natural gas for non-residential usage, totaling to 296 million therms of natural gas (California Energy Commission 2012).

17.4 Impact Analysis

17.4.1 Methodology

This section describes the potential impacts of the Proposed Project related to utilities and services systems. This evaluation considers the extent to which the Proposed Project would require entirely new or altered existing facilities to address immediate or foreseeable needs associated with SCARF operations. Effects are evaluated qualitatively based on available information on existing facilities and current demand in the Project Area and the SCARF Site.

17.4.2 Criteria for Determining Significance

Based on Appendix G of the CEQA Guidelines and professional expertise, the Proposed Program would result in a significant impact on utilities and energy use if it would:

A. Exceed waste water treatment requirements of the applicable Regional Water Quality Control Board;

B. Require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects;

C. Require or result in the construction of new stormwater drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects;

D. Have insufficient water supplies available to serve the project from existing entitlements and resources;

E. Result in a determination by the wastewater treatment provider which serves or may serve the project that it has inadequate capacity to serve the project's projected demand in addition to the provider's existing commitments;

F. Be served by a landfill with insufficient permitted capacity to accommodate the project's solid waste disposal needs;

G. Fail to comply with federal, state, and local statutes and regulations related to solid waste;

H. Cause wasteful, inefficient, and unnecessary consumption of energy during construction, operation, and/or maintenance; or

I. Cause a substantial increase in energy demand and the need for additional energy resources.

Stormwater management during construction and operation of the SCARF has been previously discussed in Chapter 9, *Geology, Seismicity and Soils*, and Chapter 12, *Hydrology, Geomorphology and Water Quality*, and so is not discussed in this chapter. Operational activities related to fisheries management, fisheries research and monitoring, and recreation management are not anticipated to generate wastewater, involve construction of water or wastewater treatment or stormwater drainage facilities, require additional water supplies, generate substantial amounts of solid waste, or require substantial energy consumption; therefore, these actions are not discussed further. SCARF construction, SCARF operations, fish reintroduction, and construction activities related to Fisheries Management and Recreation Management could result in potential impacts related to utilities and service systems. Each of these components is discussed in Section 17.4.3 below.

17.4.3 Environmental Impacts

Table 3-1 in Chapter 3, *Introduction to the Environmental Analysis,* of this document, identifies components of the Proposed Project with the potential to result in impacts from the Proposed Project to utilities and service systems. Each impact is discussed in further detail in the section below.

SCARF Construction

Impact UTL-CONSTRUCT-1: Domestic Wastewater Generation and Disposal during SCARF Construction (Significance Criteria A, B, E, Project Level, No Impact)

Construction at the SCARF site would generate minimal amounts of domestic wastewater, none of which would be directed to a wastewater facility. Rather, portable sanitary restrooms would be available for use by workers during construction. As a result, no potential exists for domestic wastewater generated during construction to exceed RWQCB treatment requirements, require any new or expanded wastewater treatment facilities, or result in a determination by the wastewater treatment provider which serves or may serve the SCARF that it has inadequate capacity to serve the Proposed Project's projected demand in addition to the provider's existing commitments. Therefore, there would be no impact.

Impact UTL-CONSTRUCT-2: Use of Water for SCARF Construction (Significance Criteria B and D, Project Level, Less than Significant)

During construction activities, non-potable water supplies would be used to wet exposed ground surfaces to minimize dust and provide limited irrigation of landscaped or re-vegetated areas. Limited quantities of potable water may also be required for construction personnel. The water needs related to construction activities would be relatively minor and likely fulfilled by off-site water supplies trucked to the site. Existing on-site supplies may fulfill potable water needs. Given the limited water supply needs for the SCARF construction activities, it is expected that existing supplies are sufficient and available to serve the project, and SCARF construction would not require new or expanded entitlements. Therefore, this impact would be less than significant.

Impact UTL-CONSTRUCT-3: Disposal of Solid Waste Generated during SCARF Construction (Significance Criteria F and G, Project Level, Less than Significant)

The Proposed Project would generate solid waste during SCARF construction activities. Site preparation would include clearing and grubbing, import of fill, placement of fill and compaction. All demolished material and debris would be disposed of off-site at an appropriate location selected by the construction contractor. The quantity of these generated solid waste materials would be relatively small, and wastes likely would be transported to American Avenue Landfill. American Avenue Landfill is located approximately 45 miles from the project site in Kerman, California. This landfill is estimated to have enough capacity to continue to operate until 2031 (City of Fresno 2012).

American Avenue Landfill currently is permitted to receive a maximum average of 2,200 tons per day of solid waste, not exceeding 3,600 tons per day (CalRecycle 2010). On average, the landfill receives approximately 1,100 tons of solid waste per day, per year (including weekends) (Kantoo pers. comm.). The construction debris transferred to a solid waste facility is estimated to be less than one ton per day (Siemering pers. comm.) Therefore, the available landfill has adequate capacity to accept solid waste materials from the SCARF's construction activities. In addition, the contractor, through conditions in the contract, would be required to comply with all federal, state, and local statutes related to solid waste handling, transport, and disposal. Therefore, this impact would be less than significant.

Impact UTL-CONSTRUCT-4: Disposal of Hazardous Materials Generated during SCARF Construction (Significance Criteria F and G, Project Level, Less than Significant)

Construction of the SCARF would require the use or handling of hazardous materials. Hazardous materials that would be used or transported to support the use and maintenance of construction equipment include fuels, lubricating oil, grease or hydraulic fluid. In addition, excavated materials could have potential to contain hazardous levels of certain substances. These materials could pose a potential hazard to construction workers, the public, and the environment. Impact HAZ-CONSTRUCT-1, identified in Chapter 11, *Hazards and Hazardous Materials*, of this document, addresses exposure and potential hazards of the use of these materials; therefore, this impact discussion focuses on the capacity of existing facilities to accommodate hazardous wastes generated from SCARF construction.

As needed, materials would be tested to determine whether they meet hazardous thresholds. If so, they would be disposed of by the contractor in an approved hazardous waste facility, likely either of the Safety Kleen Corporation hazardous waste facilities in Fresno County, which are permitted to receive hazardous materials associated with construction equipment. The quantity of hazardous material from construction of the SCARF facility would not be substantial, and therefore existing hazardous materials disposal sites are expected to have adequate capacity to accept hazardous waste generated during the SCARF's construction activities. In addition, the contractor, through conditions in the contract, would be required to comply with all federal, state, and local statutes related to handling, transport, and disposal of hazardous waste. Therefore, this impact would be less than significant.

Impact UTL-CONSTRUCT-5: Energy Consumption during SCARF Construction (Significance Criteria H and I, Project Level, Less than Significant)

Construction of the SCARF would require energy use for building SCARF structures, including the main hatchery building, fish propagation water supply and treatment system, staff residences, drainage, storm water and utilities systems, and other improvements, including parking lot, fencing, and access road. Energy used during construction would primarily be associated with the consumption of gasoline and diesel fuel from operating vehicles and construction equipment. Construction activities would be focused on completing the SCARF as efficiently and safely as possible, and there is no reason to believe that construction would use energy wastefully, inefficiently, or unnecessarily. Therefore, this impact is less than significant.

SCARF Operations

Impact UTL-OP-1: Availability of Supplies to Accommodate Non-Potable Water Use during SCARF Operations (Significance Criterion D, Project Level, Less than Significant)

The primary source of water supply for SCARF hatchery operations (i.e. non-domestic/office use) would be a new 30-inch water line from Millerton Lake connecting to an existing 44-inch line that serves the existing SJFH. The water for SCARF hatchery operations will be taken from the water set aside under the SJRRP, requiring no new entitlements or resources. In addition, the majority of the water diverted would be returned to the San Joaquin River after treatment, or percolate into the main channel of the river as groundwater flow.

Table 17-1 shows a comparison between average simulated 2030 monthly flows at Friant Dam to the estimated monthly flow rates for the fully operational SCARF. The SCARF would result in little consumptive use associated with operational water supplies (i.e. nearly all the operational water would be returned to the river with a small portion lost to evaporation and infiltration). Even in the reach between the dam and the SCARF's discharge point to the San Joaquin River, the inflow to the SCARF is a small portion of the average simulated flows of the San Joaquin River, ranging from 0.3 to 1.1 percent. Water diversions would not be expected to substantially affect San Joaquin River flow downstream of Friant Dam and flows would essentially remain unchanged as a result of SCARF operations. This impact is less than significant.

Table 17-1. San Joaquin River Simulated Average Monthly Flow Rates at Friant Dam Compared to Estimated Monthly Flow Rates for the Fully Operational SCARF

Month	Average Simulated 2030 Flow Releases at Friant Dam[1]	Total Inflow to SCARF[2]
	(cfs)	
January	882	2.8
February	897	3.3
March*	1,416	8.4
April*	2,130	11.7
May	1,309	14.9
June	1,285	2.2
July	976	2.2
August	357	2.2
September	350	2.6
October	363	2.8
November*	433	2.8
December	533	2.8

*Scaled proportionally from 2 different flow release values
[1] Source: Reclamation and DWR 2012, Table 13-69
[2] SCARF inflows and outflows are approximately the same. The SCARF would result in little consumptive use (only evaporation and infiltration).

Impact UTL-OP-2: Effects of Potable Water Use for SCARF on Water Supplies (Significance Criteria B and D, Project Level, Less than Significant)

Potable water for SCARF facilities for use by workers for domestic supply, including drinking water, operating restrooms, and kitchen supply, would be provided by a connection to the system serving the domestic water needs for the existing SJFH, which is provided by Fresno County WWD #18 (County of Fresno 2011). Water supplies from WWD #18 may also be provided for two staff residences, providing that the residences are constructed on-site. A water supply assessment for the Fresno Community Plan found that the average annual supply for the next 20 years is adequate to satisfy the projected 20-year demands within the service area (County of Fresno 2011), which includes the Proposed SCARF site. The potable water supply for the SCARF facility use and the potential use of domestic water for the residences would not represent a substantial increase in demand, at most representing several acre-feet per year, and would not be expected to result in the need for new or expanded treatment facilities or additional water supply entitlements. Therefore, this impact is less than significant.

Impact UTL–OP-3: Wastewater and Solid Waste Generation during SCARF Operations (Significance Criteria A, B, E, F, and G, Project Level, Less than Significant)

Wastewater produced by the SCARF facilities consists of domestic wastewater and hatchery process water discharges. The septic system serving the existing SJFH has been expanded and will be able to accommodate the domestic wastewater generated by the hatchery building and residences to be constructed under the Proposed Project. A new treatment system would be constructed as part of the Proposed Project for the process water discharges, the impacts of which have been considered as part of the evaluation of the Proposed Project. This treatment system would be covered under an NPDES permit issued by the RWQCB.

Solid waste produced during the operation of the SCARF would primarily be sent to the American Avenue Landfill, operated by Fresno County. The waste produced during SCARF operation is not anticipated to substantially add to the typical amount of waste handled by the facility. Solid waste from the microscreen drum filters would be dried on a sludge drying bed and then used as organic fertilizer by the worm farm that operates in the existing SJFH settling ponds, or taken off-site for disposal. At times, the SCARF may need to dispose of excess or diseased fish. Some carcasses from hatchery mortalities will be frozen and disposed of through the hatchery solid waste disposal system and ultimately be sent to the American Avenue Landfill.

The Proposed Project would not result in a substantial increase in the demand for wastewater treatment facilities that has not already been constructed or planned to be constructed onsite, and these treatment systems are expected to meet the wastewater treatment requirements of the RWQCB. Similarly, the Proposed Project would not generate substantial amounts of solid waste, nor would it violate any regulations related to solid waste. As such, the Proposed Project would have a less-than-significant impact related to wastewater and solid waste disposal.

Impact UTL-OP-4: Stormwater Generation during SCARF Operations (Significance Criterion C, Project Level, Less than Significant)

Following construction of the Proposed Project, stormwater runoff from the impermeable surfaces associated with the hatchery and utility buildings, fish tanks, and parking area would be collected, pre-treated, and routed into 42-inch RCP serving the existing SJRP, which then discharges stormwater into the secondary channel of the San Joaquin River. Runoff from the main building pad and parking area would be pre-treated prior to discharge to the San Joaquin River with catch basin inserts, bioswales, or another equivalent technology. Additionally, the Proposed Project would re-route the underground stormwater drainage pipes into the existing 42-inch RCP. Thus, the Proposed Project would include the construction of required stormwater drainage facilities and would not require any additional facilities. Therefore, this impact would be less than significant.

Impact UTL-OP-5: Long-term Increase in Energy Usage from SCARF Operations (Significance Criteria H and I, Project Level, Less than Significant)

Operation of the SCARF facility and associated buildings would require energy for fry production, incubation, freezer area, spawning building, research/laboratory, effluent treatment, office spaces, restrooms, and staff residences. PG&E would supply the electricity for SCARF operations. The SJFH currently receives approximately 289 Kwh per day from

PG&E. A pad mount transformer and underground distribution will be used to provide energy to the new structures. The electricity provided by PG&E for SCARF operations would not cause a substantial increase in demand for energy production and would not require the construction of or need for additional energy resources. Energy usage at the site would be as efficient as possible, and there is no reason to believe that SCARF operations would use energy wastefully, inefficiently, or unnecessarily. Therefore, the potential increased energy use from the Proposed Project would be less than significant.

Fish Reintroduction

Impact UTL-REINTRO-1: Effects of Broodstock Collection from the Feather River Fish Hatchery on Hatchery Operations (All Significance Criteria, Project Level, No Impact)

The FRFH would provide a potential source stock to establish a successful broodstock at the SCARF. The FRFH has a limited capacity to spawn, incubate fertilized eggs, and rear juveniles until release, but that capacity is far beyond that which is actually produced in any given year. The hatchery operates under a Draft Hatchery Genetics Management Plan (HGMP; Cavallo et al. 2012), which limits the number of spring-run Chinook it produces annually. These "production goals" are intended to, among other things, limit the degree of hatchery influence on the wild spring-run population. After FRFH meets its identified production limit, there typically are additional spring-run Chinook entering the facility to spawn. It is the intention of the Proposed Project to collect these additional fish, artificially spawn them, segregate and incubate their eggs for eventual transport to the SCARF.

The FRFH has utility needs for energy consumption, water use, and wastewater releases to produce Chinook salmon eggs and juveniles. Collection from the FRFH for the Proposed Project would occur within the existing capacity of the hatchery facility, but only after the FRFH has met its annual production goals. The Proposed Project would collect eggs or juveniles up to the limits set in the SJRRP 10(a)(1)(A) permit. Since the FRFH would not change its production levels as a result of the Proposed Project, the utilities demands would remain unchanged. Therefore, there would be no impact.

Fisheries Management

Impact UTL-MANAGEMENT-1: Domestic Wastewater Generation and Disposal during Construction of Fish Segregation Weirs (Significance Criteria A, B, E, Program Level, No Impact)

Construction of the proposed fish segregation weirs would not direct new domestic wastewater to a wastewater facility. Rather, portable sanitary restrooms would be available for use by workers during construction. As a result, no potential exists for domestic wastewater generated during construction to exceed RWQCB treatment requirements, require any new or expanded wastewater treatment facilities, or result in a determination by the wastewater treatment provider which serves or may serve the Proposed Project that it has inadequate capacity to serve the Proposed Project's projected demand in addition to the provider's existing commitments. Therefore, there would be no impact.

Impact UTL-MANAGEMENT-2: Use of Water for Construction of Fish Segregation Weirs (Significance Criteria B and D, Program Level, Less than Significant)

During construction activities, non-potable water supplies would be used to wet exposed ground surfaces to minimize dust and provide limited irrigation of landscaped or re-vegetated areas. Limited quantities of potable water may also be required for construction personnel. The water needs related to construction activities would be relatively minor and likely fulfilled by off-site water supplies trucked to the site. Given the limited water supply needs for weir construction, it is expected that existing supplies are sufficient and available, and weir construction would not require new or expanded entitlements. Therefore, this impact would be less than significant.

Impact UTL-MANAGEMENT-3: Disposal of Solid Waste Generated during Construction of Fish Segregation Weirs (Significance Criteria F and G, Program Level, Less than Significant)

The Proposed Project would generate solid waste during construction of the weirs. Site preparation would include clearing and grubbing, import of fill, placement of fill and compaction. All demolished material and debris would be disposed of off-site at an appropriate location selected by construction contractor. The quantity of these generated solid waste materials would be relatively small, and wastes would be transported to a nearby landfill with adequate capacity. In addition, the contractor, through conditions in the contract, would be required to comply with all federal, state, and local statutes related to solid waste handling, transport, and disposal. Therefore, this impact would be less than significant.

Impact UTL-MANAGEMENT-4: Disposal of Hazardous Materials Generated during Construction of Fish Segregation Weirs (Significance Criteria F and G, Program Level, Less than Significant)

Construction of the weirs would require the use or handling of hazardous materials. Hazardous materials that would be used or transported to support the use and maintenance of construction equipment include fuels, lubricating oil, grease or hydraulic fluid. In addition, excavated materials could have potential to contain hazardous levels of certain substances. As needed, materials would be tested to determine whether they meet hazardous thresholds. If so, they would be disposed of by the contractor in an approved hazardous waste facility. The quantity of hazardous material from construction of the weirs would not be substantial, and therefore existing hazardous materials disposal sites are expected to have adequate capacity to accept hazardous waste generated during the construction activities associated with the weirs. In addition, the contractor, through conditions in the contract, would be required to comply with all federal, state, and local statutes related to handling, transport, and disposal of hazardous waste. Therefore, this impact would be less than significant.

Impact UTL-MANAGEMENT-5: Energy Consumption during Construction of Fish Segregation Weirs (Significance Criteria H and I, Program Level, Less than Significant)

Construction of the weirs would require the use of energy, primarily associated with the consumption of gasoline and diesel fuel from operating vehicles and construction equipment. Construction activities would be focused on completing the weirs as efficiently and safely as possible, and there is no reason to believe that construction would use energy wastefully, inefficiently, or unnecessarily. Therefore, this impact would be less than significant.

Recreation Management

Impact UTL-RECREATION-1: Domestic Wastewater Generation and Disposal during Construction of Recreational Fishing Enhancements (Significance Criteria A, B, E, Program Level, No Impact)

Recreation management activities may include construction related to enhancement of off-channel ponds. Construction would generate minimal amounts of domestic wastewater, none of which would be directed to a wastewater facility. Rather, portable sanitary restrooms would be available for use by workers during construction. As a result, no potential exists for domestic wastewater generated during construction to exceed RWQCB treatment requirements, require any new or expanded wastewater treatment facilities, or result in a determination by the wastewater treatment provider which serves or may serve the Proposed Project that it has inadequate capacity to serve the Proposed Project's projected demand in addition to the provider's existing commitments. Therefore, there would be no impact.

Impact UTL-RECREATION-2: Use of Water for Construction of Recreational Fishing Enhancements (Significance Criteria B and D, Program Level, Less than Significant)

During construction of recreational enhancements, if necessary, non-potable water supplies would be used to wet exposed ground surfaces to minimize dust and provide limited irrigation of landscaped or re-vegetated areas. Limited quantities of potable water may also be required for construction personnel. The water needs related to construction activities would be relatively minor and likely fulfilled by off-site water supplies trucked to the site. Given the limited water supply needs for weir construction, it is expected that existing supplies are sufficient and available, and weir construction would not require new or expanded entitlements. Therefore, this impact would be less than significant.

Impact UTL-RECREATION-3: Disposal of Solid Waste Generated during Construction of Recreational Fishing Enhancements (Significance Criteria F and G, Program Level, Less than Significant)

The Proposed Project may generate solid waste during construction of the recreational fishing enhancements. Site preparation would include clearing and grubbing, import of fill, placement of fill and compaction. All demolished material and debris would be disposed of off-site at an appropriate location selected by construction contractor. The quantity of these generated solid waste materials would be relatively small, and wastes would be transported to a nearby landfill with adequate capacity. In addition, the contractor, through conditions in the contract, would be required to comply with all federal, state, and local statutes related to solid waste handling, transport, and disposal. Therefore, this impact would be less than significant.

Impact UTL-RECREATION-4: Disposal of Hazardous Materials Generated during Construction of Recreational Fishing Enhancements (Significance Criteria F and G, Program Level, Less than Significant)

Construction of recreational fishing enhancements may require the use or handling of hazardous materials. Hazardous materials that would be used or transported to support the use and maintenance of construction equipment include fuels, lubricating oil, grease or hydraulic fluid. In addition, excavated materials could have potential to contain hazardous levels of certain substances. As needed, materials would be tested to determine whether they meet hazardous thresholds. If so, they would be disposed of by the contractor in an approved hazardous waste facility. The quantity of hazardous material from construction of the weirs would not be substantial, and therefore existing hazardous materials disposal sites are expected to have adequate capacity to accept hazardous waste generated during the construction activities associated with the weirs. In addition, the contractor, through conditions in the contract, would be required to comply with all federal, state, and local statutes related to handling, transport, and disposal of hazardous waste. Therefore, this impact would be less than significant.

Impact UTL-RECREATION-5: Energy Consumption during Construction of Recreational Fishing Enhancements (Significance Criteria H and I, Program Level, Less than Significant)

Construction of the recreational fishing enhancements would require energy use, primarily associated with the consumption of gasoline and diesel fuel from operating vehicles and construction equipment. Construction activities would be focused on completing the weirs as efficiently and safely as possible, and there is no reason to believe that construction would use energy wastefully, inefficiently, or unnecessarily. Therefore, this impact would be less than significant.

Chapter 18
OTHER STATUTORY CONSIDERATIONS

18.1 Introduction

This chapter presents discussions of significant and unavoidable impacts, growth-inducing impacts, and cumulative impacts as required by the CEQA Guidelines.

18.2 Significant and Unavoidable Impacts

Section 15126.2(b) requires an EIR to describe any significant impacts that cannot be mitigated to a less-than-significant level. All of the impacts associated with the Proposed Project would be reduced to a less-than-significant level through the implementation of identified mitigation measures, with the exception of the impacts discussed below. The following impacts have been identified as significant and unavoidable:

- Impact Fish-REINTRO-1: Disturbance to Suitable Spawning and Rearing Habitat, Damage to Existing Redds, and Overharvest of Eggs and Juveniles during Broodstock Collection
- Impact FISH-RECREATION-4: Riparian or Instream Habitat Degradation or Spread of Invasive Species or Pathogens from Recreational Fishing Enhancements
- Impact GHG-MANAGEMENT-1: Potential for Construction of Fish Segregation Weirs to Generate Substantial GHG Emissions or Conflict with the CARB's Applicable Plans, Policies, or Regulations Adopted for the Purpose of Reducing the Emissions of GHGs
- Impact GHG-RECREATION-1: Potential for Construction Activities Related to Enhancing Recreational Fishing Opportunities to Generate Substantial GHG Emissions or Conflict with the CARB's Applicable Plans, Policies, or Regulations Adopted for the Purpose of Reducing the Emissions of GHGs
- Impact CUM-4. Effects of Wild Broodstock Collection
- Impact CUM-6. Effects on the Generation of Greenhouse Gas Emissions

18.3 Growth Inducement

Section 15126.2(d) of the CEQA Guidelines requires an EIR to include a detailed statement of a proposed project's anticipated growth-inducing impacts. The analysis of growth-inducing impacts must discuss the ways in which a proposed project could foster economic or population growth or the construction of additional housing in the surrounding environment. The analysis must also address project-related actions that would remove existing obstacles to population growth, tax existing community service facilities and require construction of new facilities that cause significant environmental effects, or encourage or facilitate other activities that could, individually or cumulatively, significantly affect the environment. A project would be considered growth inducing if it induces growth directly (through the construction of new housing or increasing population) or indirectly (increasing employment opportunities or eliminating existing constraints on development). Under CEQA, growth is not assumed to be either beneficial or detrimental.

The Proposed Project would not involve new development or infrastructure installation that could directly induce significant population growth in the Project Area. Construction-related jobs would be short-term and would be anticipated to draw from the existing work force. The Project would involve construction of up to two new housing units for staff, and up to four full-time and two part-time staff would be required to operate SCARF. The Proposed Project would not displace any existing housing units or persons. The small amount of job growth is not anticipated to generate sufficient economic activity such that it would result in substantial population growth.

Therefore, the Proposed Project would not be growth inducing.

18.4 Cumulative Impacts

A cumulative impact refers to the combined effect of “two or more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts” (CEQA Guidelines § 15355). Cumulative impacts reflect “the change in the environment which results from the incremental impact of the project when added to other closely related past, present, and reasonably foreseeable probable future projects. Cumulative impacts can result from individually minor, but collectively significant projects taking place over a period of time” (CEQA Guidelines §15355(b)).

CEQA Guidelines section 15130, subd. (a), requires that an EIR address the cumulative impacts of a proposed project when:

- the cumulative impacts are expected to be significant; and
- the project’s incremental effect is expected to be cumulatively considerable, or significant, when viewed in combination with the effects of past, current, and probable future projects.

An EIR does not need to discuss cumulative impacts that do not result in part from the project evaluated in the EIR.

Section 15130 requires an analysis of cumulative impacts to contain the following elements:

- Either a list of past, present, and probable future projects producing related cumulative impacts, or a summary of projections contained in an adopted local, regional or statewide plan that describes or evaluates conditions contributing to the cumulative effect.
- A definition of the geographic scope of the area affected by the cumulative effect, and a reasonable explanation for the geographic limitation used.

- A summary of the environmental effects expected to result from those projects with specific reference to additional information stating where that information is available.
- A reasonable analysis of the combined (cumulative) impacts of the relevant projects.

It must also evaluate a proposed project's potential to contribute to the significant cumulative impacts identified, and discuss feasible options for mitigating or avoiding any contributions assessed as cumulatively considerable.

The discussion of cumulative impacts is not required to provide as much detail as the discussion of the effects attributable to the project alone. Rather, the level of detail should be guided by what is practical and reasonable.

18.4.1 Methods Used in this Analysis

As mentioned above, section 15130 of the CEQA Guidelines provides two recommended approaches for analyzing and preparing an adequate discussion of significant cumulative impacts. The approaches as defined in section 15130 of the CEQA Guidelines are either:

- the *list approach*, which would involve listing past, present, and probable future projects producing related or cumulative impacts, including those projects outside the control of the lead agency; or
- the *projection approach*, which utilizes a summary of projections contained in an adopted general plan, a related planning document, or an adopted environmental document that evaluated regional or area-wide conditions contributing to the cumulative impact.

This discussion utilizes the list approach for the cumulative impact analysis. The level of detail of a cumulative impact analysis should consider a proposed project's geographic scope and other factors (e.g., a project's construction or operation activities, the nature of the environmental resource being examined) to ensure that the level of detail is practical and reasonable. Because of the broad geographic range of several of the Proposed Project activities, this section provides a discussion of the geographic extent of possible cumulative impacts by subject area. The discussion focuses on the potential cumulative impacts of the Proposed Project for environmental issues that could be expected to be cumulatively impacted by the Proposed Project in conjunction with other past, present, and reasonably foreseeable future projects. The specific geographic scope for each environmental resource topic analyzed in this DEIR for cumulative impacts is provided below.

Table 18-1 defines the geographic scope that will be used in the impact analysis for each of the resource areas to which the Proposed Project could contribute to cumulative impacts.

Table 18-1. Geographic Scope for Resources with Cumulative Impacts Relevant to the Proposed Project

Resource	Geographic Scope	Explanation for the Geographic Scope
Air Quality	Project Area	This area covers the air basins where construction would occur and where SCARF operations and other physical actions of the Proposed Project could involve the release of air pollutants.
Biological Resources – Fisheries	Potentially Affected Area	This area covers the geographic scope where salmon collected or released as part of the Proposed Project could be found, and these could affect fisheries.
Biological Resources – Vegetation and Wildlife	Project Area	This includes areas that may be disturbed during construction activities, and where salmon maybe collected or released as part of the Proposed Project.
Greenhouse Gas Emissions	Global	GHG emissions at any location affect the global climate.
Hydrology, Geomorphology, and Water Quality	Project Area	Areas that may be disturbed during construction activities, operations of the SCARF, and where collection or release of salmon could cause discharges to, or modifications of, water bodies.
Land Use and Planning	Restoration Area	The Proposed Project would not have any potential to impact land use and planning beyond the SCARF site, the fish segregation weirs, and reintroduction locations.
Recreation	Restoration Area	This is the area where relevant Proposed Project activities (construction and operation of the SCARF and fish segregation weirs, and research and monitoring activities) with potential to affect these resources would take place.
Utilities and Service Systems	Restoration Area	This is the area where relevant Proposed Project activities (construction and operation of the SCARF and fish segregation weirs, and research and monitoring activities) with potential to affect these resources would take place.

Notes:

Potentially Affected Area: Includes the portions of the San Joaquin River watershed, Sacramento River watershed, Sacramento-San Joaquin River Delta (Delta), San Francisco Bay, and Pacific Ocean that are accessible to salmon released under the Proposed Project.

Restoration Area: Includes the San Joaquin River below Friant Dam to the confluence of the Merced River.

Project Area: Includes areas in which physical actions that are part of the Proposed Project would take place. This includes broodstock collection sites, quarantine sites, Chinook salmon production and reintroduction sites, and fisheries management and research areas.

Existing information on current and historical conditions was used to evaluate the combined effects of past actions on each resource topic that was evaluated. For present and probable future projects and activities, a list of related actions was compiled. The effects of these past, present, and probable future actions were then evaluated in combination with those of the Proposed Project. The combined effects of past actions and the list of related present and probable future projects are described further below.

This analysis does not evaluate cumulative impacts separately between project- and program-level actions. By definition, cumulative impacts must consider the Proposed Project's project and program-level actions together with other past, present, and probable future actions. Consequently, no distinction is made in this chapter with respect to project- and program-level actions; the cumulative analysis is the same for both.

Note that the SJRRP EIS/R (Reclamation and DWR 2012) included a cumulative impact analysis of the SJRRP as a whole, of which the Proposed Project is a part. The SJRRP EIS/R's cumulative impact analysis was reviewed and considered in the preparation of the cumulative impact analysis in this document. However, the evaluation in this document differs somewhat, due to the fact that only a subset of the SJRRP actions are being contemplated as part of the Proposed Project. As a result, several aspects of this analysis do not precisely correspond to those of the SJRRP EIS/R analysis, such as the resource topics with cumulative impacts considered relevant to the Proposed Project, the geographic scope of the cumulative impact analysis, and the conclusions relative to cumulative impacts. In addition, to ensure that this document's cumulative impact analysis did not fail to consider the collective impacts of the Proposed Project in combination with other SJRRP actions (as well as other past, present and probable future projects), the SJRRP has been included as one of the past, present and probable future projects in the list of projects below.

18.4.2 Cumulative Impact Analysis

Cumulative Setting

Projects and activities described in this analysis include those that occur in the same geographic area and produce similar impacts on resources as those of the Proposed Project. The broad geographic range of the Project Area and Potentially Affected Area requires an analysis of a number of past, present, and probable future activities that have affected California's resources. The effects of past and present actions have strongly influenced existing conditions, and some past actions created legacies that are still affecting resources (e.g., pits from gravel/aggregate extraction activities along the San Joaquin River in the Restoration Area). The following are the most important of these past and present actions:

- Population growth and associated development;
- Conversion of natural vegetation to agricultural and developed land uses;
- Introduction of nonnative plant and animal species;
- Resource extraction (e.g., mining and timber harvest); and
- Regional and local water development actions.

A more complete list of past, present, and probable future activities that could cumulatively affect the environment in the study area, and the cumulative resource topics they affect and to which the Proposed Project could contribute to cumulative impacts, is presented in Table 18-2 and discussed further below. Note that the specificity of the list corresponds to the geographic scope of the cumulative resource topics. For instance, it would not be practical to list every single past, present or probable future project contributing to global climate change. In these cases, a more general description of these projects is provided.

The Proposed Project would involve construction only at the SCARF site, the locations for fish segregation weirs, and potential sites for enhanced recreational fishing ponds. Outside of construction activities, the potential for cumulative impacts would largely be limited to Proposed Project operational issues such as water use, discharge of hatchery return flows, and other emissions (e.g., GHGs) or wastes generated by the SCARF operations, and the effects of the collection of broodstock, fish reintroduction, and research and monitoring.

Table 18-2. List of Other Projects and Activities (Past, Present, and Probable Future) that May Cumulatively Affect Resources of Concern for the Project

Past, Present or Probable Future Activity	Resource Topics with Potential for Cumulative Impacts							
	Air Quality	Biology-Fisheries	Biology-Vegetation and Wildlife	Greenhouse Gas Emissions	Hydrology, Geomorphology, and Water Quality	Land Use and Planning	Recreation	Utilities and Service Systems
Agriculture	X	X	X	X	X		X	X
Aquaculture (i.e., hatcheries)	X	X	X	X	X		X	X
Dams	X	X	X	X	X		X	
Fish Harvesting	X	X	X	X			X	
Habitat Restoration and Conservation		X	X		X		X	
Infrastructure Development	X	X	X	X	X	X	X	X
Introductions of nonnative species		X	X		X		X	
Mining	X	X	X	X	X	X	X	
Recreational Activities (i.e., camping, boating, and trail construction or use)	X	X	X	X	X		X	
SJRRP	X	X	X	X	X	X	X	X
Timber Harvest		X	X	X	X		X	
Urbanization	X	X	X	X	X	X	X	X
Water Diversions	X	X	X		X	X	X	X
Water Pollution		X	X		X		X	
Wildfire, fire suppression, and fuels management	X	X	X	X	X			

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Agriculture

Ongoing agricultural activities in the San Joaquin Valley and especially in the areas around and adjacent to the Restoration Area, including farming and livestock grazing, may cumulatively affect biological resources and water quality through runoff and transport of pollutants, removal of streambank vegetation, straightening of natural streams, removal of woody debris, water diversions, and excessive irrigation (SWRCB 2000). Agricultural activities also may contribute air pollutants and GHG emissions from use of farm equipment, decomposition of organic materials, etc. Typical potential pollutants resulting from agricultural operations include sediment, animal wastes, salts, pesticides, herbicides, and fertilizers (SWRCB 2000). The removal of streambank vegetation or woody debris and the straightening of natural streams may affect the aquatic habitat complexity (e.g.., depth of pools) and stream water temperatures (Knight and Boyer 2007). Grazing also may affect surface water quality and aquatic biota through direct loadings of animal wastes, reductions of streamside vegetation, increasing temperatures, siltation of spawning habitat, and erosion of streambanks.

Aquaculture

The operation of aquaculture facilities, including hatcheries, may contribute pollutants via direct discharges from the facilities to waters potentially affected by the Proposed Project. As discussed in Chapter 15, *Recreation*, of this DEIR, CDFW and its precursors have operated artificial propagation and rearing programs for trout and other fish species for more than 100 years. Trout have been artificially stocked to provide recreational opportunities and steelhead and salmon have often been stocked as mitigation for the building of dams (ICF Jones & Stokes 2010). CDFW's hatcheries in the Potentially Affected Area include the SJFH, Merced River Fish Hatchery, Mokelumne River Fish Hatchery, Nimbus Fish Hatchery, and FRFH. The USFWS' Coleman National Fish Hatchery releases into Battle Creek, a tributary of the Sacramento River. CDFW issues licenses for every aquaculture operation that is involved in the controlled growing and harvesting of fish, shellfish and plants in marine, brackish and fresh water for human consumption or bait purposes. Potential pollutants of aquaculture facilities include, but are not limited to, sediment, nutrients, and solids. In addition, aquaculture facilities may require water diversions that have the potential to affect aquatic biological resources through entrainment and/or reduced downstream flows.

Aquaculture facilities also may impact native fish species through potential loss of genetic diversity and structure of naturally spawning populations, and predation or competition between the native and hatchery-reared (i.e., stocked) fish (for more detail see discussions for *Fish Reintroduction* in Section 6.5.3, *Environmental Impacts* of Chapter 6, *Biological Resources – Fisheries*). As an example, although many of CDFW's salmonid hatcheries have beneficial or less than significant impacts on native fish species populations, the release of hatchery-reared Chinook salmon and steelhead potentially cause substantial competition and predation impacts on the San Joaquin River and its tributaries' natural fall-run Chinook salmon populations (ICF Jones & Stokes 2010). Thus, aquaculture may be a significant contributor to cumulative impacts on fish or aquatic species in the Potentially Affected Area.

Dams

Dams are generally constructed and operated for flood control, recreation, water supply, and/or hydroelectric generation purposes. The implementation and operation of dams has multiple effects on the downstream biological resources, particularly to fish habitats, and water quality. Effects of dams typically include:

- creating migration barriers;
- blocking/reducing spawning and rearing habitat;
- reducing gravel transport downstream;
- altering the downstream hydrologic regime (e.g., flow quantities, flood pulse flows);
- creating slow water habitat unsuitable for native stream/river species; and/or
- altering downstream water temperatures (Knight and Boyer 2007).

Almost every major stream in the western Sierra Nevada has at least one dam or diversion to capture the water supplies from the Sierra Nevada snowpack (Moyle et al. 1996). These dams have blocked approximately 95% of the spawning and holding habitats for spring-run Chinook salmon and substantially reduced access to habitats for other runs of salmon, steelhead, and Pacific lamprey (Moyle et al. 1996). Additionally, alterations to a stream or lake by dams commonly allows for the presence or invasion of non-native species (Moyle et al. 1996).

Three dams (Friant, Mendota, and Sack) and several smaller diversion structures are located in the Restoration Area (FWUA and NRDC 2002). The construction and operation of Friant Dam impacted the San Joaquin River in significant ways. Reduced flows, combined with downstream riparian diversions, dewatered much of the San Joaquin River within the Restoration Area, preventing fish use and passage in most years. The recently implemented SJRRP has begun to restore flows and habitat in these areas; however, Friant Dam remains a barrier for upstream fish migration, and thus the farthest upstream boundary for salmonid migration.

Mendota Dam is located at the confluence of the San Joaquin River and Fresno Slough, downstream of the SCARF site. The pool behind the dam has been used for irrigation since the late 1800s. After the completion of the Friant Dam in 1948, flows to Mendota Pool from the San Joaquin River decreased. Since 1951, the Delta-Mendota Canal has delivered water to the Mendota Pool from the Delta. Although Mendota Dam is orders of magnitude smaller than Friant Dam, it is a substantial barrier to the migration of salmonids. Even if the existing fish ladder is reconstructed, the Mendota Dam would remain problematic for migrating salmonids due to higher levels of Total Dissolved Solids and more salinity than flows passing through the Friant Dam. In addition, downstream migrating juvenile fish would likely incur high entrainment losses through the unscreened diversions and canals (FWUA and NRDC 2002). Reclamation is currently evaluating alternatives to improve fish passage at Mendota Pool.

Sack Dam, which located about 7 miles southeast of the City of Dos Palos in Merced County, just north of Arroyo Canal, presents impacts similar to Mendota Dam. However, Sack Dam is much smaller and its fish ladder is more operational and would not constrain adult fish passage. Similar to Mendota Dam, juvenile fish migration would likely result in entrainment until diversions are screened or otherwise reconstructed to alleviate juvenile entrainment into the canal (FWUA and NRDC 2002). Reclamation is planning to construct fish passage improvements at Sack Dam.

Additionally, Reclamation and DWR are currently conducting the Upper San Joaquin River Basin Storage Investigation, a feasibility study to determine the type and extent of federal, state, and regional interests in a potential project(s) in the upper San Joaquin River watershed to expand water storage capacity, improve water supply reliability and flexibility, and enhance San Joaquin River water temperature and flow conditions to support anadromous fish restoration efforts. This feasibility study includes the evaluation of building of a dam in the upstream portion of Millerton Lake to create the proposed Temperance Flat Reservoir (Reclamation and DWR 2008).

Fish Harvesting

Cumulative impacts may occur as the result of fish harvesting, which may be from recreational, commercial, subsistence, or illegal fishing (poaching). Fish harvesting may be another past, present, and/or future contributing factor to the cumulative effects on California's anadromous fish populations (e.g., Chinook salmon). NMFS regulates commercial, recreational, and tribal fishing of anadromous fish populations native to California, Oregon, and Washington through its Pacific Coast Salmon Fishery Management Plan (SFMP). The goals of the SFMP are to achieve optimum yield, prevent overfishing, and ensure rebuilding of salmon stocks to harvestable levels (NMFS and PFMC 1977). The commercial fishery provides relatively high-priced fresh, frozen, and cured salmon. Ocean salmon fisheries off the California coast extending up to Washington are important for their direct economic value and indirectly for their ecological effects. In 2011, about one million pounds of Chinook salmon valued at more than $5 million were landed at California ports (CDFG 2012). The recreational fishery provides valuable recreational benefits.

Every year, the Pacific Fishery Management Council (PFMC) follows a preseason process to develop recommendations for management of salmon fisheries. The PFMC sets the regulations for commercial and recreational fishing in federal waters. The Commission considers the PFMC recommendations in its development of seasonal regulations in state waters, including rivers and the ocean within the 3-nautical mile limit. By establishing an annual goal for the number of spawners of the major salmon stocks ("spawner escapement goals") and allocating the harvest among different groups of fishermen (commercial, recreational, tribal, various ports, ocean, and inland), the SFMP manages the fishing of Chinook salmon. Annual goals are based on the geographic range and specific stocks (e.g., winter, fall, or spring runs). Fish harvesting is managed to help minimize adverse effects on anadromous fish populations.

Habitat Restoration and Conservation

Restoration and conservation programs and plans may have the potential to affect the same resources and fall within the geographic scope designated for cumulative assessment of those resources. Actions resulting from these efforts include habitat restoration/creation, removal of barriers to fish migration, enhancement of stream flows, screening of water diversions, eradication of non-native species, reductions in pollutants, research and monitoring of important aquatic organisms, and sustainable management. Although the ultimate result of these activities is generally beneficial, alterations to baseline conditions can potentially adversely impact biological resources, water quality, other environmental variables depending on the activity and location.

There are several such plans currently being developed or implemented in the Restoration Area and Potentially Affected Area. One plan, the San Joaquin County Multi-Species Habitat Conservation and Open Space Plan (SJMSCP), was developed in 2000 by the San Joaquin Council of Governments. It is a 50-year plan that provides a strategy for balancing the need to conserve open space and the need to convert open space to other uses while protecting the region's agricultural economy; preserving landowner property rights; providing for the long-term management of plant, fish and wildlife species, especially those that are currently listed, or may be listed in the future, under the ESA or CESA; providing and maintaining multiple-use open spaces which contribute to the quality of life of the residents of San Joaquin County; and accommodating a growing population while minimizing costs to project proponents and society at large. The goal of the SJMSCP is to provide 100,841 acres of preserves based on an estimated conversion acreage of 109,302 acres. The SJMSCP intends to protect 97 special-status plant, fish and wildlife species in 52 vegetative communities scattered throughout San Joaquin County by acquiring land primarily through conservation easements and fee title at a ratio of approximately 90% easements to 10% fee title acquisition. Establishment and/or use of mitigation banks, and in-lieu land dedications also will play a role in preserving habitats under the SJMSCP (SJCOG 2000).

The Bay Delta Conservation Plan (BDCP) is an HCP and NCCP intended to be implemented over a 50-year period to improve the condition of habitat and species in the Delta, reduce adverse effects of water diversions, and provide a reliable water supply (see the *Water Diversions* section below for more details).

Additionally, the Proposed Project is a part of the SJRRP. As described in Chapter 1, *Introduction*, and elsewhere in this DEIR, the SJRRP consists of two major goals: 1) a Restoration Goal and 2) a Water Management Goal. The SJRRP is also discussed in more detail below.

Infrastructure Development

Alterations to streambeds, including modifications resulting from the construction of levees, road crossings, bridges, and railways, have been numerous historically, and it is reasonable to assume that many will occur in the future, potentially affecting habitat for fish, other aquatic organisms, and terrestrial plants and wildlife. Throughout the Central Valley, levees have been constructed to provide flood protection for both urban and rural lands. In 2006, following sustained heavy rainfall and runoff, Governor Arnold Schwarzenegger declared a State of Emergency for California's levee system, commissioning up to $500 million of state funds (AB 142) to repair and evaluate State/federal project levees. Nearly 300 levee repair sites have been identified, and more than 100 of the most critical sites having already been completed with AB 142 funds. Repairs to other sites are either in progress or scheduled to be completed in the near future, and still more repair sites are in the process of being identified, planned, and prioritized (DWR 2013). These activities, as well as future maintenance to existing infrastructure and planned construction of high-speed rail, may cumulatively affect fish and/or terrestrial biological resources through numerous mechanisms such that result in loss or degradation of aquatic and terrestrial habitats. Depending on infrastructure designs, the cumulative effects may be reduced by improving instream habitats, replanting vegetation, and creating off-site mitigation areas.

Introductions of Non-Native Species

Introductions of non-native fish species and other aquatic organisms are a cumulatively contributing factor to the decline of native aquatic fauna throughout California. Non-native species may have been introduced to the Potentially Affected Area through various vectors such as ballast water and gear on ships entering the Bay-Delta from foreign waters; from recreational boats, gear, and bait; from use as biological controls (e.g., mosquitofish); and from intentional aquarium releases. Non-native species may adversely affect native species through predation, competition, food web dynamics, and habitat destruction or modifications.. Non-native species have been shown to have strong negative effects on the recovery of native species in decline including salmonids (Moyle et al. 1996). In addition to the direct effects on native species from the introduced species, efforts to remove introduced species may also cumulatively affect native species.

Two species that have previously affected hatchery operations within the U.S. are the NZMS and the quagga mussel. These species colonize hard surfaces within the hatcheries, clogging water intake structures, aeration devices, pipes, and screens. Once established within hatcheries, these species may be released downstream with effluent waters. In addition to the NZMS and the quagga mussel, fish hatchery activities present numerous potential opportunities for accelerating the spread of zebra mussels to new locations. Although the zebra mussel has not successfully infested any known U.S. hatcheries to date, its presence has been confirmed within several California water bodies. Zebra mussels, like the closely related and ecologically similar quagga mussels, are voracious filter-feeding organisms. Within new environments, these invasive mollusks have the potential to colonize with extraordinary population densities.

Mining

Sand and gravel mining currently occurs from Friant Dam downstream to the Chowchilla Bifurcation Structure. Mining in Reach 1 is predominately for gravel and sand, while Reach 2 is exclusively sand mining. Current mining operations occur primarily in off-channel locations including floodplains and terrace features. Off-channel mining, primarily in Reach 1, has degraded floodplain habitat and left gravel pits that harbor predators and may interfere with movement of migrating salmon. Historical instream mining has legacy impacts in Reach 1, including alteration of the sediment transport regime, loss of gravel bars and riffles, and gravel pits. These alterations, coupled with the reduction in sediment supply gravel supply by Friant Dam, has likely greatly reduced the historical quantity of spawning habitat on the San Joaquin River (FWUA and NRDC 2002)

Recreational Activities

Recreational activities may result in numerous potential cumulative impacts on resources in the Potentially Affected Area, including potential impacts on air quality, biological resources, climate change, hydrology, and water quality. Types of recreational activities may include but not be limited to: camping, boating, hunting, fishing, and the construction and/or use of trails. Travel to and from recreational areas and the use of off-road vehicles may cumulatively contribute to air quality impacts. The recreational activities could result in the disturbance or displacement of biological species (including nesting raptors) and loss of riparian habitat. In addition, according to Moyle et al. (1996) the success of fish spawning may be reduced by heavy use of streams by boaters or anglers and disturbances to fish that are holding or spawning.

Restoration of perennial flow through all reaches of the San Joaquin River under the SJRRP should greatly increase the recreational opportunities of all reaches (FWUA and NRDC 2002). Although the region will likely benefit economically from the increase in recreational opportunities, increased public use often results in impacts to the river such as damage to streambanks and vegetation.

State Park's Central Valley Vision Plan endeavors to create new recreational facilities as well as improve existing facilities within the Central Valley. As described in Section 15.2.2, *State Laws, Regulations, and Policies*, in Chapter 15, *Recreation*, the Central Valley Vision Plan proposes 11 new parks, five of which would be located in the San Joaquin Valley and Tulare Basin. There would be a significant increase in facilities for camping, picnicking, hiking, and boating throughout the region. The plan includes facilities to support picnicking, camping, hiking, and canoeing in the San Joaquin River Parkway, and effort led by the SJRC along 22 miles of the San Joaquin River from Friant Dam to SR 99.

San Joaquin River Restoration Program

The SJRRP is a long-term effort to restore flows to the San Joaquin River from Friant Dam to the confluence of Merced River and restore a self-sustaining Chinook salmon fishery in the river while reducing or avoiding adverse water supply impacts from restoration flows. It is a direct result of a Settlement reached in September 2006 by the U.S. Departments of the Interior and Commerce, NRDC, and FWUA. The Settlement received Federal court approval in October 2006. Federal legislation was passed in March 2009 authorizing Federal agencies to implement the Settlement. The Settlement is based on two goals:

- Restoration Goal: To restore and maintain fish populations in "good condition" in the main stem of the San Joaquin River below Friant Dam to the confluence of the Merced River, including naturally reproducing and self-sustaining populations of salmon and other fish.

- Water Management Goal: To reduce or avoid adverse water supply impacts to all of the Friant Division long-term contractors that may result from the Interim Flows and Restoration Flows provided for in the Settlement.

To achieve the Restoration Goal, the Settlement calls for release of water from Friant Dam to the confluence of the Merced River (referred to as Interim and Restoration flows), a combination of channel and structural modifications along the San Joaquin River below Friant Dam, and reintroduction of Chinook salmon. Restoration Flows are specific volumes of water to be released from Friant Dam during different year types, according to Exhibit B of the Settlement. Interim Flows are experimental flows that began in 2009 and will continue until full Restoration Flows are initiated, with the purpose of collecting relevant data concerning flows, temperatures, fish needs, seepage losses, recirculation, recapture, and reuse. To achieve the Water Management Goal, the Settlement calls for recirculation, recapture, reuse, exchange, or transfer of the Interim and Restoration flows to reduce or avoid impacts to water deliveries to all of the Friant Division long-term contractors caused by the Interim and Restoration flows (Reclamation and DWR 2012).

Timber Harvest

Timber harvesting has affected fish and other aquatic organisms in California since the mid-19th century. Loss of shade can increase stream temperatures, while removal of trees may accelerate erosion of sediments into streams (filling in cool refuge pools) and reduce the amount of large woody debris that can enter streams to form habitat for fish and other aquatic life (Moyle et al. 2008). Associated infrastructure, such as roads, may cumulatively increase the initial effects. Some industrial timberland owners participate in HCPs for listed species. Modern forest practice regulatory programs generally have high compliance and effectiveness and, together with voluntary programs, such as forest certification, provide benefits to biodiversity (California State Board of Forestry and Fire Protection Monitoring Study Group 2006). Timber harvest has historically occurred in various locations throughout the Potentially Affected Area.

Urbanization

Continued population growth in California and the increasing conversion of lands to urbanized uses may contribute to cumulative impacts on agricultural land, air quality, GHGs, water quality, biological resources, public services and utilities. Table 18-3 provides the projected population changes in California counties from 2010 to 2060 (DOF 2013). Nearly all counties would experience population growth and some counties would experience greater than 100% growth. Increasing populations in California may lead to additional impacts on climate change, aquatic resources, and water quality through:

- Increased impermeable surfaces and greater or more polluted runoff loadings;
- Increased water demands and usage;
- Increased energy needs and consumption, including vehicle fuel usage; and
- Increased recreational use.

The primary pollutants found in runoff from urban areas include sediment, nutrients, oxygen-demanding substances, road salts, heavy metals, petroleum hydrocarbons, pathogenic bacteria, and viruses (SWRCB 2000). Construction areas are a major source of suspended sediments, which contribute the largest mass of pollutant loadings to receiving waters from urban areas (SWRCB 2000).

Increased water demands and usage could result in greater water diversions and the resulting impacts on aquatic biological resources, and greater energy usage to transport waters to urban areas. Energy use increases would result in the release of additional GHGs and cumulatively contribute to climate change. An increased population may lead to an increase in recreational activities and the subsequent disturbances to aquatic or terrestrial habitats or water quality impacts.

There are a number of planned developments, primarily residential, near the SCARF site in Fresno County; if implemented, these plans would greatly increase the local population. The Friant Ranch Specific Plan (Friant Ranch) is a planned adult retirement community on approximately 900 acres east of Friant Road. The planned development consists of a mixed use community with 2,683 single-family age-restricted units, 83 multiple-family age-restricted units, 180 non-age-restricted multi-family units, and 250,000 square feet of commercial space within a Village Core that also provides for up to 50 residential units. Wellington Ranch and Mira Bella are two other residential developments planned in the vicinity of the SCARF site. Wellington Ranch would consist of the development of almost 3,000 acres south of Friant Ranch. Mira Bella is a proposed site for up to 180 residential units east of Friant Road between the Community of Friant and Millerton Lake SRA. There are several other projects planned further north and east of the SCARF site.

On the Madera County side of the San Joaquin River, there are also a number of planned developments, primarily residential. River Ranch Estates, an approved development of 900 residential units, is directly across the river from the SCARF site. North Fork Village, consisting of 1,000 planned residential units and some commercial units, is south of Millerton Lake SRA on the Madera County side. Tesoro Viejo, an approved development of 5,000 residential units, is directly to the southwest of the planned River Ranch Estates. Further downstream along the San Joaquin River, across the river from the City of Fresno, are two more large residential developments, Gunner Ranch West, which has proposed 1,500 residential units, and Gateway Village, which has been approved for the development of 6,578 residential units.

Table 18-3. Projected California Population Changes by County, 2010 to 2060

County	2010	2060	Change	County	2010	2060	Change
Alameda	1,513,236	1,675,011	10.7%	Orange	3,017,327	3,331,595	10.4%
Alpine	1,163	1,147	-1.4%	Placer	350,275	579,729	65.5%
Amador	37,853	45,116	19.2%	Plumas	19,911	19,471	-2.2%
Butte	219,990	341,850	55.4%	Riverside	2,191,886	4,216,816	92.4%
Calaveras	45,462	63,025	38.6%	Sacramento	1,420,434	2,191,508	54.3%
Colusa	21,478	40,179	87.1%	San Benito	55,350	86,939	57.1%
Contra Costa	1,052,211	1,585,244	50.7%	San Bernardino	2,038,523	3,433,047	68.4%
Del Norte	28,544	32,159	12.7%	San Diego	3,102,745	4,152,763	33.8%
El Dorado	180,921	297,972	64.7%	San Francisco	806,254	926,555	14.9%
Fresno	932,377	1,615,401	73.3%	San Joaquin	686,588	1,538,313	124.1%
Glenn	28,143	40,040	42.3%	San Luis Obispo	269,713	353,190	31.0%
Humboldt	134,663	147,377	9.4%	San Mateo	719,729	928,706	29.0%
Imperial	175,389	355,022	102.4%	Santa Barbara	424,050	519,034	22.4%
Inyo	18,528	23,921	29.1%	Santa Clara	1,786,429	2,198,503	23.1%
Kern	841,146	2,055,622	144.4%	Santa Cruz	263,260	309,474	17.6%
Kings	152,656	282,305	84.9%	Shasta	177,472	265,246	49.5%
Lake	64,599	110,055	70.4%	Sierra	3,230	3,876	20.0%
Lassen	35,136	41,961	19.4%	Siskiyou	44,893	52,646	17.3%
Los Angeles	9,824,906	11,562,720	17.7%	Solano	413,117	634,852	53.7%
Madera	151,328	373,929	147.1%	Sonoma	484,084	616,340	27.3%
Marin	252,731	272,275	7.7%	Stanislaus	515,205	953,580	85.1%
Mariposa	18,193	23,308	28.1%	Sutter	94,669	254,783	169.1%
Mendocino	87,924	102,106	16.1%	Tehama	63,487	109,201	72.0%
Merced	255,937	553,114	116.1%	Trinity	13,713	19,381	41.3%
Modoc	9,648	10,321	7.0%	Tulare	443,066	836,850	88.9%
Mono	14,240	20,755	45.8%	Tuolumne	55,144	63,947	16.0%
Monterey	416,259	569,459	36.8%	Ventura	825,077	1,034,651	25.4%
Napa	136,811	196,243	43.4%	Yolo	201,311	305,711	51.9%
Nevada	98,639	150,550	52.6%	Yuba	72,329	168,685	133.2%
Total (State)	37,309,382	52,693,583	41.2%				

Source: DOF 2013

Water Diversions

Surface water bodies provide a substantial portion of California's water supply and can be potentially impacted by numerous water diversions on each water body. The multiple purposes of water diversions may include serving as a water supply for municipal, industrial or agricultural irrigation uses, electricity generation, and other uses. Water diversions state-wide can cumulatively affect the biological resources and water quality of diverted or downstream water bodies of the Potentially Affected Area of the Proposed Project. Water diversions can impact biological resources through entrainment, impingement on fish screens that result in death or injury, dewatering of stream reaches, reduced or altered hydrologic flow patterns, and/or effects on water quality, especially water temperature. Similar to dams, water diversions may also contribute to biological resource impacts by blocking movements and migrations, isolating populations, and causing increased human use of the watersheds (Moyle et al. 1996). In addition, alterations to the water quality of diverted water bodies may affect aquatic resources by changing the concentration of pollutants and impacting the potential toxicity or accumulation in food webs (Monsen et al. 2007). As an example, the estimated mortality rate for entrained fish at the SWP and CVP pumping facilities, two of the largest water diversions in the world, is approximately 65 to 84% (NMFS 2009).

Water diversions also impact the water quality of diverted water bodies. Diversions can reduce downstream flows, which can lead to increased downstream water temperatures. Large water diversions at the pumping facilities of the SWP and CVP can alter water circulation patterns. Subsequent impacts of these water diversions include alterations to the source mixture of water (i.e., fresh waters from the San Joaquin River and Sacramento River or estuarine waters from tidal exchange with the San Francisco Bay), and the flushing time to carry nutrients or pollutants downstream (Monsen et al. 2007).

The BDCP is a plan under development that endeavors to restore and protect ecosystem health, water supplies provided by the SWP and CVP and water quality while preserving, restoring and enhancing aquatic, riparian and associated terrestrial natural communities in the plan area. As part of the BDCP, several alternative Delta conveyance facilities are being considered, including: new north Delta diversions that would use a tunnel or canal to transport water south and be operated in conjunction with existing pumping operations (dual conveyance); an isolated facility that would consist only of the north Delta diversion facilities and water transport via tunnel or canal; or a through-Delta conveyance that would continue to convey water through the Delta, using existing and new Delta corridors by developing new operable barriers, canals, and screened intakes at the Delta Cross Channel and Georgiana Slough. Establishing new intake facilities on the north side of the Delta would attempt to reduce or eliminate fish losses associated with the existing Delta export pumps, and return a normal flow pattern to the Delta by eliminating reverse flows caused by the existing pumps and water conveyance to the south Delta. This change would influence hydrologic and water quality conditions in the Delta. The BDCP also proposes to convert substantial tracts of land currently protected by levees to tidal and intertidal wetlands and other habitat types to support 57 aquatic and terrestrial covered species, including spring-run, fall-run, late-fall-run and winter-run Chinook salmon. Other conservation measures in the proposed BDCP include programs intended to improve water quality; reduce production of methylmercury; and control invasive species and non-native predators.

Water Pollution

A variety of nonpoint and point sources may contribute pollutants to the water bodies that constitute the Project Area and the Potentially Affected Area. Point sources are defined as "any discernible, confined, and discrete conveyance, including but not limited to, any pipe, ditch, channel, tunnel, conduit, and well" (SWRCB 2010). Types of point sources may include discharges from wastewater treatment plants and industrial or commercial uses. Nonpoint sources are diverse and widespread and commonly include agriculture, construction activities, forestry, mining, and urbanized areas. Rainfall and snowmelt runoff transport pollutants from nonpoint sources to surface waters as the runoff travels over and through the ground surface (U.S. EPA 1994).

Water quality impairments in California's surface waters have been identified and categorized on the SWRCB's 303(d) list. Types of pollutant impairments include: mercury, other metals, nutrients, other inorganics, other organics, pathogens, pesticides, salinity, sediment, and toxicity. These pollutants can affect aquatic species directly (e.g., diseases or bioaccumulation) or indirectly (i.e., alteration of habitat type/quality due to altered sediment loads).

As described in Chapter 12, *Hydrology, Geomorphology, and Water Quality*, TMDLs for listed pollutants and water bodies, are an estimate of the total load of pollutants from point, nonpoint, and natural sources that a water body may receive without exceeding applicable water quality standards (with a "factor of safety" included). In the Restoration Area, the SWRCB has identified 43 water bodies that require the development of TMDLs, and 12 water bodies that are currently being addressed by TMDLs. Thus, there are a number of water bodies that still require the implementation of TMDLs. Once established, the TMDL allocates the permissible contaminant loading among current and future pollutant sources to the water body to ensure that water bodies maintain compliance with the established water quality standards. When implemented, TMDLs can improve water quality and reduce existing water quality impairments.

Wildfire, Fire Suppression, and Fuels Management

Wildfires may contribute to numerous cumulative effects on the biological resources (e.g., riparian species, amphibians, and fish) and water quality in the Project Area and Potentially Affected Area. Additionally, wildfires may contribute cumulatively to climate change. Specific impacts that could affect biological resources and water quality include:

- Channel scour or sedimentation,
- Combustion,
- Debris flow and woody debris inputs,
- Decreased cover,

- Hydroperiod (increased surface water),
- Increased nutrients,
- Increased temperature,
- Ash and fine silt in runoff from burned area (Pilliod et al. 2003).

Wildfire fuel management and/or suppression efforts include prescription burning; mechanical fuel reduction, thinning, and logging; construction of fire roads and firebreaks; and chemical applications. Many of the impacts described above relating to biological resources or water quality may occur as a result of the fuel management or suppression efforts. Fire management practices (e.g., use of fire roads and chemical flame retardants) could contribute pollutants (e.g., sediment, ammonia-based fire retardants, surfactant-based foams, etc.) to local water bodies. The chemical retardants can be slightly to moderately toxic to algae and invertebrates and moderately to highly toxic to fish (Pilliod et al. 2003). In addition, management of post-wildfire areas via timber harvesting may contribute to erosion depending on the extent of ground disturbance by equipment, road use, and the size of the area to be harvested (Peterson 2009). Wildfires and fuel management efforts (e.g.,, prescription burning, thinning) may contribute to climate change through the removal of vegetation, which absorbs the greenhouse gas carbon dioxide, and through the emission of carbon dioxide as the vegetation is burned.

18.5.3 Cumulative Impacts

Table 18-4 presents a summary of cumulatively significant impacts for all resource topics and the topics for which the Proposed Project would potentially make a cumulatively considerable incremental contribution to an overall significant cumulative impact.

The Proposed Project has been evaluated to determine whether it would make a cumulatively considerable incremental contribution to any of these significant cumulative impacts. Because no significant cumulative impacts have been identified related to aesthetics, cultural resources, geology, soils, and seismicity, hazards and hazardous materials, land use and planning, mineral resources, noise, population and housing, and/or transportation and traffic, the Proposed Project does not have the potential to result in a considerable contribution to a significant cumulative impact relative to these topics. Therefore these topical areas are not discussed further, and the reason for this conclusion has been provided in Table 18-4. As shown in Table 18-4, several impacts were determined to have the potential to result in a cumulatively considerable incremental contribution to a significant cumulative impact. These impacts are described below.

Table 18-4. Summary of Cumulative Significant Impacts and Proposed Project's Contribution

Resource Topic	Cumulatively Significant Impacts	Proposed Project's Contribution
Aesthetics	While the Proposed Project may result in aesthetic effects in the specific locations where it would result in physical changes (e.g., construction of the SCARF), when considering the other past, present and probable future projects in the vicinity of these Proposed Project actions, either no significant cumulative impact was found, and/or the incremental contribution of the Proposed Project would not be considerable. For instance, at the SCARF site, the area is already generally developed and the SCARF would not be visually inconsistent with the surrounding features, resulting in a less than considerable contribution to any possibly significant cumulative aesthetic impacts. In other less developed locations for Proposed Actions (e.g. locations for rotary screw traps), aesthetic resources were determined to not be significantly cumulatively degraded.	No further analysis required.
Agricultural Resources	While the general plans of Fresno County and various other jurisdictions contain policies addressing protection of agricultural land, ongoing development in the county and the Central Valley region is anticipated to result in the incremental conversion of farmland for residential and commercial uses. These impacts would be considered cumulatively significant.	The Proposed Project would involve the construction of a fish hatchery on previously disturbed land that is not currently zoned for agricultural use. Fish segregation weirs would be constructed within the riverbed, and would not convert farmland. However, the Proposed Project is part of the larger SJRRP, which could result in cumulative impacts to agricultural resources. *Further analysis provided below.*

Resource Topic	Cumulatively Significant Impacts	Proposed Project's Contribution
Air Quality	The Project Area is located in Fresno County, in the SJVAB, which is currently designated as a nonattainment area for federal and state ozone and $PM_{2.5}$ standards, and state PM_{10} standards. The SJVAPCD has adopted a cumulative threshold of significance of 10 tons per year for ozone precursors (ROG and NOx). These impacts would be considered cumulatively significant.	Construction and operational activities of the Proposed Project would temporarily increase emissions of particulate matter and exhaust gases. *Further analysis provided below.*
Biological Resources - Fisheries	Past and present actions have significantly impacted anadromous salmonids and their habitat in the Potentially Affected Area. Incremental development could further decrease water quality, introduce non-native species, alter genetic fitness, increase ecological risks, and impede migration. These impacts would be considered cumulatively significant.	The Proposed Project as a whole is anticipated to beneficially impact fisheries throughout the Potentially Affected Area. However, release of hatchery stock has potential to compromise genetic integrity and fitness of wild stocks and potentially spread disease. The Proposed Project also has potential to incrementally decrease water quality, introduce non-native species, and/or impede migration. *Further analysis provided below.*
Biological Resources – Vegetation and Wildlife	While the General Plans of the counties and various jurisdictions contain policies addressing conservation and preservation of open space, ongoing development in the Central Valley region is anticipated to result in the incremental loss of riparian habitat, wetlands, and oak woodlands and other sensitive natural communities. These outcomes likely will lead to direct take or loss of habitat for both common and special-status species. These impacts would be considered cumulatively significant.	Construction activities have the potential to impact special-status species, and would likely result in temporary and minor permanent impacts to sensitive natural communities. *Further analysis provided below.*

Resource Topic	Cumulatively Significant Impacts	Proposed Project's Contribution
Cultural Resources	No information has been found during the preparation of this DEIR to suggest that a widespread loss or degradation of significant historic resources has occurred or will occur in the future in the geographic vicinity of the Proposed Project. Rather, impacts to significant historic resources from other past, present and probable future projects are believed to be highly localized and only affecting the immediate resources in question. For this reason, it has been concluded that no significant cumulative impact exists related to cultural resources.	No further analysis required.
Geology and Soils	No information has been found during the preparation of this DEIR to suggest that geologic resources in the Potentially Affected Area are cumulatively degraded. While loss of soil is a cumulative issue in the San Joaquin Valley, particularly with respect to agricultural soils, the ground disturbance associated with the Proposed Project is anticipated to be minimal and would not contribute to this cumulative impact.	No further analysis required.
Greenhouse Gas Emissions	Anthropogenic emissions of GHGs are widely accepted in the scientific community as contributing to global warming. Because of the nature of climate change, local impacts must be considered on a statewide and even global scale. This impact would be considered cumulatively significant.	Truck trips necessary for fish reintroduction, construction of fish segregation weirs, research and monitoring, and recreation management would generate GHGs. *Further analysis provided below.*
Hazards and Hazardous Materials	No information has been found during the preparation of this DEIR to suggest that cumulative impacts related to hazards and hazardous materials exist in proximity to the locations where hazards or hazardous materials conditions could affect, or be affected by, the Proposed Project.	No further analysis required.

Resource Topic	Cumulatively Significant Impacts	Proposed Project's Contribution
Hydrology, Geomorphology, and Water Quality	Increased development in the region may lead to a variety of impacts on water resources, including increased demand for water supplies, new sources of point source and nonpoint source pollution, increased area of impervious surface and volume of stormwater runoff, and potential flooding impacts. This impact would be considered cumulatively significant.	Construction activities of the Proposed Project could potentially impair water quality from ground disturbances resulting in discharges of sediment to streams, and heavy equipment use resulting in release of hazardous materials into streams. Operation of the SCARF would discharge hatchery effluent into the secondary channel of the San Joaquin River. *Further analysis provided below.*
Land Use and Planning	As the region develops, land use conflicts or incompatibilities, such as between agriculture and urban development at the urban/rural interface, could intensify. This impact would be considered cumulatively significant.	The Proposed Project would not involve any activities that could cause land use incompatibilities or conflicts with adopted plans or policies. As such, the Project would not make any contribution to cumulative impacts related to land use. No analysis required.
Mineral Resources	No information has been found during the preparation of this DEIR to suggest that mineral resources in the Potentially Affected Area are cumulatively degraded.	No further analysis required.
Noise	Noise is a localized impact which attenuates rapidly with distance. No information has been found during the preparation of this DEIR to suggest that noise conditions are cumulatively degraded in the locations where the Proposed Project may generate noise. While future development in proximity to the SCARF has been identified, it would be far enough away that the same sensitive receptors would be unlikely to be substantially affected.	No further analysis required.

Resource Topic	Cumulatively Significant Impacts	Proposed Project's Contribution
Population and Housing	Planned residential development in the vicinity will induce population growth. Restoration activities of the SJRRP could potentially create over 10,000 short-term jobs and approximately 500 recreation-oriented jobs over the long-term (Kantor 2012). This impact would be considered cumulatively significant.	The Proposed Project would possibly include the construction of two homes for SCARF staff, and operation of the SCARF would provide employment for up to six workers and would not generally be open to the public. Although the broader SJRRP would potentially contribute to increases in population and housing, the Proposed Project would not make a cumulatively considerable incremental contribution to the significant cumulative impact related to population and housing. No further analysis is required.
Public Services and Utilities	Planned development in Friant and the region will generate additional cumulative demand for water, wastewaster treatment, stormwater drainage, solid waste disposal, and electricity. This impact would be considered cumulatively significant.	Construction and operation of the SCARF would require relatively minor amounts of water for controlling dust and other construction activities, would minimally alter existing stormwater drainage, and would create a minimal amount of solid waste. However, operation of the SCARF would utilize flows that could be used for future hydropower generation. *Further analysis provided below.*
Recreation	Anticipated population increases over the coming decades would result in increased demand for recreational opportunities, of particular relevance, recreational fishing. In addition, the Fish and Game Commission is anticipated to enact regulations which would limit recreational fishing in the Restoration Area. Any regulations proposed by the Commission would be subject to public review and comment pursuant to the Administrative Procedure Act. This would be considered cumulatively significant.	The Proposed Project would involve activities that could affect river-based recreational activities. *Further analysis provided below.*

Resource Topic	Cumulatively Significant Impacts	Proposed Project's Contribution
Transportation and Traffic	Regional traffic conditions may worsen over time as population grows, and roadway infrastructure struggles to keep pace. This would be considered cumulatively significant.	The Proposed Project's effects on traffic would be localized to discrete isolated locations that do not have impaired traffic conditions (e.g., the community of Friant). Because of this, when considering overall traffic conditions in the region, it has been determined that the Proposed Project would not have the potential to make a cumulatively considerable incremental contribution to traffic impacts. No further analysis required.

Impact CUM-1. Effects on Agricultural Resources (No Impact)

The SJRRP, as a whole, would involve activities that would affect agriculture. This impact was previously addressed in the SJRRP PEIS/R. Restoration activities of the SJRRP would convert important farmland along the river's edge to nonagricultural uses and necessitate the cancellation of Williamson Act contracts. The SJRRP would substantially diminish agricultural land resource quality and importance because of altered inundation and/or soil saturation and water deliveries. These actions would affect cropping patterns, idling of farmland, and productivity, and would combine with other significant cumulative effects on agricultural productivity. Overall, the SJRRP PEIS/R concluded that the SJRRP would cause a significant and unavoidable cumulatively considerable incremental contribution to a significant cumulative impact on agricultural resources and productivity, Important Farmland, and Williamson Act contracts.

That said, the Proposed Project itself would have no incremental contribution to this significant cumulative impact. The Proposed Project would not alter land-use designations or farmland/timberland classifications at either the local or state level, nor would it create pressure for future land conversions. Furthermore, no Prime Farmland, Unique Farmland, or Farmland of Statewide Importance, forest lands, or lands under a Williamson Act contract would be converted by, or conflict with, the Proposed Project.

Impact CUM-2. Contributions to Non-Attainment Status of Criteria Air Pollutants (Less than Significant with Mitigation)

The SJVAB is currently designated as a nonattainment area for federal and state ozone and PM2.5 standards, and state PM10 standards. Past, present, and probable future projects would have a significant cumulative impact on air quality in the project area.

The SJVAPCD has adopted a cumulative threshold of significance of 10 tons per year for ozone precursors (ROG and NOX). Operation of the Proposed Project would result in emissions of particulate matter and exhaust gases that would not exceed these criteria. However, it is possible that construction activities associated with the Proposed Project would exceed the criteria. Implementation of **Mitigation Measure AQ-MANAGEMENT-1** would reduce construction air emissions to levels below SJVAPCD's construction significance thresholds. Therefore, with implementation of Mitigation Measure AQ-MANAGEMENT-1, the incremental contribution of the Proposed Project would not be cumulatively considerable.

Impact CUM-3. Effects on Fish Species and Their Habitats (Beneficial)

Dam construction, conversion to farmland, timber harvesting, water diversions, and the introduction of nonnative plant and animal species have substantially changed aquatic habitat in the Restoration Area and throughout the Potentially Affected Area. Most notably, wild Chinook salmon and steelhead have experienced a significant cumulative impact from past and present anthropogenic actions. Restoration of flow under the SJRRP and improvement of fish habitat has made it possible for salmon, including wild stocks found in the major San Joaquin River tributaries (the Merced, Tuolumne, and Stanislaus rivers), to swim up the San Joaquin River once again, although substantial barriers exist which prevent salmon from reaching the upper reaches of the Restoration Area. That said, the Proposed Project could have several potentially adverse effects. Release of translocated fish and conservation stock has potential to compromise genetic integrity and fitness of wild stocks and potentially spread disease. The Proposed Project also has potential to incrementally decrease water quality, introduce non-native species, and/or impede migration. These impacts could potentially be considered cumulatively significant.

Additionally, disease organisms could also be carried by broodstock from sources in the Sacramento River basin or by translocated released in the Restoration Area. Such a disease outbreak could lead to direct mortality or reduced fecundity among wild fall-run Chinook salmon in the major San Joaquin River tributaries. Direct mortality or reduced fecundity resulting from such an outbreak would be considered a potentially cumulatively considerable incremental contribution to this overall significant cumulative impact on wild fall-run Chinook salmon in the San Joaquin River tributaries. The operations component of the Proposed Project would include management measures to reduce the potential of disease and the monitoring component would further ensure a reduction of this potential (see Chapter 2, *Project Description*, for complete details). As described in Impact FISH-OP-4, before entering the SCARF, all fish would be quarantined and required to pass a health assessment. Once in the hatchery, they would be monitored for pathogens. The SCARF operations would adhere to biosecurity protocols to reduce the possibility of propagating and spreading fish pathogens.

Hatchery facilities provide suitable habitat for various forms of AIS (see Chapter 6, *Biological Resources – Fisheries*, for more details). AIS such as the NZMS, quagga and zebra mussels, and *didymosphenia geminata* (freshwater microscopic diatom) are present in portions of California. These three species are known to dramatically alter aquatic communities in which they establish themselves. Infestations by these species and other AIS could cause considerable damage to aquatic habitat and species in the Restoration Area. As described in Impacts FISH-OP-5 and FISH-REINTRO-2, the HACCP for the SCARF would include protocols to prevent the introduction of AIS into the SCARF, and operational practices that prevent the spread of AIS within and outside of the facility, such that the Proposed Project would not result in a cumulatively considerable contribution to this impact.

The reintroduction of conservation stock is potentially problematic due to concerns related to the genetic integrity of naturally spawning fish populations. This would be considered a potentially cumulatively considerable incremental contribution on wild Chinook salmon in the San Joaquin River tributaries. As discussed in Impact FISH-REINTRO-3, adhering to the SCARF's HGMP would minimize the potential for undesirable genetic traits to develop in the conservation stock, and the proposed reintroduction strategy would reduce the potential for straying. With these measures in place, reductions in genetic fitness or population viability of Sacramento River basin spring-run Chinook or San Joaquin River basin fall-run Chinook would be sufficiently minimized; therefore, the Proposed Project would not result in a cumulatively considerable contribution to this impact.

Release of hatchery-produced fish can trigger ecological risks to other fishes. Some potential risks include competition for food and territory, predation by hatchery fish due to their larger size, negative social interactions, and carrying capacity issues. This would be considered a potentially cumulatively considerable incremental contribution on wild fish populations in the San Joaquin River tributaries. As discussed in Impact FISH-REINTRO-5, the SCARF would base goals for growth patterns of hatchery fish and size at emigration on natural population parameters to reduce the risk that hatchery fish would outcompete or prey on naturally produced juveniles. Therefore, the Proposed Project would not make a cumulatively considerable contribution to this impact.

SCARF operations may affect aquatic food webs by inputting marine-derived nutrients to the San Joaquin River. As discussed in Impact FISH-OP-6, this impact would be beneficial.

While various aspects of fish reintroduction could contribute to adverse cumulative impacts, on the whole, the Proposed Project's reintroduction activities are expected to benefit salmon populations, in particular within the Restoration Area where no established salmon runs currently exist. Accordingly, the Proposed Project would not make a cumulatively considerable incremental contribution to the decline of aquatic habitat, wild fall-run Chinook salmon, or other aquatic species in the San Joaquin River and its tributaries. The overall contribution of the Proposed Project would be beneficial.

Impact CUM-4. Effects of Wild Broodstock Collection (Significant and Unavoidable)

Broodstock collection would have the potential to adversely affect wild spring-run Chinook populations in the collection areas, which are considered to already be subject to cumulatively significant impacts based on their endangered status. As described in Impact FISH-REINTRO-1, Mitigation Measure FISH-REINTRO-1 would be taken such that wild broodstock collection would only occur when such adverse effects would not be possible. This mitigation measure will allow CDFW to address impacts and develop take totals. However, because sufficient details or specific take totals do not currently exist, specific mitigation measures or performance standards cannot be identified at this time. CEQA requires that specific mitigation and/or performance standards be provided to avoid improper mitigation deferral. It is the intent of CDFW to not have significant adverse impacts on donor stock populations. However, because full compliance with CEQA's standards for mitigation is not possible at this time, CDFW is conservatively finding that this activity would have a considerable contribution to this cumulative impact, and impacts are therefore considered significant and unavoidable. Future, more detailed analysis will be conducted as necessary through tiered CEQA documentation prior to broodstock collection from naturally spawning spring-run donor stock.

Impact CUM-5. Effects on Terrestrial Vegetation, Wildlife, and Sensitive Communities (Less than Significant with Mitigation)

Fresno and Madera counties east of SR 99 historically contained vast areas of grassland and vernal pool habitat. Past anthropogenic activity, especially conversion to farmland and developed land use, has substantially changed wildlife populations and vegetation at the SCARF site, in the Project Area, and throughout the Potentially Affected Area. Additionally, the CVP, the SWP, and the introduction of nonnative plant and animal species have resulted in overall significant adverse effects on the extent, species composition, and functioning of wetlands, riparian habitats, and other sensitive natural communities and the distribution and abundance of wildlife species. The threatened and endangered status of numerous plant and animal species, and the dramatic reductions in the extent of wetland and riparian vegetation are evidence of these overall significant cumulative impacts.

Wildlife species include non-riverine aquatic invertebrates, reptiles, birds and mammals. Tables 7-1 and 7-2 list the wildlife and plant species considered in this DEIR at the SCARF site, and Appendix J, *Supporting Documentation Related to Biological Resources - Vegetation and Wildlife*, lists these species considered in the Restoration Area. Non-Project related activities that may impact terrestrial wildlife or plant species either through direct disturbance or habitat alteration include: agriculture, climate change, introductions of nonnative species, recreational activities, streambed alteration, urbanization, and wildfire, fire suppression, and fuels management.

Species listed in Tables 7-1, 7-2, and in Appendix J have been designated as special-status by the CDFW or USFWS, or are considered by CDFW to meet the criteria for "rare" as defined under CEQA Guidelines section 15380. The population status and/or viability vary for each of these species. Similar to fish species, declines in wildlife and plant species populations are largely due to long-term degradation of environmental conditions. With few exceptions, the declines in the population of a species are the result of the synergistic effects of anthropogenic activities, and not a single causative agent or project. Thus, by definition, it is cumulative impacts that threaten the viability of these species.

Potential adverse effects of the Proposed Project on these species may include: direct physical disturbance; indirect stress-inducing disturbances such as noise; creation of barriers to movement, migration or dispersal; and degradation of habitat (see Chapter 7, *Biological Resources – Vegetation and Wildlife,* for complete description of impacts).

As explained in Impact BIO-CONSTRUCT-1, five special-status plant species have potential to occur at the SCARF site because suitable habitat is present, or in the case of Sanford's arrowhead, the species was observed at the site in 2012. It is not likely that the Proposed Project would contribute substantially to any foreseeable decline of any special-status plants with implementation of Mitigation Measures BIO-CONSTRUCT-1a and -1b. Therefore, the incremental contribution of the Proposed Project would not be cumulatively considerable, and is considered less than significant.

As described in BIO-CONSTRUCT-2, the SCARF site provides marginally suitable habitat for special-status branchiopods such as vernal pool fairy shrimp. Mitigation Measures BIO_CONSTRUCT-2a through -2c would reduce potential impacts to less than significant. With mitigation, it is not likely that the Proposed Project would contribute substantially to any foreseeable decline in the range or population viability of special-status branchiopods. Thus, the incremental contribution of the Proposed Project would not be cumulatively considerable, and is considered less than significant.

As explained in BIO-CONSTRUCT-3, CTS and western spadefoot species are known to breed in close proximity to the SCARF site and may use burrows throughout the site as upland habitat. It is not likely that the Proposed Project would contribute substantially to any foreseeable decline of CTS or western spadefoot with implementation of Mitigation Measures BIO-CONSTRUCT-3a through -3d. Therefore, the incremental contribution of the Proposed Project would not be cumulatively considerable, and is considered less than significant.

As described in Impact BIO-CONSTRUCT-4, the western pond turtle is the only reptile species for which the Proposed Project poses a significant threat. **Mitigation Measure BIO-CONSTRUCT-4** would minimize impacts to the western pond turtle. With mitigation, it is not likely that the Proposed Project would contribute substantially to any foreseeable decline in the range or population viability of the western pond turtle. Thus, the incremental contribution of the Proposed Project would not be cumulatively considerable, and is considered less than significant.

As described in Impacts BIO-CONSTRUCT-5 through -10, the SCARF site is known to provide habitat for several special-status avian species (burrowing owl, Swainson's hawk, white-tailed kite, willow flycatcher, and others), several special-status bat species, and two special-status mammals (American badger and San Joaquin kit fox). The Proposed Project may adversely impact these species if they are present during construction. **Mitigation Measures BIO-CONSTRUCT-5 through -10** would reduce these impacts to less than significant. The incremental effects of the Proposed Project on avian and mammal Species of Concern would not be cumulatively considerable because the magnitude of impact that may occur is not likely to contribute substantially to any foreseeable decline in the range or population viability. Thus, the incremental contribution of the Proposed Project would not be cumulatively considerable, and is considered less than significant.

As described in Impact BIO-TER-CONSTRUCT-11, the Proposed Project would result in a permanent loss of sensitive natural communities: about 5,000 square feet of riparian habitat and 3,000 square feet of Fremont Cottonwood woodland. **Mitigation Measures BIO-TER-CONSTRUCT-11a and -11b** would ensure that the impacts are minimized and revegetation plans are implemented that result in no net effect. Thus, the incremental contribution of the Proposed Project would not be cumulatively considerable, and is considered less than significant.

As described in Impact BIO-CONSTRUCT-12, the Proposed Project would result in the fill of a small amount of federally protected wetlands. **Mitigation Measures BIO-CONSTRUCT-12a and -12b** would minimize the impact to wetlands and result in no net effect. Thus, the incremental contribution of the Proposed Project would not be cumulatively considerable, and is considered less than significant.

The Proposed Project is not likely to result in substantial loss or degradation of habitats that support the species and communities described above, and direct impacts to individuals are unlikely. This conclusion is based on field surveys on the SCARF site and the known distribution of these organisms and their habitats in relationship to anticipated actions under the Proposed Project. Thus, the incremental contribution of the Proposed Project would not be cumulatively considerable.

Impact CUM-6. Effects on the Generation of Greenhouse Gas Emissions (Significant and Unavoidable)

As described above, anthropogenic emissions of GHGs are widely accepted in the scientific community as contributing to global warming, a significant cumulative impact.

Any measurable contribution by the Proposed Project would be cumulatively considerable. **Mitigation Measure GHG-MANAGEMENT-1** has been identified to reduce emissions. However, it may not eliminate emissions, and in addition, it may not be feasible to implement (for instance, if inadequate funding were available to purchase emissions offsets). As a result, the Proposed Project's contribution to GHG emissions would be a significant and unavoidable cumulatively considerable incremental contribution to a significant cumulative impact on generation of GHG emissions.

Impact CUM-7. Effects on Hydrology and Water Quality (Less than Significant)

TMDL impairments in the Project Area are all the result of agricultural practices and urban discharges, including legacy pesticides, salinity, and E. coli. These pollutants represent a significant cumulative impact on water quality in the Project Area.

The Proposed Project would not contribute to any of these pollutants. Construction of the SCARF could result in temporary water quality impacts; however, construction BMPs would minimize this impact. The operation of the SCARF would discharge treated effluent into a secondary channel of the San Joaquin River; however, such discharges would be regulated under permits to ensure protection of beneficial uses of the river and would not make a cumulatively considerable incremental contribution to this significant cumulative impact.

Impact CUM-8. Effects on Hydropower Operations Upstream of the SCARF Site (Less than Significant)

Population growth in the state will result in an increase in the demand for electricity. This would be a significant cumulative impact on hydropower operations and demands.

As described in Chapter 2, *Project Description*, Reclamation currently diverts a continuous flow to the existing SJFH from the Friant Dam via the Fishwater Release Powerplant owned by Orange Cove Irrigation District, generating hydropower in the process. Reclamation has prepared plans for water supply infrastructure improvements so that a continuous flow would be available for the SCARF. Under the Proposed Project, CDFW would complete all necessary actions to convey 20 cfs from the federal property boundary to the SCARF. The supply for the SCARF would exceed the capacity of, and therefore bypass, the power plant.

Comment letters received during the EIR scoping period suggested that the 20 cfs to be used by the SCARF could be used for future hydropower generation as it is released from the reservoir. However, no specific plans are in place to expand the hydropower facility, and so this is not a reasonably foreseeable future action. In addition, the Proposed Project would not preclude the future alteration of the water delivery system such that the SCARF process water supply could effectively generate hydroelectric power. For these reasons, the Proposed Project would not make a cumulatively considerable incremental contribution to significant cumulative impacts on electricity generation, specifically on hydropower operations immediately downstream of Friant Dam.

Impact CUM-9. Effects on Recreational Fishing (Less than Significant)

Past and present actions have significantly impacted anadromous salmonids and their habitat in the San Joaquin River and its tributaries. Consequently, there is a significant cumulative impact on fisheries resources and related recreational fishing opportunities.

The Proposed Project would involve reintroduction of Chinook salmon to the Restoration Area, an activity that is anticipated to result in the Fish and Game Commission updating fishing regulations in the Restoration Area, such that recreational fishing would be restricted to protect the reintroduced fish. Any regulations proposed by the Commission would be subject to public review and comment pursuant to the Administrative Procedure Act. The Proposed Project may also include enhanced enforcement by CDFW of such fishing regulations. These activities have potential to contribute to significant cumulative impacts related to recreational fishing. However, the Proposed Project would also enhance fishing opportunities in other locations outside of the Restoration Area, where fishing regulations are not anticipated to change due to the Proposed Project's reintroduction activities. In addition, the Proposed Project includes recreational fishing enhancements in the Restoration Area that are specifically intended to offset recreational impacts of the overall SJRRP. Considering all of these factors as a whole, the Proposed Project is not expected to make a cumulatively considerable incremental contribution to significant cumulative impacts related to recreational fishing.

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Chapter 19
ALTERNATIVES

19.1 Introduction

This chapter describes the alternatives considered for the Proposed Project and evaluates their environmental impacts as compared with the Proposed Project. The purpose of the alternatives analysis in an EIR is to describe a range of reasonable, potentially feasible alternatives to the project that can feasibly attain most of the identified project objectives, but reduce or avoid one or more of the project's significant impacts. A more detailed description of the CEQA regulatory requirements for alternatives analysis is provided in the section immediately below.

The chapter then describes the alternative development process, alternatives that were considered, and alternatives that were considered but dismissed. The chapter closes with a discussion regarding the environmentally superior alternative.

19.1.1 Regulatory Requirements

CEQA requires that an EIR evaluate a reasonable range of potentially feasible alternatives to the proposed project, including the No Project Alternative. The No Project Alternative allows decision-makers to compare the impacts of approving the action against the impacts of not approving the action. While there is no clear rule for determining a reasonable range of alternatives to the proposed project, CEQA provides guidance that can be used to define the range of alternatives for consideration in the environmental document.

The alternatives described in an EIR must feasibly accomplish most of the basic project objectives, should reduce or eliminate one or more of the significant impacts of the proposed project (although the alternative could have greater impacts overall), and must be potentially feasible (CEQA Guidelines § 15126.6(a)). In determining whether alternatives are potentially feasible, Lead Agencies are guided by the general definition of feasibility found in State CEQA Guidelines Section 15364: "capable of being accomplished in a successful manner within a reasonable period of time, taking into account economic, environmental, legal, social, and technological factors." In accordance with CEQA Guidelines section 15126.6, subd. (f), the Lead Agency should consider site suitability, economic viability, availability of infrastructure, general plan consistency, other regulatory limitations, and jurisdictional boundaries in determining the feasibility of alternatives to be evaluated in an EIR. An EIR must briefly describe the rationale for selection and rejection of alternatives and the information that the Lead Agency relied on in making the selection. It also should identify any alternatives that were considered by the Lead Agency but were rejected as infeasible during the scoping process and briefly explain the reason for their exclusion (CEQA Guidelines §15126.6(c)).

An EIR's analysis of alternatives is required to identify the environmentally superior alternative among all those considered (CEQA Guidelines §§ 15126.6(a) and (e)(2). If the "no project" alternative is identified as the environmentally superior alternative, then the EIR must also identify an environmentally superior alternative amongst the other alternatives.

These guidelines were used in developing and evaluating the alternatives as described below.

19.2 Alternatives Development Process

The Proposed Project's purpose and objectives, as well as its potentially significant environmental impacts were considered while developing alternatives. Alternatives were developed to achieve most of the basic objectives of the Proposed Project, although the selected alternatives may reach these objectives to a greater or lesser extent than the Proposed Project. The alternatives also were selected to reduce the significance of anticipated adverse environmental impacts associated with the Proposed Project. A reasonable range of potentially feasible alternatives is presented in Section 19.3, *Alternatives Considered*, describing their potential impacts as well as benefits.

19.2.1 Project Goals and Objectives

The following goals and objectives are the same as those set out in Sections 2.1 and 2.2 in Chapter 2, *Project Description*. Under the Proposed Project, CDFW would support the implementation of the SJRRP Restoration Goal, "to restore and maintain fish populations in 'good condition' in the main stem of the San Joaquin River below Friant Dam to the confluence of the Merced River, including naturally reproducing and self-sustaining populations of salmon and other fish." The Project also would manage and conserve native salmon and the San Joaquin River habitat they occupy for their ecological significance, as well as provide for recreation and enjoyment by current and future citizens.

The Proposed Project's objectives are as follows:

- Support and assist implementation of the Settlement Agreement, including the following:
  - Support the Settling Parties in achieving the SJRRP Restoration Goal, consistent with CDFW's authorities, resources, and broader regional resource strategies; and
  - Fulfill the other commitments identified in the State Agency MOU pertaining to the Settlement Agreement.
- Produce a spring-run Chinook salmon stock on the San Joaquin River that is genetically diverse, while minimizing impacts to source populations.
- Provide a controlled laboratory environment for conducting fish research.

- Manage Chinook salmon runs in the Restoration Area and, specifically, the potential for hybridization between runs.
- Monitor and conduct research that will direct Chinook salmon management within the Restoration Area.
- Fulfill CDFW's mission to manage California's diverse fish, wildlife, and plant resources, and the habitats on which they depend, for their ecological values and for their use and enjoyment by the public.
- Fulfill CDFW's obligation to conserve, protect, and manage fish, wildlife, native plants, and habitats necessary for biologically sustainable populations of those species and as a trustee agency for fish and wildlife resources pursuant to Fish and Game Code section 1802.

19.2.2 Significant Environmental Impacts of the Proposed Project

A number of impacts have been identified as significant, but would be mitigated to a level of less-than-significant through implementation of mitigation measures. These impacts are listed in Table ES-1 in the *Executive Summary* of this DEIR.

19.2.3 Significant and Unavoidable Environmental Impacts of the Proposed Project

The following impacts have been identified as significant and unavoidable:

- Impact Fish-REINTRO-1: Disturbance to Suitable Spawning and Rearing Habitat, Damage to Existing Redds, and Overharvest of Eggs and Juveniles during Broodstock Collection
- Impact FISH-RECREATION-4: Riparian or Instream Habitat Degradation or Spread of Invasive Species or Pathogens from Recreational Fishing Enhancements
- Impact GHG-MANAGEMENT-1: Potential for Construction of Fish Segregation Weirs to Generate Substantial GHG Emissions or Conflict with the CARB's Applicable Plans, Policies, or Regulations Adopted for the Purpose of Reducing the Emissions of GHGs
- Impact GHG-RECREATION-1: Potential for Construction Activities Related to Enhancing Recreational Fishing Opportunities to Generate Substantial GHG Emissions or Conflict with the CARB's Applicable Plans, Policies, or Regulations Adopted for the Purpose of Reducing the Emissions of GHGs
- Impact CUM-4. Effects of Wild Broodstock Collection
- Impact CUM-6. Effects on the Generation of Greenhouse Gas Emissions

19.3 Alternatives Considered

The No Project Alternative is considered as required by CEQA. In addition, the following alternatives were considered because they meet most of the Proposed Project's objectives, are feasible, and avoid or substantially reduce one or more significant impacts of the Proposed Project:

- Hatchery Broodstock Only Alternative
- Spring-Run Only Alternative
- SCARF Siting Alternative

19.3.1 No Project Alternative

Characteristics of this Alternative

Under the No Project Alternative, CDFW would not construct the SCARF or other facilities to propagate spring-run or fall-run Chinook salmon; including the structures comprising SCARF, drainage and stormwater management features, and other associated improvements. No Chinook salmon donor stock would be gathered and transported to the SCARF site to establish a broodstock, and there would be no active reintroduction of spring-run Chinook salmon to the Restoration Area. The operations and design of the existing HFB would not be modified, nor would any other fish segregation weirs be constructed.

As the SJRRP is a direct result of the September 2006 settlement of NRDC v. Rodgers, a number of actions have already occurred to implement the Settlement Agreement, and will continue to occur regardless of implementation of the Proposed Project. On October 1, 2009, Interim Flow water releases began from Friant Dam into the San Joaquin River to establish and maintain the flow targets set in the Settlement Agreement. The Interim Flow releases are scheduled to continue until the Full Restoration Flows begin, no later than January 1, 2014. For the purposes of this analysis, it is assumed that the Interim Flow and Full Restoration Flow water releases would continue regardless of implementation of the Proposed Project.

While no active reintroduction would take place, natural recolonization of the San Joaquin River by Chinook salmon would be possible. However, if CDFW chooses to continue operations of the HFB located upstream of the San Joaquin River's confluence with the Merced River, the HFB would continue to impede passage into the San Joaquin River upstream of the Merced, and would block suitable spawning habitat and prevent salmon from recolonizing the entire Restoration Area.

Note that under this alternative, other agencies besides CDFW could choose to remove, reconstruct or reoperate the HFB, or implement this or other Proposed Project activities; however, it is speculative as to which agencies might undertake some of the Proposed Project actions, which actions might be undertaken and what impacts or benefits might arise from a change in HFB operations, or when they might be undertaken. In addition, the

Interim Facility may still be operated, but it is unclear the extent to which it would be used, and for what purpose. Therefore, for the purposes of evaluating this alternative, the analysis assumes that none of the Proposed Project actions or Interim Facility operations would occur.

The No Project Alternative would not achieve the Proposed Project's objectives.

Impact Analysis

Under the No Project Alternative, all of the impacts (both adverse and beneficial) associated with the construction and operation of the SCARF would be avoided, as well as those from fish reintroduction, fisheries management, fisheries research and monitoring, and recreation management.

19.3.2 Spring-Run Only Alternative

Characteristics of this Alternative

The Spring-Run Only Alternative would reintroduce only spring-run Chinook salmon to the Restoration Area. No fall-run Chinook salmon would be actively reintroduced. While volitional reintroduction of fall-run Chinook salmon would be likely, CDFW would focus its management activities on spring-run. For example, segregation weirs would be operated with the primary focus of ensuring fall-run Chinook do not interfere with spring-run spawning, rather than attempting to balance spawning of both runs. As a result, spring-run reintroduction efforts may experience increased success by avoiding issues such as redd superimposition or competition for resources between spring-run and fall-run Chinook in the Restoration Area, increasing potential to achieve Project objectives. That said, the benefits associated with fall-run reintroduction activities would be diminished.

Impact Analysis

Impacts associated with SCARF construction, operation, spring-run fish reintroduction, fisheries research and monitoring, and recreation management would occur as under the Proposed Project. However, the potential impacts associated with fall-run reintroduction activities would be avoided. This includes collection of fall-run broodstock from San Joaquin tributaries, and related impacts such as emissions of criteria pollutants during truck and vehicle trips to collect fall-run broodstock; biological impacts from potentially disturbing potential spawning and rearing habitat, damaging existing redds, overharvesting wild eggs and juveniles, and collecting eggs and juveniles from existing redds; and water quality impacts from turbidity caused by broodstock collection. In addition, the potential for straying of fall-run Chinook to affect other wild fall-run populations and the impacts associated with removing fall-run from populations where they currently exist for purposes of reintroducing them to the San Joaquin River would be avoided.

Overall, this alternative would be anticipated to have reduced impacts compared to the Proposed Project, to the extent it would avoid impacts associated with fall-run reintroduction. This would particularly be the case relative to active fall-run reintroduction approaches that may be conducted under the Proposed Project (e.g., broodstock collection). It also may increase the success of spring-run reintroduction efforts through mechanisms such as reducing potential for redd superimposition or competition for resources between spring-run and fall-run Chinook in the Restoration Area.

19.3.3 Hatchery Broodstock Only Alternative

Characteristics of this Alternative

Under the Hatchery Broodstock Only Alternative, rather than using a combination of broodstock from FRFH and wild sources, only the FRFH would be used to provide a source of spring-run broodstock. No wild sources of broodstock would be used. The FRFH has a finite capacity to spawn, incubate fertilized eggs, and rear juveniles, but that capacity is far beyond that which is actually used in any given year. The hatchery limits the number of spring-run Chinook it produces annually to 2.5 million smolts, which equates to 3 million fertilized eggs, in order to, among other things, limit the degree of hatchery influence on the wild spring-run population (Cavallo et al. 2012). Typically, more spring-run Chinook enter the facility to spawn than what the FRFH requires to meet its production goal. Under this alternative, CDFW would artificially spawn selected fish and segregate and incubate eggs from resulting crosses for SCARF broodstock. No eggs would be moved from FRFH for the SCARF unless FRFH production goals were met. The FRFH would not change its production levels as a result of this alternative; removal of eggs or juveniles from FHFH for the Proposed Project would occur only after the FRFH has met its annual production goal of 3 million fertilized eggs. In addition, the number of eggs or juveniles collected annually would depend on the rearing capacity at the Interim Facility and the proposed SCARF. The methods of transport of broodstock from FRFH to the Proposed Project area would be the same as under the Proposed Project. Reintroduction, fisheries research and monitoring, and recreation management would occur as under the Proposed Project.

Hatchery fish have been shown to be less fit in natural environments than wild fish and contribute to increased straying rates. Specifically, FRFH spring-run Chinook salmon have a known history of introgression with fall-run Chinook salmon. As such, the use of hatchery fish would be less likely to meet the Proposed Project objective of restoring naturally reproducing and self-sustaining populations of Chinook salmon than the Proposed Project. While hatchery fish spawned in controlled conditions generally have higher rates of juvenile survival, hatchery broodstock has been shown to have less success reproducing in the wild.

Because use of hatchery fish alone would be expected to result in reduced diversity in the spring-run genotype and phenotype and less fitness, this alternative may require SCARF to operate longer than planned in order to establish naturally reproducing and self-sustaining populations of Chinook salmon, and it is possible that this alternative may not be able to establish a self-sustaining population of naturally reproducing Chinook salmon. In addition, analysis of the possible Central Valley spring-run populations to use for broodstock determined that a multi-stock approach would have the greatest likelihood of successful restoration of the species (by increasing diversity) and that experimenting with one stock at a time through trial and error could extend the timeline of the project and would be more costly (SJRRP 2010, i.e. Stock Selection Strategy).

Impact Analysis

Under this alternative, all impacts associated with the collection of wild spring-run Chinook broodstock from Butte, Deer, Mill, Battle, and Clear Creeks, opportunistic collections of spring-run fish from the Yuba River, and opportunistic collection of Chinook salmon exhibiting spring-run life history from the Stanislaus, Mokelumne, and Yuba rivers would be avoided. These include air quality impacts from emissions of criteria pollutants during truck and vehicle trips to collect spring-run broodstock, biological impacts from potentially disturbing potential spawning and rearing habitat, damaging existing redds, overharvesting wild eggs and juveniles, and collecting eggs and juveniles from existing redds, and water quality impacts from turbidity caused by broodstock collection. However, this alternative could result in increased straying of reintroduced fish, with related effects on the aforementioned wild populations.

Impacts from SCARF construction, operation, fish reintroduction, fisheries research and monitoring, and recreation management would still occur. The impacts of collection from the FRFH would be the same as under existing (baseline) conditions.

Should the SCARF need to be operated for a longer period of time in order to establish the spring-run Chinook, the impacts associated with Proposed Project activities (besides SCARF construction and collection of wild broodstock) would continue over this extended period. These operational impacts include biological impacts from the release of chemicals and pharmaceuticals associated with aquaculture in the San Joaquin River and effects of hatchery operations on aquatic food webs; noise impacts from an increase in ambient noise levels; hazardous materials impacts from an accidental spill during transport, use or disposal of hazardous materials; and water quality impacts from operational discharges, etc.

19.3.4 SCARF Siting Alternative

Characteristics of this Alternative

Under the SCARF Siting Alternative, an alternate location would be found to construct the SCARF facility. Desirable criteria for an alternate site for the SCARF include:

- **Proximity to the river:** a site adjacent to the San Joaquin River allows for volitional fish release and ease of discharge of hatchery return flows.
- **Proximity to Friant Dam:** a site close to Friant Dam can take advantage of the reservoir's high-quality cool temperature water that can be gravity-fed to the site for use as hatchery process water.
- **Site ownership:** sites in public ownership or having a willing seller would facilitate the real estate transactions associated with securing an alternate site.
- **Access to utilities and infrastructure:** the selected site would need access to utilities and infrastructure, including electricity, roads and wastewater systems.

Based on these criteria, upland locations were dismissed, because they would not allow for the direct discharge of hatchery return flows or allow for volitional fish release, and potentially would not be able to take advantage of gravity-fed water deliveries from the reservoir.

Instead, the River Vista parcel, directly across from the proposed SCARF site on the north side of the river (Figure 2-2), was identified as a potential alternative site for the SCARF. This site is downstream of the dam within the riparian zone, and is owned by the San Joaquin River Parkway and Conservation Trust. While the site may require extensions of utilities and infrastructure, it would generally meet the criteria outlined above.

Impact Analysis

Constructing the SCARF on the River Vista parcel would avoid all site-specific impacts at the proposed SCARF site. That said, the impacts of constructing the SCARF on the River Vista parcel would generally be similar to the impacts at the proposed SCARF site, described above in sections 19.2.2 and 19.2.3. However, as the site is currently less developed than the SCARF site, the mosaic of habitats that would be impacted would be somewhat different, and there may be increased impacts to riparian and upland habitats. The River Vista parcel would not be able to use the existing infrastructure at the proposed SCARF site, including potable water supply, wastewater, stormwater, electricity, and paved roads. Constructing this infrastructure at the River Vista parcel would create additional impacts. These include air quality and greenhouse gas emissions from the use of construction vehicles and equipment; biological impacts to wetland, riparian, and upland habitats and the special-status plant and wildlife species that may use the habitats; geology and soils impacts from soil erosion; and water quality impacts from construction.

Finally, the River Vista parcel is included in the San Joaquin River Parkway Master Plan, which aims to create a 22-mile regional greenspace and wildlife corridor along the river from Friant Dam to Highway 99, with an interconnected trail system and recreational and educational features. The site is shown on the master plan as being within the proposed parkway boundary. Since the site is set aside as a natural conservation area for a regional park, the use of the River Vista site for the SCARF would conflict with existing land use plans and policies at the site. These goals of the Parkway Master Plan focus on providing a combination of low-impact recreational uses, education, and natural resource protection and Fresno County General Plan Policy OS-H.11 to support the policies of the Parkway Master Plan.

Table 19-1. Summary of Alternatives and Comparison to the Proposed Project

Alternative	Characteristics	Relationship to Project Objectives	Impacts Compared to the Proposed Project
No Project Alternative	▪ CDFW would not construct SCARF or conduct any related actions	▪ Benefits of the Proposed Project would not be realized ▪ CDFW would have limited ability to support and assist implementation of the Settlement Agreement, including to support the Settling Parties in achieving the SJRRP Restoration Goal ▪ This alternative would fail to meet project objectives	▪ All impacts and benefits of the Proposed Project would be avoided, including the following significant and unavoidable impacts: o Impact FISH-REINTRO-1 o Impact FISH-RECREATION-4 o Impact GHG-MANAGEMENT-1 o Impact GHG-RECREATION-1 o Impact CUM-5
Spring-Run Only Alternative	▪ No management actions would be taken to develop fall run; fall-run Chinook may still volitionally colonize the area. ▪ Spring-run activities would still be implemented as under the Proposed Project	▪ May increase the success of spring-run reintroduction by avoiding redd superimposition or competition for resources ▪ Limits the range of fish reintroduction activities, and associated potential benefits	▪ Avoids impacts associated with fall-run management activities and active fall-run reintroduction activities such as broodstock collection. ▪ The following significant and unavoidable impacts would be reduced or avoided: o Impact FISH-REINTRO-1 o Impact GHG-MANAGEMENT-1 o Impact CUM-5

Alternative	Characteristics	Relationship to Project Objectives	Impacts Compared to the Proposed Project
Hatchery Broodstock Only Alternative	▪ No wild broodstock would be collected ▪ Only broodstock from hatcheries would be used	▪ Hatchery broodstock has reduced genetic diversity and less fitness than wild broodstock, contribute to increased straying and as such may impede achievement of Proposed Project objectives	▪ Avoids potential impacts from collection of wild broodstock but could increase straying impacts to those populations ▪ Could result in increased duration of SCARF operation, extending the time period for impacts of operational activities and other related management actions ▪ The following significant and unavoidable impact would be reduced or avoided: o Impact FISH-REINTRO-1 o Impact CUM-5
SCARF Siting Alternative	▪ Criteria for an alternate site for the SCARF include: o Proximity to the river o Proximity to Friant Dam o Site ownership o Access to utilities and infrastructure ▪ River Vista parcel opposite the San Joaquin River from SCARF site identified because it generally meets these criteria	▪ Would achieve Proposed Project objectives to a similar degree as the Proposed Project	▪ Avoids site-specific impacts at the proposed SCARF site ▪ Impacts at the alternative SCARF site would likely generally be similar in kind and scope to those of the planned SCARF site ▪ May result in additional impacts associated with development and extensions of infrastructure (water, sewer, electricity, site access, etc.) ▪ Would result in land use inconsistencies at the River Vista parcel

19.4 Alternatives Considered and Dismissed

The following alternatives were considered, but ultimately dismissed from further analysis for one or more of the following reasons: (1) they would not sufficiently meet most of the Proposed Project objectives; (2) they were determined to be infeasible; or (3) they would not avoid or substantially reduce one or more significant impacts of the Proposed Project.

- **Fall-Run Only Alternative:** Under the Fall-Run Only Alternative, only fall-run Chinook salmon would be reintroduced in the Restoration Area, and no spring run would be established. This alternative would fail to meet the fundamental project objective to "produce a spring-run Chinook salmon stock on the San Joaquin River," and has therefore been dismissed.

- **Expanded Fall-Run Alternative:** Under an Expanded Fall-Run Alternative, reintroduction of fall-run Chinook salmon would be a co-equal goal alongside reintroduction of spring-run Chinook salmon. Such an alternative would require an extensive regional, or even statewide, fall-run management effort and plan, to ensure that the fall-run reintroduction activities do not adversely affect other fall-run restoration efforts. Such a management effort is beyond the scope of this project. In addition, an Expanded Fall-Run Alternative would not meet CEQA's requirement that an alternative reduce or avoid one or more of a proposed project's significant impacts. Also, while fall-run reintroduction is not a co-equal goal of the Proposed Project, note that active approaches to fall-run reintroduction are considered as a component of the Proposed Project.

- **Natural Recolonization Alternative:** Under the Natural Recolonization Alternative, barriers to salmon migration would be removed or managed throughout the entire Restoration Area. A portion of the existing population of fall-run Chinook salmon migrating through the San Joaquin River basin would naturally stray and travel upstream above the confluence with the Merced River in search of areas to spawn. Over time, enough fall-run Chinook salmon may stray into the Restoration Area to establish a breeding population.

  However, considering the distances to travel, the risk of predation by other fish, and other habitat constraints and mortality possibilities, Chinook salmon may not be able to successfully recolonize the Restoration Area to produce a naturally reproducing and self-sustaining population within a reasonable amount of time, and therefore it is less likely that this alternative would meet project objectives. In addition, this alternative would not allow for the development of a spring-run, which would also not meet most project objectives. For these reasons, it has been dismissed.

- **No SCARF Alternative:** Under the No SCARF Alternative, the SCARF and associated improvements would not be constructed. CDFW would use other fish hatcheries, such as the FRFH, to provide fish for reintroduction. Fish would either be directly released into the river or would be kept in holding pens to imprint the fish, and then released.

In considering this alternative, it was determined that FRFH and other fish hatcheries may not be able to produce sufficient stock to support reintroduction. In addition, fish may not be able to sufficiently imprint if they are directly released or held in pens, potentially leading to more straying and reduced escapement to the Restoration Area. As such, the success of the reintroduction effort would be questionable, and it was therefore concluded that this alternative would not adequately meet the project objectives.

In addition, while this alternative would reduce or avoid impacts associated with SCARF construction and operation, this was already considered under the No Project Alternative, and so it duplicates that alternative in this respect.

This alternative was therefore dismissed because it was determined to not adequately meet most project objectives, and it would be duplicative of aspects of one of the alternatives that was considered.

- **Wild Broodstock Only Alternative:** Under the Wild Broodstock Only Alternative, only wild broodstock would be used, and no hatchery fish would be used as a broodstock source. The use of wild broodstock would provide a more pure spring-run genotype and phenotype and higher fitness. However, the 10(a)(1)(A) permit that would be necessary for wild broodstock collection may not allow for collection of sufficient numbers to establish a population on the San Joaquin and would impose greater population level impacts to wild-source populations. In addition, obtaining this permit would likely delay fish reintroduction efforts compared to the Proposed Project, and would potentially have greater biological impacts on wild broodstock. As a result, this alternative is considered potentially infeasible, and would be unlikely to meet most project objectives, including meeting the timeframes in the Settlement Agreement and establishing self-sustaining fish populations. Therefore, this alternative was dismissed from further consideration.

- **Upland SCARF Location Alternative:** An Upland SCARF Location Alternative would construct the SCARF in an upland location. As described above in "SCARF Siting Alternative," an upland location would not meet the basic criteria for hatchery siting. As such, it presents significant logistical challenges, is therefore not considered feasible, and has been dismissed from further consideration.

- **Off-Site Housing Alternative:** The Off-Site Housing Alternative would place SCARF staff housing off-site to avoid constructing homes that would be subject to inundation during the 100-year flood event. CDFW would purchase or rent homes in Friant, or purchase vacant parcels and construct new residences. This is not considered a separate alternative because it has already been considered and rejected as an option under the Proposed Project.

- **Trout Stocking in Restoration Reach Alternative:** Under the Trout Stocking in the Restoration Reach Alternative, CDFW would stock trout in the Restoration Area while reintroducing Chinook salmon, to reduce the SJRRP's anticipated impacts on recreational fishing in the Restoration Area, especially in Reach 1. This action would potentially conflict with Fish and Game Commission policy under which domesticated fish species are generally not stocked in locations where they could adversely affect native salmon populations (e.g., the reintroduced salmon, once established). In addition, this alternative is likely to be infeasible in achieving benefits to recreational fishing as the Fish and Game Commission may still enact fishing restrictions. Finally, trout may compete with Chinook salmon for food or may consume reintroduced salmon. This would have the potential to impair the successful reintroduction of salmon, interfering with achievement of most project objectives. As such, for feasibility reasons and because it would not adequately meet most project objectives, this alternative was dismissed from further analysis.

19.5 Environmentally Superior Alternative

Because each of the alternatives has fundamentally different characteristics, comparison of their environmental impacts and benefits is not simple. However, considering all aspects on balance, the SCARF Siting Alternative is considered the environmentally superior alternative among the alternatives (excluding the Proposed Project) carried forward for full analysis in this EIR. It would achieve all of the Proposed Project's objectives to a similar degree as the Proposed Project, and as a result, would have the same environmental benefits related to fish reintroduction. It would also have site-specific impacts similar to the SCARF site, although it may have slightly greater impacts related to site development by not being located adjacent to the existing hatchery or with easy access to necessary infrastructure, and by being inconsistent with local land use plans. However, in the context of the other alternatives, the environmental benefits associated with achieving project objectives are considered to outweigh any potential adverse impacts associated with this alternative.

It bears noting that while the Proposed Project is not an "alternative," and as such cannot be selected as the environmentally superior alternative, it would have the same benefits of the environmentally superior alternative, while avoiding some of the adverse impacts related to site development by not being located adjacent to the existing hatchery or within easy access to necessary infrastructure. As such, it is considered environmentally superior to the SCARF Siting Alternative.

The other alternatives were not selected as the environmentally superior alternative for the following reasons:

- **No Project Alternative.** The No Project Alternative would eliminate all of the adverse effects of the Proposed Project by not implementing any of the Proposed Project activities. However, it would not achieve any of the environmental benefits of fish reintroduction.

- **Spring-Run Only Alternative.** This alternative would reduce or avoid the impacts of the Proposed Project relative to fall-run reintroduction activities, in particular active reintroduction efforts (e.g., impacts of fall-run broodstock collection). However, it is undetermined at this point the extent to which the Proposed Project would engage in active fall-run reintroduction strategies, given the Proposed Project's initial focus on volitional fall-run reintroduction. While this alternative may increase success of spring-run reintroduction efforts, it is unclear the extent to which such environmental benefits would accrue, or the extent to which impacts of fall-run reintroduction would be avoided. Given these uncertainties, this alternative was not considered environmentally superior.
- **Hatchery Broodstock Only Alternative.** While this alternative would avoid impacts associated with wild broodstock collection, it would be expected to have a reduced potential to achieve self-sustaining fish populations. The reduced impacts were not believed to outweigh the reduction in environmental benefits of this alternative related to fish reintroduction.

Chapter 20
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Chapter 21
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