APPLICATION FOR NEW LICENSE
MAJOR PROJECT – EXISTING DAM

VOLUME II: EXHIBIT E

EXHIBIT E – ENVIRONMENTAL REPORT

CAMP FAR WEST HYDROELECTRIC PROJECT
FERC Project No. 2997

SECURITY LEVEL: PUBLIC

Prepared by:
South Sutter Water District
2464 Pacific Ave.
Trowbridge, CA 95659

Draft - December 2018

COVER SHEET

a. Title: Application for New License – Major Project- Existing Dam, Camp Far West Hydroelectric Project, FERC Project No. 2997

b. Subject: Exhibit E, Environmental Report of Final License Application

c. Lead Agency: Federal Energy Regulatory Commission

d. Abstract: On or about June 30, 2019, South Sutter Water District (SSWD) filed with the Federal Energy Regulatory Commission (FERC or Commission) a final application for a new license for SSWD's Camp Far West Hydroelectric Project (P-2997). The Project is located on the main stem of the Bear River in Nevada, Yuba and Placer counties, California.

The existing Project occupies 2,863.7 acres of land, none of which is federal lands or Indian tribal lands. The Project does not use any United States owned facilities.

SSWD proposes to continue to operate the Project as it has been operated historically, with the addition of the 5 foot pool raise of Camp Far West Reservoir and certain modifications and additional measures.

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f. Transmittal: This Exhibit E to relicense the Camp Far West Hydroelectric Project is made available to federal, state and local agencies, Native American tribes, non-governmental organizations, and members of the public on or about June 30, 2019, as required by Part 18 of the Code of Federal Regulations, Section 5.17.

FOREWORD

The Federal Energy Regulatory Commission (FERC or Commission), pursuant to the Federal Power Act (FPA)[1] and the United States Department of Energy Organization Act[2] is authorized to issue licenses for up to 50 years for the construction and operation of non-federal hydroelectric development subject to its jurisdiction, on the necessary conditions:

> That the project… shall be such as in the judgment of the Commission will be adapted to a comprehensive plan for improving or developing a waterway or waterways for the use or benefit of interstate or foreign commerce, for the improvement and utilization of water-power development, for the adequate protection, mitigation, and enhancement of fish and wildlife (including related spawning grounds and habitat), and for other beneficial public uses, including irrigation, flood control, water supply, and recreational and other purposes referred to in section 4(e).[3]

The Commission may require such other conditions not inconsistent with the FPA as may be found necessary to provide for the various public interests to be served by the project.[4] Compliance with such conditions during the licensing period is required. The Commission's Rules of Practice and Procedure allow any person objecting to a licensee's compliance or noncompliance with such conditions to file a complaint noting the basis for such objection for the Commission's consideration.[5]

[1] 16 U.S.C. § 791(a)-825r, as amended by the Electric Consumers Protection Act of 1986, P.L. 99-495 (1986) and the Energy Policy Act of 1992, P.L. 102-486 (1992).
[2] P. L. 95-91, 91 Stat. 556 (1977).
[3] 16 U.S.C. § 803(a).
[4] 16 U.S.C. § 803(g).
[5] 18 CFR § 385.206 (1987).

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Glossary - Definitions of Terms, Acronyms and Abbreviations

Term	Definition
0-9	
7DADM	7-day averages of the daily maxima
A	
ac	acre
ac-ft	acre-feet or acre-foot; the amount of water needed to cover one acre to a depth of one foot (43,560 cubic feet or 325,900 gallons)
ACHP	the Advisory Council on Historic Preservation
ADA	Americans with Disabilities Act
AIS	Aquatic Invasive Species
APE	Area of Potential Effect, as pertaining to Section 106 of the National Historic Preservation Act
B	
BA	Biological Assessment
BAF	Bioaccumulation factors
Basin Plan	Water Quality Control Plan for the Sacramento and San Joaquin Rivers
Bay-Delta	the San Francisco Bay/Sacramento-San Joaquin Delta Estuary
BGEPA	the Bald and Golden Eagle Protect Act
BLM	United States Department of the Interior, Bureau of Land Management
BMI	benthic macroinvertebrate
BO	Biological Opinion
C	
°C	Degrees Celsius
CALFED	CALFED Bay-Delta Program; state and federal interagency committee with management and regulatory responsibility for the Bay-Delta Estuary, now California's Delta Stewardship Council
Cal-IPC	California Invasive Plant Council
CDEC	California Data Exchange Center
CDFA	California Department of Food and Agriculture
CDFG	California Department of Fish and Game
CDFW	California Department of Fish and Wildlife
CDPR	California Department of Parks and Recreation
CEC	California Energy Commission
CEII	Critical Energy Infrastructure Information
CEQA	California Environmental Quality Act
CESA	California Endangered Species Act
C.F.R.	Code of Federal Regulations
cfs	cubic feet per second. One cfs equals approximately 1.98 acre-feet per day.
CFWID	Camp Far West Irrigation District
CHART	Critical Habitat Review Team
CNDDB	California Natural Diversity Data Base
CNPPA	The California Native Plant Protection Act
Commission	see FERC
CRLF	California red-legged frog
CSCI	California Stream Condition Index
cu ft	cubic feet
cu yd	cubic yards
CV	Central Valley
CVHJV	The California Central Valley Habitat Joint Venture
CVRWQCB	Central Valley Regional Water Quality Control Board
CWA	Federal Clean Water Act

Glossary. (continued)

Term	Definition
CWHR	California Wildlife Habitat Relationships System
CZMA	Coastal Zone Management Act
D	
DBOW	California State Parks Division of Boating and Waterways
DCU	Deer Conservation Units
DLA	Draft License Application
DO	dissolved oxygen
DPS	distinct population segment
DWR	California Department of Water Resources
E	
EA	Environmental Assessment
EFH	Essential Fish Habitat
EIS	Environmental Impact Statement
El.	elevation
EPA	United States Environmental Protection Agency
EPT	Ephemeroptera
ESA	Federal Endangered Species Act
F	
°F	Degrees Fahrenheit
FE	Federally Endangered
FEIS	Final Environmental Impact Statement
FEMA	Federal Emergency Management Agency
FERC	Federal Energy Regulatory Commission; also referred to as Commission
F.G.C.	California Fish and Game Code
Forest Service	United States Department of the Interior, Forest Service
FP	Fully Protected
FPA	Federal Power Act
ft	foot or feet
FT	Fully Threatened
FWN	Foothills Water Network
FYLF	Foothill yellow-legged frog
G	
g	grams
GIS	Geographic Information System
GPS	Global Positioning System
GUI	graphical user interface
H	
HPMP	Historic Properties Management Plan
HSC	Habitat Suitability Criteria
HU	Hydrologic unit, numbers assigned by California's Regional Water Quality Control Boards
HUC	Hydrologic unit codes developed by the Water Resources Council corresponding to hierarchal classification of hydrologic drainage basins in the United States. Each hydrologic unit is identified by a unique HUC
I	
ILP	Integrated Licensing Process
in.	inch
IPaC	Information, Planning, and Conservation System
J	
None	

Glossary. (continued)

Term	Definition
K	
kW	kilowatt: 1,000 watts
L	
LFAC	Low Flow Active Channel
Licensee	South Sutter Water District
LOP	Limited Operating Period
LWM	large woody material
M	
MBTA	The Migratory Bird Treaty Act of 1918
mg/L	milligrams per liter
mi	miles
mm	millimeter
MMI	multi-metric index
MSA Act	Magnuson-Stevens Fishery Conservation and Management Act
MWh	Megawatt hours: 1,000 kilowatt hours
N	
NAAQS	National Ambient Air Quality Standards
NAWMP	The North American Waterfowl Management Plan
NCIC	North Central Information Center
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NID	Nevada Irrigation District
NMFS	United States Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service
NMWSE	Normal maximum water surface elevation (applies to reservoirs and impoundments)
NNIP	Non-Native Invasive Plants
NOAA	National Oceanic and Atmospheric Association
NRHP	National Register of Historical Places
NRI	Nationwide Rivers Inventory
NSRA	North Shore Recreation Area
NWI	National Wetlands Inventory
O	
O&M	operation and maintenance
O/E	observed-to-expected
OHP	the California State Office of Historic Preservation
P	
PAD	Pre-Application Document
PAOT	people at one time
PG&E	Pacific Gas and Electric Company
PM&E	Protection, Mitigation & Enhancement
Project	SSWD's Camp Far West Hydroelectric Project, FERC Project No. 2997. Specifically, the Project facilities and features identified in the existing FERC license
Project Area	The area within and immediately adjacent to the existing FERC Project Boundary, and the Bear River downstream of the Project.
Project Boundary	All lands necessary for the safe operations and maintenance of the Project and other purposes, such as recreation, shoreline control, and protection of environmental resources
PUB	Palustrine Unconsolidated Bottom

Glossary. (continued)

Term	Definition
Q	
QA/QC	Quality Assurance/Quality Control
R	
RD	Recreation Day, which equals a visit by a person to a site for recreation purposes during any portion of a 24-hour period
Reclamation	United States Department of Interior, Bureau of Reclamation
Relicensing Participants	Any agency, Indian tribe non-governmental organization (NGO) or member of the public that actively participates in the Camp Far West Hydroelectric Project relicensing.
RM	River Mile, as measured along the river course, from downstream to upstream, often beginning at a downstream confluence with another river reach
RV	recreational vehicle
S	
§ or §§	section or sections
SCORP	California Department of Parks and Recreation's Statewide California Outdoor Recreation Plan
SE	State Endangered
SHPO	California Department of Parks and Recreation, Office of Historic Preservation, State Historic Preservation Officer
SIP	State Implementation Plans
SMUD	Sacramento Municipal Utility District
sq ft	square feet
sq mi	square mile
sq m	square meter
SSC	Species of special concern
SSRA	South Shore Recreation Area
SSWD	South State Water District
SWAMP	SWRCB's Surface Water Ambient Monitoring Program
SWRCB	State Water Resources Control Board
T	
TCP	Traditional Cultural Property
TMDL	total maximum daily load
U	
U.S.	United States
U.S.C.	United States Code
USACE	United States Department of Defense, Army Corps of Engineers
USDOC	United States Department of Commerce
USDOI	United States Department of Interior
USFWS	United States Department of the Interior, Fish and Wildlife Service
USGS	United States Geological Survey
V	
VAOT	Vehicles-at-one-time
VegCAMP	Vegetation Classification and Mapping Program
W	
WPT	western pond turtle
WSRA	Wild and Scenic Rivers Act
WUA	Weighted Usable Area
WY(s)	Water Years: Time period from October 1 of one year through September 31 of the next

Glossary. (continued)

Term	Definition
X	
None	
Y	
yr	year
Z	
None	

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SECTION 1.0
INTRODUCTION

1.1 SSWD's Application for a New License

The South Sutter Water District (SSWD or Licensee) has prepared this Exhibit E, Environmental Report, as part of its Application for a New License Major Project – Existing Dam (Application for New License) from the Federal Energy Regulatory Commission (FERC or Commission) for the Camp Far West Hydroelectric Project, FERC Project Number 2997 (Project). This exhibit is prepared in conformance with Title 18 of the Code of Federal Regulations (C.F.R.), Subchapter B (Regulations under the Federal Power Act), Part 4 (traditional licensing process). In particular, this exhibit conforms to the regulations in 18 C.F.R. Section 4.51(f). The initial license for the Project was issued by FERC to SSWD on July 2, 1981, effective on July 1, 1981, for a period of 40 yrs (yr).

1.1.1 The South Sutter Water District

Established in 1954, SSWD, located in Trowbridge, California, is a State of California public agency formed under California Water District Law, California Water Code Section 34000 et seq. to develop, store, and distribute surface water supplies for irrigation uses in SSWD's service area. In addition, Section 34000 et seq. authorizes SSWD to develop hydroelectric power in connection with SSWD's projects. SSWD is governed by a Board of Directors, whose seven members are elected by landowners within SSWD's service area.

SSWD's service area encompasses a total gross area of 63,972 acres (ac), of which 6,960 ac are excluded, for a net area of 57,012 ac. Approximately 40,107 ac are in Sutter County and 16,905 ac are in Placer County (Figure 1.1-1). In a normal yr, over 35,500 ac within SSWD's service area are under irrigation, with approximately 29,000 ac (82%) in rice production, 3,800 ac (11%) in orchards, 2,200 ac (6%) in irrigated pasture, and 500 ac (1%) in miscellaneous row and field crops.

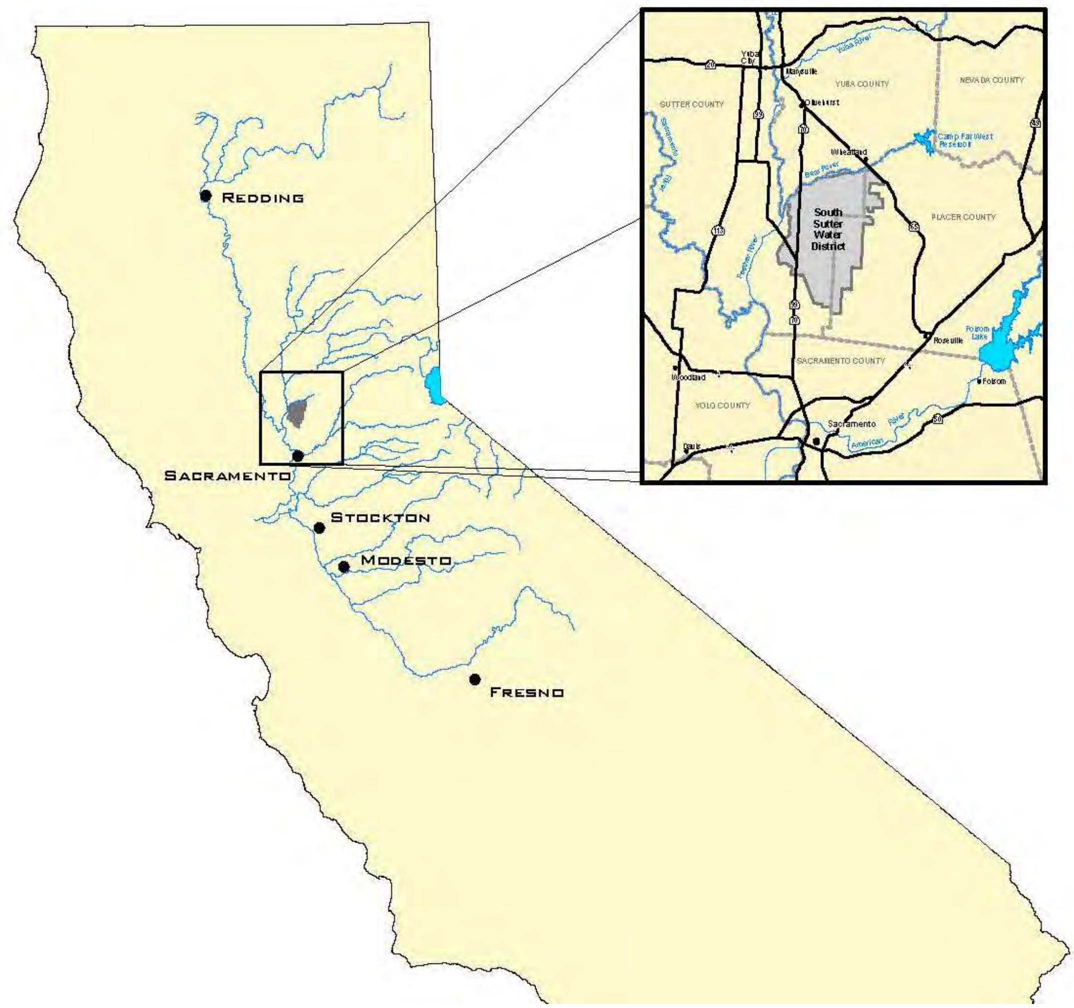

Figure 1.1-1. South Sutter Water District's service area.

One of the first acts by SSWD when it was formed was to enlarge the existing Camp Far West Dam and Reservoir and to develop a distribution system to augment and provide alternatives to a declining groundwater table that was being tapped by private agricultural wells within SSWD's service area.

Today, the annual available water supply in the enlarged Camp Far West Reservoir is totally allocated each yr, but still represents only a portion of SSWD's users' demands. Up to 435 cubic feet per second (cfs) of the water released from Camp Far West Reservoir is re-diverted from the Bear River during the irrigation season (i.e., typically, from mid-April through mid-October) at a non-Project 38-feet (ft) high diversion dam[1] located approximately 1.25 miles (mi) downstream from Camp Far West Dam into SSWD's Conveyance Canal, which is located on the south bank and runs predominately north to south along the higher eastern border of SSWD's service area.[2] Typically, water deliveries begin low in mid-April, peak in July, and then gradually decrease through mid-October. Through turnouts and head gates, water is directed from SSWD's Conveyance Canal into improved canals, one pipeline, and natural channels running from east to west, and distributed to water users. Depending upon the anticipated reservoir yield, the water user's allocations may range from 0.5 acre-feet (ac-ft) per ac of irrigated land during a drought year to as much as 2.5 ac-ft per ac during a wet yr. Perennial crops such as orchards and pasture receive a higher priority of allocation over seasonal crops, with rice growers receiving the lowest priority.

1.1.2 Brief Description of the Project

The Project ranges in elevation (E1.) from 150 ft to 320 ft[3] and is located on the main stem of the Bear River in Nevada, Yuba and Placer counties, California. The Project includes a single development whose principal facilities and features consist of: the 170-ft high Camp Far West Dam; the 93,740 ac-ft Camp Far West Reservoir; the 6.8 megawatt (MW) Camp Far West Powerhouse at the base of the Camp Far West Dam; and two recreation areas on Camp Far West Reservoir. The existing FERC Project Boundary includes 2,863.7 ac of land. SSWD owns over 95 percent (2,710.5 ac) of the land within the boundary, and the remaining 5 percent (153.2 ac) of the land is owned by private parties – no federal or state land occurs within or adjacent to the FERC Project boundary or on the Bear River downstream of the Project. The Project does not include any open water conveyance facilities, transmission lines,[4] or active borrow or spoil areas.

Figure 1.1-2 illustrates the general regional location of the Bear River watershed. Figure 1.1-3 shows the Project Vicinity,[5] Project facilities, and the existing FERC Project Boundary. Refer to Exhibit A of the Draft License Application (DLA) for a detailed description of the Project.

[1] The diversion dam was constructed in 1924-1925 and is owned and operated by SSWD. It is not part of SSWD's Camp Far West Hydroelectric Project, it is not used or useful for operations of the Camp Far West Hydroelectric Project, and it does not have any hydropower production facilities otherwise associated with the dam.

[2] The Camp Far West Irrigation District, which is not part of SSWD, diverts approximately 35 cfs of water into the Camp Far West Canal, the intake of which is located on the north bank at the diversion dam across from SSWD's Conveyance Canal intake.

[3] In this exhibit, all E1. data are in United States Department of Commerce (USDOC), National Oceanic and Atmospheric Association (NOAA), National Geodetic Survey Vertical Datum of 1929 (NGVD 29), unless otherwise stated.

[4] The original license for the Project included a short 60 kilovolt transmission line, however, on April 2, 1991, the transmission line was removed from the Project FERC license and added to Pacific Gas & Electric Camp Far West Transmission Line project (FERC Project No. 10821.

[5] In this exhibit, "Project Vicinity" refers to the area surrounding the Project on the order of USGS 1:24,000 scale topographic quadrangle.

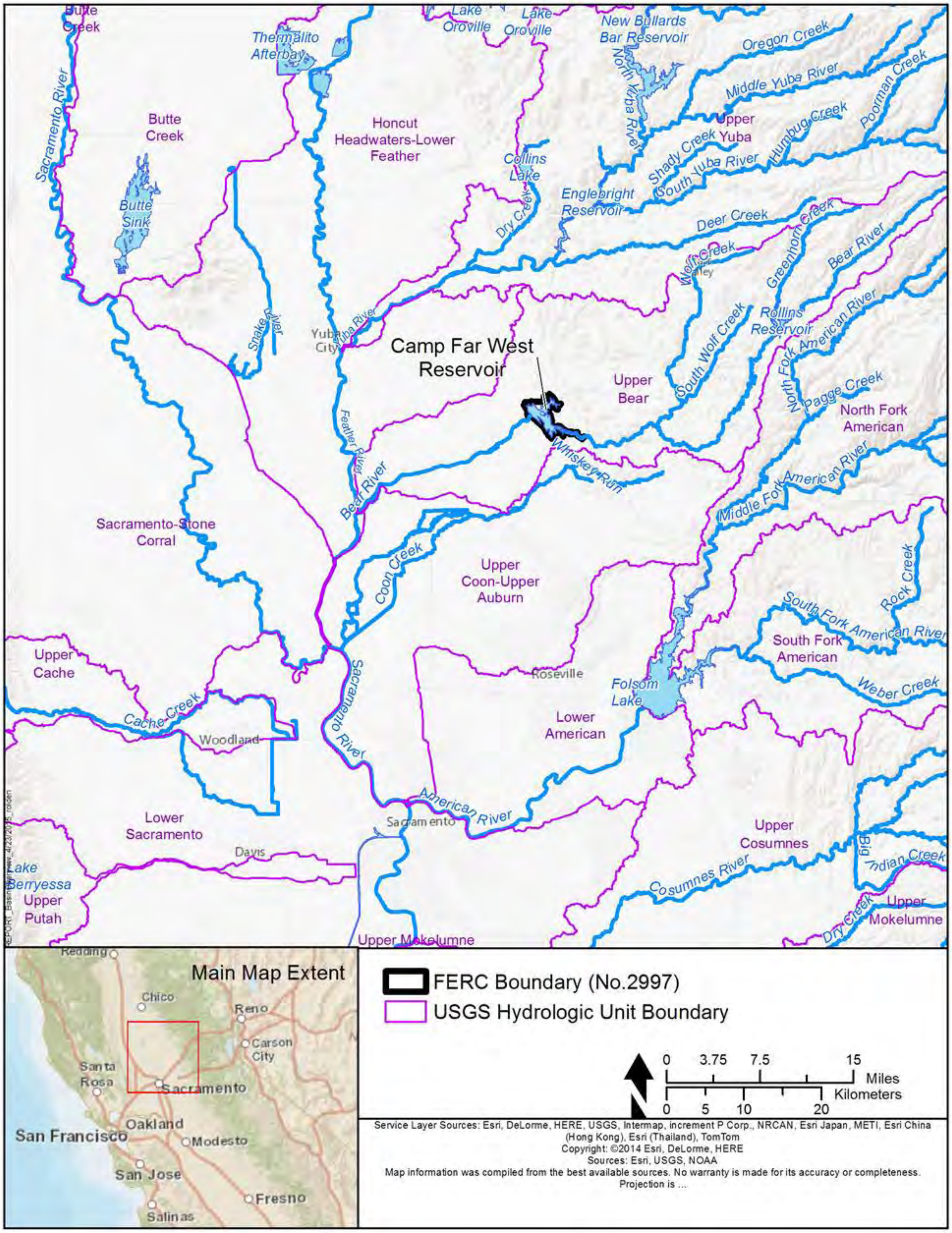

Figure 1.1-2. Bear River watershed in relation to the Feather River and other tributaries to the Sacramento River.

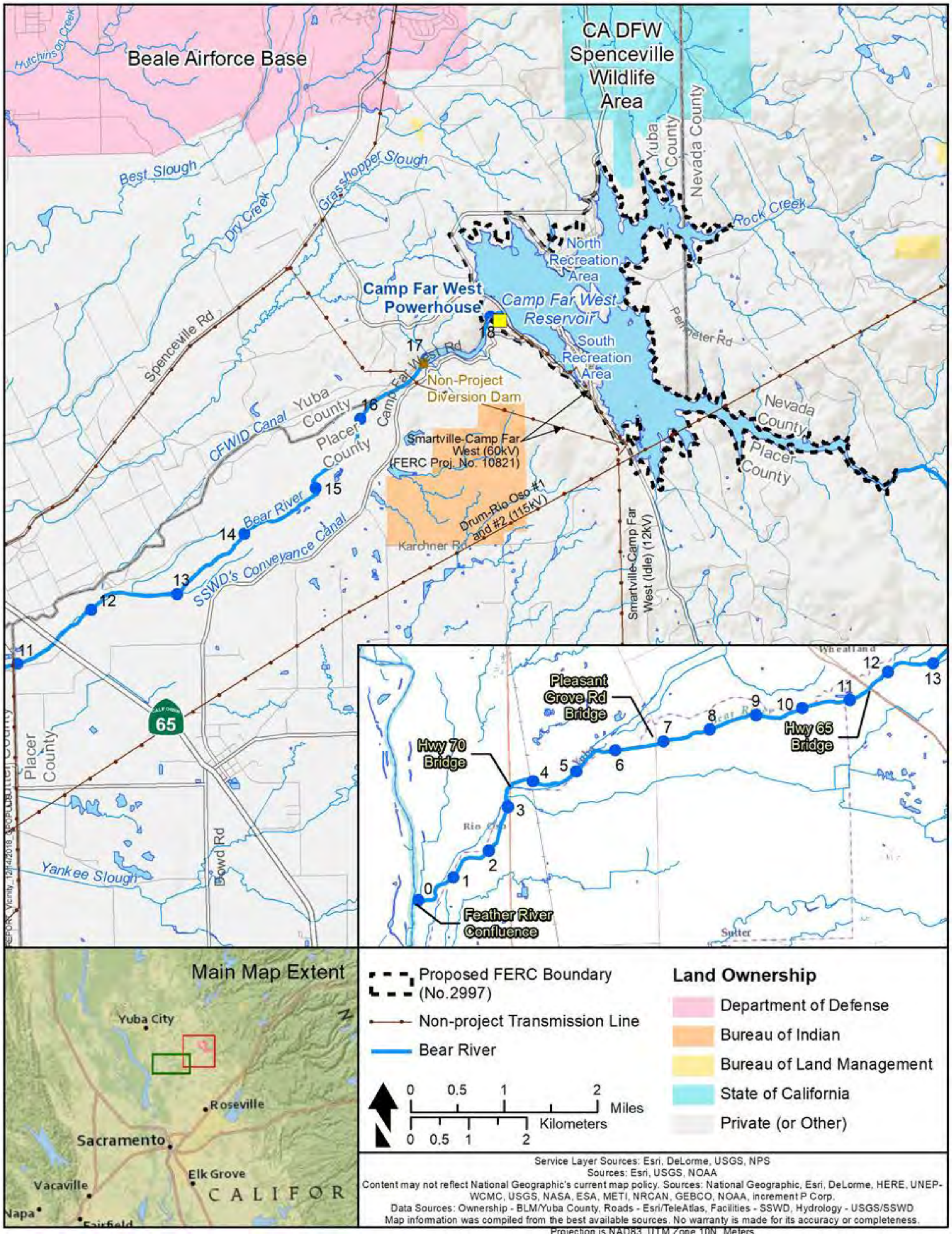

Figure 1.1-3. SSWD's Camp Far West Hydroelectric Project and Proposed Project Vicinity.

The Project is operated primarily to provide irrigation water to growers in SSWD's and the Camp Far West Irrigation District's (CFWID) service districts. However, SSWD also operates the Project to meet Bear River flow requirements and to generate power. Although the specific water availability can vary widely, normal Project operation is to fill Camp Far West Reservoir as early in the season as sufficient water becomes available and to then spill the excess flows over the Camp Far West Dam ungated spillway. Because the reservoir is primarily fed by rainfall-produced runoff and releases from upstream water projects, it is difficult to predict the amount of inflow anticipated before the end of the season; therefore, SSWD retains within the reservoir all of the inflow except releases for requirements for fisheries until the beginning of the irrigation season. Since the reservoir is operated as a fill-and-spill system, its effect on downstream flood flows is erratic, as it may range from complete control to only minor surcharge regulation. Camp Far West Reservoir does not have any dedicated flood control space or associated flood control rules. Because of the Camp Far West Powerhouse generating unit's operating characteristics, power can only be generated when the E1. of the Camp Far West Reservoir water surface is at or above 236 ft and when reservoir outflow is greater than 130 cfs. This condition normally occurs each yr starting in September and continuing into the fall until such time that surplus inflows are available to be passed through the powerhouse. During the irrigation season, up to a maximum of 530 cfs passes through the powerhouse in conformance with downstream irrigation and instream requirements. However, during the heavy runoff period, when spilling from the reservoir occurs, a greater quantity of water is routed through the powerhouse up to its maximum limit of 725 cfs.

SSWD proposes to modify the Project.[6] SSWD proposes two changes to existing Project facilities: 1) raising the normal maximum water surface elevation (NMWSE) of Camp Far West Reservoir by 5 feet (ft) from an E1. of 300 ft to an E1. of 305 ft (pool raise); and 2) modifying Project recreation facilities at Camp Far West Reservoir. In addition, SSWD proposes to modify the existing FERC Project Boundary.

In general, SSWD proposes to continue to operate the Project as it has operated historically, with the addition of a number of operation and management activities to: 1) protect or mitigate impacts from continued operation and maintenance (O&M) of the Project; and 2) enhance resources affected by continued Project O&M. These activities are collectively referred to as protection, mitigation and enhancement (PM&E) measures.

SSWD's Proposed Project would be able to continue to provide reliable surface water supplies under SSWD's water right permits. The Proposed Project would also continue to provide substantial protection and enhancement for anadromous salmonids in the Bear River downstream of the Project.

SSWD anticipates that its Proposed Project would generate an average of about 21,281 megawatt-hours (MWh) of energy annually, which represents a gross annual power value of $778,187. Annual costs under the Proposed Project would be $1,028,444. Shortfalls are met through periodic and unpredictable water sales and acquisition of federal and State grants.

[6] In this exhibit, "SSWD's Proposed Project" refers to the Project as proposed by SSWD in this Application or New License.

1.2 Purpose of Action and Need for Power

1.2.1 Purpose of Actions

The Commission must decide whether to issue a license to SSWD for the Project and what conditions should be placed in the license, if issued. In deciding whether to issue a license for the Project, the Commission must determine that the Project will be best adapted to a comprehensive plan for improving or developing the waterway. In addition to the power and developmental purposes for which licenses are issued (e.g., irrigation and water supply), the Commission must give equal consideration to the purposes of energy conservation; the Protection, Mitigation and Enhancement (PM&E) of fish and wildlife, including related spawning grounds and habitat; the provision of recreational opportunities; and the preservation of other aspects of environmental quality.

Issuing a new license for the Project would allow SSWD to continue to generate electricity at the Project for the term of the new license, making electric power from a renewable resource available for transmission to its customers. SSWD would continue to provide irrigation water to the local communities.

This Exhibit E was prepared in general conformance with the Commission's *Preparing Environmental Assessments: Guidelines for Applicants, Contractors and Staff* (FERC 2008). In addition, this Exhibit E was prepared in accordance with the National Environmental Policy Act of 1969 (NEPA), and assesses the effects associated with the operation of SSWD's Proposed Project and the No Action Alternative.[7] This Exhibit E includes measures proposed by SSWD for the PM&E of resources that would potentially be affected by SSWD's Proposed Project.

1.2.2 Need for Power

The Project is located in the California-Mexico Power area of the Western Electricity Coordination Council (WECC). According to the California Energy Commission (CEC), electricity consumption statewide is projected to grow at an annual average compounded rate of 1.2 percent from 2010 through 2020 (CEC 2009). SSWD's proposed Project would continue to meet part of existing load requirements within the system, which is in need of resources.

Power from the Project could help to meet a need for power in the WECC region in both the short-term and long-term. The Project would provide low-cost power that may displace non-renewable, fossil-fired generation and contribute to a diversified generation mix. Displacing the operation of fossil-fired facilities avoids some power plant emissions and creates an environmental benefit.

[7] The "No Action Alternative" is defined as the condition under which the existing Project as currently configured (e.g., no changes to generation facilities) would continue to operate into the future as it operates today. All Project alternatives, including SSWD's Proposed Project, are compared to the No Action Alternative.

In August 1991, SSWD and Sacramento Municipal Utility District (SMUD) entered into a Contract for the Sale and Purchase of Electricity of the power generated at the Camp Far West Powerhouse. Under the contract, SMUD reimbursed SSWD for the construction of the Camp Far West Powerhouse and associated power facilities, SMUD operates the powerhouse under a lease, and SMUD receives all the power from the powerhouse paying for the power at a fixed rate. SSWD will continue to lease the Camp Far West Powerhouse to SMUD through 2032, when the existing SSWD/SMUD Contract expires on July 1, 2031. Upon termination of the existing SSWD/SMUD Contract, SSWD plans to negotiate a new lease/power purchase contract or multiple contracts with, at this time, an unknown third-party, which could be SMUD, or parties, and assumes the third party(ies) will sell the Project power into the California Independent System Operator (CAISO) daily and real-time energy markets.

1.3 Statutory and Regulatory Requirements

Issuing a new license for the Project is subject to numerous requirements under the Federal Power Act (FPA) and other applicable statutes. The major acts and related requirements are summarized in Table 1.3-1 and described below in chronological order based on date of enactment. The current status of actions undertaken by SSWD or the agency with jurisdiction related to each requirement are briefly described.

Table 1.3-1. Summary of statutory and regulatory requirements and status.

Requirement	Agency with Jurisdiction	Status
Migratory Bird Treaty Act of 1918	USFWS	The USFWS has not formally specified measures to protect birds protected under the Migratory Bird Treaty Act at this time.
Section 10(a) of the Federal Power Act of 1920	Park Service, NMFS, USFWS, SWRCB and CDFW	The agencies have not formally provided Section 10(a) recommendations at this time.
Section 10(j) of the Federal Power Act of 1920	USFWS, NMFS and CDFW	The agencies have not formally provided Section 10(j) recommendations at this time.
Section 18 of the Federal Power Act of 1920	NMFS and USFWS	NMFS and USFWS have not formally prescribed Section 18 fishway prescriptions at this time.
Energy Policy Act of 2005	USDOC	At this time, parties have not requested trial-type hearings or recommended alternatives to FPA Section 18 fishway prescriptions.
Bald and Golden Eagle Protection Act of 1940	USFWS	The USFWS has not formally specified measures to protect bald and golden eagles at this time.
California Fully Protected Species Act (1957)	Cal Fish and Wildlife	SSWD has consulted with CDFW regarding Fully Protected species. CDFW has not issued a formal determination at this time.
National Historic Preservation Act of 1966	Advisory Council, State Historic Preservation Officer, Park Service and Native American Tribes	SSWD has consulted with the Forest Service, State Historic Preservation Officer and Native American tribes, and included a Historic Properties Management Plan in the Application for New License.
Wild and Scenic Rivers Act of 1968	Park Service	The agency has not provided formal comments regarding designated, or proposed for designation Wild and Scenic Rivers at this time.
Clean Air Act of 1970	EPA and Air Quality Control Boards	The agencies have not provided formal comments regarding air quality at this time.

Table 1.3-1. (continued)

Requirement	Agency with Jurisdiction	Status
Section 401 of the Clean Water Act (added by the Water Pollution Control Act Amendments of 1972)	SWRCB	SSWD will file with the SWRCB a formal request for a CWA Section 401 Water Quality Certification within 60 days of the date that FERC issues its Ready for Environmental Analysis Notice.
Coastal Zone Management Act of 1972	California Coastal Zone Commission	Not applicable; the Project is not within the Coastal Zone.
California Environmental Quality Act of 1970	SSWD, SWRCB and CDFW	SSWD plans to be the Lead Agency for CEQA (SWRCB expected to be Responsible Agency), and will initiate CEQA at the appropriate time in the relicensing proceeding.
California Wild and Scenic Rivers Act of 1972	CDPR	The agency has not provided formal comments regarding designated, or proposed for designation California Wild and Scenic Rivers at this time.
Endangered Species Act of 1973	USFWS and NMFS	SSWD has consulted with USFWS and NMFS. The agencies have not provided formal comments regarding Section 7 consultation.
Magnuson-Stevens Fishery Conservation and Management Act of 1976	NMFS	SSWD has consulted with NMFS. The agency has not provided formal comments regarding the act.
Pacific Northwest Electric Power Planning and Conservation Act of 1980	Pacific Northwest Power and Conservation Planning Council	Not applicable; the Project is not within the Pacific Northwest Power and Conservation Planning area (i.e., the Columbia River Basin).
Wilderness Act of 1984	Park Service	The agency has not provided formal comments regarding designated, or proposed for designation Wilderness Areas at this time.
California Endangered Species Act of 1984	Cal Fish and Wildlife	SSWD has consulted with CDFW regarding CESA-listed species. CDFW has not issued a formal determination at this time.
Americans with Disabilities Act of 2010, and Accessibility Standards	United States Department of Justice	SSWD has assessed recreation facilities on private land owned by SSWD using these standards, and addressed ADA access in the Application for New License. Consultation is not required.

1.3.1 Migratory Bird Treaty Act of 1918

The Migratory Bird Treaty Act (MBTA) of 1918, as amended (16 U.S.C. §§ 703-712), implemented the 1916 Convention between the United States (U.S.) and Great Britain, on behalf of Canada, for the protection of migratory birds. The MBTA was later amended to address treaties between the U.S. and Mexico, the U.S. and Japan, and the U.S. and the Soviet Union, now Russia. The act provides that, unless and except as permitted by regulations made under the act, it is unlawful

> …to pursue, hunt, take, capture, kill, attempt to take, capture or kill, possess, offer for sale, sell, offer to barter, barter, offer to purchase, purchase, deliver for shipment, ship, export, import, cause to be shipped, exported, or imported, deliver for transportation, transport or cause to be transported, carry, or cause to be carried, or receive for shipment, transportation, carriage, or export, any migratory bird, any part, nest, or

> egg of any such bird, or any product, whether or not manufactured, which consists, or is composed in whole or part, of any such bird or any part, nest, or egg thereof…

that is included in terms of one or more of these treaties. (16 U.S.C. § 703)

Executive Order 13186 (66 FR 3853) defines the responsibilities of federal agencies for the protection of migratory birds. Each federal agency taking actions that have, or are likely to have, measurable negative effect on migratory bird populations are directed to develop and implement, within two yrs, a Memorandum of Understanding (MOU) with the United States Department of the Interior (USDOI), Fish and Wildlife Service (USFWS), the lead agency for migratory birds, that shall promote the conservation of migratory bird populations.

SSWD has had ongoing discussions with the USFWS during the relicensing regarding potential Project effects on migratory bird species potentially affected by the Project.

At this time, the USFWS has not proposed any recommendations for potentially-affected migratory birds. SSWD expects that the USFWS will initiate discussion on migratory birds at the appropriate time in the relicensing proceeding.

1.3.2 Federal Power Act of 1920

1.3.2.1 Section 10(a) Recommendations

Section 10(a)(1) of the FPA (16 U.S.C. § 806(a)(1)) provides that the Project adopted by the Commission:

> …shall be such as in the judgment of the Commission will be best adapted to a comprehensive plan for improving or developing a waterway or waterways for the use or benefit of interstate or foreign commerce, for the improvement and utilization of water-power development, for the adequate protection, mitigation, and enhancement of fish and wildlife (including related spawning grounds and habitat), and for other beneficial public uses, including irrigation, flood control, water supply, and recreation and other purposes referred to in…

FPA section 4(e).

SSWD has had ongoing discussions with federal, State and local agencies regarding potential Project effects.

At this time, federal and State agencies that have filed with FERC comprehensive plans for the development of the waterway have not proposed any FPA Section 10(a) recommendations. SSWD expects that these agencies will exercise their FPA Section 10(a) authorities at the appropriate time in the relicensing proceeding.

Refer to Section 5.4 of this Exhibit E for a discussion of the Project's consistency with comprehensive plans that have been filed with FERC (i.e., Qualifying Plans).

1.3.2.2 Section 10(j) Recommendations

Under Section 10(j) of the FPA (16 U.S.C. § 803(j)), each hydroelectric license issued by the Commission must include conditions for the PM&E of fish and wildlife that are affected by the project and are based on recommendations that federal and State fish and wildlife agencies provide to the Commission, unless the Commission determines that the proposed PM&E recommendations are inconsistent with the purposes and requirements of the FPA or other applicable law. Before rejecting or modifying any such agency recommendation, the Commission must attempt to resolve any such inconsistency with the agency making the recommendation, giving due weight to the recommendations, expertise, and statutory responsibilities of such agency.

SSWD has had ongoing discussions with federal, State and local fish and wildlife agencies regarding potential Project effects on fish and wildlife.

At this time, federal and State and local fish and wildlife agencies have not proposed any FPA Section 10(j) recommendations for potentially-affected fish and wildlife resources. SSWD expects that these agencies will exercise their FPA Section 10(j) authorities at the appropriate time in the relicensing proceeding.

1.3.2.3 Section 18 Fishway Prescriptions

Section 18 of the FPA (16 U.S.C. § 811) provides that the Commission shall require the construction and O&M by a licensee at its own expense of such fishways as may be prescribed by the Secretary of Commerce or the Secretary of the Interior.

Pursuant to FERC's regulations at 18 C.F.R. Section 5.22(a)(4), FERC will solicit preliminary FPA Section 18 prescriptions in its notice that SSWD's license application is ready for environmental analysis. After the USDOC, NOAA, National Marine Fisheries Service (NMFS) and USFWS have proposed their preliminary FPA Section 18 prescriptions, parties to a relicensing proceeding may request a trial-type hearing on any disputed issues of material fact with respect to such preliminary prescriptions (16 U.S.C. § 811). Requests for trial-type hearing must be filed with the relevant agency within 30 days of the agency's deadline for filing the preliminary condition with FERC (50 C.F.R. § 221.21(a)(2)).

In addition, pursuant to Section 33 of the FPA, which was added by Section 241 of the Energy Policy Act of 2005 (16 U.S.C. § 823d(b)), parties to a relicensing proceeding may propose alternative Section 18 prescriptions. The Secretary of relevant agency must accept the alternative in lieu of its own proposal if it determines, based on substantial evidence, that the alternative prescription:

(A) will be no less protective than the fishway initially prescribed by the Secretary; and

(B) will either, as compared to the fishway initially prescribed by the Secretary –

(i) cost significantly less to implement; or

(ii) result in improved operation of the project works for electricity production.

Alternative FPA Section 18 prescriptions must be filed within 30 days of the agency's deadline for filing the preliminary Section 18 prescription with FERC (50 C.F.R. § 221.71(a)(2)).

SSWD has had ongoing discussions with NMFS and USFWS regarding potential Project effects on fish passage.

At this time, the Secretaries of Commerce and Interior have not provided any formal fishway prescriptions. SSWD expects that the Secretaries will exercise or reserve their FPA Section 18 authorities at the appropriate time in the relicensing proceeding.

1.3.3 Bald and Golden Eagle Protection Act of 1940

Section 1 of the Bald and Golden Eagle Protect Act (BGEPA) of 1940 (16 U.S.C. § 668), prohibits the take, possession, sale, purchase, barter, offer to sell, purchase or barter, transport, export or import of any bald or golden eagles, or any part, nest or egg thereof, unless otherwise permitted by the Secretary of the Interior. Section 4 of the Act (16 U.S.C. § 668c) defines "take" to include to "*pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb*." A USFWS regulation (50 C.F.R. § 22.3) defines "disturb" as

> …to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available, 1) injury to an eagle, 2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or 3) nest abandonment, by substantially interfering with normal breeding, feeding or sheltering behavior.

SSWD has observed bald eagles (*Haliaeetus leucocephalus*) and golden eagles (*Aquila chrysaetos*) in the Project Area.[8]

SSWD has had ongoing discussions with the USFWS regarding the potential effect of the Project on bald eagles and golden eagles.

[8] For the purposes of this document, "Project Area" is defined as the area within the FERC Project Boundary and the land immediately surrounding the FERC Project Boundary (i.e., within about 0.25-mi of the FERC Project Boundary) and includes he Bear River to its confluence with the Feather River.

At this time, USFWS has not made a formal determination regarding Project effects on bald or golden eagles. SSWD anticipates formal discussion with the USFWS will occur at the appropriate time in the relicensing proceeding.

1.3.4 California Fully Protected Species Statutes (1957)

In 1957, California adopted statutes providing for the full protection of specified birds, mammals, amphibians and reptiles and fish (California Fish and Game Code [F.G.C.] §§ 3511, 4700, 5050, 5515). These statutes provide that no provision of the Fish and Game Code or any other provision of law shall be construed to authorize the issuance of permits or licenses to take any member of one of these Fully Protected (CFP) species, except that the California Department of Fish and Wildlife (Cal Fish and Wildlife)[9] may authorize the taking of members of these species "*for necessary scientific research, including efforts to recover fully protected, threatened, or endangered species*," and may authorize the live capture and relocation of members of the listed bird species pursuant to a permit for the protection of livestock.

Today, 13 bird species, 9 mammal species, 5 reptile and amphibian species, and 10 fish species are designated as CFP under California state law.

Through consultation with CDFW, SSWD has identified six CFP species that have a reasonable potential to be affected by the Project: five birds and one mammal. These include:

- <u>State of California Fully Protected Species:</u>
    - Bald eagle
    - Golden eagle
    - American peregrine falcon (*Falco peregrinus anatum*)
    - California black rail (*Laterallus jamaicensis coturniculus*)
    - White-tailed kite (*Elanus leucurus*)
    - Ringtail (*Bassariscus astutus*)

The bald eagle is also listed as an endangered species under the California Endangered Species Act (CESA), and both the bald eagle and the golden eagle are protected under the MBTA and BGEPA. In addition, the bald eagle, golden eagle and American peregrine falcon are protected under F.G.C. Sections 3503, 3503.5, and 3513, which make it unlawful to take, possess, or needlessly destroy birds' nests or eggs; take, possess, or destroy raptors and their eggs and nests; and take or possess any migratory nongame bird, or part thereof, designated in the MBTA, respectively. None of the CFP species are listed as threatened or endangered species under the Endangered Species Act (ESA).

[9] In January 2013, the California Natural Resources Agency changed the name of the California Department of Fish and Game (CDFG) to the California Department of Fish and Wildlife.

SSWD has had ongoing discussions with CDFW regarding the potential effect of the Project, including on CFP species.

At this time, CDFW has not made a formal determination regarding potential Project effects on CFP species. SSWD expects that CDFW will make comments or recommendations regarding this issue at the appropriate time in the relicensing proceeding.

1.3.5 National Historic Preservation Act of 1966

Section 106 of the National Historic Preservation Act (NHPA) of 1966 (16 U.S.C. § 470f), requires any federal agency having direct or indirect jurisdiction over a proposed federal or federally assisted undertaking to "*take into account the effects of the undertaking on any district, site, building, structure, or object that is included in or eligible for inclusion in*" the National Register of Historic Places (NRHP) that the Secretary of the Interior is authorized to expand and maintain under Section 101(a)(1)(A) of the NHPA (16 U.S.C. § 470a(a)(1)(A)). The regulations implementing the NHPA are in 36 C.F.R. Part 800. Section 800.4(a)(1) of 36 C.F.R. requires the federal agency whose proposed undertaking is subject to the NHPA must determine and document the "area of potential effects" (APE) and 36 C.F.R. Section 800.16(d) defines this area as "*the geographic area within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist*." This regulation also provides that the "*area of potential effects is influenced by the scale and nature of an undertaking and may be different for different kinds of effects caused by the undertaking*." 36 C.F.R. Section 800.16(y) defines "undertaking" as "*a project, activity, or program funded in whole or in part under the direct or indirect jurisdiction of a Federal agency, including those carried out by or on behalf of a Federal agency; those carried out with Federal financial assistance; and those requiring a Federal permit, license or approval*." In this case, the undertaking is FERC's issuance of a new license to SSWD for the Project.

Historic properties are any prehistoric or historic district, site, building, structure, object, or traditional cultural property included in or eligible for inclusion in the NRHP maintained by the Secretary of the Interior (36 C.F.R. § 800.16(l)(1)). In most cases, cultural resources less than 50 yrs old are not considered eligible for the NRHP; however, a property achieving significance within the past 50 yrs is eligible if it is of exceptional importance. Cultural resources also must retain their integrities (i.e., the ability to convey their significance) to qualify for listing in the NRHP. For example, dilapidated structures or heavily disturbed archaeological sites may not retain enough integrity to relay information relative to the context in which the resource is considered to be important and, therefore, may not be eligible for listing on the NRHP.

As part of the NHPA Section 106 process, federal agencies and their representatives are required to participate in consultation on any findings and determinations regarding an undertaking's effect on historic properties (36 C.F.R. § 800.2(a)(4)). Consulting parties include: 1) the State Historic Preservation Officer (SHPO); 2) Indian tribes; 3) local governments; and 4) individuals and organizations with a demonstrated interest in the Project. Section 106 requires that federal agencies seek concurrence from the SHPO on any determinations of NRHP eligibility and findings of effect to historic properties, and notify the Advisory Council on Historic Preservation (Council) on any finding of adverse effects. Additionally, federal agencies must make a reasonable and good faith effort to identify Indian tribes and other consulting parties that might attach religious and cultural significance to historic properties that may be affected by the undertaking (36 C.F.R. § 800.3(f)(2)), and gather information to assist in the identification of such properties (36 C.F.R. § 800.4(a)(3),(4)).

On May 13, 2016, FERC initiated consultation with SHPO pursuant to 36 C.F.R. Section 800.3(c)(3), and designated SSWD as its non-federal representative for the purposes of informal Section 106 consultation with regards to the relicensing. FERC also contacted Native American tribes in the area informing them of the beginning of consultation and soliciting their interest in participating in the process.

FERC typically requires, as a license condition, that an applicant for a new license develop and implement a Historic Properties Management Plan (HPMP) that considers and manages effects to historic properties throughout the term of the license. SSWD has completed cultural resources studies to identify historic properties within the APE. This has included consultation with consulting parties, as described above. The data from these studies have been used to develop the HPMP that outlines the procedures and protocols for managing historic properties within the APE under the new FERC license. A draft HPMP will be provided to Indian tribes and SHPO in January 2019 for review, and a final HPMP will be included in SSWD's final Application or New License filed with FERC in June 2019.

SSWD anticipates that FERC will enter into a programmatic agreement (PA) that will formally implement the HPMP under the new license for the Project. The PA generally concludes FERC's NHPA Section 106 responsibilities for the relicensing.

1.3.6 Wild and Scenic Rivers Act of 1968

Under the Wild and Scenic Rivers Act of 1968, as amended (16 U.S.C. §§ 1271-1287), various rivers and river segments are designated as components of the national wild and scenic rivers system for their "*outstandingly remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural or other similar values*" (16 U.S.C. §1271). The purpose of the act is to preserve these rivers in their free-flowing conditions, and to protect them and their immediate environments for the benefit and enjoyment of present and future generations. There are no designated federal Wild and Scenic Rivers in the Project Vicinity or downstream of the Project, nor are there any river segments recommended for designation as federal Wild and Scenic Rivers in the Project Vicinity or downstream of the Project.

At this time, the USDOI, National Park Service (NPS) have not formally commented on SSWD's proposed Project in relation to the Wild and Scenic Rivers Act. SSWD expects that the agencies will comment at the appropriate time in the relicensing proceeding, as necessary.

1.3.7 National Environmental Policy Act of 1969

The National Environmental Policy Act of 1969 (42 U.S.C. §§ 4321-437h) (NEPA) requires all federal agencies involved in the permitting of activities affecting the environment, such as the issuance of a new FPA license for the Project, to evaluate the environmental impacts of the proposed action and the significance of these impacts.

Under NEPA, it is the continuing responsibility of the federal government

> …to use all practical means consistent with other essential considerations of national policy, to improve and coordinate Federal plans, functions, programs, and resources to the end that the Nation may-- (1) fulfill the responsibilities of each generation as trustee of the environment for succeeding generations; (2) assure for all Americans safe, healthful, productive, and esthetically and culturally pleasing surroundings; (3) attain the widest range of beneficial uses of the environment without degradation, risk to health or safety, or other undesirable and unintended consequences; (4) preserve important historic, cultural, and natural aspects of our national heritage, and maintain, wherever possible, an environment which supports diversity and variety of individual choice; (5) achieve a balance between population and resource use which will permit high standards of living and a wide sharing of life's amenities; and (6) enhance the quality of renewable resources and approach the maximum attainable recycling of depletable resources. (42 U.S.C. §4331(b))

NEPA requires federal action agencies to prepare an Environmental Assessment (EA) or environmental impact statements (EIS) that describe: 1) the environmental impacts of the proposed action; 2) any adverse environmental effects which cannot be avoided should the proposal be implemented; 3) alternatives to the proposed action; 4) the relationship between local short-term uses of man's environment and the maintenance and enhancement of long-term productivity; and 5) any irreversible and irretrievable commitments of resources which would be involved in the proposed action should it be implemented. (42 U.S.C. § 4332(2)(C)).

The EA or EIS acts as a disclosure or guidance document in which FERC describes the effects of proposed actions and possible PM&E measures; assesses the environmental effects of relicensing the project; and concludes that relicensing the project is: 1) not a major federal action significantly affecting the quality of the human environment; or 2) a major federal action significantly affecting the quality of the human environment.

SSWD anticipates that FERC will initiate NEPA after SSWD files its Application for New License.

1.3.8 Clean Air Act of 1970

The Clean Air Act (42 U.S.C. §§ 7401-7671q) and the Conformity Rules require federal agencies to conform to State Implementation Plans (SIPs). The United States Environmental Protection Agency (EPA) has established requirements and procedures to ensure that federally sponsored or approved actions will comply with the National Ambient Air Quality Standards (NAAQS), and conform to the appropriate SIPs. The conformity rules apply to designated non-attainment or maintenance areas for criteria pollutants regulated under NAAQS. The SIPs are the approved State air quality regulations that provide policies, requirements, and goals for the implementation, maintenance, and enforcement of the NAAQS. SIPs include emission limitations and control measures to attain and maintain the NAAQS. The EPA has developed two conformity regulations: one for transportation projects and one for non-transportation projects. Non-transportation projects are governed by the "general conformity" regulations (40 C.F.R. Parts 6, 51 and 93) described in the final rule for Determining Conformity of General Federal Actions to State or Federal Implementation Plans.

Because the Project is a non-transportation project, the general conformity rule applies.

At this time, the EPA and local Air Quality Control Boards have not formally commented on the Project with regards to air quality. SSWD expects that these agencies will comment at the appropriate time in the relicensing proceeding, as necessary.

1.3.9 Federal Water Pollution Control Act of 1970

Waters of the U.S. are those that are regulated under the Federal Water Pollution Control Act of 1970, as amended (33 U.S.C. § 1313),[10] and include waters which are currently used, were used in the past, or may be susceptible to use in interstate or foreign commerce; their tributaries; and adjacent waters, including wetlands, ponds, lakes, impoundments and similar waters (40 C.F.R. § 230.3). For rivers and streams, including those that are non-vegetated, the limit of jurisdiction is determined by the ordinary high water mark, which is typically delineated in the field by evaluating field indicators. Evaluation of hydrological data also can provide additional information to assist in determination of the ordinary high water mark. Riparian areas that are not located within waters of the U.S. are not regulated under the Federal Clean Water Act (CWA). Man-made water bodies may or may not be considered jurisdictional under the CWA. The jurisdictional determination of these features is typically made by considering wetland characteristics and hydrological connections to other waterways or wetlands. The U.S. Army Corps of Engineers (USACE) ultimately makes the final determination of jurisdictional status.

Section 303 of the CWA authorizes states to adopt water quality standards applicable to intrastate waters and to submit them to the EPA for review and approval. The SWRCB and the State's nine Regional Water Quality Control Boards (RWQCB) adopt such water quality standards through their adoption of water quality control plans, which also are known as "Basin Plans," pursuant to Water Code Sections 13240-13248. The region of the Central Valley Regional Water Quality Control Board (CVRWQCB) includes the Project and the Bear River watershed.

CWA Section 303(c)(2)(A) (33 U.S.C. § 1313(c)(2)(A) provides that water quality standards shall "*consist of the designated uses of the navigable waters involved and the water quality criteria for such waters based upon such uses*." In California, water quality control plans contain water quality objectives, which consist of "*limits or levels of water quality constituents*

[10] For the purpose of this PAD, the Federal Water Pollution Control Act is referred to as the "Clean Water Act" or "CWA," which is the name commonly used when referring to the Federal Water Pollution Control Act.

or characteristics which are established for the reasonable protection of beneficial uses of water or the prevention and correction of water pollution and nuisance" and programs of implementation to achieve the objectives (Water Code §§ 13050(h), 13241-13242.) The RWQCBs must consider various factors, including: 1) past, present and probable future beneficial uses of water; 2) environmental characteristics of the hydro unit (HU) under consideration, including the quality of water available thereto; 3) water quality conditions that could reasonably be achieved through the coordinated control of all factors that affect water quality in the area; 4) economic considerations; 5) the need for developing housing within the region; and 6) the need to develop and use recycled water (Water Code § 13241).

The SWRCB's management goals are set forth in the *Water Quality Control Plan (Basin Plan) for the Sacramento and San Joaquin Rivers*, the fourth edition of which was initially adopted in 1998 and most recently revised in 2016 (CVRWQCB 1998). This Basin Plan formally specifies designated existing and potential beneficial uses and water quality objectives for the Bear River. The various water quality objectives specified in the Basin Plan are in numeric and narrative form, and some apply to the whole basin while others apply only to specified water bodies.

The Basin Plan includes the Bear River in one HU: 1) HU 515.1, which includes the Bear River and its tributaries from its origin to the Feather River. Table 1.3-2 lists designated existing and potential beneficial uses for this HU.

Table 1.3-2. Designated beneficial uses of surface waters within the Camp Far West Hydroelectric Project Vicinity by HU in the Basin Plan.

<table>
<tr><th colspan="2" rowspan="2">Designated Beneficial Use
Description from Basin Plan, Section II</th><th>Designated Beneficial Use by HU in the Basin Plan, Table II-1</th><th>Bear River from Headwaters to Feather River</th></tr>
<tr><th>Use</th><th>HU 515.1</th></tr>
<tr><td>Municipal and Domestic Supply (MUN)</td><td>Uses of water for community, military, or individual water supply systems including, but not limited to, drinking water supply.</td><td>Municipal and Domestic Supply</td><td>Existing</td></tr>
<tr><td rowspan="2">Agricultural Supply (AGR)</td><td rowspan="2">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.</td><td>Irrigation</td><td>Existing</td></tr>
<tr><td>Stock Watering</td><td>Existing</td></tr>
<tr><td>Industrial Process Supply (PRO)</td><td>Uses of water for industrial activities that depend primarily on water quality.</td><td>Process</td><td>--</td></tr>
<tr><td rowspan="2">Industrial Service Supply (IND)</td><td rowspan="2">Uses of water for industrial activities that do not depend primarily on water quality including, but not limited to, mining, cooling water supply, hydraulic conveyance, gravel washing, fire protection, or oil well re-pressurization.</td><td>Service Supply</td><td>--</td></tr>
<tr><td>Power</td><td>Existing</td></tr>
<tr><td rowspan="2">Water Contact Recreation (REC-1)</td><td rowspan="2">Uses of water for recreational activities involving body contact with water, 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.</td><td>Contact</td><td>Existing</td></tr>
<tr><td>Canoeing and Rafting</td><td>Existing</td></tr>
</table>

Application for New License

Table 1.3-2. (continued)

Designated Beneficial Use Description from Basin Plan, Section II		Designated Beneficial Use by HU in the Basin Plan, Table II-1	Bear River from Headwaters to Feather River
		Use	**HU 515.1**
Non-Contact Water Recreation (REC-2)	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. These uses include, but are not limited to, picnicking, sunbathing, hiking, beach-combing, camping, boating, tide-pool and marine life study, hunting, sightseeing, or aesthetic enjoyment in conjunction with the above activities.	Other Non-Contact	Existing
Warm Freshwater Habitat (WARM)	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.	Warm[1]	Existing
Cold Freshwater Habitat (COLD)	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.	Cold[1]	Existing
Migration of Aquatic Organisms (MGR)	Uses of water that support habitats necessary for migration or other temporary activities by aquatic organisms, such as anadromous fish.	Warm[2]	Potential
		Cold[3]	Potential
Spawning (SPWN)	Uses of water that support high quality aquatic habitats suitable for reproduction and early development of fish.	Warm[2]	Potential
		Cold[3]	Potential
Wildlife Habitat (WILD)	Uses of water that support terrestrial or wetland ecosystems including, but not limited to, preservation or enhancement of terrestrial habitats or wetlands, vegetation, wildlife (e.g., mammals, birds, reptiles, amphibians, or invertebrates), or wildlife water and food sources.	Wildlife Habitat	Existing
Navigation (NAV)	--	--	--

Source: CVRWQCB 1998

[1] Resident does not include anadromous. Any hydrologic unit with both WARM and COLD beneficial use designations is considered COLD water body by the SWRCB for the application of water quality objectives.

[2] Striped bass, sturgeon, and shad.

[3] Salmon and steelhead.

CWA Section 303(d) (33 U.S.C. § 1313(d)) requires that each state identify the waters within the state for which effluent limitations under CWA Section 301(b)(1)(A) and (B) (33 U.S.C. § 1311(b)(1)(A) & (B)) are not stringent enough to implement any water quality standard applicable to such waters. The SWRCB and CVRWQCB work together to research and update this list for Central Valley Region. This list and its associated Total Maximum Daily Load (TMDL) Priority Schedule indicate that, in the Project Area, the surface waters listed in Table 1.3-3 have been identified by the SWRCB as impaired under CWA Section 303(d) (SWRCB 2010).[11]

[11] The proposed 2012 update of the CWA Section 303(d) List is limited to waterbodies of the North Coast, Lahontan, and Colorado River regions and is not expected to modify the 303(d) List in the Project Area. http://www.waterboards.ca.gov/northcoast/water_issues/programs/tmdls/303d/pdf/150115/SB_Notice.pdf

Table 1.3-3. Section 303(d) List of Water Quality Limited Segments for the Camp Far West Hydroelectric Project and downstream of the Project.

Waterbody Segment	Pollutant / Stressor	Potential Sources	SWRCB's Expected TMDL Plan Completion Date
CAMP FAR WEST RESERVOIR			
Camp Far West Reservoir	Mercury	Resource Extraction	2015[1]
BEAR RIVER			
Downstream of Camp Far West Reservoir	Chlorpyrifos	Agriculture	2021[2]
	Mercury	Resource Extraction	2015[1]
	Diazinon	Agriculture	2010[2]
	Copper	Unknown	2021

[1] Mercury TMDLs are being addressed through the SWRCB's process to develop a statewide water quality control program for mercury that consists of a mercury water quality objectives based on fish tissue concentrations and a Statewide Reservoir Mercury Control Program and TMDL. The SWRCB has completed the scoping phase of the California Environmental Quality Act, and is currently gathering more information.[12, 13]

[2] On March 7, 2017, the SWRCB adopted the CVRWQCB *Amendment to the Water Quality Control Plan for the Sacramento River and San Joaquin River Basins for The Control of Diazinon and Chlorpyrifos Discharges*, and approving the supporting Substitute Environmental Documentation and Staff Report. The EPA adopted the amendment on August 16, 2017. The diazinon and chlorpyrifos TMDLs are being addressed through this SWRCB initiative.[14]

A TMDL may apply to a single water body and pollutant, or a combination of multiple water bodies and pollutant listings. There are currently no approved TMDL plans specific to the Bear River.

CWA Section 401 (33 U.S.C. § 1341) requires that an applicant for a federal license or permit seek certifications from the appropriate State agency that the Project will comply with several listed sections of the CWA, including CWA Section 303. CWA Section 401(d) (33 U.S.C. § 1341(d)) provides that any such certification

> …shall set forth any effluent limitations and other limitations and monitoring requirements necessary to assure that any applicant for a Federal license or permit will comply with any applicable effluent limitations and other limitations under [33 U.S.C. § 1311 or 1312] standard of performance under [33 U.S.C. § 1316] or prohibition, effluent standard, or pretreatment standard under [33 U.S.C. § 1317], and with any other appropriate requirement of State law set forth in such certification, and shall become a condition on any Federal license or permit subject to the provisions of this section.

The SWRCB issues CWA Section 401 certifications for hydroelectric power projects in California.

A CWA Section 401 water quality certificate was not issued for the current FERC license for the existing Project because FERC issued the Project license before enactment of the CWA.

[12] http://www.waterboards.ca.gov/water_issues/programs/mercury/reservoirs/
[13] http://www.swrcb.ca.gov/water_issues/programs/mercury/
[14] http://www.waterboards.ca.gov/rwqcb5/water_issues/tmdl/central_valley_projects/central_valley_pesticides/

SSWD intends to file with the SWRCB a request for a CWA Section 401 Water Quality Certificate within 60 days of the date that FERC issues its notice accepting SSWD's application and stating the application is ready for environmental review.

1.3.10 California Environmental Quality Act of 1970

The California Environmental Quality Act (CEQA) (Pub. Res. Code §§21000-21189.3) requires State and local government agencies to follow specified procedures to identify any significant environmental impacts of their proposed actions and to avoid or mitigate those impacts whenever feasible. CEQA applies to all discretionary activities proposed to be undertaken or approved by California state agencies, such as the SWRCB and CDFW, or local government agencies, such as SSWD.

Under CEQA, an environmental impact report (EIR) must be prepared for any Project that may have a significant effect on the environment. (Pub. Res. Code §21100, subd. (a).) An EIR is the public document that analyzes and describes the significant environmental effects of a proposed Project, identifies and describes alternatives, and describes potential measures to reduce or avoid potential environmental impacts. A CEQA guideline states that when federal review of a Project under NEPA also is required, State agencies should cooperate with federal agencies to the fullest extent possible to reduce duplication between CEQA and NEPA. (Cal. Code Regs., tit. 14, § 15226.)

One CEQA requirement for which there is no corresponding NEPA requirement is the need for CEQA lead agencies to adopt a program for monitoring or reporting on mitigation measures that were adopted for the Project. (Cal. Code Regs., tit. 14, § 15097.) The monitoring or reporting program must ensure compliance with mitigation measures during Project implementation. The program may also provide information on the effectiveness of mitigation measures. Although discussion of the mitigation reporting or monitoring program can be deferred until the final EIR or, in some cases, after Project approval, it is often included in the draft EIR, so that the public may review it and comment on it.

Another analysis required for EIR under CEQA that is not required by NEPA is a description of any growth-inducing effects that the proposed Project may cause. (Cal. Code Regs., tit. 14, § 15126.2(d).)

As a local governmental agency, SSWD will be the lead agency for the CEQA process for Project relicensing, and expects that the SWRCB will be a CEQA responsible agency. SSWD expects CDFW will be involved in the CEQA process because it is both a trustee agency for the State's fish and wildlife resources and a responsible agency for administering the CESA and other provisions of the F.G.C. that afford protection to the State's fish and wildlife public resources (CEQA Guidelines § 21070 and 21069).

SSWD expects to initiate the CEQA process, which will include agency consultation and public review, after FERC issues its final environmental document and ESA consultation is complete.

1.3.11 Coastal Zone Management Act of 1972

Under Section 307(c)(3)(A) of the Coastal Zone Management Act of 1972, as amended, (CZMA), (16 U.S.C. § 1456(c)(3)(A)), the Commission may not issue a license for a Project within or affecting a state's coastal zone unless the state's CZMA agency concurs with the license applicant's certification of consistency with the state's CZMA program, or the agency's concurrence is conclusively presumed by its failure to act within 180 days of its receipt of the applicant's certification.

SSWD determined the Project is not located within the coastal zone boundary, which extends from a few city blocks to 5 mi inland from the sea, and will not affect any resources located within the boundary of the coastal zone. The California Coastal Commission concurred with SSWD's determination in a letter dated March 13, 2018, which is included in this Exhibit E as Attachment 1.0A.

1.3.12 California Wild and Scenic Rivers Act of 1972

The California Wild and Scenic Rivers Act (WSRA) (Pub. Res. Code §§ 5093.50-5093.70) was enacted in 1972 to preserve in their free-flowing states designated rivers possessing extraordinary scenic, recreation, fishery, or wildlife values. (See Pub. Res. Code § 5093.50.) The WSRA prohibits the construction of dams, reservoirs, diversions and other water impoundment facilities, other than permitted temporary flood storage facilities, on any designated river and segment unless the Secretary of the California Resources Agency (Resources Agency) determines that the facility is needed to supply domestic water to local residents and that the facility will not adversely affect the free-flowing condition and natural character of the river and segment. (Pub. Res. Code § 5093.55.) The WSRA requires the Resources Agency to coordinate the activities of State agencies whose activities affect designated rivers with the activities of other State, local and federal agencies with jurisdiction over matters that may affect the rivers, and it requires State and local agencies and departments to exercise their powers in manners that are consistent with the WSRA and its policy. (Pub. Res. Code §§ 5093.60, 5093.61.). Initially, the WSRA required the implementation of a management plan for each river or river segment designated as wild and scenic, but the amendments of 1982 eliminated this requirement. (See former Pub. Res. Code § 5093.59.) State designated rivers may be added to the federal system upon the request of the Governor of California and the approval of the Secretary of the Interior. (See 16 U.S.C. § 1275(c).)

The Project Vicinity does not include any sections of river designated or proposed for designation under the WSRA.

At this time, California Department of Parks and Recreation (CDPR) have not formally commented on SSWD's Proposed Project in relation to the WSRA. SSWD expects that CDPR will comment at the appropriate time in the relicensing proceeding, as necessary.

1.3.13 Endangered Species Act of 1973

The ESA of 1973, as amended, (16 U.S.C. § 1531 - 1544) was enacted to conserve endangered and threatened species and the ecosystems upon which they depend. (See 16 U.S.C. § 1531(b) & (c)(1)). The ESA defines an "endangered" species as "*any species which is in danger of extinction throughout all or a significant portion of its range…*and a "threatened" species as, "*any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range*." (16 U.S.C. § 1532(6) & (20)). A species may be listed under the ESA as an endangered species or as a threatened species. (16 U.S.C. § 1533.) The ESA is administered by the Secretary of the Interior through USFWS for most species, and by the Secretary of Commerce through NMFS for marine and anadromous species. (See 16 U.S.C. § 1532(15).)

Section 7 of the ESA (16 U.S.C. § 1536) requires federal agencies to consult with the USFWS or NMFS to ensure that any action that they authorize, fund, or carry out is not likely to jeopardize the continued existence of any threatened or endangered species, or result in the destruction or adverse modification of critical habitat[15] for these listed species. A proposed action may jeopardize the continued existence of a listed species if it would "*reduce appreciably the likelihood of both the survival and recovery of a listed species...*" (50 C.F.R. § 402.02).

An ESA Section 7 consultation begins with requests to the USFWS and NMFS for inventories of the threatened and endangered species that may be affected by the proposed Project. For hydroelectric power project relicensings, FERC then prepares a Biological Assessment (BA) that discusses whether or not any listed species or critical habitat is likely to be adversely affected by the federal action, and therefore requires formal consultation. At the end of the consultation process, the USFWS or NMFS may issue a Biological Opinion (BO) that specifies whether the proposed action will jeopardize the continued existence of any threatened or endangered species, or result in the destruction or adverse modification of any designated critical habitat. (16 U.S.C. § 1536(b).) If jeopardy or adverse modification is found, then the USFWS or NMFS must suggest a reasonable and prudent alternative, or alternatives, to the proposed action that the USFWS or NMFS believes would not cause such jeopardy or adverse modification and which can be taken by the federal agency or applicant in implementing the proposed Project. (16 U.S.C. § 1536(b)(3)(A).) A non-jeopardy opinion may be accompanied by an incidental take statement that specifies potential impacts of the taking of individuals of a listed species or their habitat, mitigation measures, and terms and conditions for implementation of reasonable and prudent mitigation measures. (16 U.S.C. § 1536(b)(4).)

On May 13, 2016, the Commission initiated informal consultation with USFWS and NMFS as required under Section 7 of the ESA and the interagency cooperation regulations in 50 C.F.R.

[15] Critical habitat is defined in Section 3(5)(A) of the ESA (16 U.S.C. § 1532(5)(A)) as the specific areas within the geographical area occupied by the species where there are physical or biological features that are essential to the conservation of the species or that may require special management considerations or protection. (16 U.S.C. § 1532(5)(A)(i).) Specific areas outside of the geographical area occupied by the species may also be included in designations of critical habitat, if such areas are determined to be essential for the conservation of the species. (16 U.S.C. § 1532(5)(A)(ii).)

Part 402, and designated SSWD as FERC's non-federal representative for purposes of informal consultation.

Through informal consultation with the USFWS and NMFS, SSWD has identified 11 species - two endangered species and nine threatened species – that could potentially be affected by continued Project O&M and associated recreation. No candidate or proposed for listing species are potentially affected. These species include one plant, four invertebrates, one amphibian, one reptile, three fishes, and one bird. These species are:

- <u>ESA Endangered Species</u>:
  - Hartweg's golden sunburst (*Pseudobahia bahiifolia*)
  - Vernal pool tadpole shrimp (*Lepidurus packardi*)
- <u>ESA Threatened Species</u>:
  - Valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*)
  - California red-legged frog (*Rana draytonii*)
  - Conservancy fairy shrimp (*Branchinecta conservatio*)
  - Vernal pool fairy shrimp (*B. lynchi*)
  - Giant garter snake (*Thamnophis gigas*)
  - Central Valley spring-run Chinook salmon (*Oncorhynchus tshawytscha*) Evolutionarily Significant Unit (ESU) and Critical Habitat[16]
  - Steelhead, California Central Valley Distinct Population Segment (DPS) (*O. mykiss)* and Critical Habitat[17]

[16] The ESU for Central Valley spring-run Chinook salmon is defined as all naturally-spawned populations of spring-run Chinook salmon in the Sacramento River and its tributaries, including the Feather River Fish Hatchery population. In the Bear River, NMFS designates CV spring-run Chinook salmon critical habitat to include the area defined in the CALWATER Marysville HU 5515, Lower Yuba River Hydrologic Sub-area 551510. Outlet(s) = Bear River (Lat 38.9398, Long-121.5790) upstream to endpoint(s) in: Bear River (38.9783,-121.5166), which means the upstream extent is approximately to RM 5 in the Bear River (70 FR 52488).

[17] The DPS for Central Valley steelhead includes all naturally-spawned populations of steelhead below natural and human-made impassable barriers in the Sacramento and San Joaquin rivers and their tributaries, excluding steelhead from San Francisco and San Pablo bays and their tributaries. In the Bear River, NMFS designates CV steelhead critical habitat to include the area defined in the CALWATER Marysville Hydrologic Unit 5515 (i) Lower Bear River Hydrologic Sub-area 551510. Outlet(s) = Bear River (Lat 39.9398, Long –121.5790) upstream to endpoint(s) in Bear River (39.0421, –121.3319), which means the upstream extent is at the non-Project diversion dam (70 FR 52488).

- North American green sturgeon, Southern DPS (*Acipenser medirostris*) and Critical Habitat[18]
- Yellow-billed cuckoo, Western DPS[19] (*Coccyzus americanus*)

Hartweg's golden sunburst and the western yellow-billed cuckoo are also listed as endangered species under the CESA; and giant garter snake and Central Valley spring-run Chinook salmon are also listed as threatened under the CESA, which is discussed below. None of the ESA-listed species are CFP species.

SSWD has had ongoing discussions with NMFS and USFWS regarding the potential effects of the Project on ESA-listed species.

The process used to address Project effects on ESA-listed species and their critical habitats and a summary of anticipated environmental effects on the species are included in Section 3.3.5.

SSWD anticipates that FERC will consult with NMFS and USFWS at the appropriate time in the relicensing proceeding.

1.3.14 Magnuson-Stevens Fishery Conservation and Management Act of 1976

One purpose of the Magnuson-Stevens Fishery Conservation and Management Act of 1976 (MSA Act), as amended (16 U.S.C. §§ 1801-1891d) (MSA) is to conserve and manage anadromous fishery resources of the U.S.. (16 U.S.C. § 1801(b)(1).) The MSA establishes eight Regional Fisheries Management Councils and authorizes them to prepare, monitor and revise fishery management plans in ways that will achieve and maintain the optimum yield from each fishery. (16 U.S.C. §1852.) The Pacific Fisheries Management Council is responsible for implementing the MSA in California. (16 U.S.C. § 1852(a)(1)(F).) The Secretary of Commerce has oversight authority. (See 16 U.S.C. § 1854.)

The MSA was amended in 1996 to establish a new requirement to describe and identify "Essential Fish Habitat" (EFH) in each fishery management plan. (16 U.S.C. § 1855(b).) EFH is defined in the MSA regulations as "*those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity*." (50 C.F.R. § 600.10.) For Pacific salmon, EFH "*includes all those water bodies occupied or historically accessible*" in specified hydrologic units. (50 C.F.R. § 600.412.) For the purpose of EFH, NMFS uses fourth field hydrologic unit

[18] The Southern DPS of North American green sturgeon includes the green sturgeon population spawning in the Sacramento River and utilizing the Sacramento-San Joaquin River Delta and San Francisco Estuary. NMFS has not designated any critical habitat for North American green sturgeon, Southern DPS, in the Bear River.

[19] The Western DPS for yellow billed-cuckoo is defined as that portion of the species that nests west of the Continental Divide in the states of Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Texas, Utah, Washington, and Wyoming, as well as in southwestern British Columbia, Canada, and in parts of western Mexico. This DPS also corresponds to the subspecies, western yellow-billed cuckoo (*C. americanus occidentalis*), which is generally, but not universally accepted as a valid taxon. Critical habitat was proposed in 2014, but a Final Rule has not been published. The nearest critical habitat unit is located in the Sutter National Wildlife Refuge.

codes developed by the United States Geological Survey (USGS) as defined in the USGS publication; HU Maps, Water Supply Paper 2294, 1987.[20]

The MSA requires that all federal agencies consult with NMFS on all actions and proposed actions, that are or will be permitted, funded, or undertaken by the agency (the lead agency), and that may adversely affect any EFH (16 U.S.C. § 1855(b)(2).). Comments from NMFS following consultation are advisory only; however, the lead agency must provide a written explanation to NMFS if the lead agency does not agree with NMFS' recommendations regarding EFH. (See 16 U.S.C. § 1855(b)(4)(B).)

Within the Project affected basin, the Pacific Fisheries Management Council has designated freshwater EFH for Pacific salmon (50 C.F.R. § 660.412). The designation does not identify specific Chinook salmon races (e.g., spring-run or fall-run) but instead is for "Pacific salmon." As discussed above, Pacific salmon EFH "*includes all water bodies occupied or historically accessible*" in designated hydrologic units (50 C.F.R. § 660.412), and the Upper Bear River hydrologic unit (USGS Hydrologic unit code [HUC] 18020126)[21] is one of these designated hydrologic units (50 C.F.R., pt. 660, subpt. H, table 1.) Although in some cases, EFH can extend beyond impassable dams, within HUC 18029126 on the Bear River, the upstream extent of Pacific salmon EFH is the Camp Far West Dam (PFMC 2014).

On May 13, 2016, FERC designate SSWD as FERC's non-federal representative for purposes of MSA consultation.

SSWD has had ongoing discussions with NMFS regarding the potential effect of the Project.

SSWD anticipates that FERC will consult with NMFS under the MSA at the appropriate time in the relicensing proceeding.

1.3.15 California Native Plant Protection Act of 1977

The California Native Plant Protection Act (CNPPA) (F.G.C. §§ 1900 - 1913) was enacted in 1977 and authorizes the California Fish and Wildlife Commission to designate native plants within the State as rare or endangered (F.G.C. § 1904). Currently, 64 species, including some with the potential to occur on the Project, are listed under the CNPPA. Take of these plant species is prohibited, with the exception of certain exempted activities, including some agriculture and nursery operations, emergencies and proper notification of CDFW for vegetation removal from canals, roads, etc., and changes in land use.

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[20] The geographic extent of HUs range is from the first field, which is the largest geographic extent, to the sixth field, which is the smallest geographic extent. Fourth field HU Codes divide the landscape into distinct geographic areas that are identified by eight numbers unique to that HU.

[21] Historically, the HUC8 basin data set from USGS called the basin from the Feather River to the Camp Far West Dam on the Bear River, the "Lower Bear" (HUC #18020108) and the basin upstream of Camp Far West Dam the "Upper Bear" (HUC #18020126). The new and current USGS Watershed Boundary Dataset combines the two basins and calls it the "Upper Bear" (HUC #18020126), eliminating the "Lower Bear" designation. However, this does not affect the EFH area.

No CNPPA-listed plant species were located in the Project Area during SSWD's relicensing studies. If any plants listed on the CNPPA are found to be located on the Project, then SSWD will comply with the CNPPA.

1.3.16 Pacific Northwest Electric Power Planning and Conservation Act of 1980

The provisions of the Pacific Northwest Electric Power Planning and Conservation Act of 1980, as amended (16 U.S.C. §§ 839 - 839h) do not apply to the Project because the Project is not located within the Pacific Northwest Electric Power Planning and Conservation Area (i.e., the Columbia River Basin).

1.3.17 Wilderness Act of 1984

The Project Vicinity does not include any areas that have been included in or are proposed for inclusion in the National Wilderness Preservation System under Wilderness Act of 1984, as amended (16 U.S.C. §§ 1131 - 1136).

At this time, agencies have not formally commented on the Proposed Project with regards to Wilderness Areas. SSWD expects that agencies will comment at the appropriate time in the relicensing proceeding, if necessary.

1.3.18 California Endangered Species Act of 1984

Under the CESA (F.G.C. §§ 2050 – 2069), the California Fish and Wildlife Commission may, after following specified procedures, list native bird, mammal, fish, amphibian, reptile or plant species as endangered species or threatened species (F.G.C. §§ 2062, 2067, 2070 - 2079).[22]

CESA prohibits any person from importing, exporting, taking, possessing, purchasing or selling within California any species or product thereof that is listed as an endangered species or a threatened species under CESA (F.G.C. § 2080). However, CDFW may issue permits for the incidental take of CESA-listed species if the impacts of the authorized take are minimized and fully mitigated and other applicable statutory requirements are satisfied (F.G.C. § 2081(b)). But no such permit may be issued if its issuance would jeopardize the continued existence of the species (F.G.C. § 2081(c)).

If a species is listed as an endangered species or threatened species under the ESA, and if the USFWS or NMFS has authorized incidental take of the species under ESA Section 7 (16 U.S.C. § 1536) or ESA section 10 (16 U.S.C. § 1539), then such incidental take also is authorized by CESA if CDFW follows the statutory procedures and issues a determination that such incidental take is consistent with CESA (F.G.C. § 2080.1).

[22] Cal Fish and Wildlife, pursuant to its goal of maintaining viable populations of all native species, also designates "species of special concern" when in CDFW's opinion, declining population levels, limited ranges, and/or continuing threats have made them vulnerable to extinction. The State's species of concern designation is an administrative term and has no legal status.

Through consultation with CDFW, SSWD has identified eight species listed as threatened or endangered species under CESA and one candidate species (i.e., proposed for listing) that have reasonable potential to be affected by the Project: one plant, one amphibian, one fish, and five birds. These species are:

- CESA Endangered Species:
  - Hartweg's golden sunburst
  - Western yellow-billed cuckoo
  - Bald eagle
- CESA Threatened Species:
  - Central Valley Spring-run Chinook salmon
  - California black rail
  - Swainson's hawk (*Buteo swainsoni*)
  - Bank swallow (*Riparia riparia*)
- CESA Candidate Species:
  - Foothill yellow-legged frog (*Rana boylii*)

Hartweg's golden sunburst is also listed as an endangered species under the ESA, and CV spring-run Chinook salmon and western yellow-billed cuckoo, also known as the Western DPS of yellow-billed cuckoo, are also listed as threatened species under the ESA. Bald eagle is also protected under the MBTA and F.G.C. Sections 3503, 3503.5, and 3513, and under the BGEPA. Bald eagle and California black rail are CFP species.

SSWD has had ongoing discussions with CDFW regarding the potential effects of the Project on fish and wildlife.

At this time, CDFW has not formally commented on the Proposed Project with regards to CESA. SSWD expects that CDFW will formally comment at the appropriate time in the relicensing proceeding, if necessary.

1.3.19 Americans with Disabilities Act of 2010

Public recreation facilities must comply with the Americans with Disabilities Act of 2010 as amended (ADA) (42 U.S.C. §§ 12101 - 12213) on private land. FERC, however, has no statutory role in implementing or enforcing the ADA as it applies to its licenses. A licensee's obligation to comply with the ADA exists independent of its FERC Project license.

All Project recreation facilities are on private land owned by SSWD.

1.4 Consultation Documentation

The Commission's regulations (18 C.F.R. § 16.8) require that an applicant consult with appropriate federal and State agencies, local governments, Indian tribes, non-governmental organizations, businesses and unaffiliated members of the public that may be interested in the proceeding before filing an application for a license. This consultation is the first step in complying with ESA, NHPA, and other federal statutes. Pre-application filing consultation must be completed and documented according to the Commission's regulations.

On March 14, 2016, SSWD filed with FERC a request to use FERC's traditional licensing process (TLP) to relicense the Project. FERC granted SSWD's request in a letter dated May 13, 2016.

The TLP includes three stages of consultation. SSWD's consultation efforts by consultation stage is described below.

If a document mentioned in this section has already been filed with FERC in the Camp Far West Hydroelectric Project relicensing docket, to reduce redundancy the document is not attached to this Application for New License, but the accession number in FERC's ELibrary is noted and the document is included in this Application for New License by reference. SSWD assumes documents on FERC's ELibrary, excluding Privileged or Critical Energy Infrastructure Information (CEII), are accessible by all interested parties. However, if a party would like a copy of a specific document referenced below and that party is unable to access the document on FERC's ELibrary, the party may contact SSWD who will provide the document.

1.4.1 First Stage Consultation

First Stage Consultation begins when an applicant for a new license files its Notice of Intent (NOI) to file an application for a new license (NOI) and its Pre-Application Document (PAD) (18 C.F.R. §4.38(b)(1)), and ends after all participating agencies and Indian tribes provide written comments on the applicant's NOI and PAD (18 C.F.R. § 4.38(b)(7)).

1.4.1.1 Filing of NOI and PAD

On March 13, 2016, SSWD filed with FERC its NOI[23] and PAD.[24] The PAD included 15 detailed study plans (Table 1.4-1) that SSWD proposed to conduct to supplement existing, relevant and reasonably available information regarding the Project and potentially affected resources. In addition, the PAD included a Water Balance/Operations Model for the Project. The 15 proposed studies were:

[23] FERC Accession No: 20160311-5262.
[24] FERC Accession No: 20160311-5263.

Table 1.4-1. Studies proposed by SSWD in its March 2016 PAD.

Study Designation in PAD	Study Name in PAD
2.1	Water Temperature Monitoring
2.2	Water Temperature Modeling
2.3	Water Quality
3.1	Salmonid Redd
3.2	Stream Fish Populations
3.3	Instream Flow
4.1	Special-status Plants and Non-native Invasive Plants
4.2	Special-status Wildlife – Raptors
4.3	Special-status Wildlife – Bats
5.1	ESA-listed Plants
5.2	ESA-listed Wildlife – Valley Elderberry Longhorn Beetle
5.3	ESA-listed Amphibians – California Red-legged Frog
6.1	Recreation Use and Visitor Survey Study
10.1	Cultural Resources
11.1	Tribal Interests
Total	**15 Studies**

1.4.1.2 FERC Notice

On May 13, 2016, FERC issued a NOI to File License Application, Filing of Pre-Application Document, and Approving Use of Traditional Licensing Process. In its notice, FERC initiated informal consultation with USFWS and with NMFS under Section 7 of the ESA, with NMFS under Section 305(b) of the MSFMCA, and with SHPO under section 106 of the NHPA. In addition, FERC designated SSWD as its non-federal representative for informal consultation for ESA and MSA Act and with SHPO for consultation for NHPA.

1.4.1.3 Site Visit and Joint Meeting and Initial Indian Tribe Consultation during First Stage Consultation

On June 10, 2016, SSWD filed with FERC and provided to agencies a letter advising that SSWD had coordinated with agencies, Indian tribes and members of the public to schedule a site visit and joint agency/public meeting.[25] The letter included an agenda for the joint meeting.

On June 9 and 10, 2016, SSWD placed notices of the joint meeting in three newspapers, one in each county in which the Project is located.

The site visit occurred on June 27, 2016, and, besides SSWD representatives, eight agency representatives participated: three from USFWS; four from the CDFW; and one from the SWRCB.

The joint meeting occurred on June 27, 2016. The purpose of the meeting was to provide agencies, Indian tribes and members of the public an opportunity to discuss the information in the PAD, discuss data and studies to be developed by SSWD, and express their views regarding resource issues that should be addressed in SSWD's application for new license. Besides SSWD

[25] FERC Accession No: 20160610-5251.

representatives, the facilitator and the transcriber, 16 people attended the joint meeting: three from the USFWS; one from the NMFS; three from the CDFW; two from the SWRCB; one from the California State Office of Historic Preservation (OHP); one from the United Auburn Indian Community (UAIC); one from the California Sport Fishing Alliance (CSPA); one from the Foothill Water Network (FWN)/Sierra Club (SC); two from the Sierra Streams Institute; and one from the SMUD.

On August 2, 2016, SSWD filed with FERC documentation of SSWD's site visit and joint meeting, the later including a meeting transcript and proof of publication of the joint meeting public notices.[26]

On June 29, 2016, under Section 106 of the NHPA, SSWD offered a site visit to interested Indian tribes and held an initial Section 106 meeting. Besides SSWD representatives, the site visit was attended by three UAIC representatives and two Nevada City Rancheria representatives; and the meeting was attended by one OHP representative, three UAIC representatives and two Nevada City Rancheria representatives. FERC participated in the meeting by telephone.

In addition, during this period, FERC staff reached out to potentially interested Indian tribes and documented its consultation with memos to the docket. These include:

- May 11 and 13, 2016 Memorandum.[27] Mechoopda Indian Tribe of Chico Rancheria advised FERC that the tribe "would refer consultations and comments to the other Indian tribes involved with this relicensing."
- May 11 and 17, 2016 Memorandum.[28] Shingle Springs Rancheria advised FERC that the tribe "would defer to the United Auburn Indian Community involving tribal consultation with this relicensing."
- May 20, 2016 Memorandum.[29] Washoe Tribe of Nevada and California advised FERC that the tribe "would defer to the other Indian tribes (e.g., United Auburn Indian Community) who would be participating with this relicensing."
- June 1, 2016 Memorandum.[30] FERC staff noted it had left messages with the Tribal Chairman with the Mooretown Rancheria to see if the tribe would like to consult with FERC on the relicensing, but had not heard back from any representative from the Mooretown Rancheria.
- June 16, 2016 Memorandum.[31] FERC staff contacted the Chair of the Greenville Rancheria to see if the tribe would like to consult with FERC on the relicensing. The memo says that, initially, the Chair said he would be interested, and asked that FERC

[26] FERC Accession No: 20160802-5106.
[27] FERC Accession No: 20160516-4022.
[28] FERC Accession No: 20160517-4008.
[29] FERC Accession No: 20160523-4002.
[30] FERC Accession No: 20160601-4005.
[31] FERC Accession No: 20160615-4001.

staff leave a time and date on his telephone answering machine the following week to discuss this further. The memo notes that FERC staff have not heard back since then.

1.4.1.4 Comments on NOI and PAD

In a letter to FERC dated August 25, 2016, the USFWS requested a 60-day extension from the NOI/PAD comment filing deadline of August 27, 2016.[32]

Seven parties filed comments on SSWD's PAD: NMFS,[33] CDFW,[34] SWRCB,[35] OHP,[36] FWN,[37] USFWS[38] and UAIC[39] (Table 1.4-2).

Table 1.4-2. Parties that filed with FERC comments on SSWD's March 2016 PAD.

Commenter	Date of Comment Letter
UAIC	April 27, 2016
OHP	August 25, 2016
NMFS	August 25, 2016
Cal Fish and Wildlife	August 25, 2016
SWRCB	August 26, 2016
FWN	August 26, 2016
USFWS	September 7, 2016
Total	**7 Comment Letters**

SSWD careful reviewed the seven comment letters, and identified 63 individual requests[40] for modifications to eight of SSWD's proposed studies, and requests for 10 studies not proposed by SSWD (i.e., new studies). Table 1.4-3 shows the number of SSWD-identified requested study modifications by commenter and the number of SSWD-identified requested new studies by commenter.

Table 1.4-3. Requested study modifications and new studies.

Study Proposed in SSWD's PAD		Commenter						
Designation	**Name**	**NMFS**	**CDFW**	**SWRCB**	**OHP**	**FWN**	**USFWS**	**UAIC**
REQUESTED STUDY MODIFICATIONS								
2.1	Water Temperature Monitoring	1	1	1			1	
2.2	Water Temperature Modeling		1				1	
2.3	Water Quality							
3.1	Salmonid Redd	3	3	1			2	
3.2	Stream Fish Populations	6	5			1	5	

[32] FERC Accession No: 20160825-5100.
[33] FERC Accession No: 20160825-5156.
[34] FERC Accession No: 20160826-5029.
[35] FERC Accession No: 20160829-5064.
[36] FERC Accession Nos: 20160825-5094 and 20160906-5224.
[37] FWN's letter was signed by 13 parties that included FWN, CSPA, Trout Unlimited, Nevada City Rancheria Tribal Council, American Whitewater, American Rivers, Sierra Club – Mother Lode Chapter, Federation of Fly Fishers, Northern California Federation of Fly Fishers, Friends of the River, Dry Creek Conservancy, Friends of Spenceville, and Sierra Streams Institute.
[38] FERC Accession No: 20160908-5223.
[39] FERC Accession No: 20160425-0068. Note: This correspondence is Privileged and not available on FERC's eLibrary.
[40] SSWD found that approximately 25 percent of the 63 individual requested study modifications were identical or very similar to each other. SSWD considered each of these duplicate requests separately.

Table 1.4-3. (continued)

Study Proposed in SSWD's PAD		Commenter						
Designation	**Name**	**NMFS**	**CDFW**	**SWRCB**	**OHP**	**FWN**	**USFWS**	**UAIC**
REQUESTED STUDY MODIFICATIONS (cont'd)								
3.3	Instream Flow		5	1			4	
4.1	Special-status Plants and Non-native Invasive Plants		1					
4.2	Special-status Wildlife – Raptors		8				4	
4.3	Special-status Wildlife – Bats		8					
5.1	ESA-listed Plants							
5.2	ESA-listed Wildlife – Valley Elderberry Longhorn Beetle							
5.3	ESA-listed Amphibians – California Red-legged Frog							
6.1	Recreation Use and Visitor Survey Study							
10.1	Cultural Resources							
11.1	Tribal Interests							
	Subtotal	*10*	*32*	*3*	*0*	*1*	*17*	*0*
	Total	**Requested Study Modifications: 63 Modifications to 8 Studies**						
REQUESTED NEW STUDIES								
New	Effects of Camp Far West Project and Related Facilities on Fluvial Process and Channel Morphology for Anadromous Fish	1						
New	Effects of Camp Far West Project and Related Facilities on Coldwater Delivery Feasibility for Anadromous Fish	1						
New	Vegetation Mapping		1					
New	Sturgeon		1				1	
New	Benthic Marcroinvertebrates		1				1	
New	Algal Growth			1				
New	Evaluation of Migration and Use of the Lower Bear River by Juvenile Chinook Salmon and Other Anadromous Fish Using Two Rotary Screw Traps					1		
New	California Red-legged Frog						1	
New	Juvenile Chinook Salmon Survival						1	
New	Large Woody Material and Sediment Transport						2	
	Subtotal	*2*	*3*	*1*	*0*	*1*	*5*	*0*
	Total	**Requested New Studies: 12 Requests for 10 New Studies**						

1.4.1.5 Resolution of Study Disagreements

Upon careful consideration, SSWD adopted without modification 14 of the requested study modifications, adopted with modification 26 of the requested study modifications, and did not adopt 23 of the requested study modifications in commenters' letters regarding SSWD's PAD. SSWD adopted some elements of five of the requested new studies into its proposed studies, and did not adopt eight of the requested new studies (Tables 1.4-4 and 1.4-5, respectively). In addition, SSWD withdrew one study that had been proposed in the PAD - Study 4.3, Special-Status Wildlife – Bats - because SSWD planned to include in its Application for New License a Bat Management Plan that would require SSWD to inspect all Project facilities for bats in the first full calendar yr after license issuance and to install and maintain bat exclusion devices where bats are found.

Table 1.4-4. Number of requested modifications that SSWD adopted without modification, adopted with modification and did not adopt by study.

SSWD Proposed Study	Adopted Without Modification	Adopted With Modification	Not Adopted	Total
2.1, *Water Temperature Monitoring*	2	2		4
2.2, *Water Temperature Modeling*	2			2
3.1, *Salmonid Redd Survey*		7	2	9
3.2, *Stream Fish Populations*	4	8	5	17
3.3, *Instream Flow*		8	2	10
4.1, *Special-Status Plants and Non-Native Invasive Plants*			1	1
4.2, *Special-Status Wildlife – Raptors*	6	1	5	12
4.3, *Special-Status Wildlife – Bats*			8	8
Total	**14**	**26**	**23**	**63**

Table 1.4-5. Elements of requested new studies that SSWD adopted.

Requested New Study	Adopted Elements
Effects of Camp Far West Project and Related Facilities on Fluvial Process and Channel Morphology for Anadromous Fish	LWM count in Bear River downstream of non-Project diversion dam, course sediment evaluation and gravel permeability in Bear River downstream of non-Project diversion dam adopted into SSWD's proposed Study 3.3, Instream Flow
Effects of Camp Far West Project and Related Facilities on Coldwater Delivery Feasibility for Anadromous Fish	User defined downstream release water temperature targets adopted into SSWD's proposed Study 2.2, Water Temperature Modeling
Vegetation Mapping	None
Sturgeon	eDNA, snorkel surveys and beach seining in the Bear River downstream of the non-Project diversion dam adopted into SSWD's proposed Study 3.2, Stream Fish Populations
Benthic Marcroinvertebrates	None
Algal Growth	None
Evaluation of Migration and Use of the Lower Bear River by Juvenile Chinook Salmon and Other Anadromous Fish Using Two Rotary Screw Traps	None
California Red-legged Frog	Additional survey time to monitor for American bullfrog and two additional site visits adopted into SSWD's proposed Study 5.3, ESA-listed Amphibians – California Red-legged Frog

Table 1.4-5. (continued)

Requested New Study	Adopted Elements
Juvenile Chinook Salmon Survival	None
Large Woody Material and Sediment Transport	Sediment accumulation in Camp Far West Reservoir adopted into SSWD's proposed Study 3.3, Instream Flow

On October 12, 2016, SSWD filed with FERC a letter that provided: 1) SSWD's rationale for adopting, adopting with modification, or not adopting each requested study modification and new study; and 2) detailed plans for each of the 14 studies that SSWD now proposed to conduct.[41]

On November 17, 2016, CDFW filed with FERC a letter to SSWD responding to SSWD's October 12, 2016 letter, which included additional CDFW study requests as well as reiteration of various points from its PAD comment letter.[42]

In an effort to reach agreement on studies, on November 21, 2016, SSWD met with representatives from the CDFW, USFWS, SWRCB; CSPA; 5) FWN; and 6) Sierra Streams Institute. At the conclusion of the meeting, SSWD agreed to modify its October 12, 2016, study plans, as described in Table 1.4-6. In addition, SSWD agreed to perform two new studies: 1) Benthic Macroinvertebrates; and 2) Special Status Wildlife – Bats; and to provide to interested stakeholders in early 2017 an upstream hydrology model and a modified Water Balance/Operations Model that SSWD included in its PAD.

Table 1.4-6. Summary of changes made based on November 21, 2016 Relicensing Participants[43] Meeting.

Study Proposed in SSWD's October 12, 2016 Letter		Study Proposed in SSWD's PAD
Designation	**Designation**	**Modification**
2.2	Water Temperature Modeling	Develop hydrology for Dry Creek (also include in updated Water Balance/Operations Model)
3.1	Salmonid Redd Surveys	Add physical redd measurements to sampling beginning in December 2016
3.2	Stream Fish Populations	Change location and timing of eDNA sampling
4.2	Special Status Wildlife – Raptors	Modify study plan to reflect language regarding intent to survey 0.25 mile from FERC boundary
All Study Plans		Add elderberry bushes to list of incidental observation species

SSWD understood that these agreements resolved any outstanding study disagreements with those parties that attend the November 21 meeting. SSWD considered that these studies, and no others, are reasonable and necessary for an informed decision but the Commission on the merits of SSWD's Application or New License, and the use of the use of the methods for conducting each study are generally accepted practices.

[41] FERC Accession No: 20161014-5144.
[42] FERC Accession No: 20161117-5158.
[43] In this exhibit, "Relicensing Participants" mean any agency, Indian tribe non-governmental organization (NGO) or member of the public that actively participates in the Camp Far West Hydroelectric Project relicensing.

On December 20, 2016, NMFS filed a letter with FERC commenting on SSWD's October 12, 2016, letter and requesting a meeting with FERC "to discuss ESA consultation procedures including developing a shared understanding of the environmental baseline, including related structures such as CFW diversion dam in the analysis of the Project's effects."[44] SSWD commented on NMFS's letter in its January 9, 2017 filing. On January 24, 2017, FERC responded to NMFS's letter stating that FERC does not participate in pre-filing activities under the TLP, and that NMFS may file formal dispute regarding SSWD's proposed studies if NMFS "sees fit to do so."[45]

On January 9, 2017, SSWD filed a letter with FERC with each of the 16 study plans, including those agreed to at the November 21, 2016 meeting, and advised FERC that SSWD was undertaking these studies to support the relicensing.[46] Each study plan is posted on SSWD's Camp Far West Relicensing Website at www.sswdrelicensing.com, and for clarity, the studies are listed in Table 1.4-7.

Table 1.4-7. Studies provided in SSWD's January 9, 2017 letter to FERC and undertaken by SSWD in support of the Camp Far West Hydroelectric Project relicensing.

Study Designation	Study Name
2.1	Water Temperature Monitoring
2.2	Water Temperature Modeling
2.3	Water Quality
3.1	Salmonid Redd
3.2	Stream Fish Populations
3.3	Instream Flow
3.4	Benthic Macroinvertebrates
4.1	Special-status Plants and Non-native Invasive Plants
4.2	Special-status Wildlife – Raptors
4.3	Special-status Wildlife – Bats
5.1	ESA-listed Plants
5.2	ESA-listed Wildlife – Valley Elderberry Longhorn Beetle
5.3	ESA-listed Amphibians – California Red-legged Frog
6.1	Recreation Use and Visitor Survey Study
10.1	Cultural Resources
11.1	Tribal Interests
Total	**16 Studies**

In its January 9, 2017 letter, SSWD advised FERC that it was commencing the studies described in its letter.

1.4.2 Second Stage Consultation

Second Stage Consultation begins when an applicant commences all reasonable studies (18 C.F.R. §4.38(c)(1)), and ends after the applicant holds the last joint meeting to resolve any substantive disagreements with the applicant's conclusions in its draft application regarding resource impacts or its proposed PM&E measures (18 C.F.R. § 4.38(c)(10)).

[44] FERC Accession No: 20161220-5206.
[45] FERC Accession No: 20170124-3052.
[46] FERC Accession No: 20170109-5327.

Each month during study performance, SSWD posted to its Camp Far West Hydroelectric Project relicensing website and e-mailed to Relicensing Participants SSWD's planed fieldwork schedule for the upcoming month in case any agency wished to observe the fieldwork.

1.4.2.1 Formal Requests for FERC to Resolve a Study Disagreement

To SSWD's knowledge, during Second Stage Consultation, neither NMFS nor any other party filed with FERC a formal request, as provided in 18 C.F.R. Section (c)(2), for FERC to resolve a dispute regarding a disagreement as to any matter arising during First Stage Consultation or the need for SSWD to conduct a study or gather information.

1.4.2.2 Study Status

At the time SSWD distributes its draft Application for New License, SSWD has completed all 16 of its relicensing studies listed in Table 1.4-1 with the exception of minor components of the following two studies:

- Study 3.3, Instream Flow. The study is complete with the exception that SSWD agreed to install and monitor pressure transducers at four locations for one calendar yr. The transducers will be removed and data will be provided to Relicensing Participants in January 2019. The data will also be included, as appropriate, in SSWD's final Application for New License that will be filed with FERC in June 2019.
- Study 11.1, Traditional Cultural Properties. The study is complete with the exception that one Indian tribe provided additional information on August 30, 2018 and SSWD held a meeting with the Indian tribe on September 30, 2018. SSWD is incorporating the information into the final report, which will be provided to SHPO for review and concurrence by January 15, 2019. The final report will be included in SSWD's final Application for New License that will be filed with FERC in June 2019.

1.4.2.3 Availability of Study Results

Beginning in April 2018, SSWD made the data and results of the 16 relicensing studies available on SSWD's relicensing website at https://sswdrelicensing.com/home/study-results/. As new study results became available, SSWD alerted agencies and other interested parties of the new information via email. The results of these studies are also discussed in the appropriate Exhibit E sections of this Application for New License and any specific products (e.g., models and reports) are provided as attachments to Exhibit E.

1.4.2.4 Collaborative Development of PM&E Measures

On March 2018, via e-mail, SSWD invited Relicensing Participants to a series of meetings to collaboratively develop PM&E measures that SSWD could include in its draft Application for New License. Meetings were held on June 5, July 16, July 23, September 20, October 18, and November 15, 2018, at which the meeting participants discussed relicensing study results, Project operations, water temperature and instream flow models, and lower Bear River aquatic resources. Meetings on August 16 and November 9, 2018, discussed vegetation management, wildlife and recreation.

Some, but not all, issues that were raised during the meetings included: 1) ramping rates; 2) extending spring flows coming off Camp Far West Dam spill; 3) augmenting gravel and large woody material (LWM) in the lower Bear River; 4) monitoring; 5) bald eagle; 6) bats; 7) black rail; 8) vegetation; 9) erosion; 10) recreation; and 11) CRLF. These issues are addressed in the appropriate sections of this Application for New License.

Unfortunately, SSWD and interested parties did not reach agreement on any PM&E measures that SSWD could propose in its draft Application for New License. However, SSWD is fully committed to reaching collaborative agreement on as many measures as possible with as many agencies as possible, and include those collaboratively-agreed to measures in its final Application for New License that will be filed with FERC in June 2018. To that end, SSWD has scheduled the following eight meetings with agencies and interested parties in early 2019: January 8, January 25, February 12, March 1, March 12, March 29, April 9, and April 26. SSWD will hold additional meetings if substantial progress is being made. This does not include meetings SSWD will hold if necessary to resolve written disagreements regarding conclusions and measures in the draft Application for New License (see Section 1.4.2.7).

1.4.2.5 Distribution of Draft Application for New License

On December 28, 2018, SSWD provided to interested agencies, Indian tribes and members of the public a copy of its draft Application for New License for 90-day review. The draft: 1) indicated the type of application SSWD expects to file with FERC; 2) responded to written comments and recommendations made by resource agencies and Indian tribes during First Stage Consultation or up to the time SSWD distributed the draft; 3) the results of studies and information gathering conducted by SSWD; 4) SSWD's proposed PM&E measures; and 5) a request for review and written comments regarding the draft within the 90-day review period. In addition, SSWD filed a copy of the draft with FERC.

1.4.2.6 Comments on Draft Application for New License

[Relicensing Participants – This section is a placeholder in the DLA and will be completed in the final Application for New license. SSWD]

1.4.2.7 Attempt to Resolve Disagreements

If SSWD concludes that a written comment received within the comment deadline on the draft Application for New License indicates an agency or Indian tribe has a substantive disagreement with SSWD's conclusions regarding resource impacts or SSWD's proposed protection, mitigation and enhancement measures, SSWD will schedule and hold a meeting with the disagreeing agency or tribe, and invite to the meeting other agencies or tribes with an interest in the issue, no later than 60 days from the date of the comment letter to discuss and attempt to reach agreement with the disagreeing agency or tribe on SSWD's proposed measures. The consultation will be documented in SSWD's final Application for New License. Attempts to resolve disagreements, if any, will be documented in this section of SSWD's final Application for New License.

1.4.2.8 Filing of Final Application for New License

[Relicensing Participants – This section is a placeholder in the DLA and will be completed in the final Application for New license. SSWD]

1.4.3 Third Stage Consultation

Third Stage Consultation begins when an applicant files it application, and includes the actions FERC will take to process the application.

1.5 List of Attachments

Attachment 1.0A The California Coastal Commission's March 13, 2018 concurrence letter.

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Attachment 1.0A
The California Coastal Commission's March 13, 2018
Concurrence Letter

STATE OF CALIFORNIA – NATURAL RESOURCES AGENCY

EDMUND G. BROWN, JR., GOVERNOR

CALIFORNIA COASTAL COMMISSION

45 FREMONT, SUITE 2000
SAN FRANCISCO, CA 94105-2219
VOICE (415) 904-5200
FAX (415) 904-5400
TDD (415) 597-5885

March 13, 2018

James Lynch
Senior Vice President
Hydropower Services HDR
2379 Gateway Oaks Drive, Suite 200
Sacramento, CA 95833

Subject: Camp Far West Hydroelectric Project Relicensing

Dear Mr. Lynch:

The Coastal Commission staff reviewed your determination that the South Sutter Water District's proposed relicensing of the Camp Far West Hydroelectric Project (FERC Project No. 2997), located in Yuba, Nevada, and Placer counties, would not affect coastal resources. The Commission staff concurs with your determination. Please contact me should you have any questions regarding this matter.

Sincerely,

Larry Simon

Larry Simon
Federal Consistency Coordinator

SECTION 2.0
PROPOSED ACTION AND ALTERNATIVES

This section describes the existing Project (i.e., No Action Alternative) and SSWD's proposed changes to the existing Project (i.e., SSWD's Proposed Project). Section 2.1 describes the No Action Alternative, the baseline from which to compare all action alternatives. Section 2.2 describes SSWD's Proposed Project. Section 2.3 describes alternatives considered but not analyzed in detail in this document.

2.1 No Action Alternative

Under the No Action Alternative, the Project would continue to operate into the future as it has historically operated (i.e., for the past 5 years) but with planned modification to the Camp Far West Dam Spillway as described below, and no new environmental PM&E measures would be implemented. Provided below is a description of: 1) existing Project facilities (Section 2.1.1); 2) existing Project Boundary (Section 2.1.2); 3) Project safety (Section 2.1.3); 4) current Project operations (Section 2.1.4); 5) conditions in the existing FERC license and other agreements and contracts that affect existing Project operations (Section 2.1.5), and facility maintenance (Section 2.1.6).

2.1.1 Existing Project Facilities and Features

The existing Project includes one development – Camp Far West. Figure 1.1-2 shows the Project in relation to the Bear and Feather River watersheds, and Figure 1.1-2 shows existing Project facilities and features.

The Project does not include any open water conveyance facilities, transmission lines, active borrow or spoil areas, the diversion dam located downstream from Camp Far West Dam, SSWD's Conveyance Canal, CFWID's Camp Far West Canal, or the intake structures to these water delivery canals.

Table 2.1-1 and Table 2.1-2 summarize key information for the Project's powerhouse and reservoir, respectively.

Table 2.1-1. Key information regarding the Camp Far West Hydroelectric Project's powerhouse.

Powerhouse	Unit	Turbine Type	Rated Head (ft)	Rated Hydraulic Capacity (cfs)		Generation Capacity (kW)		Historical Average Annual Energy (MWh/yr)[3]
				Minimum	Maximum	Nameplate Rating[1]	Historical Dependable[2]	
Camp Far West	1	Francis	143	200	725	6,800	6,970	22,637

Key: ft=feet; cfs = cubic feet per second; kW = kilowatts; and MWh/yr = megawatt-hours per year
1 From Section 5.2.1.1 in Exhibit D.
2 From Section 5.2.1.2 in Exhibit D. Using its Water Balance/Operations Model, SSWD estimates dependable capacity to be 0 kW (Section 5.2.1.3 in Exhibit D). The difference is because the model includes the driest WY on record, WY 1977, which is prior to when the Project began operations, and the model estimates that the Project if in operations would have generated no power during that critically dry period.
3 From Section 5.2.2.1 in Exhibit D and over Calendar Years 2010 through 2017. Using it Water Balance/Operations Model, SSWD estimates average annual energy generation to be 20,376 MWh/yr (section 5.2.2.2. in Exhibit D).

Table 2.1-2. Key morphological information regarding the Camp Far West Hydroelectric Project's reservoir.

Project Reservoir	NMWSE (ft)	Gross Storage[1] (ac-ft)	Usable Storage[2] (ac-ft)	Surface Area[3] (ac)	Maximum Depth[3] (ft)	Shoreline Length[3] (mi)	Drainage Area At Dam (sq mi)
Camp Far West	300	93,737	92,430	1,886	155	29	284

Key: NMWSE = normal maximum water surface elevation; ft =feet; ac-ft = acre-feet; ac = acres; mi = miles; and sq mi = square miles
1 Defined as the reservoir storage between the NMWSE and the bottom of the reservoir.
2 Defined as the reservoir storage between the NMWSE and the invert of the 72-inch hollow jet valve level outlet (i.e., 175 ft), below which there is 1,307 ac-ft of reservoir storage that is not available for release (i.e., dead storage).
3 At NMWSE.

Existing Project facilities and features are described below.

2.1.1.1 Main Dam and Auxiliary Dams

2.1.1.1.1 Main Dam

The first Camp Far West Dam was a 50-ft high concrete gravity structure built by the CFWID in 1927. Construction on the dam was completed in January 1964 by SSWD as part of the California State Water Plan to enhance water supply in California's Central Valley. Camp Far West Dam and Reservoir are not part of California's State Water Project.

The main embankment of the existing dam is a zoned earthfill structure, which is 185 ft high, 40 ft wide at the crest and 2,070 ft long. The dam has variable 2 to 1, 2.5 to 1, and 3 to 1 upstream slopes, with a 60-ft wide beam at an elevation of 200 ft, and a 2 to 1 downstream slope. The certified crest of the dam is at an elevation of 320 ft and has an additional 2.2 to 3.1 ft of camber resulting from roadway construction along the dam crest.

The central impervious core of the main embankment is comprised of compacted silts, clays, and gravels. Upstream from the core is a compacted shell of sand, gravel, and cobbles. Downstream and separated from the core by an inclined chimney drain is a shell of compacted clays and silts, which is further overlain by a shell of compacted rock with soil fines. Underlying the center portion of the embankment over the original river channel and extending from the 12-ft thick inclined chimney drain to the downstream toe is a 6-ft-thick, 100-ft-wide horizontal drain blanket. Both upstream and downstream slopes of the embankment are covered with a layer of riprap having a maximum diameter of 3 ft.

Figure 2.1-1 shows the Camp Far West Dam.

Figure 2.1-1. Photograph of some Camp Far West Hydroelectric Project facilities and features.

2.1.1.1.2 North and South Wing Dams

Adjacent to the left abutment of the main embankment is the south wing dam constructed of earthfill with a maximum height of 45 ft, a crest width of 20 ft, and length of 1,060 ft. Constructed to the north of the main embankment opposite the spillway is the north earthfill wing dam that is 25 ft in height, 20 ft in width at the crest, and 1,460 ft in length. The upstream slopes of the south and north wing dams are 2.5 to 1 and 3 to 1, respectively. The downstream slopes of both wing dams are 2.5 to 1. The north and south wing dams are constructed of compacted clays and silts. The upstream outside slope of the two wing dams is covered with 3 ft of riprap underlain by an 18-in. layer of gravel bedding. The downstream slope of the south wing dam is protected by a layer of riprap with a minimum thickness of 3 ft.

2.1.1.1.3 North Dike

The Project includes an earthfill dike constructed to the north of the north wing dam, and referred to as the north dike. The north dike is 15-ft-high, has a crest length of 1,450 ft, and a crest width of 20 ft. The nominal elevation at the top of the dike is 320 ft.

2.1.1.2 Camp Far West Reservoir

When the main dam was built, the reservoir had a surface area of 2,020 ac and storage volume of 104,000 ac-ft at the NMWSE of 300 ft. Based on recent SSWD topographic and bathymetric surveys, the current reservoir surface area is 1,886 ac with a gross storage capacity of approximately 93,737 ac-ft at the NMWSE of 300 ft. The reservoir contains 1,307 ac-ft and has a surface area of about 74 ac at its minimum operating elevation of 175 ft, below which the reservoir storage is not available for release (i.e., dead storage). Maximum reservoir depth is approximately 155 ft, relative to the NMWSE. Figure 2.1-2 shows Camp Far West Reservoir.

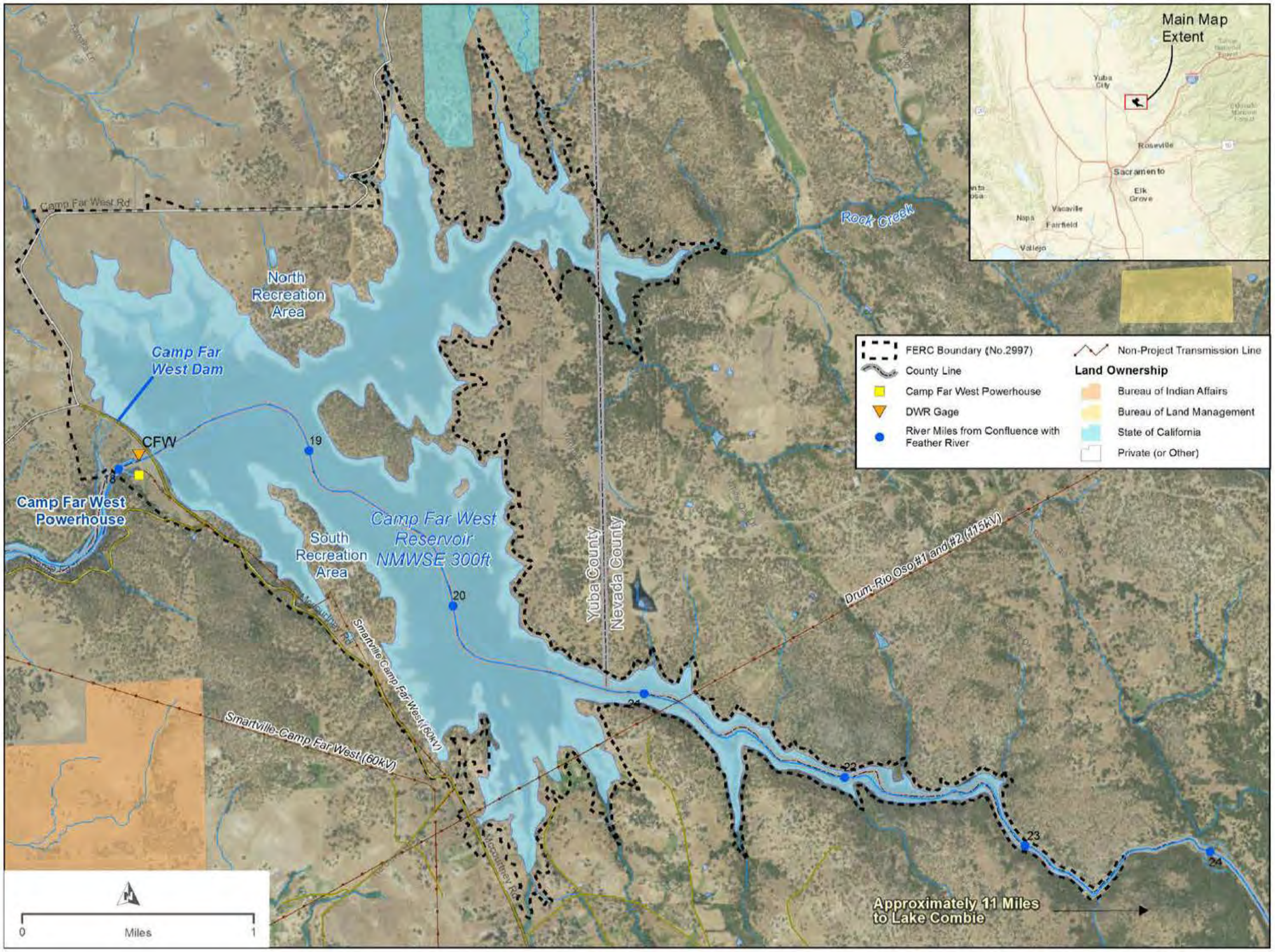


Figure 2.1-2. Camp Far West Reservoir and associated facilities and features.

2.1.1.3 Camp Far West Spillway

2.1.1.3.1 Existing Spillway

An overflow spillway is located adjacent to the right abutment of the Camp Far West main dam. The spillway structure consists of a 15-ft-wide reinforced concrete approach apron with the invert at 290 ft, an ungated, ogee-type reinforced concrete structure with a crest length of 300 ft, and a 77-ft long downstream reinforced concrete chute with vertical reinforced concrete counterforted sidewalls. The spillway crest elevation is 300 ft. The channel downstream of the spillway terminates in a chute excavated in solid rock. This underlined channel then joins the Bear River approximately 1,200 ft below the main dam. A 302.5-ft single-span, steel-truss bridge across the spillway crest provides access across the dam. The spillway has a maximum design capacity of 106,500 cfs at a reservoir elevation of 320 ft. Figure 2.1-1 shows the existing Camp Far West Dam Spillway.

2.1.1.3.2 Ongoing Spillway Modification to Meet Probable Maximum Flood

In 2005, the PMF was recalculated for the Camp Far West Hydroelectric Project resulting in a Camp Far West Dam Spillway capacity of less than the PMF, and consequently inadequate spillway capacity. Since the existing spillway capacity at NMWSE (i.e., 106,500 cfs) is less than recalculated peak outflow during the PMF (i.e., 126,500 cfs), FERC directed SSWD to increase the spillway capacity to 134,100 cfs at a reservoir elevation of 320 ft. Similarly, the California Division of Safety of Dams (DSOD) directed SSWD to increase the spillway capacity to 134,100 cfs at a reservoir elevation of 320 ft with 2 ft of freeboard at the dam. The modification is needed to assure that the Camp Far West Dam Spillway could accommodate the PMF wherein water would flow over the spillway rather than overtop the dam embankment, thereby avoiding the risk of dam failure along with sudden and significant downstream flooding. SSWD is coordinating with FERC and DSOD to modify the spillway, as directed.

At the time this Application for New License is filed, the spillway modification, which has been agreed to by FERC[1] includes the following:

- New Auxiliary Spillway Structure. The proposed new auxiliary spillway structure would be an ogee-type weir, horizontally concaved, with a crest length of 300 ft. The spillway would be constructed of reinforced concrete and be of similar design to the existing, adjacent spillway structure. Although the auxiliary spillway is being constructed to elevation 305 ft, it will not affect the existing Camp Far West Reservoir NMWSE because the reservoir will still spill over the existing elevation 300 ft spillway: the auxiliary spillway would only be activated at higher inflows.
- New Inlet Channel. A new unlined spillway inlet channel would be excavated upstream of the auxiliary spillway structure, within the Camp Far West Reservoir area, to divert water to the new auxiliary spillway. The width of the new auxiliary inlet channel would

[1] FERC issued concurrence on the new Auxiliary Spillway Structure on July 3, 2007 (Accession no. 20070709-0225).

be a minimum of 300 ft at its narrowest, and the bottom elevation of the channel would be a constant 290 ft elevation. The side slopes of the channel would be constructed at 1:1 slopes where moderately weathered or un-weathered rock is encountered and 2:1 slopes for all other material types.

- New Outlet Channel. A new unlined auxiliary spillway outlet channel would be constructed downstream of the new auxiliary spillway structure to convey water back to the existing spillway channel. The channel would be approximately 805 ft long with a slope varying from 3 percent to 5.6 percent. The side slopes of the channel would be constructed at 1:1 slopes where moderately weathered or un-weathered rock is encountered and 2:1 slopes for all other material types.
- New Bridge. A new 300-ft-long bridge would be constructed for the new auxiliary spillway to provide continuity and allow vehicular traffic to pass over the dam and along Blackford Road. The bridge would be constructed of precast concrete girders, and consist of side concrete barriers and a paved road surface. Guardrails would be placed at the ends of the bridge for transition from the road to the bridge. The bridge would be supported by concrete abutments at each end and two additional piers, evenly spaced.
- Grading and Raising Existing Blackford Road. Construction of the new bridge to a top-of-paved-surface-elevation of 325 ft would require the existing Blackford Road to be raised approximately 15 ft at the west end of the proposed new bridge to accommodate the approach to the bridge over the new auxiliary spillway. The new bridge would ramp back down to the existing road grade on the east end. Fill would be required on the west end of the bridge in order to accommodate the approach to the new spillway bridge. Maximum grade would be approximately 6 percent, similar to existing maximum grade. The road width would be 24 ft along Blackford Road and 20 ft along Camp Far West Road. Fill side slopes would be constructed at 2:1.
- Relocation of Existing Powerline. A segment of an existing distribution powerline, which is located just south of the proposed new auxiliary spillway and owned and operated by Pacific Gas and Electric (PG&E), would be relocated. The line serves only as a distribution line from the Camp Far West Powerhouse switchyard to the main grid and would not disrupt power distribution to other users.

When the spillway modification is complete, the combined spillways will have a capacity of 154,600 cfs at a reservoir elevation of 318.5 ft with 1.5 ft of freeboard at the dam.

SSWD anticipates that the auxiliary spillway would be constructed in the course of 3 months in fall 2019 and 8 months in spring and summer 2020.

For the purposes of this Application for New License, SSWD assumes the spillway modification is fully implemented under the existing license and is in-place when FERC issues a new license for the Project.

2.1.1.4 Water Intakes and Water Conveyance Systems

2.1.1.4.1 Intakes

There are two intake structures associated with the Camp Far West Dam; the power intake that was constructed when hydropower was added to the dam, and the intake structure for the outlet works. Both structures are submerged for most of the year and are located at the upstream toe of the main dam.

The power intake structure consists of a reinforced concrete ungated vertical intake tower 22-ft-high, with openings on three sides; two 10-ft-wide by 14-ft-high and one 10-ft-wide by 10-ft-high. The openings are protected by steel trashracks on 6-in. centers. A concrete bulkhead enables positive closure and the sill elevation measures 197.0 ft.

The intake for the outlet works consists of a reinforced concrete ungated vertical intake tower 25-ft-4 in. high, with openings on three sides – each 7-ft-wide by 8-ft-high. The openings are protected by steel trashracks on 6-in. centers and the sill elevation measures 175.0 ft.

2.2.2.4.2 Water Conveyance Systems

There are three main conveyance systems associated with the Camp Far West Dam. The overflow spillway discussed above flows into an unlined rock conveyance channel that carries the discharge back into the Bear River downstream of the dam.

The power intake structure described above connects to a 760-ft-long, 8-ft diameter concrete tunnel through the left abutment of Camp Far West Dam that conveys water directly to the Camp Far West Powerhouse.

A 350-ft-long, 48-in. diameter steel pipe connects the intake structure for the outlet works described above to a valve chamber, and a 400 ft long, 7.5-ft diameter concrete-lined horseshoe tunnel connects the valve chamber to a 48-in. diameter Howell Bunger outlet valve on the downstream face of Camp Far West Dam. The valve has a release capacity of 500 cfs at NMWSE and discharges directly into the Bear River.

2.1.1.5 Camp Far West Powerhouse

The powerhouse was constructed in conjunction with the addition of hydropower licensed in 1981 after Camp Far West Dam was built and in operation. The powerhouse is an above-ground, steel reinforced concrete structure that houses a single vertical-shaft Francis-type turbine. The turbine-generator unit is rated at 6,800 kilowatts (kW) under a rated head of 143 ft and a rated flow of 725 cfs. The unit includes a synchronous three-phase, 13.6 kilovolt (kV) generator with a capability of 6,800 kW. The intake is submerged in the reservoir. Figure 2.1-1 shows the Camp Far West Powerhouse.

2.1.1.6 Camp Far West Switchyard

The Camp Far West Switchyard is a fenced switchyard adjacent to the Camp Far West Powerhouse containing a 6/8 NVA, OH/FA, three phase, 13.8 kV – 60 kV, delta-ground wye power step-up transformer; a 60 KV, 31, 60 Marts, 600 ampere, 1,000 MVA short circuit bulk oil circuit breaker; and appropriate disconnect switches. The switchyard also contains PG&E electrical equipment facilities that are not part of the Project. Figure 2.1-1 shows the Camp Far West Switchyard.

2.1.1.7 Camp Far West Reservoir Recreation Facilities

There are two developed recreational areas on the Camp Far West Reservoir, both of which are owned by SSWD and leased to a private concessionaire to operate. The North Shore Recreation Area (NSRA) is located off of Camp Far West Road in Wheatland, CA. This campground is currently open year-round. The South Shore Recreation Area (SSRA) is located off of McCourtney Road in unincorporated Lincoln, CA, and is only open from mid-May until September. The boat launching facility at the NSRA was reconstructed in 2003-2004. Table 2.1-3 provides details of the recreation facilities at the NSRA and the SSRA. Figure 2.1-2 shows the locations of the NSRA and SSRA.

Table 2.1-3. Camp Far West Hydroelectric Project recreation facilities.

Facility	Amenity	North Shore Recreation Area	South Shore Recreation Area
Family Campgrounds	Number of Sites (standard)	70	67
	Sites (RV with hookups)	10	none
	Parking Spurs	1 spur per site	1 spur per site
	Overflow Parking Spaces	None	18 single
	Restrooms	2 flush	1 flush, 2 vault
Group Campgrounds	Sites	2, 25-person group sites, 1, 50-person horse camp site	1, 50-person group site
	Parking Spaces	None[1]	10
	Restrooms	4 portable chemical toilets	None[2]
Day Use Areas	Picnic Sites	20	33
	Swim Beaches	1	1
	Parking Spaces	None[3]	44
	Restrooms	1 flush	None[4]
Boat Ramps	Number	1, 4-lane concrete ramp	1, 2-lane concrete ramp
	Parking Spaces	82 single, 73 vehicle with trailer	52 vehicle with trailer
	Restrooms	1 flush	1 flush
Dispersed Use Areas[5]	Sites	2	2
	Restrooms	6 portable chemical toilets	6 portable chemical toilets

Table 2.1-3. (continued)

Facility	Amenity	North Shore Recreation Area	South Shore Recreation Area
Other Facilities	Entrance Station	1	1
	Store	1	1
	RV Dump Station & Holding Pond	1	1
	Concessionaire Trailers	2	1
	Water Treatment Plant	1	None[6]
	Water Storage Tank	1, 60,000-gallon tank	None[6]

[1] The group campsites use the adjoining family campground restroom building.
[2] Parking is available in open areas adjacent to the group sites, but is not designated or defined.
[3] The day use area (picnic area and swim beach) uses the adjoining boat ramp parking area for parking.
[4] The picnic area uses the adjoining boat ramp restroom building.
[5] The dispersed use areas provide day use and overnight opportunities with minimal facilities (roads, portable chemical toilets and trash cans).
[6] Water is piped under the reservoir to South Shore Recreation Area from the North Shore Recreation Area treatment plant and storage tank.

A recreational water system source is Camp Far West Reservoir, where two pumps in the reservoir deliver water at 70 gallons/minute (5,000,000 gallons or 15.3 ac-ft per year) uphill via underground piping to the water treatment facility in the NSRA. After being treated, the water is piped nearby to a 60,000-gallon storage tank constructed of belted steel and recently installed in 2011. From the storage tank, underground distribution piping sends the water throughout the NSRA and SSRA. The SSRA facilities are connected via two pipes under the reservoir that sends the water from the NSRA to the SSRA.

Both NSRA and SSRA have a sewage holding pond with an aerator to handle the sanitary needs of the flush restroom buildings and the RV dump stations at each recreation area. The NSRA sewage system uses a gravity-feed operation and is supplemented by a pump to get the sewage up to the holding pond. The SSRA sewage system is a gravity-fed system.

2.1.1.8 Gages

Flow data for the Project comes from five gages, two of which are publicly-available (Table 2.1-4). Figure 2.1-3 provides a schematic view of Project facilities and the gages. SSWD also measures spill through the Camp Far West Dam spillway by indirect stage method.

Table 2.1-4. Project streamflow, releases and reservoir gages.

USGS/CDEC Gage Number	Name	Elevation (ft)	Drainage (sq mi)	Period of Record		Measures
				Start	End	
STREAMFLOW GAGES						
NA	Bear River above Camp Far West Reservoir[2]	325	NA	Seasonal		Compliance with flow requirements (seasonal outflow/inflow)
11423800[1] / and CFW[2]	Bear River Fish Release below Camp Far West Reservoir, near Wheatland, CA	120	286	10/1/1989	Present	Compliance with flow requirements
PROJECT RELEASE GAGES						
NA	Camp Far West Dam Low-Level Outlet Flowmeter[3]	140	286	1/1/1968	Present	Low-level outlet discharge
NA	Camp Far West Powerhouse Flowmeter[3]	140	286	1/1/1985	Present	Powerhouse discharge

Table 2.1-4. (continued)

USGS/CDEC Gage Number	Name	Elevation (ft)	Drainage (sq mi)	Period of Record		Measures
				Start	End	
RESERVOIR STORAGE GAGE						
11423700[4] / and CFW[2]	Camp Far West Reservoir near Wheatland, CA	N/A	283	10/1/1966	9/30/1983	Reservoir stage

Key: USGS = United States Geological Survey; CDEC = California Data Exchange Center; ft – feet; sq mi = square miles; and NA = not applicable

[1] USGS Gage 11423800, maintained by USGS, reports river stage and flow below the non-Project diversion dam for compliance with the FERC license. It is not a full flow gage. Elevation, drainage and period of record are shown for the USGS gage 11423800, not the CDWC gage CFW.

[2] CDEC gage CFW, maintained by DWR Flood Management, reports end-of-month Camp Far West Reservoir storage and stage. CDEC gage CFW also reports river stage and flow downstream from Camp Far West Dam.

[3] Flowmeters below Camp Far West Dam at low-level outlet and powerhouse are maintained by the SMUD and data are not reported publicly.

[4] USGS gage 11423700 measured Camp Far West Reservoir storage, but has not been reported by USGS since September 30, 1983. Elevation, drainage and period of record are shown for the USGS gage 11423700, not CDWC gage CFW.

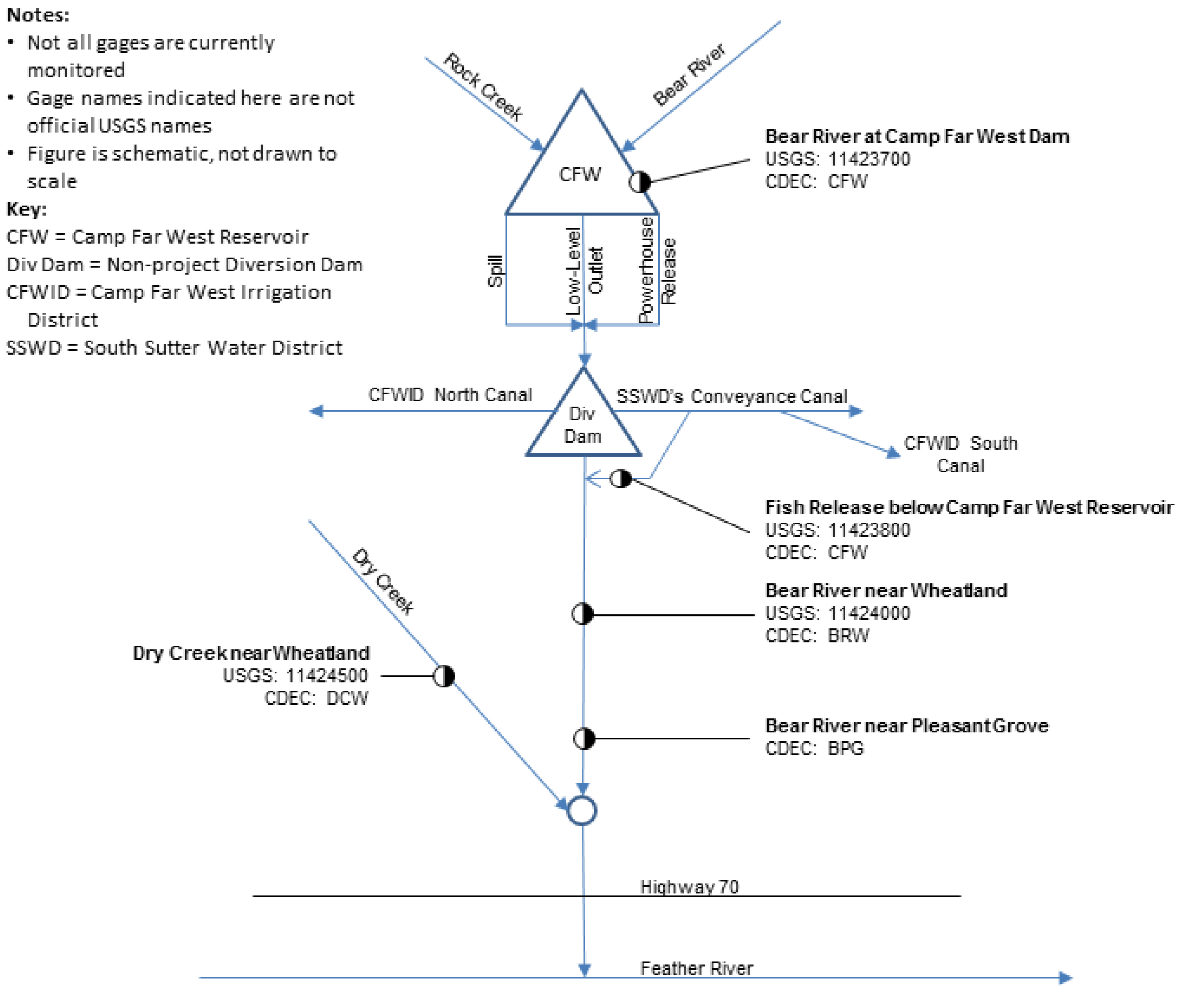


Figure 2.1-3. Schematic of the Project Vicinity, including gage locations.

Besides the above five Project gages, seven non-Project gages exist in the Bear River downstream of the Project. One gage is a stage gage that measures the stage of the pool formed by the non-Project diversion dam, and the other six are flow gages. One flow gage is located on CFWID's canal on the north side of the river to measure diversions into the canal from the Bear River. Two flow gages are located on SSWD's Conveyance Canal on the south side of the river. One gage measures diversions from the Conveyance Canal into a side canal for deliveries to the CFWID's use on the south side of the river, and the second gage is located further along the canal and measures flow in the canal at that point. The fourth flow gage measures spill over the diversion dam. The fifth flow gage is USGS Gage 11424000, reported by CDEC as BRW, *Bear River near Wheatland*, located 6.5 mi downstream from Camp Far West Dam, 200 ft downstream of the State Highway 65 bridge crossing, which is a full-flow gage and is maintained by USGS and DWR. The last flow gage is CDEC Gage BPG, *Bear River at Pleasant Grove Road*, a full-flow gage maintained by DWR and located 10.5 mi downstream from Camp Far West Dam. The gages are shown schematically in Figure 2.1-3 and in Figure 2.1-4.

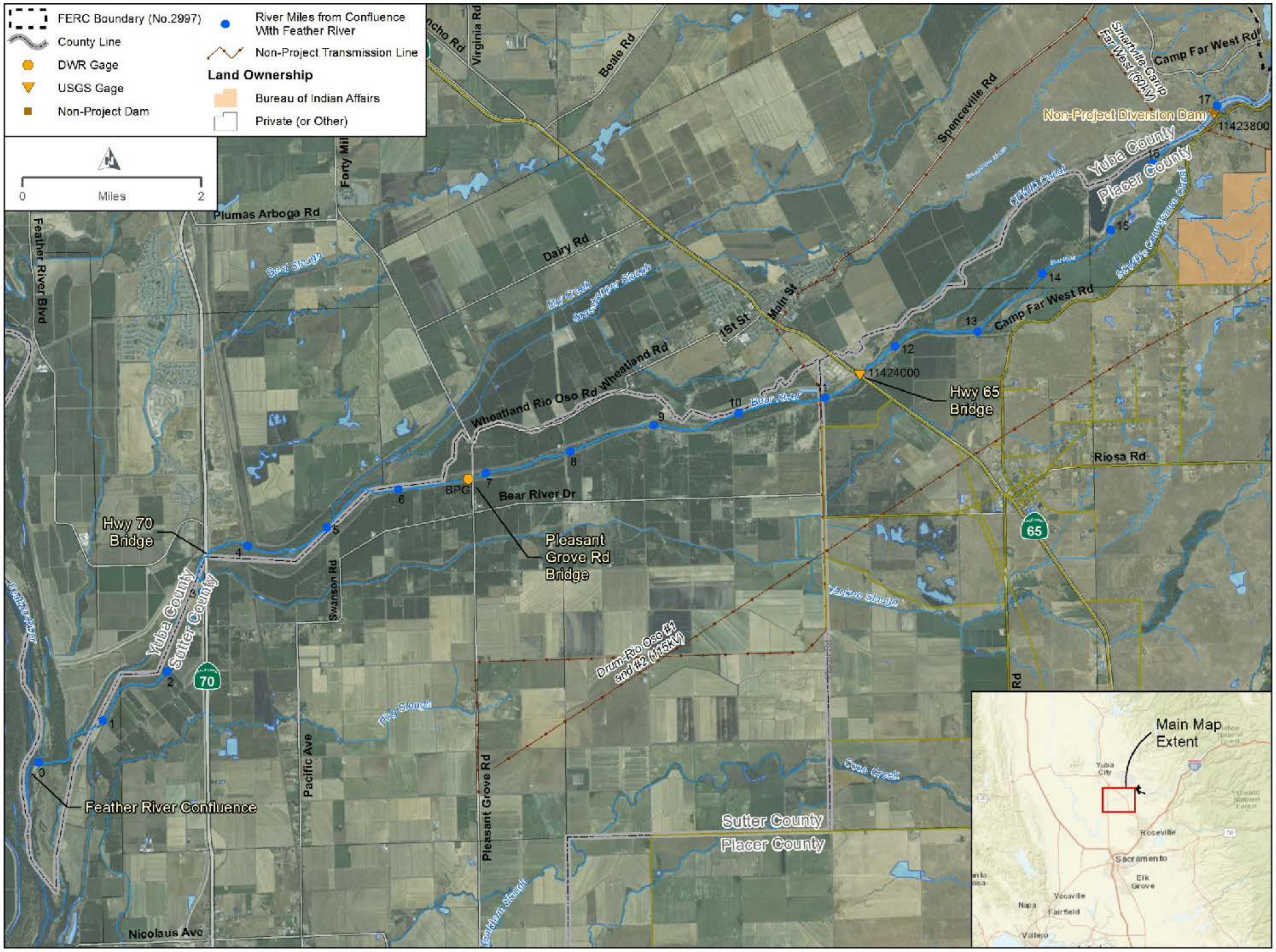


Figure 2.1-4. Location of downstream flow streamflow gages.

2.1.1.9 Primary Project Roads and Trails

There are no Primary Project Roads or Primary Project Trails included as part of the FERC-licensed Project facilities.

2.1.2 Existing Project Boundary

The FERC Project Boundary is intended to consist of all lands necessary for the safe operations and maintenance of the Project and other purposes, such as recreation, shoreline control, and protection of environmental resources. For the Camp Far West Hydroelectric Project, the existing FERC Project Boundary encompasses 2,863.7 ac of land. SSWD owns over 95 percent (2,710.5 ac) of the land within the boundary, and the remaining 5 percent (153.2 ac) of the land is owned by private parties – no federal or state land occurs within or adjacent to the FERC Project Boundary or along the Bear River downstream of the Project. The boundary generally follows the 320 ft elevation contour around Camp Far West Reservoir with the exception of the additional lands included at the northwest end of the reservoir that include the NSRA and additional lands included at the southwest end of the reservoir that include the SSRA.

2.1.3 Existing Project Safety

The Project has been operating for more than 35 years under the existing license and during this time, FERC staff has conducted operational inspections focusing on the continued safety of the structure, identification of unauthorized modifications, efficiency and safety of operations, compliance with the terms of the license, and proper maintenance. In addition, the Project has been inspected and evaluated every 5 years by an independent consultant and a consultant's safety report has been submitted for FERC's review. SSWD has a strong commitment to employee and public safety, which is reflected in its safety procedures and training program, and its safety record.

2.1.4 Operations

2.1.4.1 Use of SSWD's Water Balance/Operations Model

SSWD has operated the Project since 1984. However, Project operations have changed through time. Therefore, historical operations information (e.g., flows, storage and generation) may not provide the best picture of current existing conditions. To better describe existing operations of Camp Far West Reservoir and associated hydropower and irrigation facilities over a range of hydrologic conditions, SSWD developed the Camp Far West Hydroelectric Project Water Balance/Operations Model (Ops Model).

The Ops Model is a tool to examine water supply and hydropower generation under a variety of hydrologic and operational conditions, and addresses operational decisions including: stream flow requirements, water supply, recreation, and hydropower generation. The Ops Model simulates operations subject to the physical constraints of the Project, including maximum and minimum reservoir, outlet, and powerhouse capacities. Ops Model logic focuses on operations of Camp Far West Reservoir. The Ops Model simulates operations at Camp Far West Dam and the downstream non-Project diversion dam. Diversions into SSWD's Conveyance Canal and CFWID's North Canal and South Canal are modeled at the non-Project diversion dam. Irrigation diversions are based on estimated agricultural demands, Camp Far West Reservoir storage and anticipated releases and diversions from upstream water storage projects. The Ops Model also includes a representation of the Bear River downstream of the diversion dam to the confluence of the Bear River with the Feather River, including tributary inflow from Dry Creek at RM 5.1. Three additional stream nodes are located downstream of the diversion dam: Bear River at Wheatland; Bear River at Pleasant Grove Road; and the Bear River at the confluence with the Feather River. Table 2.1-5 provides a summary of output available from the Ops Model and Figure 2.1-5 is an overview of the Project, SSWD and CFWID service territories, and Ops Model nodes.

Table 2.1-5. Summary of Ops Model nodes and outputs.

Model Node	Model Output
NODES WITHIN PROJECT	
Camp Far West Reservoir	Storage and elevation
Camp Far West Powerhouse	Generation and release through turbine
Camp Far West Dam	Release from low-level outlet and spillway
NODES DOWNSTREAM OF PROJECT	
CFWID North Canal	Diversion into canal
CFWID South Canal	Diversion into canal
SSWD Main Canal	Diversion into canal
Non-Project Diversion Dam	Estimated flow below diversion dam
Bear River at Wheatland	Estimated flow in river
Bear River at Pleasant Grove Road	Estimated flow in river
Bear River at Feather River	Estimated flow in river

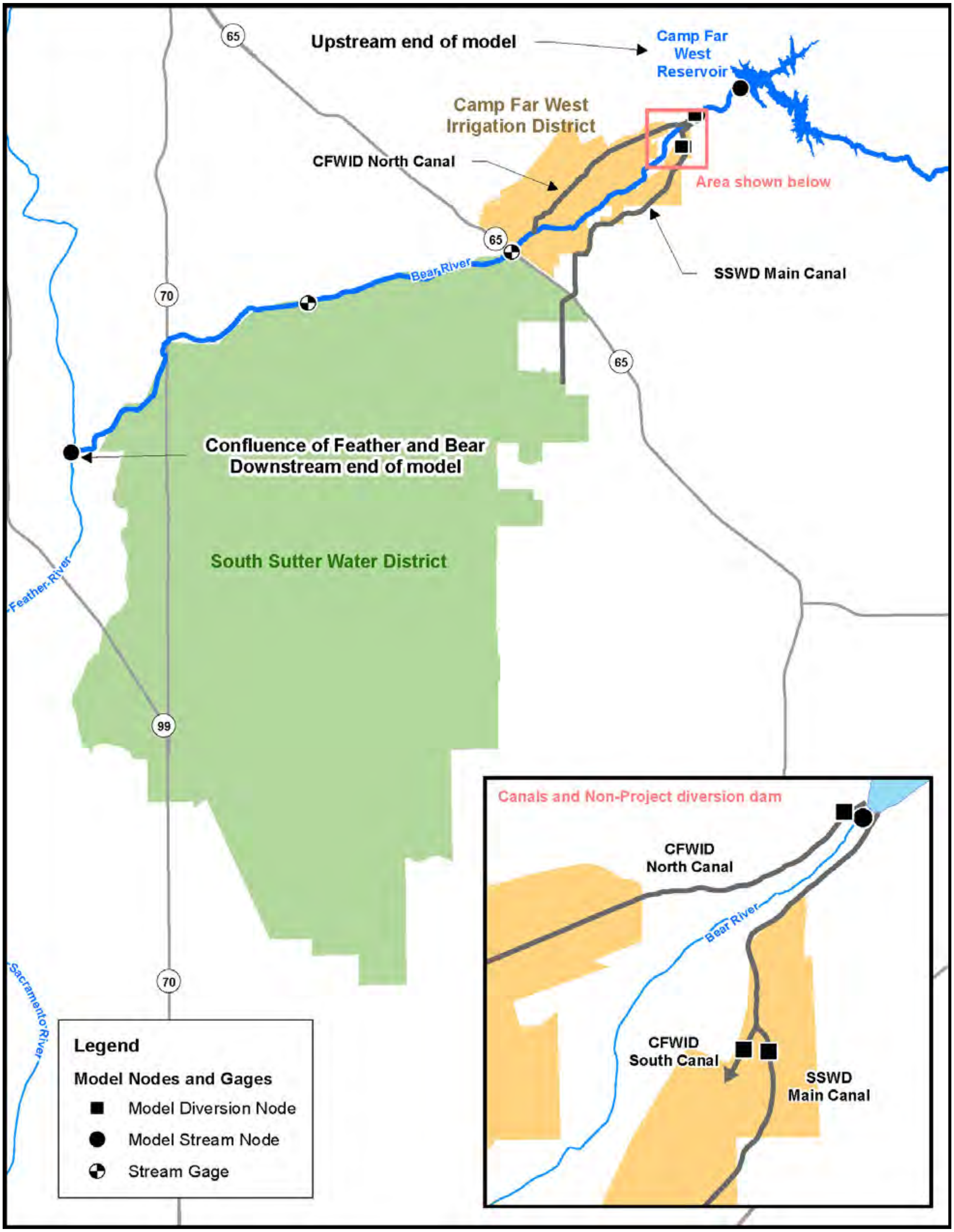


Figure 2.1-5. Camp Far West Hydroelectric Project, SSWD and CFWID service territories, and Ops Model nodes.

The Ops Model simulates operations on a daily time-step for 39 years of historical hydrology from WY 1976 through WY 2014. This period covers a range of hydrologic conditions and includes both the driest (1977) and wettest (1983) years on record, based on total annual inflow to Camp Far West Reservoir. The period also includes three multi-year periods of below average inflow: WYs 1976 through 1977; WYs 1987 through 1992; and WYs 2012 through 2014.

The Ops Model is a Microsoft™ Excel spreadsheet. SSWD selected Microsoft™ Excel as the Ops Model platform for several reasons including: availability to Relicensing Participants; transparency of Ops Model logic and operations; flexibility in developing operational rules; and existing familiarity with spreadsheets for most Relicensing Participants. The Ops Model allows user-defined variables to be changed and different operations to be evaluated. Ops Model operational logic is transparent and editable.

The Ops Model includes preliminary WY types based on five WY types proposed for the upstream Nevada Irrigation District's (NID) Yuba-Bear Project (FERC Project No. 2266) and PG&E's Drum-Spaulding Project (FERC Project No. 2310), collectively, the Yuba-Bear Drum Spaulding (YB/DS) Projects. The YB/DS Projects' WY types are used in the Ops Model for reporting model results and to evaluate potential operational decisions. The existing Project license includes only two WY types.

The Ops Model was developed and validated with inputs designed to represent historical operations and historical inflow.

The Ops Model was then used to develop two separate existing Project (i.e., baseline) simulations. The first scenario, Near-Term Condition - Baseline, assumes YB/DS Projects operations with assumed new FERC license requirements based on the FERC-issued Final Environmental Impact Statement (FEIS) for both projects and the current level of development upstream. The YB/DS Projects are currently in the process of being relicensed. Therefore, upstream operations are expected to change in the near future, and those changes will affect inflow into Camp Far West Reservoir and SSWD's operations. Inflow into Camp Far West was provided by HDR Inc., a consultant to NID and PG&E for the YB/DS relicensings, based on a model of the YB/DS Projects. The second scenario, Future Condition - Baseline, assumes YB/DS Projects operations with assumed new FERC license requirements and a future level of development (i.e., water deliveries) upstream. Both the Near-Term and Future conditions include Camp Far West operations representative of how SSWD currently operates the Project, and include all current physical, regulatory and contractual constraints.

Inflow hydrology for Dry Creek, a major tributary to the Bear River downstream of the Project, was developed as part of SSWD's relicensing Study 2.2, *Water Temperature Modeling*, by gage reconstruction. Dry Creek was gaged from WY 1947 to 1962, capturing 87 percent (99.9 square miles, or sq mi) of the total Dry Creek drainage basin. The analysis was a flow gage reconstruction for the desired WYs (1976 through 2014), and not an estimate of the total Dry Creek flow at the Bear River. Statistical regression relationships were developed to relate the Dry Creek gage to other flow gages in Northern California as summarized in Table 2.1-6. Due to the lack of overlapping periods of record, regressions of Laguna Creek near Elk Grove and Dry Creek near Roseville to South Honcut Creek were developed to first synthesize South

Honcut Creek, which is then used to synthesize Dry Creek near Wheatland. The resulting time series was used for both the Near-Term and Future Conditions scenarios.

Table 2.1-6. Flow gages used in Dry Creek analysis.

Flow Gage	USGS Gage Identification[1]	WYs Available	Elevation (ft)	Watershed Area (sq mi)	Dry Creek Synthesis Periods
Dry Creek near Wheatland	11424500	1947-1962	920	99.9	--
South Honcut Creek near Bangor	11407500, *A05775*	1951-1986, *2006-2014*	1640	30.6	1975-1986
Dry Creek near Roseville	11447293	2000-2012	450	80.1	2000-2005
Laguna Creek near Elk Grove	11336585	1996-2014	120	31.9	1996-1999
Napa River near St. Helena	11456000	1947-1995, 2000-2014	1020	78.8	1987-1995

Key: USGS = United States geological Survey; ft = feet; and sq mi = square miles
[1] Italicized data from DWR Water Data Library. All other data from USGS.

The Ops Model was validated by comparison with observed data from WY 1995 through WY 2014. Recent years are used for validation because SSWD operations have changed during the 39-year simulation period, most notably in 2000. For this reason, a separate simulation was used for model validation. The validation model also includes limited water transfers that occurred during the validation period.

2.1.4.2 Relicensing Hydrology Datasets

Publicly-available flow and reservoir elevation and storage data for the Project Vicinity come from USGS and CDEC gages, which are described in Section 2.1.1.8, within the Bear River basin. Based on these gages, SSWD developed five hydrology datasets (i.e., mean daily values for flows and daily values for reservoir elevation and storage) to support the Camp Far West Project relicensing. These datasets are:

1. Historical Hydrology. This dataset is composed of publically available, empirical, gaged reservoir and flow data in the Project Area, and covers the period from WY 1928 through WY 2014. The WY 1928 through 1964 period covers prior to the development of Camp Far West Dam;[2] the WY 1967 through 1984 period covers from when the dam was in place but prior to the development of Camp Far West Powerhouse; and the WY 1985 through 2014 period covers from when both the dam and powerhouse were in place. The Ops Model includes calculated, historical inflow to Camp Far Water Reservoir based on historical gage records for the modeling period of record, which is from WY 1976 through WY 2014.
2. Unimpaired Hydrology. This dataset is an estimation of flows that would have occurred in the basin during the modeling period of record if no Project or non-Project facilities were present.[3]

[2] This period starts after the first Camp Far West Dam, which was a 50-ft high concrete gravity structure built by the CFWID in 1927. The dam was enlarged in 1967 by SSWD.
[3] Unlike other tributaries to the Feather River, the California Department of Water Resources (DWR) does not forecast or estimate unimpaired flow in the Bear River.

3. Near-Term Condition - Baseline. This dataset is the No Action Alternative, and is an estimation of inflow to Camp Far West Reservoir, operations, and flows that would have occurred in the basin during the modeling period of record if the Project and all non-Project facilities were present and operating under expected, near-term conditions. This dataset is used throughout SSWD's Application for New License to represent environmental baseline reservoir and flow conditions. SSWD uses this dataset instead of the Historical Hydrology dataset to represent near-term environmental baseline conditions because using historical data would be misleading given changes in Project and non-Project operations over time. This hydrology dataset is a product of the Ops Model (Near-Term Conditions Ops Model Run), and is sometimes referred to in this Application for New License as the "Base Case" model run. Near-Term Conditions assume YB/DS Project YB/DS Projects operations, with assumed new FERC license requirements, based on the FERC-issued FEIS for both projects and the current level of development upstream.
4. Near-Term Condition – Proposed Project. This dataset is the same as the Near-Term Condition - Baseline hydrology dataset with the exception that SSWD's proposed Project, rather than the existing Project, conditions are applied.
5. Future Condition – Proposed Project. This dataset is the same as the Future Condition - Baseline hydrology dataset with the exception that SSWD's proposed Project, rather than the existing Project, conditions are applied.

Each hydrology dataset as well as SSWD's methods used to estimate each flow condition are provided in Appendix E1 to this Exhibit E. Specifically, the attachment includes for the modeling period of record: 1) mean daily releases from the Project powerhouse; 2) total mean daily flow below Camp Far West Dam (i.e., the sum of the powerhouse discharge, dam spill and low-level outlet release); 3) mean daily fish release flow immediately downstream of the non-Project diversion dam, the flow compliance location in the existing Project license; 4) daily Camp Far West Reservoir water surface elevation (WSE) and storage; and 5) other hydrologic information. Data is provided in the USACE Hydrologic Engineering Center's (HEC) Data Storage System (DSS) format and in Microsoft™ Excel format, and monthly duration curves are provided for flow.

2.1.4.3 Typical Operations

The Project is operated primarily to provide irrigation water to growers in SSWD's and CFWID's service districts. However, SSWD also operates the Project to meet Bear River flow requirements and to generate power. SSWD leases the power generating facilities to SMUD, which operates the Camp Far West Powerhouse and switchyard.

Although the specific water availability can vary widely, normal Project operation is to fill the reservoir as early in the season as sufficient water becomes available and to then spill the excess flows over the ungated spillway. Because the reservoir is primarily fed by rainfall-produced runoff, it is difficult to predict the amount of inflow anticipated before the end of the season; therefore, SSWD retains within the reservoir all of the inflow except releases for requirements for fisheries until the beginning of the irrigation season. Since the reservoir is operated as a fill-and-spill system, its effect on downstream flood flows is erratic, as it may range from complete control to only minor surcharge regulation.

Camp Far West Reservoir does not have any dedicated flood control space or associated flood control rules.

In most years, the reservoir reaches NMWSE in January when the basin produces its heaviest runoff, and then starts to decline in April or May as releases for irrigation increase. The reservoir reaches its lowest point in the mid-October period when irrigation deliveries are no longer made.

Power is produced at Camp Far West Powerhouse during the winter/early spring months when the reservoir is spilling and during the spring and summer months when releases are being made for irrigation and to meet instream flow requirements. Because of the generating unit's operating characteristics, power can only be generated when the elevation of the reservoir water surface is at or above 236 ft and when reservoir outflow is greater than 130 cfs. If these two criteria cannot be met, water is released through the low-level outlet. This condition normally occurs each year starting in September and continuing into the fall until such time that surplus inflows are available to be passed through the powerhouse.

During the irrigation season, up to a maximum of 530 cfs passes through the powerhouse in conformance with downstream irrigation and instream requirements. However, during the heavy runoff period when spilling from the reservoir occurs, a greater quantity of water is routed through the powerhouse up to its maximum limit of 725 cfs.

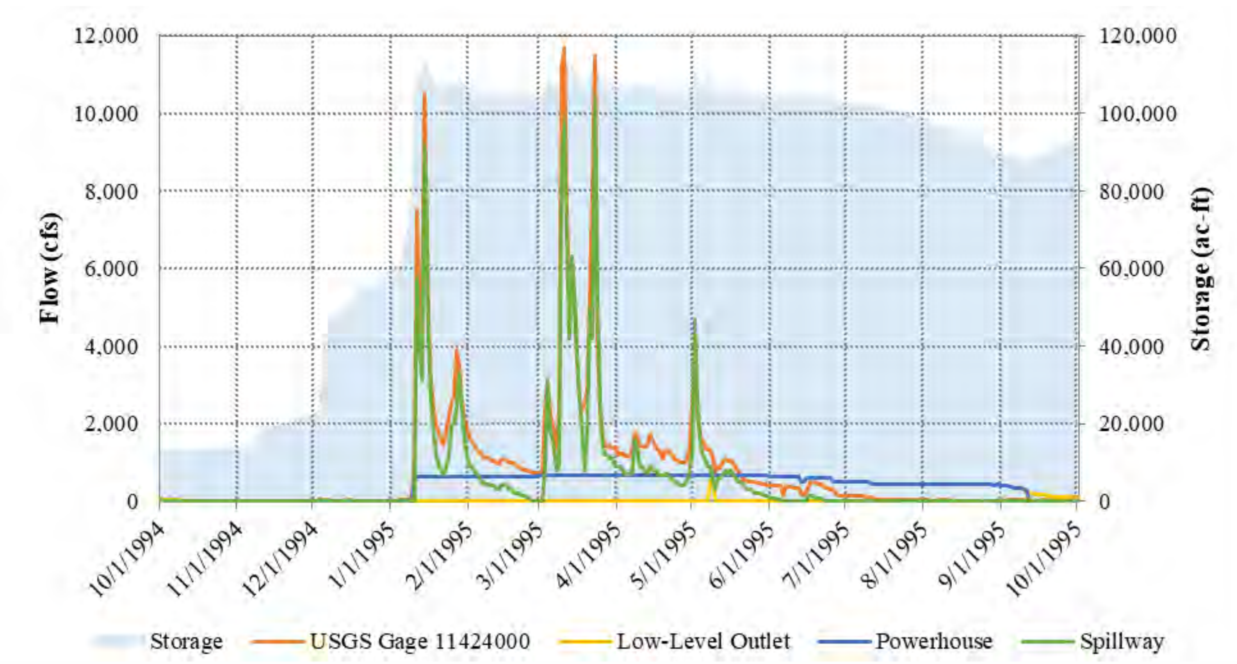
When the reservoir water surface is high enough to send flows over the spillway, all flows up to approximately the physical capacity of the turbine are diverted through the power tunnel. The balance of any flows greater than turbine capacity are passed over the uncontrolled spillway.

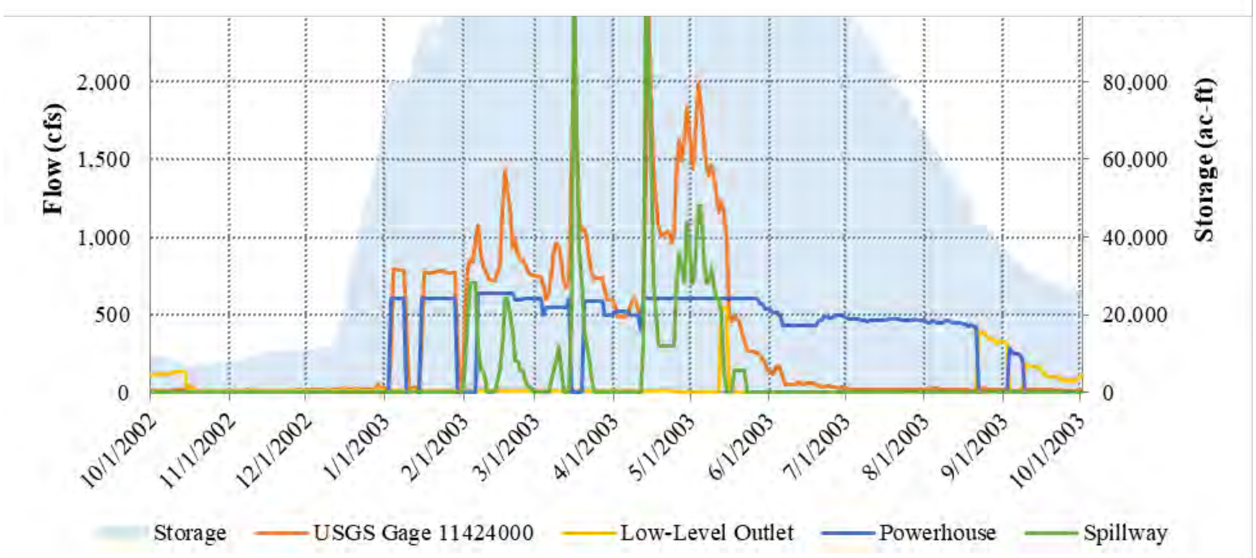
During normal reservoir releases for furnishing irrigation water, all releases are utilized for power production except under those conditions as described above when the combination of head and flow are outside the operating characteristics of the turbine. During dry periods outside of the irrigation season, reservoir releases can be limited to minimum instream flow requirements, which are at times controlled by inflow per the existing license (see Article 29). Inflow from the Bear River is measured during the low-flow season by SSWD in the Bear River immediately upstream of Camp Far West Reservoir.

Operation of the powerhouse is automatic except for start-up, which is done manually. A powerhouse shutdown activates an alarm at SMUD's dispatch center, which requires sending trained personnel to the site to determine the problem and re-start the powerhouse.

SMUD receives Renewable Energy Credits (REC) for power generated at Camp Far West Powerhouse through the CEC. The powerhouse is registered under CEC Plant ID H0083.

To demonstrate normal operations, SSWD selected 1995, 2003, and 2001 as representative Wet, Normal, and Dry WYs, respectively, because these years approximate the 10, 50, and 90 percent exceedance intervals, respectively, for annual flow volume as measured at USGS Gage 11424000 (*Bear River near Wheatland*). This gage was selected as it is the nearest full-flow gage to Camp Far West Dam. Figures 2.1-7 through 2.1-9 show for each representative WY: 1) daily water storage in Camp Far West Reservoir; 2) mean daily water releases from Camp Far West Dam and Powerhouse (i.e., releases through the powerhouse, low-level outlet and over the spillway); 3) mean daily flows at USGS Gage 11424000 located about 6.5 mi downstream from Camp Far West Dam near Wheatland; and 4) mean daily flow at CDEC Gage BPG, located approximately 10.5 mi downstream from the Camp Far West Dam near Pleasant Grove Road.





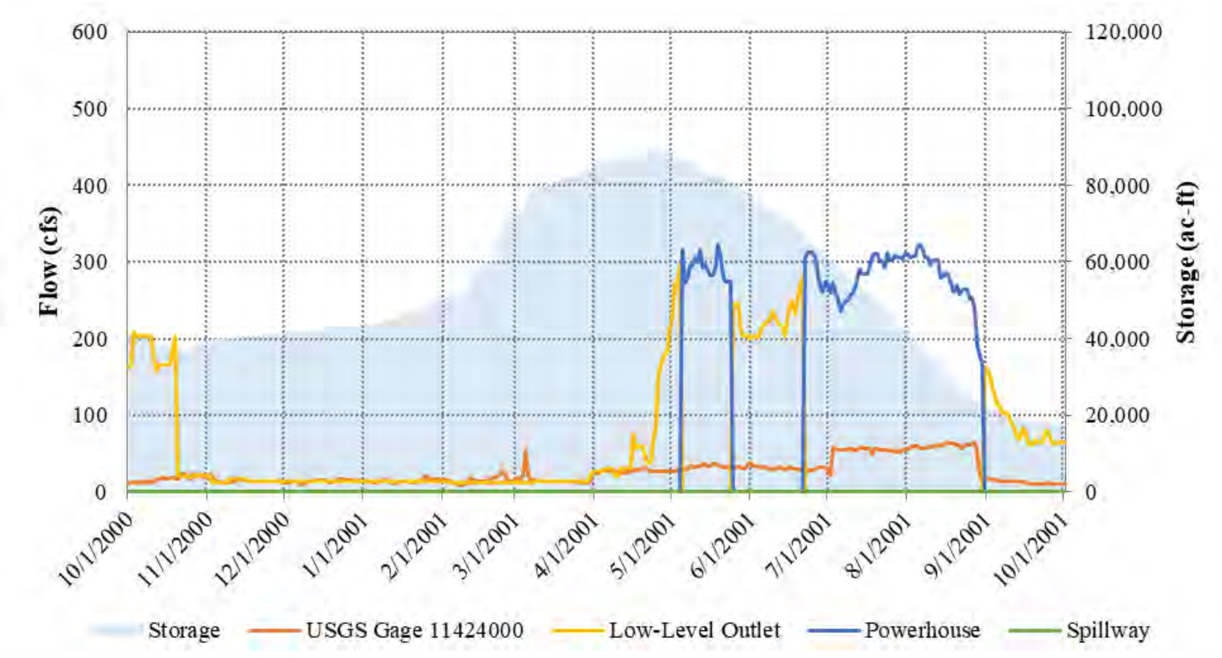


Figure 2.1-6. Camp Far West Hydroelectric Project releases and storage in a representative Dry Water Year – 2001 (Historical Hydrology).

2.1.5 Existing Environmental Measures

This section discusses operating constraints, including conditions in the existing FERC license, measures in other existing licenses, agreements and contracts that affect Project operations.

2.1.5.1 Conditions in Current FERC License

The initial license included 33 articles numbered 1 through 33, which have not changed since the license was issued. Of these, SSWD considers six articles (i.e., articles 24, 25, 26, 27, 28 and 32) "expired" or "out of date," because each pertains to a construction activity that has been completed, a filing related to a construction activity that has been completed, or another activity that has been completed. As a result, the existing license contains 27 "active" articles. The general topic that each of the 27 active articles is provided in Table 2.1-7.

Table 2.1-7. List of active requirements in the existing FERC license for the Camp Far West Hydroelectric Project.

Article(s)	Description	Article(s)	Description
1	General - Compliance	15	Construction of fish and wildlife protective devices and structures by Licensee
2 & 3	FERC approval of changes	16	Construction of fish handling facilities by U.S.
4	FERC inspection and supervision	17	Recreation facilities
5	Obtain any needed land rights	18	Allow public access to Project lands and waters
6	Federal takeover	19	Soil erosion and sedimentation control
7	Project costs and depreciation	20	Clearing

Table 2.1-7. (continued)

Article(s)	Description	Article(s)	Description
8	Gaging and stream gaging	21	Implied surrender provisions
9	Install additional capacity if order by FERC	22	Termination of license
10	Coordinate with others if ordered by FERC	23	Terms and conditions of FPA
11	Headwater benefits	29	Minimum flows
12	Operation as ordered by FERC to protect life, health property or for other benefits	30	Consult with resource agencies on impacts to fish and wildlife during construction and operation of project.
13	Non-project use of project lands	31	Annual Charges
14	Public safety related to safety of transmission lines, telephone lines, etc.	33	Standard Land Use Article

Of these, Article 29 is more germane to Project operations than the other 27 articles. Provided below as Article 29 as it appears in the existing FERC License.

> **Article 29.** The licensee shall maintain a continuous minimum flow of 25 cfs from April 1 through June 30 and 10 cfs from July 1 through March 31 or inflow to the project reservoir, whichever is less, as measured immediately below the Camp Far West diversion dam to protect and enhance the fishery resources in Bear Creek. The flows may be temporarily modified if required by operating emergencies beyond the control of the licensee, or for short periods for fishery management purposes, upon mutual agreement between the licensee and the California Department of Fish and Game. Gaging facilities shall be constructed according to the recommendations of the Geological Survey and shall be operational by April 15, 1989.[4]

2.1.5.2 Measures in Other Existing Licenses, Agreements and Contracts that Affect Project Operations

2.1.5.2.1 SSWD's Water Rights for Power (No Expiration Date)

SSWD holds a post-1914 appropriative water right for the purposes of operating the Project for hydroelectric power generation. Table 2.1-8 provides SWRCB designations and the key terms of the post-1914 appropriative water-right permit held by SSWD for power use.

[4] Article 29 in the initial license was amended in 46 FERC ¶62,088, Order Amending License, issued by FERC on January 26, 1989 to read as shown above.

Table 2.1-8. Water right permit held by SSWD for operation of the Camp Far West Hydroelectric Project for power generation.[1]

Priority (date)	SWRCB Designation (application)	SWRCB Designation (permit)	SWRCB Designation (license)	Source (Waterbody)	Rate, Amount & Season	Point of Diversion (powerhouse)
1/4/80	26162	18360	Not Issued Yet	Bear River	725 cfs Direct Diversion from 1/1 – 12/31	Camp Far West Dam Powerhouse
					103,100 ac-ft Storage from 10/1 – 6/30	

1 SSWD's water rights include a Bay-Delta flow component as described in Section 2.1.5.2.3.

For the protection of fish and wildlife, SSWD's Permit 18360 identifies a minimum required release of 25 cfs during April 1 through June 30 and 10 cfs from July 1 through March 31. If the total inflow to Camp Far West Reservoir is less than the designated amount for a given period, SSWD shall bypass that quantity.

The time to complete beneficial use for Permit 18360 expired on December 1, 1995. SSWD submitted a request for licensing of Permit 18360 to the SWRCB Division of Water Rights on September 9, 1997, which is still pending.

SSWD operates the Project consistent with the terms and conditions of the above water right.

2.1.5.2.2 Water Supply Deliveries from the Bear River to SSWD's Service Area (No Expiration Date)

SSWD makes water deliveries from the Bear River and several small tributaries to its members within its service area consistent with SSWD's consumptive use water rights. Table 2.1-9 lists SSWD's post-1914 appropriative water-right licenses and permit for irrigation and domestic uses.

Table 2.1-9. Water rights held by SSWD for delivery to SSWD's members within its service area for irrigation and domestic uses.

Priority (date)	SWRCB Designation (application)	SWRCB Designation (license)	Source (Waterbody)	Purpose of Use	Rate & Amount	Season (period)	Place of Beneficial Use
6/13/41	10221	11120	Bear River	Irrigation, Domestic and Incidental Power [2]	250 cfs Direct Diversion	from 3/1 – 6/30 and from 9/1 – 10/31	59,000 ac within SSWD and 4,180 ac within CFWID
					40,000 ac-ft Storage	from 10/1 – 6/30	
5/12/52[1]	14804	11118	Bear River	Irrigation, Domestic and Incidental Power	330 cfs Direct Diversion	from 5/1 – 9/1	59,000 ac within SSWD and 4,180 ac within CFWID
					58,370 ac-ft Storage	from 10/1 – 6/30	
8/16/51	14430	4653	Coon Creek	Irrigation	2 cfs Direct Diversion	from about 4/1 – about 11/1	80 ac
4/12/65	22102	11121	East Side Canal, Coon Creek, Markham Ravine, and Auburn Ravine	Irrigation	40.3 cfs Direct Diversion 4,769 ac-ft per annum	from 4/1 – 6/1 and 9/1 – 10/31	4,000 ac

Table 2.1-9. (continued)

Priority (date)	SWRCB Designation (application)	SWRCB Designation (license)	Source (Waterbody)	Purpose of Use	Rate & Amount	Season (period)	Place of Beneficial Use
8/11/71	23838	12587	Yankee Slough	Irrigation	1.35 cfs Direct Diversion 143 ac-ft per annum	from 4/1 – 6/1 and 9/1 – 9/30	235 ac

[1] SSWD received a release from priority from Applications 5633 and 5634 for Application 14804.
[2] Incidental Power is identified as a purpose of use for Applications 10221 and 14804. The powerhouse listed in the place of use for these applications is a hydroelectric facility located along SSWD's main canal.

SSWD delivers this water from the Bear River via its Conveyance Canal, which is located on the Bear River about 1.2 mi downstream of Camp Far West Dam.

Identical to the required fish release for SSWD's power permit, Applications 10221 and 14804 identify minimum required releases of 25 cfs during April 1 through June 30 and 10 cfs from July 1 through March 31. If the total inflow to Camp Far West Reservoir is less than the designated amount for a given period, SSWD shall bypass that quantity. These required fish releases are not additive.

2.1.5.2.3 Bay-Delta Bear River Voluntary Agreement (Expires December 31, 2035)

In February 2000, SSWD, DWR and the CFWID entered into the Bear Agreement (DWR, SSWD and CFWID 2000) to settle the responsibilities of SSWD, CFWID, and all other Bear River water rights, to implement the objectives in the *Water Quality Control Plan for the San Francisco Bay/ Sacramento-San Joaquin Delta Estuary* adopted May 22, 1995.

To incorporate this agreement into SSWD's water rights, in July 2000, the SWRCB issued Order 2000-10 that amended SSWD's Water Right Licenses 11120 and 11118 to provide that:

> During releases of water in connection with the change of purpose of use and place of use of up to 4,400 acre-feet transferred to DWR during dry and critical years,[5] Licensee shall increase flows in the lower Bear River by no more than 37 cfs from July through September. To avoid stranding impacts to anadromous fish in the Bear River below Camp Far West Reservoir, Licensee shall, by the end of a release period from the reservoir in connection with said change, ramp down flows from the reservoir at a rate not to exceed 25 cfs over a 24-hour period.

The required flow volume is in addition to the minimum flow requirement in the Project license, and is measured immediately downstream of the diversion dam as spill over the diversion dam

[5] SWRCB Order 2000-10 states: "*Dry and critical years are defined, for purposes of this order, as set forth on page 23 of the Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary (Adopted by the SWRCB in May, 1995), except that such years do not include a year in which water storage in Camp Far West Reservoir on April 1 is at or below 33,255 acre-feet ("extreme critical year").*"

(i.e., SSWD installs notched boards on the diversion dam and controls the elevation of the diversion dam impoundment to provide the required flow).

SWRCB's Order 2000-10 states that this arrangement would terminate upon the termination of the Bear River Agreement on December 31, 2035, or sooner if the Bear River agreement were terminated sooner.

2.1.5.2.4 Water Supply Contracts (No Expiration Date)

SSWD and CFWID entered into an Agreement in 1957 and a Supplemental Agreement in 1973, relative to the construction and subsequent enlargement of Camp Far West Reservoir. Under the Agreement, SSWD provides CFWID 13,000 ac-ft of water from the reservoir each year to satisfy CFWID's senior water rights along the Bear River.

2.1.5.2.5 Water Transfers

In recent years, SSWD has participated in water transfers of water held in storage in Camp Far West Reservoir. Transfers occurred in 2008, 2009, 2010, and 2014. The volume of water transferred in 2008 was approximately 6,800 ac-ft. The transfer volume was approximately 10,000 ac-ft in each of the other three years. In each year, transfer water was released from Camp Far West Dam in the months of July, August, and September. Transfer water flowed over the non-Project diversion dam and down the Bear River, was conveyed across the Sacramento-San Joaquin River Delta, and was pumped out of the southern Delta at facilities owned and operated by the State Water Project (SWP). The decision on whether to participate in voluntary water transfers is made each year, when there are potential buyers, by the SSWD Board of Directors. It is unknown whether SSWD will participate in future water transfers.

2.1.5.2.6 SMUD Power Purchase Contract (Expires July 1, 2031)

In August 1991, SSWD and SMUD entered into a Contract for the Sale and Purchase of Electricity of the power generated at the Camp Far West Powerhouse. Under the contract, SMUD reimburses SSWD for the construction of the Camp Far West Powerhouse and associated power facilities, SMUD operates the powerhouse under a lease, and SMUD receives all the power from the powerhouse paying for the power at a fixed rate. The contract expires on July 1, 2031.

SMUD receives Renewable Energy Credits for power generated at Camp Far West Powerhouse through the California Energy Commission. The powerhouse is registered under California Energy Commission Plant ID H0083.

2.1.6 Facility Maintenance

2.1.6.1 Camp Far West Powerhouse Maintenance

SMUD conducts annual mechanical and electrical inspections and maintenance at the Camp Far West Powerhouse to verify the structural and/or functional integrity of the facilities and to identify conditions that might disrupt operations. The Camp Far West Powerhouse unit is offline to support planned outages for approximately 2 to 3 weeks in September/October. During an unplanned outage, such as when the unit trips offline, water flows to the low-level outlet. Depending on maintenance work needed on the tunnel and penstock, it can be dewatered by closing the intake gates.

2.1.6.2 Other Facility Maintenance

Routine maintenance activities conducted in the vicinity of Project Facilities include vegetation management, pest management, road and trail maintenance, maintenance of communication facilities, debris management, and facility painting. Each of these activities is described below.

2.1.6.2.1 Vegetation Maintenance

Vegetation management, manually using hand tools and chemically by the use of herbicides, is implemented by SSWD at Project Facilities. Vegetation management is completed throughout the Project Area as necessary to reduce fire hazard, to provide for adequate Project Facility access and inspection, to protect Project Facilities, and to provide for worker and public health and safety. In general, vegetation management is implemented within about 75 ft of the powerhouse and switchyard; within about 15 ft on either side of roads and trails to Project Facilities; and within recreation areas.

Vegetation management occurs both by hand trimming and herbicides. Hand trimming includes trimming grasses and forbs using string trimmers, and removal or trimming of overhanging shrubs and tree limbs using a chain saw or other handheld saw or clippers. These management activities are conducted as needed in conjunction with facility inspections.

Herbicides, in combination with surfactants, are used in combination with hand trimming vegetation management activities on an annual basis at Project Facilities located on SSWD-owned property. All herbicide applications are supervised by a Qualified Applicator with direction of a licensed Pest Control Advisor (PCA). The PCA prepares Pest Control Recommendations (PCR) consistent with the specific herbicide label(s) for each site prescribing specific application direction and associated precautions that must be strictly followed. All-terrain vehicles, other vehicles (pick-up trucks), backpack sprayers, or small hand-held sprayers are used to apply herbicides. Herbicide application occurs, at a minimum, twice annually. These applications occur between December 1 and March 31, as determined by the PCA for pre-emergents, and are seasonally dependent, typically occurring between April 1 and June 30. This cycle allows for follow-up visits to apply post-emergent herbicide application and/or additional treatments as needed. A third cycle, if required, would be completed between July 1 and October 14.

2.1.6.2.2 Hazard Trees

Hazard trees, generally defined as dead or dying trees or trees with defects that may result in failure and have the potential to cause property damage, personal injury, or death, are removed as needed. Removal is conducted with a chainsaw, handheld saw, or other equipment. Smaller diameter debris from hazard trees is either chipped or lopped and scattered. Downed logs are typically left onsite and only moved if needed for safety. If moving logs is necessary, it may be completed by hand or machine depending on the situation.

2.1.6.2.3 Vertebrate Pest Management

SSWD implements rodent control as needed in facility interiors using non-restricted rodenticides (e.g., D-Con®), which are applied in accordance with the label instructions. Rodent control occurs within the Camp Far West Powerhouse.

2.1.6.2.4 Road Maintenance

Regular inspection of the Project access roads and recreation roads occurs during the course of day-to-day Project activities. Road maintenance occurs as needed. Maintenance generally includes, but is not limited to, the following types of activities: debris removal; filling potholes; grading, sealing, and surfacing; maintenance or replacement of erosion control features (e.g., culverts, drains, ditches, and water bars); repair, replacement, or installation of access control structures such as posts, cables, rails, gates, and barrier rock; and repair and replacement of signage. Vegetation management may be conducted concurrently with road maintenance.

2.1.6.2.5 Trail Maintenance

Regular inspection of trails to access the Project powerhouse, and other ancillary facilities occurs during the course of day-to-day Project activities. Maintenance occurs as needed. Trail maintenance generally includes, but is not limited to, the following types of activities: debris removal; basic repairs, including minor brushing; maintenance of erosion control features such as water bars; repair, replacement, or installation of access control structures, such as barrier rock; and repair and replacement of signage. Vegetation management may be conducted concurrently with trail maintenance on an as-needed basis.

2.1.6.2.6 Facility Painting

SSWD paints the exterior of Project Facilities, including the powerhouse and ancillary facilities as needed.

2.1.6.2.7 Recreation Facilities Maintenance

SSWD, through a concessionaire, routinely maintains the Project recreation facilities at the North and South Shore recreation areas. Typical routine maintenance activities include litter and trash collection, lowering/raising the boat launch docks as the water level changes, fire pit cleaning and ash removal, cleaning and maintaining restroom buildings, gate and traffic control maintenance, keeping roadways and parking areas clear of debris, and public signage maintenance. In addition, SSWD routinely maintains and tests the water supply system and sewage treatment ponds with aerators that serve the flush restroom buildings and RV sanitary dump stations at both recreation areas.

2.2 Proposed Changes to the Existing Project

2.2.1 Changes to Existing Project Facilities and Features

SSWD proposes two general change to existing Project facilities: 1) raising the NMWSE of Camp Far West Reservoir by 5 ft from an elevation of 300 ft to an elevation of 305 ft;[6] and 2) modifications to Project recreation facilities at Camp Far West Reservoir. Each of these is discussed below.

2.2.1.1 Camp Far West Reservoir Pool Raise

Recent aerial surveying and topographic mapping shows that Camp Far West Reservoir stores 93,737 ac-ft of water at its existing Camp Far West Reservoir NMWSE of 300 ft. This is roughly 10 percent less than anticipated when the dam was enlarged in 1967, and the amount authorized in SSWD's water rights. Therefore, SSWD proposes to raise the NMWSE of Camp Far West Reservoir by 5 ft to an elevation of 305 ft. The Pool Raise would increase Camp Far West Reservoir storage by 9,836 ac-ft to a capacity of 103,573 ac-ft at Camp Far West Reservoir's new NMWSE of 305 ft.

When the Pool Raise is complete, (i.e. the spillway modification will have already been completed), the combined spillways will be able to pass 126,400 cfs at a reservoir elevation of 318.5 ft with 1.5ft of freeboard at the dam.

2.2.1.1.1 Anticipated Facilities

The Pool Raise would involve demolition of the concrete cap on the existing Camp Far West Dam spillway, the addition of approximately 1,730 cubic yards (cu yd) of concrete to raise the existing spillway crest from an elevation of 300 ft to an elevation 305 ft, and anchoring of the new concrete with steel dowels. The spillway design would not change from its existing reinforced concrete, ungated, ogee-type weir and the existing 300-ft crest length will not change. In addition, no changes would be required to the ongoing spillway modification. Figure 2.2.-1 is

[6] For the purpose of this exhibit, this is referred to as the "Pool Raise."

a general conceptual-level plan showing the details of the Pool Raise. Figure 2.2-2 shows profiles of the existing spillway and Blackford Road profiles. Figure 2.2-3 shows typical sections of the existing spillway and Blackford Road. Figure 2.2-4 shows additional typical sections of the existing spillway.

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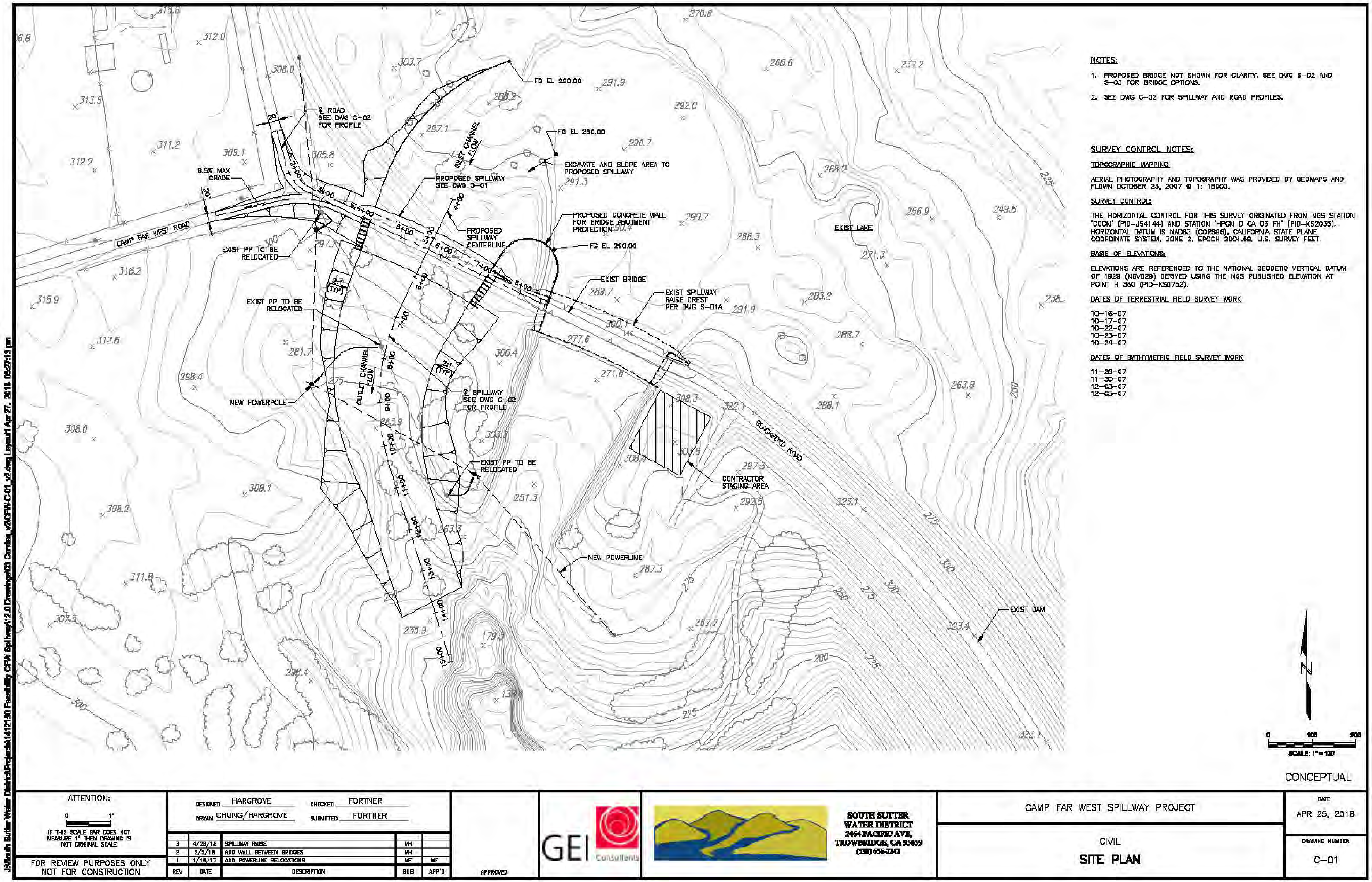

Figure 2.2-1. Conceptual level plan for Camp Far West Reservoir Pool Raise – general plan.

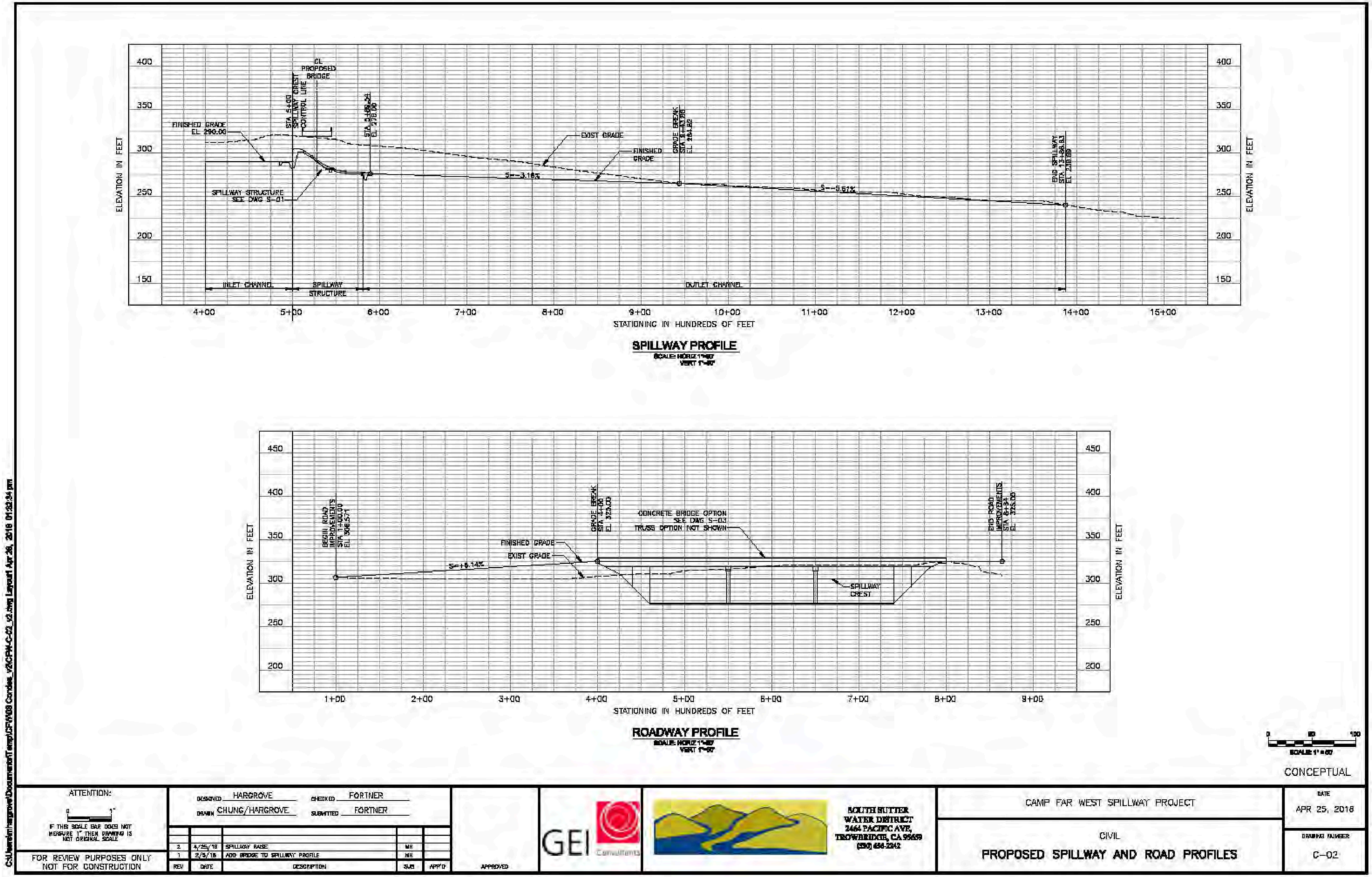

Figure 2.2-2. Conceptual level plan for Camp Far West Reservoir Pool Raise – spillway and road profiles.

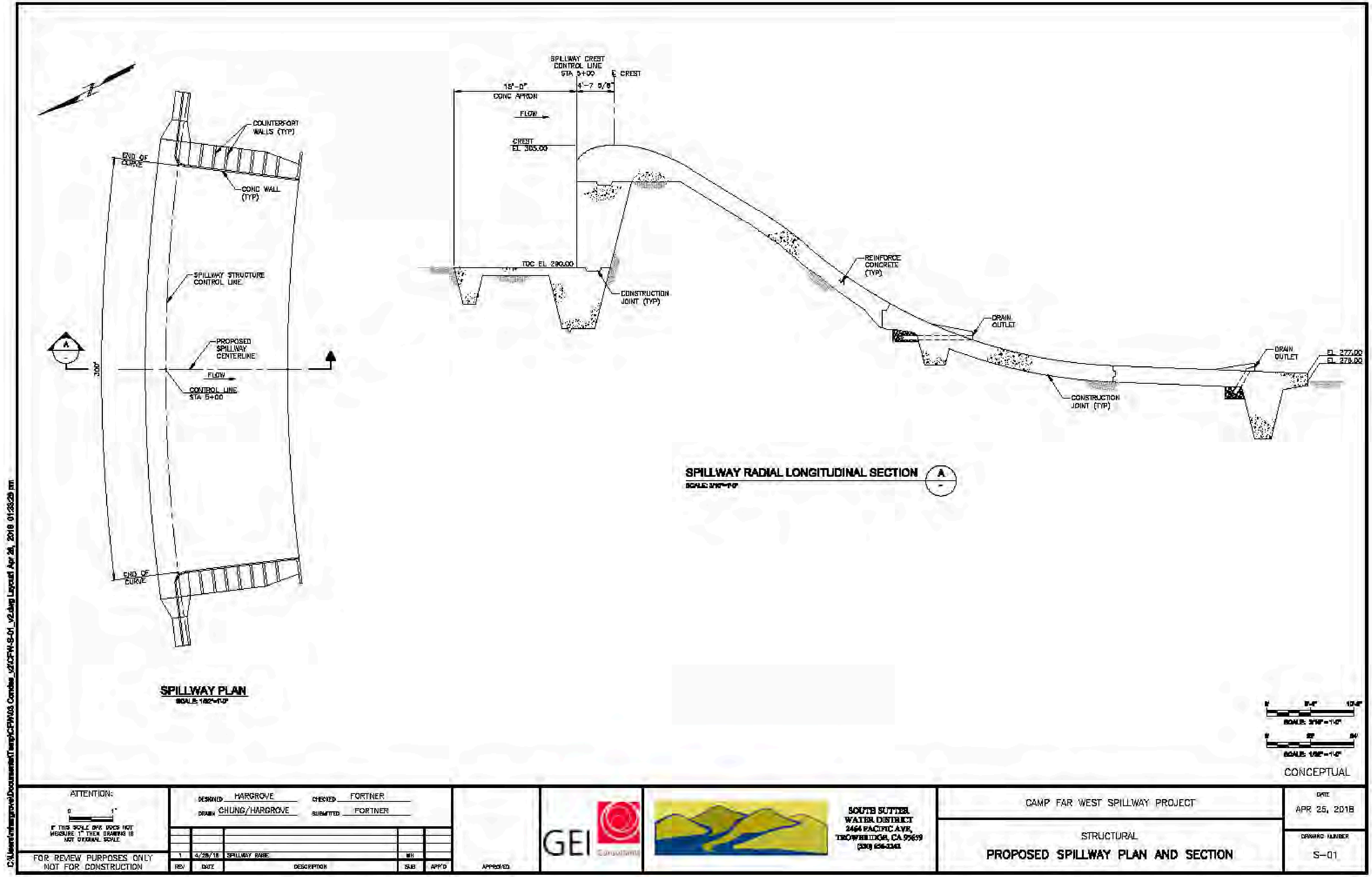

Figure 2.2-3. Conceptual level plan for Camp Far West Reservoir Pool Raise – spillway and road typical sections.

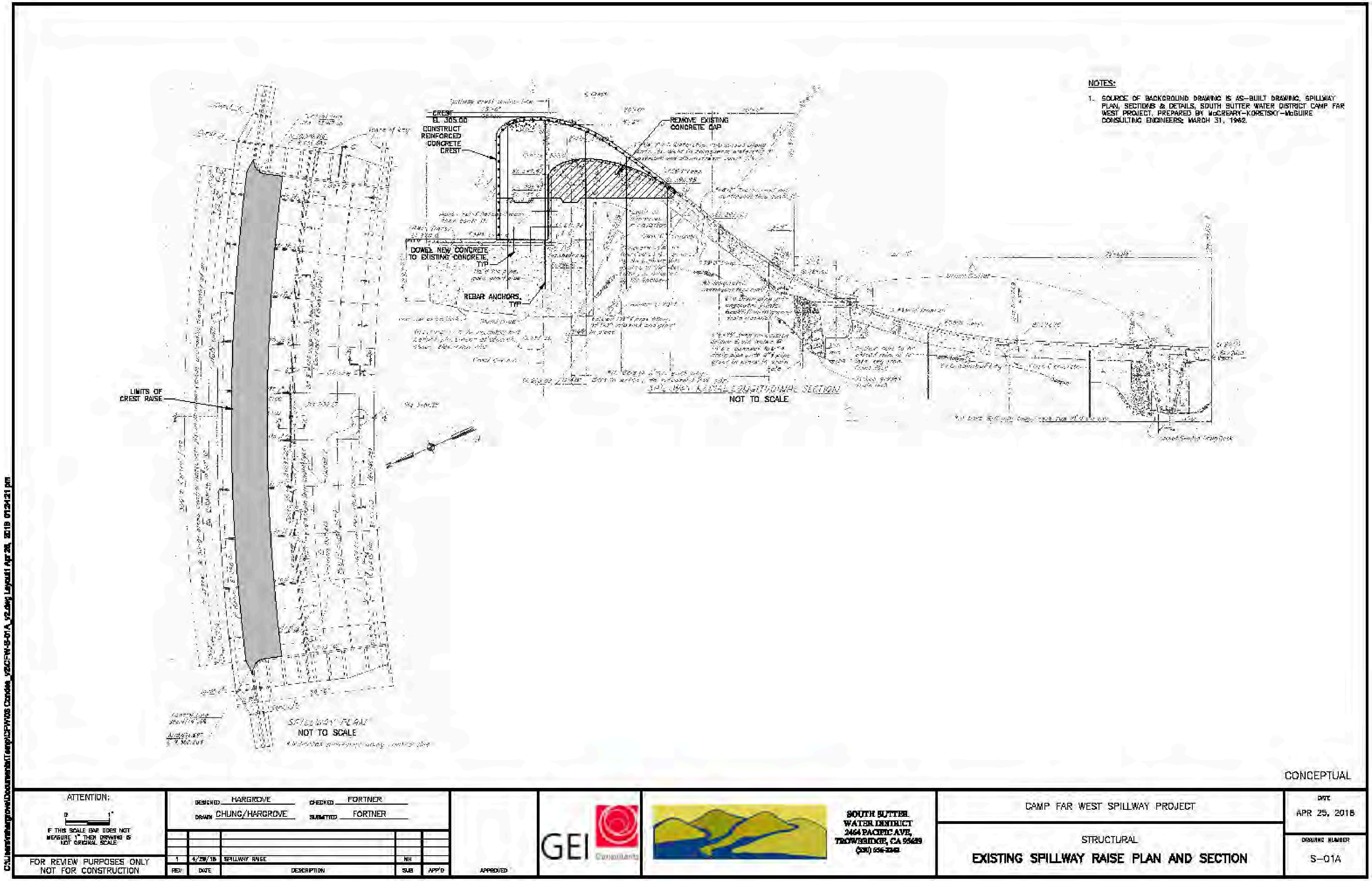

Figure 2.2-4. Conceptual level plan for Camp Far West Reservoir Pool Raise - spillway typical section.

2.2.1.1.2 Anticipated Construction

The existing spillway crest modifications to facilitate the pool raise would involve demolition of the existing concrete cap, the addition of 1,730 cu yd of concrete to raise the spillway crest from an elevation of 300 ft to an elevation 305 ft, and anchoring of the new concrete with steel dowels. The spillway design would not change from its existing reinforced concrete, ungated, ogee-type weir and the existing 300-ft crest length will not change.

Construction Laydown and Staging Areas

A contractor staging area would be located south of Blackford Road, immediately adjacent to the auxiliary spillway. Activities at the staging area would include parking for concrete trucks and other construction vehicles, temporary storing of material (e.g., rebar for new concrete crest and demolished concrete), and meetings. At this time, SSWD anticipates the staging area will encompass 3.71 ac (Figure 2.2-5).

Figure 2.2-5. Anticipated construction laydown area and staging area for the Pool Raise.

Construction Borrow and Disposal Areas

Concrete would be brought from offsite (within 100 miles) thus there will be no on-site borrow areas associated with the Pool Raise. Steel needed for pool raise would be transported from Sacramento, CA. The approximately 550 cy of demolished concrete, rebar, and any other material from the spillway cap removal would be disposed of at an approved off-site facility that accepts construction waste, such as at the Western Regional Sanitary Landfill in Placer County, CA, which is permitted to receive construction waste in the quantities anticipated and is located within 50 miles of the Project (WPWMA 2018). Location and disposal of hazardous waste materials is not expected to occur for the Pool Raise.

Construction Roads and Traffic Considerations

Construction-related traffic would be spread over the duration of the Pool Raise work. During this period, the existing bridge over the spillway would likely be closed to through-traffic and detours around the dam may be required. During construction and the bridge closure, local residents would use McCourtney Road and then Riosa Road to access Highway 65 for north-south travel to Wheatland and the Sacramento areas (Figure 2.2-6). Closures and detours would be coordinated with Yuba County. The bridge would be permanently reopened following completion of the Pool Raise. There would be no work within the reservoir or the construction of any additional haul routes for the existing spillway modifications for the Pool Raise.

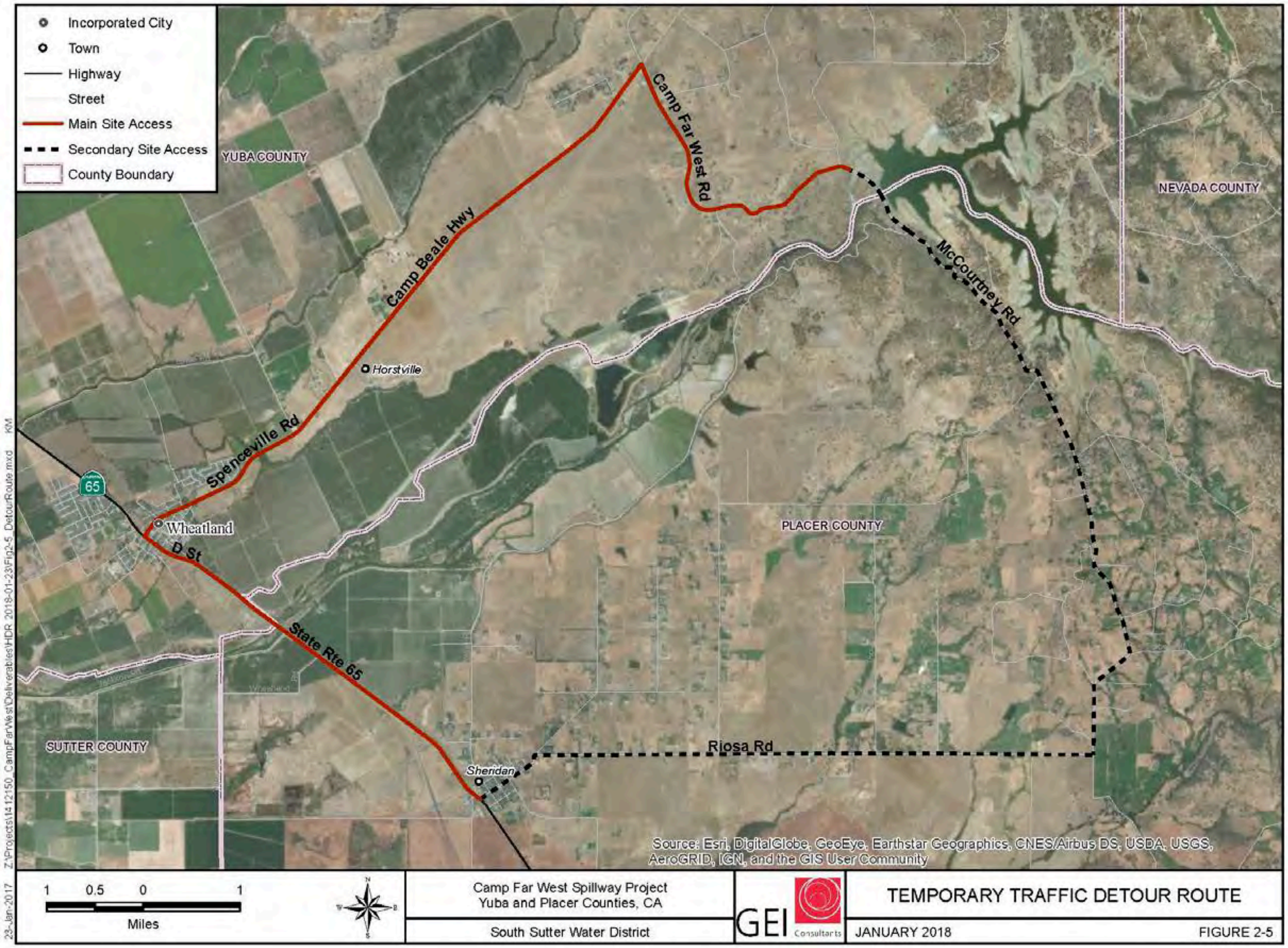

Figure 2.2-6. Anticipated traffic detour route during construction of the Pool Raise.

Construction Sequences and Schedule

At this time, SSWD anticipates that planning, design, and construction would take approximately 2 years to complete. The typical construction sequence and duration for this type of work is shown in Table 2.2-1. The major activities are discussed below.

Table 2.2-1. Draft preliminary schedule for construction of the Pool Raise.

Task #	Task Name	Duration
1	**Complete Pool Raise Design**	**585 days**
1.1	Seismological Investigation	45 days
1.2	Geotechnical Investigation	90 days
1.3	Geotechnical Data Evaluation	45 days
1.4	Agency Consultation on Engineering Evaluation	60 days
1.5	Preliminary (30%) Design & Specifications	120 days
1.6	Draft 60% Design & Specifications	90 days
1.7	Draft 90% Design & Specifications	90 days
1.8	Final (100%) Design & Specifications	45 days
2	**Complete Environmental Permitting and Obtain Regulatory Approvals**	**150 days**
2.1	Notify adjacent landowners of upcoming pool raise	1 day
3	**Onsite Kickoff Meeting**	**1 day**
4	**Site Preparation**	**126 days**
4.1	Pre-Construction Meeting	2 days
4.2	Prepare Site for Demolition and Set Traffic Control	3 days
4.3	Demolishing and Removal of Waste	7 days
4.4	Prepare Foundation for New Concrete	5 days
4.5	Construct Forms for New Concrete	7 days
4.6	Install Rebar and Pour New Concrete	97 days
4.7	Relocate Campsites	5 days
5	**Site Cleanup and Restoration**	**1 day**

Seismological Investigation

Seismological data would be to provide estimates on strong ground motion and seismic design parameters for the existing spillway. A review of surface-fault rupture hazard would be performed using existing California Geological Survey and USGS reports on active faults in the vicinity of the planned structure. SSWD would develop a database of historical and recent seismicity in the region to assess the controlling seismic source(s) for deterministic ground motion assessment. The evaluation of site seismicity would include the following critical parameters:

- The distance to the closest seismic source
- The specific geometry of the seismic source in the Project area
- The maximum expected earthquake magnitude
- Deterministic and probabilistic response spectra

SSWD would prepare a detailed Subsurface Exploration Work Plan for geotechnical investigations. The investigations would focus on exploring the thickness of overburden, depth to competent bedrock, and engineering characteristics of the soil and rock beneath the existing spillway and bridge abutments. The work plan would describe locations of geotechnical explorations, samplings details, and other field exploration activities. A laboratory testing plan would be included in the work plan detailing the types and numbers of laboratory tests to be performed during subsurface investigations. The work plan would include any permits or access approvals needed to conduct the investigations, and methods for restoration of all areas disturbed by the field investigation.

The investigation program would consist of borings and test pits. Exploration locations and depths may be adjusted based on conditions encountered during the subsurface investigations. Access constraints and logistics would be further evaluated during preparation of the work plan. Site terrain may require track-mounted drilling equipment. The work plan would include the use of drilling and sampling equipment suitable for the site constraints, thus minimizing the need for access improvements.

All soil and rock samples collected from the borings and test pits would be carefully logged, labeled, and photographed. Exploratory borings would be continuously logged, describing the types and characteristics of the material encountered. Soils would be described in accordance with American Society for Testing and Materials (ASTM) D2487 Classification of Soils for Engineering Purposes and ASTM D2488 Description and Identification of Soils. Rock core samples would be identified and described based on standards developed by the International Society of Rock Mechanics (ISRM 1981) and Bureau of Reclamation (2001). The borehole logs would include complete descriptions of materials encountered, including the frequency and orientation of fractures and joints, as well as additional relevant field information, such as fluid loss or penetration rates. Additionally, Core Recovery (REC) Rock Quality Designation (RQD) would be recorded and presented on boring logs based on procedures described in Deere and Deere (1989). The remaining samples and cores would be stored until completion of construction. Field logs would be prepared by the field logger, which would be reviewed by a senior geologist and input into a gINT log format for finalization.

Drill cuttings and fluid from the borings would be collected in 55-gallon drums or roll-away bins for testing and disposal. The cuttings would be hauled off-site for disposal after completion of laboratory testing. It is assumed that the cuttings would not contain hazardous or toxic material. All drilling and sampling activities would be performed at the direction of a qualified geologist licensed in the State of California. A field engineer or geologist would supervise all drilling and sampling, and will log the soil and rock in accordance with ASTM standards.

The laboratory testing program would be finalized during implementation of the subsurface exploration program. It is assumed that index testing would include sieve analysis, Atterberg Limits, specific gravity, and bulk density to be performed on samples collected from the site. Additionally, unconfined compression tests would be performed on bedrock samples collected from within the preliminary footprint of the concrete spillway and bridge abutments.

Geotechnical Investigation

A geotechnical evaluation would be prepared to support the Pool Raise design. The evaluation would cover the methods and results of the necessary work needed to perform for the investigation, provide key graphics, and summarize the findings, conclusions, and recommendations. The evaluation would include the following:

- Detailed site map showing all investigations
- Boring logs, test pit logs, and laboratory results
- Updated site geologic map and two preliminary geologic cross sections oriented normal and parallel to the spillway alignment.
- Evaluation of design parameters

Design

SSWD would coordinate with FERC and DSOD at the 30 percent, 60 percent, 90 percent and final design milestones. SSWD would prepare a Final Design Report that would include detailed hydraulic, geotechnical and design evaluation. The final design documents would be submitted to FERC and DSOD for final approval/acceptance. A 60 percent design (draft of the final design) would be provided to FERC and the California Division of Safety of Dams (DSOD) for review and approval. Following approval of the 60 percent design, SSWD would advertise the work for bid and contractor selection.

Obtain Permits and Approvals

SSWD would consult with FERC, federal, state and local agencies to discuss the Pool Raise's permitting/approval needs, including any necessary ground-disturbing investigations. Table 2.2-2 list permits and approvals that may be required.

Table 2.2-2. Anticipated permits and approvals that may be needed for the Pool Raise.

Permit/Approval	Issuing Body
Approval for inclusion in the License	FERC, including SWRCB's issuance of Clean Water Act Section 401 Water Quality Certification for FERC's issuance of the new license. Compliance with both NEPA and CEQA would be required. It is assume d SSWD would be the lead agency for CEQA compliance.
Clean Water Act Section 404 Permit	U.S. Army Corps of Engineers – Nationwide Permit (NWP) #3 [Maintenance] and #7 [Outfall Structures & Associated Intake Structures]
Clean Water Act Section 401 Water Quality Certification for Construction	Central Valley Regional Water Quality Control Board or State Water Quality Control Board
Section 1600 Streambed Alteration Agreement	California Department of Fish and Wildlife
Endangered Species Act – Section 7 Consultation	U.S. Fish and Wildlife Service. FERC or the USACE would be the lead agency for consultation. A biological opinion may be needed.
Endangered Species Act Incidental Take Permit	California Department of Fish and Wildlife
National Historic Preservation Act, Section 106	State Historic Preservation Office and Native Americans. FERC or the USACE would be the lead agency for consultation.
Endangered Species Act Incidental Take Permit	California Department of Fish and Wildlife
Grading permits	Counties of Sutter, Yuba and Nevada
Clean Water Act Section 402 (National Pollution Discharge Elimination System)	Central Valley Regional Water Quality Control Board
Stormwater Pollution Prevention Plan	Central Valley Regional Water Quality Control Board
Other Approvals	California Division of Safety of Dams, FERC

On-Site Kick Off Meeting to Discuss Logistics, Work Sequence and Safety

A pre-construction meeting will be held with the construction contractor to discuss construction related activities including schedule, work sequencing, environmental requirements, temporary facilities, staging areas, parking, site access, traffic control, and various other items.

Prepare Site for Demolition, including Traffic Control

The following activities are expected to be performed to prepare for demolition work required for the existing weir:

- Set-up project notification and warning signs in accordance with Caltrans Unified Traffic Control Devices Manual Devices (MUTCD) and Yuba County standards at locations along the east and west approaches of Blackford Road to notify on-coming traffic of construction being conducted at the site.
- Provide traffic control as needed for deliveries and hauling of materials to and from the site.
- Set-up staging areas, including staging area near southeast side of existing bridge on Blackford Road.
- Set-up all environmental and safety controls.
- Construct access ramps to existing spillway.
- Move demolition tools and equipment to the existing weir area and set-up.

Demolition of Existing Weir, and Removal of Waste

The following activities are expected to be performed for the removal of the existing weir:

- Sawcut a minimum of 12” existing weir at elevation 295 on the vertical upstream face of the weir at elevation 295.71 on sloped downstream face of the weir. Sawcuts shall be perpendicular to the face of the weir.
- Stop sawcuts a minimum of 6-inches from longitudinal joints. Chip out concrete around waterstop and protect and preserve a minimum of 6-inches of the waterstop in the joints.
- The remaining concrete on the weir may be removed by hydroblasting or hydrodemolition. Removing concrete by hammering or percussion means shall not be allowed.
- All concrete removal by hydrodemolition and water used shall be contained and disposed of off-site.

Prepare Foundation for New Concrete

The following activities are expected to be performed for the preparation of the foundation for the new concrete:

- Surfaces of all existing concrete against which new concrete will be placed shall be roughened to a minimum of 0.25 inch amplitude.
- Within 48 hours prior to placement of new concrete, use low-pressure water jetting to remove all loose materials and rust at existing reinforcement.
- Protect exposed existing waterstops from sun exposure and damage during reinforcement installation procedures.

- Protect reinforcement after removal of existing concrete to preclude rust forming on the ends of exposed reinforcement.

Construct Forms for New Concrete

The following activities are expected to be performed for constructing forms for the concrete:

- Formwork shall be designed by an engineer licensed in the state of California and shall support all concrete placement loads.
- Formwork may consist of wood or steel; aluminum formwork or accessories shall not be allowed.
- Formwork shall be designed for placement of concrete in 2 lifts.

Install Rebar and Pour New Concrete

The following activities are expected to be performed for the installation of the new rebar and concrete:

- All reinforcement shall consist of 60 ksi reinforcement.
- Vertical anchor dowels shall consist of #10 bars and shall be placed in 2-inch diameter grouted holes with a minimum embedment as shown on the drawings and shall be located at 6-feet on-center each way in each section of the crest.
- Edge distance from joint to vertical anchors shall be a minimum of 6-inches and shall not exceed 12-inches.
- Vertical anchor dowels may be mechanically coupled above the surface of the concrete removal and above the existing apron with Engineer approved mechanical couplers.
- Anchor dowels shall have a 135-degree hook that connects with the reinforcement mat to be placed at the surface of the new structure.
- Dowels placed between new and existing concrete shall consist of #5 bars and shall be placed in 1-1/2-inch diameter holes with a minimum embedment of 8-inches and shall be located at 12-inches on center each-way in each structure.
- Place #5 dowels as shown to match existing longitudinal reinforcement.
- Edge distance from joint to dowels shall be a minimum of 6-inches and shall not exceed 12-inches.
- Roughen hole surfaces by means of a wire brush and remove loose materials prior to grouting all dowels.
- Place 9-inch waterstops per manufacturer’s requirements at each contraction joint to match existing waterstops. Weld new waterstops to existing waterstops per manufacturer recommendations.
- Place new #5 vertical longitudinal bars in first concrete lift to elevation 295 and allow for Type A lap with vertical bars from second and final lift in accordance with ACI 318.

- Horizontal #4 bars at 12-inches on-center shall be lapped as needed in crest sections and shall not extend through contraction joints.
- Minimum cover for all reinforcement shall be a minimum of 3-inches.
- Concrete shall be placed in 2 lifts the first lift to elevation 295 and the second lift to complete crest structure.
- Concrete mix design:
  - Minimum 28-day strength of 4,000 psi
  - Shall have a maximum aggregate size of 0.75
  - All aggregate shall be proven to conform to ASTM C1567 for alkali reactivity
  - Type II/V low alkali cement shall be used
  - Class F Fly Ash may be used up to a 20 percent replacement of cementitious materials to reduce heat of hydration in concrete
  - Air entrainment shall be a minimum of 6 percent
  - Maximum water/cement ratio of 0.45
  - All admixtures shall be compatible and shall not contain any chlorides
  - Maximum slump of concrete shall not exceed 3-inches.
- Roughen surface of first lift to be in contact with second lift to a 0.25 inch amplitude and remove all laitance and loose materials prior to placement of final concrete lift.
- All concrete placement work shall conform to ACI 305R and 306R hot and cold weather placements of concrete.
- Both lifts are categorized as mass concrete placements and shall be placed in accordance with ACI 207.1 to prevent thermal cracking.

Clean-Up and Site Restoration

During construction daily clean-up activities will take place to keep construction and staging areas clean. After construction is completed the disturbed areas, including areas where temporary access or staging has taken place, will be restored to similar conditions prior to construction. Equipment, material, temporary facilities, temporary controls, etc. will be removed from the site. A final clean-up and walk-thru will be conducted to make sure site clean-up and restoration has been completed.

2.2.1.2 Change to Existing Recreation Facilities

As a result of the Pool Raise, 104 recreational facilities or site features would be impacted along the shoreline at the NSRA and SSRA. Most of the impacted features (i.e., 59%) would be directly impacted by the pool raise by either partially or fully inundating the features. In these instances, the inundated features would be relocated, re-routed or re-aligned to avoid inundation. The remaining impacted features (i.e., 41%) would be indirectly impacted, whereby the Pool Raise would not inundate the feature, but would closely abut the feature likely resulting in flooding and/or erosion impacts to the features due to wind, wave or high flow events. In a few instances, a feature would be indirectly impacted and require relocation because an inundated segment of a circulation road would likely be re-aligned through these features. The construction work to relocate, re-route or realign the impacted features would be completed in one calendar year. Overall, the majority of the construction would occur outside the peak recreation season (i.e., Memorial Day through Labor Day holiday weekends). In instances where construction would be necessary during the peak season, the work would be restricted to select areas and conducted during low-use periods (i.e., weekdays) to minimize any impacts to the recreation facilities and visitor experiences.

At NSRA, 57 site features would be impacted, including 21 campsite living spaces (i.e., table and/or grill area), 19 campsite vehicle spurs, 13 circulation road segments (i.e., 2,410 ft of dirt roads and 480 ft of paved roads), 2 boat ramp and parking area segments, 1 picnic site, and 1 water hydrant. The majority of the impacted recreational site features at NSRA would be at the family campground (i.e., 43 impacted features) followed by the dispersed use areas (i.e., 6 impacted features – all dirt roads), group campground (i.e., 4 impacted features), and the day use area and boat launch facilities (i.e., each with 2 impacted features). At the family campground, most of the impacted features would be campsite living spaces and vehicle spurs (i.e., each with 19 impacted sites) with a five impacted road (dirt surface) segments. At the group campground, one of the two group campsites would be fully inundated. At the dispersed use areas, all of the impacted features would be the dirt roads (i.e., 1,410 ft) that provide shoreline access. Overall, most of the impacted features at NSRA (i.e., 61%) would be directly impacted by the pool raise and the remaining impacted features would be indirectly impacted (i.e., features abutting the 305 ft NMWSE).

At SSRA, 47 site features would be impacted, including 15 circulation road segments (i.e., 3,720 ft of dirt roads and 1,140 ft of paved roads), 11 campsite living spaces (i.e., table and/or grill area), 9 picnic sites, 7 campsite vehicle spurs, 1 boat ramp turnaround area, 1 parking area, 1 swim beach, 1 water hydrant, and 1 stage. The majority of the impacted recreational site features at SSRA would be at the family campground (i.e., 22 impacted features) followed by the day use area (i.e., 14 impacted features), dispersed use areas (i.e., 9 impacted features – all dirt road segments), the swim beach (i.e., 2 impacted features), and the boat launch (i.e., 1 impacted feature). At the family campground, most of the impacted features would be campsite living spaces (i.e., 11 sites), vehicle spurs (i.e., 7 sites) and road segments (i.e., 3 segments). At the dispersed use areas, all of the impacted features would be the dirt roads (i.e., 2,710 ft) that provide shoreline access. The entire swim beach would be inundated. Overall, most of the impacted features at SSRA (i.e., 55%) would be directly impacted by the Pool Raise and the remaining impacted features would be indirectly impacted (i.e., features abutting the 305 ft NMWSE). Notably, at five campsites in the family campground, the campsite living space and vehicle spurs would be indirectly impacted and require relocation because an inundated segment of the campground circulation road would likely be re-aligned through these campsites.

2.2.2 Change to Existing FERC Project Boundary

SSWD proposes several changes to the existing FERC Project Boundary in order to more accurately define lands necessary for the safe operation and maintenance of the Project and other purposes, such as recreation, shoreline control, and protection of environmental resources. This includes modifying the existing FERC Project Boundary to remove lands surrounding the Camp Far West 60 kV transmission line, which is part of the Project, and other lands not used for Project operations. The transmission line, which was built and is owned and operated by PG&E, was originally included in the license application as part of the Camp Far West Hydroelectric Project. However, on April 2, 1991, with the consent of PG&E, the transmission line from the Camp Far West switchyard was removed from the Camp Far West Hydroelectric Project FERC license and added to PG&E's Camp Far West Transmission Line Project (FERC Project No. 10821). SSWD inadvertently did not amend the FERC Project Boundary at that time.

There are two categories of proposed Project Boundary changes:

- Proposed addition of lands to the existing FERC Project Boundary that are currently utilized with a preponderance of use related to the Project operation and maintenance, and proposed removal of lands from the Project Boundary that do not have Project facilities and are not used or necessary for Project O&M. These proposed changes are essentially making corrections to the existing FERC Project Boundary.
- Proposed changes to the existing FERC Project Boundary around the Project reservoir and impoundments from surveyed coordinates to a contour located above the NMWSE or to a distance of 200 ft from NMWSE. These changes are proposed as these are the preferred methods of defining project boundaries as outlined in the FERC Drawing Guide (FERC 2012) and as it is a better representation of lands required for Project O&M around the Project reservoir.

Proposed changes are discussed below. All proposed changes are described in detail in Section 2.0 of Exhibit G.

SSWD proposes the following changes under the category of corrections to the existing FERC Project Boundary:

- The addition of the areas that encompass rights-of-way for road access to the Camp Far West Powerhouse used to access and maintain the dam outlet and powerhouse. Land in this proposed addition is owned by a private land owner (Placer County Assessor's Parcel Number 018-020-015-000).
- The removal of the land owned by SSWD to the west of the dam spillway (Yuba County Assessor's Parcel Number 015-370-016-000). These lands are not used or needed for Project O&M. Note that the area of the new Spillway Modification to the Bear River is retained in the proposed Project Boundary with a 15 ft buffer.
- The removal of the area in the existing Project Boundary bounded on the north and west by Camp Far West Road, extending to a boundary established at 200' from the NMWSE. This land is not used for Project O&M. Land in this proposed removal is owned by SSWD (Yuba County Assessor's Parcel Numbers 015840021000, 015840020000, 015370016000).
- The removal of the area in the existing Project Boundary bounded on the north by Camp

Far West Road, extending to the northern use limit of the North Recreation Area. This land is not used as part of the recreation facility or for Project O&M. Land in this proposed removal is owned by SSWD (Yuba County Assessor's Parcel Number 015840022000).

SSWD proposes the following changes under the category of a contour 20 ft above NMWSE or proximity of 200 horizontal ft from NMWSE:

- The addition and removal of land such that the Project Boundary around Camp Far West Reservoir where the Project Boundary is not encompassing Project facilities is defined by the lesser (closer to reservoir NMWSE) of either the topographic contour of 320 ft, which is 20 ft above the NMWSE, or 200 horizontal ft from the NMWSE. Lands in this proposed change are a combination of lands owned by private land owners and SSWD. The corrections consist of many small additions and subtractions from the existing FERC boundary based on higher accuracy elevation data made available since the creation of the original boundary geometry. Areas of significant change are limited to the upland reaches of tributary canyons of unnamed creeks where the existing FERC Boundary extends beyond 200 ft horizontally from the NMWSE. All of the upland canyon changes are removal of lands included in the existing FERC boundary.

Table 2.2-3 summarizes SSWD's proposed changes to the existing FERC Project Boundary.

Table 2.2-3. Summary of proposed changes to the existing FERC Project Boundary.

Owner and Action	Added to Include Primary Project Roads (ac)	Beyond 200 ft from NMWSE (ac)	Correction to 320 ft contour (ac)	Not Used for Project O&M (ac)	Added to include recreation area (ac)	Total (ac)
EXISTING FERC PROJECT BOUNDARY						
Private Lands	--	--	--	--	--	139.6
SSWD Lands	--	--	--	--	--	2,724.1
Total	--	--	--	--	--	**2,863.7**
PROPOSED CHANGES TO EXISTING FERC PROJECT BOUNDARY						
Changes to Private Lands						
addition	+0.7	--	+7.2	--	--	+7.9
subtraction	--	-0.4	-0.4	--	--	-0.8
Subtotal	*+0.7*	*-0.4*	*+6.8*	*0.0*	--	*+7.1*
addition	0	--	+7.7	--	+6.7	+14.4
subtraction	--	-87.6	-2.0	-121.6	--	-211.2
Subtotal	*0*	*-87.6*	*+5.7*	*-121.6*	*+6.7*	*-196.8*
Total	**+0.7**	**-88.0**	**+12.5**	**-121.6**	**+6.7**	**-189.7**
PROPOSED FERC PROJECT BOUNDARY						
Private Lands	--	--	--	--	--	146.7
SSWD Lands	--	--	--	--	--	2,527.3
Total	--	--	--	--	--	**2,674.0**

Where SSWD proposes to add private lands to the FERC Project Boundary, SSWD has notified the land owner of this proposal.

Neither the existing FERC Project Boundary nor the Proposed FERC Project Boundary includes federal lands or tribal reservation lands.

2.2.3 Changes to Existing Project Operations

The Pool Raise would create additional storage space in Camp Far West Reservoir, which allows for more water to be stored when Camp Far West Reservoir fills and spills. The additional stored water may be delivered for water supply in the year when it is stored, or carried over for water supply in future years. Some of the changes to the No Action Alternative with the Pool Raise include:

- Increase in average annual water supply deliveries to SSWD of 2,500 ac-ft overall WYs, ranging from an increase of 4,400 ac-ft in Below Normal and Dry WYs to 400 ac-ft in Wet WYs.
- Increase in average annual carryover storage in Camp Far West Reservoir of 5,200 ac-ft overall WYs, ranging from an increase of 9,000 ac-ft in Wet WYs to 100 ac-ft in Critical WYs.
- Increase in average annual energy production at Camp Far West Powerhouse of 904 MWhrs over all WYs, ranging from an increase of 1,287 MWhrs in Wet WYs to 88 MWhrs in Critical WYs.
- Increase of three years (i.e., 1987, 1990 and 2001) when Bay-Delta Settlement Agreement releases would be made.
- Decrease in average annual flow below the non-Project diversion dam of 4 cfs, ranging from a decrease of 8 cfs in Below Normal WYs to no change in Dry WYs. No measurable difference in the Bear River downstream due to accretion.

2.2.4 Changes to Conditions in the FERC license and Other Agreements

2.2.4.1 SSWD's Proposed Conditions in the FERC license

SSWD developed Proposed Conditions, including associated implementation plans, for the new licenses. These conditions are:

- SSWD Proposed Conditions AR1. SSWD shall maintain a continuous minimum flow of 25 cfs from April 1 through June 30 and 10 cfs from July 1 through March 31 or inflow to Camp Far West Reservoir, whichever is less, as measured immediately below the non-Project diversion dam downstream of Camp Far West Dam. The flows may be temporarily modified if required by operating emergencies beyond the control of SSWD or for short periods for fishery management purposes, upon mutual agreement between SSWD and CDFW.
- SSWD Proposed Condition TR1. SSWD shall within one year of license issuance and in consultation with CDFW and USFWS develop a Bald Eagle Management Plan that will provide for the protection of bald eagles during nesting at Camp Far West Reservoir.

- SSWD Proposed Condition TR2. SSWD shall within one year of license issuance and in consultation with CDFW install and thereafter maintain devices to exclude bats from Project facilities.

- SSWD Proposed Condition RR1. Implement the Recreation Facilities Plan included in SSWD's Application for New License. The plan describes how SSWD will manage recreation at Camp Far West Reservoir, including the maintenance of Project recreation facilities.

- SSWD Proposed Condition CR1. Implement the Historic Properties Management Plan included in SSWD's Application for New License. The plan describes how SSWD will manage cultural resources within the FERC Project Boundary.

Refer to Appendix E2 for the full text of each proposed measure.

2.2.4.2 Changes to Measures in Other Licenses, Agreements and Contracts that Affect Operations

Section 2.1.5.2 describes other licenses (i.e., not the FERC license), agreements and contracts that affect current Project operations. When FERC issues its new license, SSWD would apply to the SWRCB to modify any water rights, if necessary, to make them consistent with the new license. SSWD does not anticipate any changes will be needed to SSWD's water delivery contracts. Upon termination of the existing SSWD/SMUD Contract, SSWD plans to negotiate a new lease/power purchase contract or multiple contracts with, at this time, an unknown third party, which could be SMUD, or other parties. SSWD may continue to make water transfers, when possible, and will abide by the requirements, which are unknown at this time, in a new power purchase contract. SSWD would continue to make releases to meet its Bay-Delta commitment.

2.2.5 Changes to Existing Facility Maintenance

Section 2.1.6 describes SSWD's existing facility maintenance measures. SSWD does not propose any changes to those measures.

2.3 Alternatives Considered But Eliminated From Further Analysis

SSWD considered but eliminated from further analysis the following alternatives:

- Retire the Project
- Issue a Non-Power License
- Federal Agency Takeover of the Project
- Alternatives Proposed by FWN in its DLA Comments

Each of these alternatives and the consideration of factors through which the alternative was eliminated from further analysis are described below.

2.3.1 Retire the Project

Project retirement could be accomplished with or without removal of the Project dam. No Relicensing Participant has proposed that removal of the Project dam would be appropriate in this case and, besides providing for hydroelectric power generation, the dam also provides critical water-supply functions, as well as important environmental and recreational opportunities. For these reasons, there is little practical basis for recommending removal of the Project dam, and dam removal is not a reasonably foreseeable alternative to relicensing the Project with appropriate resource management measures.

The second Project retirement alternative would involve retaining the Project dam and disabling or removing equipment used to generate power. Project works would remain in place and would be used for historical consumptive-use, environmental and recreational water management, or other purposes. No Relicensing Participant has advocated this alternative and there is no basis for recommending it. Because the power supplied by the Project is needed, replacement power from some other source, without adding air pollutants, would have to be provided. For these reasons, removal of the electric generating equipment is not a reasonably foreseeable alternative.

2.3.2 Issue a Non-Power License

A non-power license is a temporary license that FERC would issue when it determines that a governmental agency, other than SSWD in this case, would assume regulatory authority and supervision over the lands and facilities covered by the non-power license. At this point, no agency has suggested a willingness or ability to do this. No party has sought a non-power license and there is no basis for concluding that the Project should no longer be used to produce power. As stated above, if the power facilities were removed, a source of replacement power would have to be identified. Thus, a non-power license is not a realistic alternative to relicensing in this circumstance.

2.3.3 Federal Agency Takeover of the Project

Federal takeover of the Project is not a reasonably foreseeable alternative. Federal takeover and operation of the Project would require Congressional approval. While that fact alone would not preclude further consideration of this alternative, there is no evidence to indicate that federal takeover should be recommended to Congress. No Relicensing Participant or other party has suggested federal takeover would be appropriate, and no federal agency has expressed an interest in operating the Project. So, federal takeover of the Project is not a reasonably foreseeable alternative.

2.4 List of Attachments

There are no attachments to this section.

SECTION 3.0

ENVIRONMENTAL ANALYSIS

This section has four components. Section 3.1 provides a general description of the river basin in which the Project occurs, including existing water projects. Section 3.2 provides the temporal and geographic scope of the cumulative effects analysis in this Exhibit E, and describes past, present and reasonably foreseeable future actions considered in the analysis. Section 3.3 explains the effects of SSWD's proposed Project on environmental resources using the information included in SSWD's PAD, information developed through SSWD's studies, and other information otherwise developed or obtained by SSWD.[1]

3.1 General Description of the River Basin

3.1.1 Existing Water Projects in the Bear River Basin

Four existing water projects, all of which are under FERC's jurisdiction, occur in the Bear River Basin. Together, these four projects have a combined FERC-authorized capacity of 277.95 MW, of which the Camp Far West Project represents approximately 2.4 percent of the total capacity. Each of these water projects is described briefly below.

3.1.1.1 Drum-Spaulding Project

PG&E's 190-MW Drum-Spaulding Project, FERC Project No. 2310, is located on the South Yuba River, Bear River, North Fork of the North Fork American River and tributaries to the Sacramento River Basin in Nevada and Placer counties, California. Major project reservoirs include Lake Spaulding (74,773 ac-ft) on the South Yuba River and Fordyce Lake (49,903 ac-ft) on Fordyce Creek. In addition, the Drum-Spaulding Project includes numerous smaller reservoirs on tributaries to the South Yuba River, and diversions from the South Yuba River to Deer Creek via the South Yuba and Chalk Bluff Canals (maximum capacity of 107 cfs) and to the Bear River via the Drum Canal (840 cfs). In anticipation of the expiration of the initial license on April 30, 2013, PG&E filed with FERC an application for a new license on April 12, 2011. In that application, PG&E requested FERC split the existing license into three separate licenses, one each for the Upper Drum-Spaulding Project, Lower Drum-Spaulding Project and Deer Creek Project. Since the initial license expired, PG&E has operated the Project under annual licenses from FERC and is expected to continue to do so until a new license is issued.

[1] Because a voluminous amount of information exists or has otherwise been developed for many resource areas, SSWD has made a good faith effort to bring forward the most important and relevant information into Section 3.3. However, if readers want a more comprehensive understanding of the totality of available information, data and study results, readers should review other relicensing materials, including SSWD's PAD and the data summaries available on SSWD's relicensing website at www.sswdrelicensing.com.

3.1.1.2 Yuba-Bear Hydroelectric Project

NID's 79.3-MW Yuba-Bear Hydroelectric Project, FERC Project No. 2266, is a water supply/power project constructed in the 1960s, though some project facilities were initially constructed in the late 1800s. The project includes a storage reservoir on the Middle Yuba River (i.e., Jackson Meadows Reservoir) with a gross storage capacity of 69,205 ac-ft, five storage reservoirs on Canyon Creek (i.e., Jackson, French, Faucherie, Sawmill and Bowman) with a combined gross storage capacity of 90,790 ac-ft, and a storage reservoir on the Bear River (Rollins Reservoir) with a gross storage capacity of 58,682 ac-ft. The Project also includes a diversion with a maximum capacity of about 450 cfs via the Milton-Bowman Diversion Dam from the Middle Yuba River to Bowman Lake on Canyon Creek, and a diversion with a maximum capacity of about 300 cfs via the Bowman-Spaulding Canal from Bowman Lake on Canyon Creek to PG&E's Lake Spaulding on the South Yuba River. In anticipation of the expiration of the initial license on April 30, 2013, NID filed with FERC an application for a new license on April 15, 2011. Since the initial license expired, NID has operated the Project under annual licenses from FERC and is expected to continue to do so until a new license is issued.

3.1.1.3 Lake Combie/Combie North Aqueduct Projects

The 1.5-MW Lake Combie Project, FERC Project No. 2981, along with the 0.35-MW Combie North Aqueduct Project, FERC Project No. 7731, are FERC-exempt power projects constructed in the 1980s at NID's Van Geisen Dam, that forms Lake Combie, on the Bear River. The dam was originally constructed in 1928. Lake Combie has a gross storage capacity of 5,555 ac-ft.

3.1.1.4 Camp Far West Hydroelectric Project

The existing Camp Far West Hydroelectric Project is described in Exhibit A of this Application for New License.

3.1.2 The River Basin

Provided below is a description of the general setting of the Project Vicinity. The discussion focuses primarily on the Project Area. A general description of the Feather River downstream of the Bear River confluence and the Sacramento River is also provided for reference.

Figure 3.1-1 is a streambed gradient profile of the Bear River and its tributaries from and including Camp Far West Reservoir, the most upstream Project facility, to the Bear River's confluence with the Feather River. Figure 3.1-2 shows Bear River drainage sub-basins.

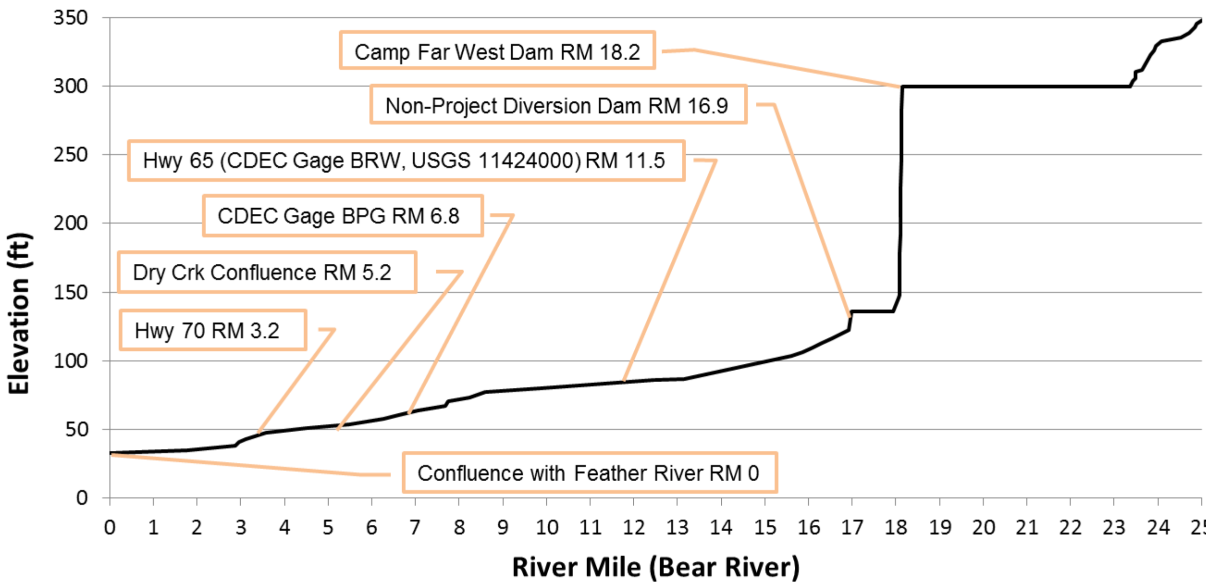

Figure 3.1-1. Streambed gradient of the Bear River from Camp Far West Reservoir, the most upstream Project facility, to the Bear River's confluence with the Feather River.

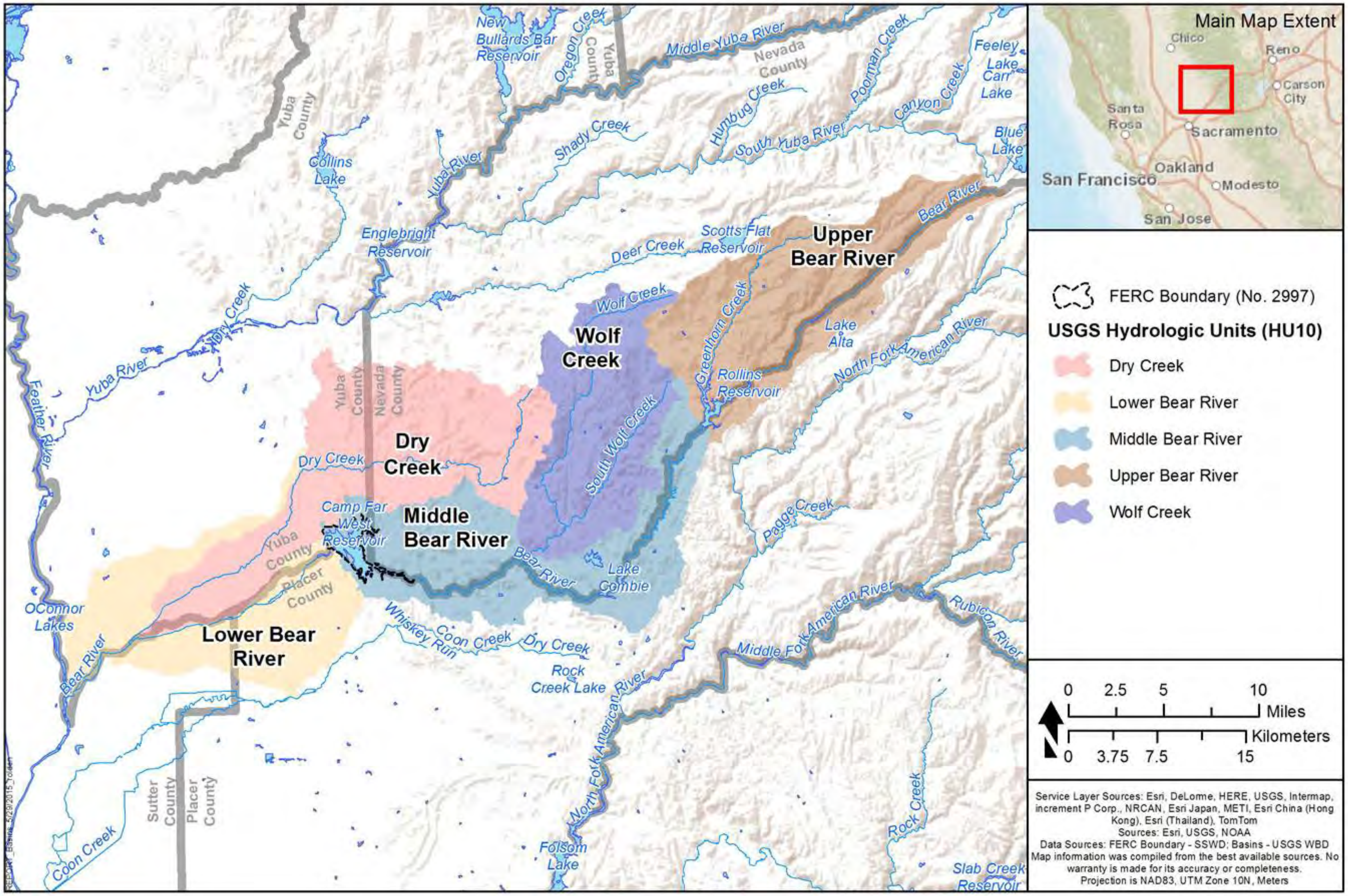

Figure 3.1-2. Bear River drainage sub-basins.

3.1.2.1 Bear River Basin

The Bear River basin is on the western slope of the Sierra Nevada and is bounded by the Yuba River basin to the north, the American River basin to the south, and the Feather River basin to the west. The Bear River originates near Emigrant Gap in Nevada County in Township 17 North, Range 12 East at an elevation of approximately 4,900 ft and then flows southwesterly for approximately 75 mi to its confluence with the Feather River northeast of the town of East Nicolaus, CA, at an elevation of about 50 ft. The Bear River drains approximately 400 sq mi in Yuba, Nevada, Sutter, and Placer counties. The average annual flow of the Bear River from WY 1975 to WY 2014 as measured at the USGS Gage 11424000, *Bear River at Wheatland*, at RM 11.5 is 376 cfs, and the annual flow has ranged from a maximum of approximately 1,191 cfs in WY 1983 to a minimum of approximately 3 cfs in WY 1977.

Upstream of Camp Far West Reservoir at RM 74.5, PG&E's Drum-Spaulding Project Drum Canal can add up to 840 cfs of water to the natural flow in the Bear River at PG&E Drum Forebay, which is at elevation (El.) 4,756 ft and has a gross storage capacity of 621 ac-ft. Other small impoundments in the Bear River include PG&E's Drum Afterbay at RM 65.9, which is at El. 3,383 ft, and NID's Dutch Flat Afterbay at RM 60.5, which is at El. 2,740 ft and has a gross storage capacity of 1,397 ac-ft. Major storage reservoirs in the Bear River occur at RM 50.4 (NID's Rollins Reservoir at El. 2,171 ft with a gross storage capacity of 58,682 ac-ft) and at RM 37.2 (NID's Lake Combie at El. 1,600 ft with a gross storage capacity of 5,555 ac-ft). Out-of-basin diversions occur at RM 50.3 (PG&E's Bear River Canal with a maximum capacity of 470 cfs) and at RM 37.2 (NID's Combie Phase I Canal with a maximum diversion of 200 cfs).

From the Van Giesen Dam, the Bear River flows another 13.8 mi until it reaches the NMWSE (i.e., El. 300 ft) of Camp Far West Reservoir at RM 23.4.

Camp Far West Reservoir is relatively shallow and has an average retention time of about 4 months. The reservoir has two main arms. The longer arm extends approximately 5.2 mi upstream of the dam into the Bear River, and the shorter arm extends upstream about 2.4 mi into Rock Creek, a small tributary to the Bear River. The lower portion of the Bear Creek arm is the widest portion of the reservoir at about 1-mi wide. Most of the land surrounding Camp Far West Reservoir is undeveloped (i.e., no roads or residential communities), with the exception of the recreation areas.

Based on recent bathymetric surveys, the Camp Far West Reservoir has a gross storage capacity of 93,740 ac-ft, which results in a surface area is 1,886 ac and a shoreline length of 29 mi. At the minimum operating pool (El. 175 ft),[2] the reservoir has a gross storage of 1,310 ac-ft and a surface area of 55 ac.

Similar to the other reservoirs in the Bear River Basin, the normal operation for Camp Far West Reservoir is to fill as early in the season as sufficient water becomes available and to then spill

[2] Minimum operating pool is the sill elevation of the low level intake structure, whereby no additional releases can be made from the reservoir.

the excess flows over the ungated spillway. Because the reservoir is primarily fed by rainfall-produced runoff and releases from upstream reservoirs, it is difficult to predict the amount of inflow anticipated before the end of the season. Therefore, SSWD retains within the reservoir all of the inflow except for instream flow requirements until the beginning of the irrigation season. Since the reservoir is operated as a fill-and-spill system, its effect on downstream flood flows is erratic, as it may range from complete control to only minor surcharge regulation.

The reservoir normally reaches its maximum level in January when the basin produces its heaviest runoff. The water level starts to decline in mid-April, at the beginning of the irrigation season, and reaches its lowest point (usually around El. 178 ft) in mid-October when irrigation deliveries are no longer made.

Power is produced at Camp Far West Powerhouse during the winter/early spring months when the reservoir is spilling and during the spring and summer months when releases are being made for irrigation and to meet instream flow requirements. Because of the generating unit's operating characteristics, power can only be generated when the elevation of the reservoir water surface is at or above 235 ft and when the flow is greater than 270 cfs. If these two criteria cannot be met, water is released through the low-level outlet. This condition normally occurs each year starting in September and continuing into the fall until such time that surplus flows are available to be passed through the powerhouse.

During the irrigation season, up to a maximum of 530 cfs passes through the turbine in conformance with downstream irrigation and instream flow requirements. However, during the heavy runoff period, when spilling from the reservoir occurs, a greater quantity of water is routed through the powerhouse to its maximum limit of 725 cfs.

The existing Camp Far West Dam is the second dam built at this location. The original dam was a 50-ft high concrete gravity structure, built by the CFWID in 1927.

The drainage area at Camp Far West Dam is 281.8 sq mi, approximately 70 percent of the total Bear River drainage area.

From Camp Far West Dam, the Bear River flows southwest another 1.3 mi to a 38-ft high non-Project diversion dam where up to 475 cfs of Bear River water is diverted into SSWD's Conveyance Canal. Approximately 40 cfs of that water is re-diverted from the first 0.5-mi of the canal to the CFWID, with the remaining water going to SSWD's customers. In addition, up to 35 cfs of Bear River water is diverted at the non-Project diversion dam into CFWID Camp Far West Canal on the north bank.

From the non-Project diversion dam, the Bear River flows another 16.9 mi to where it empties into the Feather River.

3.1.2.2 Feather River, Sacramento River and Delta

The Bear River discharges into the Feather River, whose basin encompasses a broad variety of terrain, climate, historic use, and flora and fauna. Over 80 percent of the upper Feather River watershed is federally-owned land managed by the U.S. Department of Agriculture, Forest Service as part of the Plumas National Forest. Approximately 11 percent of the upper Feather River watershed is alluvial valleys that are predominantly privately-owned and used for livestock grazing. The rest of the land is used for other agricultural purposes, urban development and wildlife habitat.

Water originating from the Feather River drainages provides significant amounts of water to California's SWP, which provides water to meet urban and agricultural demands. The Feather River Basin also produces significant forest and agricultural outputs. Flow in the lower Feather River is controlled mainly by releases from Lake Oroville, the second largest reservoir in the Sacramento River basin and part of DWR's Oroville Project (FERC Project No. 2100), and by flows from the Yuba and Bear rivers. As with many Sierra Nevada foothill streams and rivers, the Feather River Basin has historically been influenced by large-scale gold mining operations. To a lesser degree, gold mining operations still continue within the western slope watersheds.

The Feather River drains into the Sacramento River, which provides water for municipal, agricultural, recreational, and environmental purposes throughout northern and southern California. The Sacramento River is the largest river system in California, yielding 35 percent of the state's water supply. Most of the Sacramento River flow is controlled by the United States Department of Interior, Bureau of Reclamation (Reclamation's) Shasta Dam and Reservoir, and river flow is augmented by imports of Trinity River water through Clear and Spring Creek tunnels to the Reclamation's Keswick Reservoir. Immediately below Keswick Dam, the river is deeply incised in bedrock with very limited riparian vegetation.

The upper Sacramento River is often defined as the portion of the river from Princeton (i.e., RM 163; downstream extent of salmonid spawning in the Sacramento River) to Keswick Dam (i.e., the upstream extent of anadromous fish migration and spawning). The Sacramento River is an important corridor for anadromous fishes moving between the ocean and the Delta and upstream river and tributary spawning and rearing habitats. The upper Sacramento River is differentiated from the river's "headwaters," which lie upstream of Shasta Reservoir. The upper Sacramento River provides a diversity of aquatic habitats, including fast-water riffles and shallow glides, slow-water deep glides and pools, and off-channel backwater habitats (Reclamation 2004).

The lower Sacramento River is generally defined as the portion of the river from Princeton, CA, to the Delta at approximately Chipps Island near Pittsburg, California. The lower Sacramento River is predominantly channelized, leveed and bordered by agricultural lands. Aquatic habitat in the lower Sacramento River is characterized primarily by slow water glides and pools, is depositional in nature, and has lower water clarity and habitat diversity, relative to the upper portion of the river.

The Delta is a vast, low-lying inland region located east of the San Francisco Bay area, at the confluence of the Sacramento and San Joaquin rivers. Geographically, this region forms the eastern portion of the San Francisco estuary, which includes San Francisco, San Pablo and Suisun bays. An interconnected network of water channels and man-made islands, the Delta stretches nearly 50 mi from Sacramento south to the City of Tracy, and spans almost 25 mi from Antioch east to Stockton (Public Policy Institute of California 2007). The Delta is a complex area for both anadromous fisheries production and distribution of California water resources for numerous beneficial uses. Approximately 42 percent of the state's annual runoff flows through the Delta's maze of channels and sloughs, which surround 57 major reclaimed islands and nearly 800 un-leveed islands (WEF Website 2006). The Delta also includes the federal Central Valley Project Jones Pumping Plant and the SWP's Banks Pumping Plant (i.e., export pumps) in the south Delta. Water withdrawn from the Delta provides for much of California's water needs, including both drinking water and water for agricultural irrigation purposes.

3.1.2.3 Potentially-Affected Bear River Stream Reaches

Table 3.1-1 provides a description of stream reaches in the Bear River Basin potentially affected by continued Project operations.

Table 3.1-1. Stream reaches in the Bear River Basin potentially affected by continued Project operations.

River	Reach Name in PAD	Description
Bear River (1.3 mi)	Camp Far West Reach	Approximately 1.3 mi of the Bear River from Camp Far West Dam at RM 18.2 to the non-Project Diversion Dam at RM 16.9.
Bear River (16.9 mi)	Lower Bear River	Approximately 16.9 mi of the Bear River from the non-Project diversion dam at RM 16.9 to the confluence of the Bear River and the Feather River at RM 0.0.

3.1.2.4 Bear River Basin Streams and Tributaries

Table 3.1-2 provides a list of named tributaries and named secondary tributaries to the Bear River. Some of the tributaries are intermittent or ephemeral in nature and contribute water to the Bear River during only part of the year.

Table 3.1-2. Streams and tributaries to the Bear River.

Tributary	Secondary Tributaries
UPSTREAM OF THE PROJECT	
Wolf Creek, Steephollow Creek, Greenhorn Creek, Little Bear Creek	Numerous
WITHIN THE PROJECT	
Rock Creek, Long Ravine	--
DOWNSTREAM OF THE PROJECT	
Dry Creek	Best Slough

Source: USGS, National Hydrology Dataset.

3.1.2.5 Bear River Basin Dams

There are approximately 11 major dams and diversions in the Bear River Basin, with a combined storage capacity of approximately 155,940 ac-ft of water (Table 3.1-3). All of the dams except one are upstream of the Project and account for about 40 percent of the total storage capacity. The Project accounts for the other 60 percent of storage.

Table 3.1-3. Owners and capacities of dams and diversions in the Bear River Basin.

Owner	FERC Project No.	River / Tributary	Dam / Diversion	Reservoir Gross Storage Capacity (ac-ft)
PG&E	2310	Bear River	Drum Afterbay Dam	150.4
PG&E	2310	Off Channel	Alta Forebay Dam	19.4
PCWA	NA	Off Channel	Lower Boardman Canal Diversion Dam	Negligible
NID	2266	Off Channel	Dutch Flat No. 2 Forebay Dam	159.8
NID	2266	Bear River	Dutch Flat Afterbay Dam	1,359.2
NID	2266	Off Channel	Chicago Park Forebay Dam	103
NID	2266	Bear River	Rollins Dam	54,453
PG&E	2310	Bear River	Bear River Diversion Dam	Negligible
NID	2981 (Exempt)	Bear River	Van Geisen Dam (Lake Combie)	5,555
SSWD	2997	Bear River	Camp Far West Dam	93,740
SSWD	7580 (Exempt)	Bear River	Camp Far West Diversion Dam	Negligible
Total	**4 Projects**	--	**11 Dams/Diversions**	**155,539.8 ac-ft**

Key:
PG&E – Pacific Gas and Electric Company
PCWA – Placer County Water Agency
NID – Nevada Irrigation District
SSWD – South Sutter Water District

Figure 3.1-3 depicts the general location of each of the dams in Table 3.1-3.

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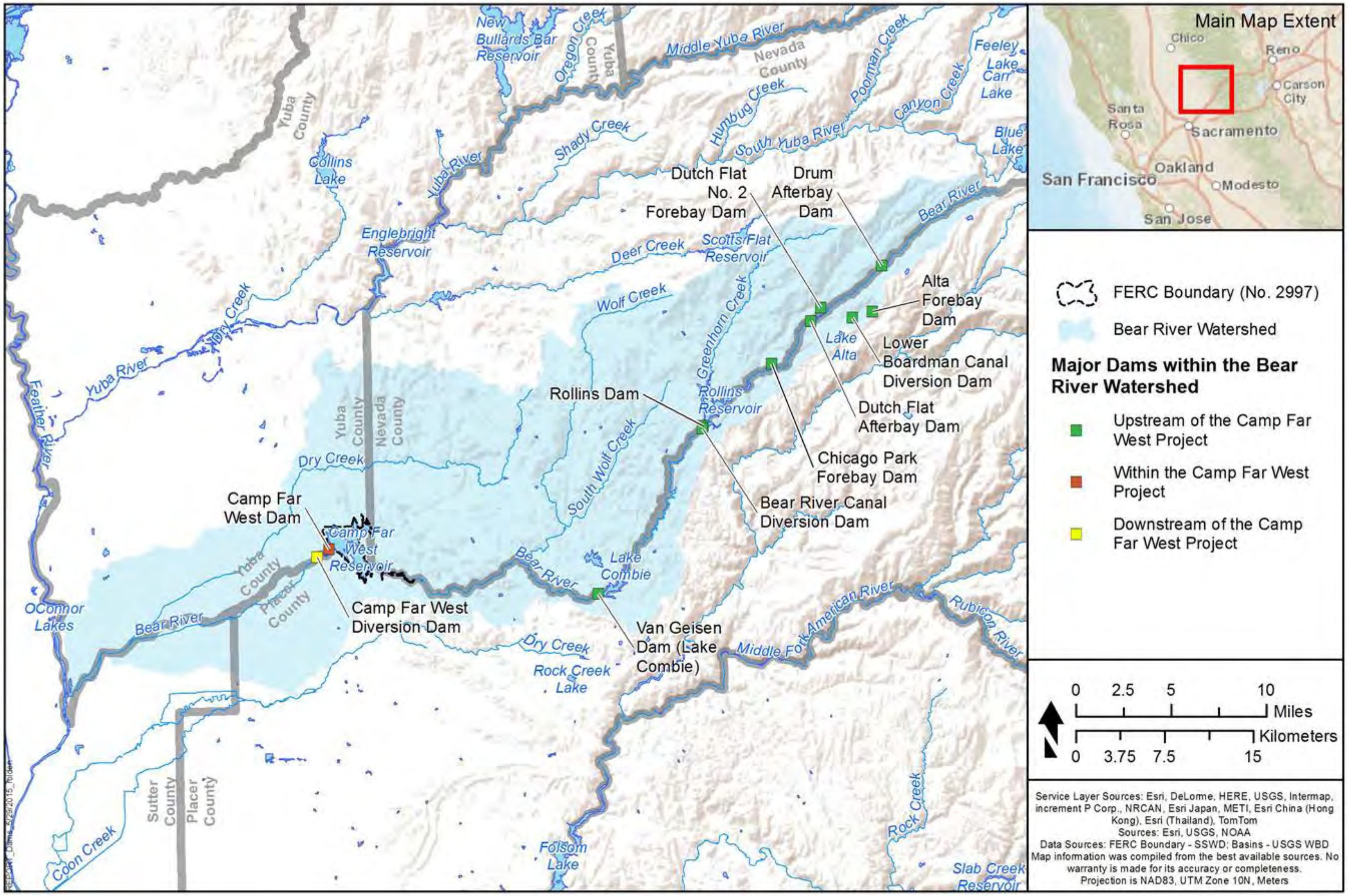

Figure 3.1-3. General location of dams within the Bear River watershed.

3.1.3 Climate

The Project Region,[3] which includes the sub-basins, excluding the Upper Bear River sub-basin, shown in Figure 3.1.2, experience hot, dry summers and cool winters with substantial rainfall, but no appreciable snowfall. The National Weather Service monitoring station Number 045385 at Marysville, at an elevation of approximately 75 ft, provides a climate history representative of the Project Region. These areas occupy the eastern Central Valley and rolling, western Sierra foothills, and can experience high summer temperatures, mostly unmitigated by the "Delta breezes" that are present further south and west in California's Central Valley. July air temperatures at Marysville, California, average a high of 96.4 degrees Fahrenheit (°F), and a low of 62.0°F. Average January high and low temperatures are 54.1°F and 38.0°F, respectively. Annual average precipitation totals 21.59 in., and falls exclusively as rain, with 67 percent falling during the winter months from December through March. June through August precipitation averages only 0.25-in., generally resulting from rare summer thunderstorms (WRCC 2009).

3.1.4 Major Land Uses

The topography around Camp Far West Reservoir consists of rolling hills and many oak trees with elevations from 150 to 320 ft. Slopes range from 2 to 30 percent and rock outcrops are common.

The area immediately adjacent to the reservoir is owned by SSWD and accessible to the public. Beyond that, land in the vicinity is rural in nature with large parcel (e.g., 20 ac or larger) homesteads and cattle ranching. Beale Air Force Base is located approximately 11 mi northwest of the dam.

Hydraulic mining for gold was prevalent in the Bear River and other watersheds in the Sierra Nevada during the latter half of the 19th century. Underground mining of hardrock (i.e., lode) gold-quartz vein deposits also was important in the Bear River watershed.

The Dairy Farm Mine, located in Placer County on the southeast side of the reservoir, produced copper, zinc, and gold from a deposit along the south shore of Camp Far West Reservoir, part of the Foothill Copper-Zinc Belt. Open pit mining was used at the Dairy Farm Mine during the 1920s and 1930s. When the water level in the reservoir is high, the pit is inundated by the reservoir, whereas at lower water levels, the pit is hydraulically isolated (Alpers et al. 2008).

The counties are the primary agencies for establishing land use policies for private land within the river basins and sub-basins. The county general plans provide the land use policies for each county. The Yuba County General Plan was adopted in 1996, and is currently being revised. Nevada County and Sierra County also adopted their general plans in 1996.

[3] In this Exhibit E, "*Project Region*" is defined as the area surrounding the Project on the order of a county.

3.1.5 Major Water Uses

The CVRWQCB, in its Basin Plan (CVRWQCB 1998) identifies existing beneficial uses of the waters in the Project Area as Municipal and Domestic Supply, Agricultural Supply, Power, Contact Recreation, Non-contact Recreation, Warm Freshwater Habitat, Cold Freshwater Habitat and Wildlife Habitat. The Basin Plan identifies potential beneficial uses of the water as Migration of Aquatic Organisms and Spawning.

3.2 Scope of Cumulative Effects Analysis

Council on Environmental Quality regulations require that EIS's describe direct and indirect effects of the proposed action (40 C.F.R. § 1502.16(a) & (b)). These regulations define "effects" to include cumulative effects (40 C.F.R. § 1508.8). These regulations state that a "*Cumulative impact is the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.*" (40 C.F.R. §1508.7.) Note that cumulative effects under ESA are defined differently.

Based on information in this Application for New License, SSWD concludes that the following resources have the potential to be cumulatively affected by the continued O&M of the Project as proposed in this Application for New License:

- water resources
- aquatic resources, including Pacific salmon EFH
- ESA-listed anadromous salmonids and their designated critical habitat

Provided below are the geographic and temporal scopes of the cumulative effects analysis for these resources, and the past, present, and reasonably foreseeable future actions considered in the analysis.

3.2.1 Geographic Scope for Analysis of Cumulatively Affected Resources

The geographic scope of the cumulative effects analysis defines the physical limits or boundaries of the Proposed Action's effect on the resources. Based on information in this Application for New License, SSWD defines the geographic scope for water resources, aquatic resources, and ESA-listed anadromous salmonids and their critical habitats as follows:

- from the NMWSE of Camp Far West Reservoir downstream in the Bear River to the Bear River's confluence with the Feather River

3.2.2 Temporal Scope for Analysis of Cumulatively Affected Resources

The temporal scope of the cumulative effects analysis includes a discussion of past, present, and future actions and their effects on each resource that could be cumulatively affected. For any resource identified as potentially having cumulative effects, the temporal scope will look 30 to 50 years into the future, based on the potential term of a new license, concentrating on the effect on the resource from reasonable foreseeable future actions. The historical discussion will, by necessity, be limited to the amount of available information for each resource.

3.2.3 Past, Present and Reasonably Foreseeable Future Actions Considered for Analysis of Cumulatively Affected Resources

Following FERC Guidelines on Preparing Environmental Documents, the application should include a brief discussion of past, present, and future actions, and their effects on resources based on the new license term (30 to 50 years). Further, the guidance from FERC notes the need to highlight the effect on the cumulatively affected resources from reasonably foreseeable future actions. The past actions' effects on a resource are normally outlined in the Affected Environment section.

Each of these actions is discussed below without consideration of the added effects, if any, of the Proposed Project. Incremental effects of the Proposed Project, when taken in combination with these actions, are discussed in the appropriate resource sections of this Exhibit E.

3.2.3.1 Past and Present Actions

Past and present actions contribute to the current condition of the resources, and are intrinsically embedded in the baseline (i.e., existing conditions), and are discussed where appropriate in the specific resource sections of this Exhibit E. These activities include harvesting, grazing, mining, and operation of upstream and downstream water projects. These activities affect the resources identified for cumulative effects analysis, and are outside the Commission's authority to regulate under a new license for the Camp Far West Project.

Timber harvesting and grazing affect water resources (i.e., both water quantity and water quality, including temperature), which in turn affect aquatic resources and ESA-listed anadromous fishes.

Mining affects water quality, especially the metal contaminant concentrations. The Dairy Farm Mine, which predates the Project, can affect water quality. Most notably, hydraulic mining has had drastic effects on geology and soils in the Bear River, especially with regards to channel morphology, substrate and riparian vegetation.

The most significant past and present actions in the Project area is the construction and operation of the various water projects on the Bear River, all of which went into operation prior to the Project. As described in Sections 3.1.2.1 and 3.1.2.5, upstream water projects in the Bear River import large amounts of water from the Yuba and American rivers, store the imported water as well as the natural flow in the Bear River, and divert large amounts of water. The result is that inflow into the Project is controlled by these upstream water projects, is somewhat unreliable since the upstream projects are operated for the benefit of their owners, and is not akin to the hydrology in an unimpaired system. For instance, in wet years, the upstream project may store and divert much of the runoff so that the Project inflow is more typical of a drier water year. In addition, the upstream projects capture large amounts of sediment and wood that would otherwise flow into the Project. Because of these upstream projects, releases from the Project do not reflect the natural hydrograph and can be unpredictable, especially in spring, which affects aquatic habitat and ESA-listed anadromous fishes.

In addition, flows in the lower Bear River for most of the spring and summer are mostly controlled by diversions at the non-Project diversion dam below Camp Far West Dam. As described in Section 3.1.2.1, approximately 510 cfs of water is diverted at the dam. These diversions can affect water quality, aquatic resources and habitat for ESA-listed fishes in the lower Bear River by reducing flow. Further, the non-Project diversion dam is a complete physical barrier to the upstream movement of anadromous fishes.

Water projects in the Feather River, such as DWR's Oroville Project, also have significant environmental effects in the Bear River. The releases from these projects along with the natural flow in the Feather River are often many magnitudes of order greater than Bear River flows, which result in backwatering in the lower Bear River, sometimes for over a mile.

While not as significant as the upstream and downstream water projects, the introduction and proliferation of giant cane grass in the lower Bear River, which predates the Project, has a significant effect on habitat for aquatic resources and ESA-listed fishes.

3.2.3.2 Reasonably Foreseeable Future Actions

The past and present actions described above are likely to continue in the future, though the magnitudes of particular actions may change. Timber harvesting and grazing are declining. Hydraulic mining was prohibited in the watershed in the late 1800's, but other forms of mining continue, and past mining activities continue to have environmental effects. Annual water demands are projected to increase. NID expects its demand will increase to 201,000 ac-ft by 2062 and PCWA anticipates its demand will increase to 118,000 ac-ft by 2062.

SSWD has not included in its cumulative effects analysis under reasonably foreseeable future actions the SWRCB's Bay-Delta Water Quality Control Plan, potential related changes in Feather River flows, and the Bay-Delta Conservation Plan (BDCP). SSWD has not included any potential SWRCB update of the Bay-Delta Water Quality Control Plan or any related changes in Feather River flows in the cumulative impacts discussions of this Amended FLA because the SWRCB's process to update this plan has not proceeded far enough for SSWD or the Commission to know what amendments to this plan may be adopted in the future. DWR and the USDOI, Bureau of Reclamation (Reclamation) now are pursuing possible development of the proposed BDCP Delta conveyance facilities through the California WaterFix Project. California Water Fix is a controversial $15,000,000,000 plan proposed by Governor Edmond G. Brown Jr. and DWR to build two large, 40-foot diameter tunnels to carry fresh water from the Sacramento River under the Delta toward the intake stations for the SWP and the CVP. SSWD has not included any potential changes in Project operations that may occur because of the California WaterFix Project because it is not possible at this time to know whether or not the California WaterFix Project will be implemented, or, if it is implemented, how its implementation might affect Project operations.

SSWD is unaware of any other reasonably foreseeable future actions for consideration in this cumulative effects analysis.

3.3 Existing Environment and Effects

Section 3.3 is further divided into subsections, by major resource areas:

- Geology and Soils (Section 3.3.1)
- Water Resources (Section 3.3.2)
- Aquatic Resources (Section 3.3.3)
- Terrestrial Resources (Section 3.3.4)
- Threatened and Endangered Species (Section 3.3.5)
- Recreation Resources (Section 3.3.6)
- Land Use (Section 3.3.7)
- Aesthetic Resources (Section 3.3.8)
- Socioeconomic Resources (Section 3.3.9)
- Cultural Resources (Section 3.3.10)
- Tribal Resources (Section 3.3.11)

Excluding Section 3.3.5,[4] each of the above resource areas is divided into the following three subsections:

- Affected Environment. This subsection uses existing, relevant and reasonably available information included in the PAD and available since the PAD was filed and the results of SSWD's studies to describe the condition of the environment under the existing Project. In general, the affected environment discussion is divided into major areas of interest within each resource area.
- Environmental Effects. This subsection describes the beneficial and adverse direct and indirect effects of SSWD's proposed Project, which includes SSWD's proposed environmental measures. This section describes how each of SSWD's proposed measures are expected to protect or enhance the existing environment, including, where

[4] Although Section 3.3.5 discusses SSWD's studies and includes analysis of both the affected environment and potential environmental effects, Section 3.3.5 is organized by ESA-listed species.

possible, a non-monetary quantification of the anticipated environmental benefits of the measure.

- Unavoidable Adverse Effects. This subsection describes any adverse environmental effects under SSWD's proposed Project that cannot be mitigated, including whether the effect is short- or long-term, minor or major, and cumulative or site-specific.

3.3.1 Geology and Soils

The discussion of geology and soils is divided into three sections. The affected environment is discussed in Section 3.3.1.1, environmental effects of the Project are discussed in Section 3.3.1.2, and unavoidable adverse effects are addressed in Section 3.3.1.3.

SSWD augmented existing, relevant, and reasonably available information regarding geology and soils by conducting one study: Study 3.3, *Instream Flow Study*. This study included habitat mapping, channel topography, substrate and cover type mapping and large woody material (LWM) observations that address aspects of channel morphology in the lower Bear River.

3.3.1.1 Affected Environment

This section describes existing geology and soils within the Project Area. Geology and soil conditions are summarized in the following sections: 1) geologic setting, 2) tectonic history, faulting and seismicity, 3) mineral resources, 4) soils, 5) physiography, 6) sedimentation, and 7) existing information.

3.3.1.1.1 Geologic Setting

The Project is located within the Sierra Nevada physiographic and geologic provinces. The geology within the region has evolved through many complex interactions within and beneath the earth's crust. These processes include plate tectonics, where continents are created and transferred by various mechanisms. Other smaller-scale local processes, such as mass wasting, weathering, erosion, and sedimentation also constantly change the landscape.

The geologic history of the region spans the period from the mid-Paleozoic, approximately 300-400 million yrs ago (Mya), to the present day. The deepest basement rocks were emplaced about 225 Mya. However, the deepest basement rocks are actually younger than many of the overlying metamorphic, volcanic, and sedimentary rocks exposed in the region. The basement rock and overlying rocks began to move westward with the formation of a subduction boundary on what was then the western margin of the North American land mass (Schweickert et al. 1984), located east of the present day Sierra Nevada.

Paleozoic and Mesozoic terrains were both accreted upon and subducted beneath the continent. Accretion occurred along the continental margin in long, linear strips, striking roughly parallel to the present day Sierra crest. The subduction zone supplied the mantle with new rock to a depth great enough for the subducting plate to melt. The resulting magma eventually rose as both surface volcanic rock and as subsurface granitic plutons. The granitic plutons compose much of the core of the current Sierra Nevada. Concurrent with the development of the plutons, the hot magma intruded into the folded sedimentary rocks, resulting in metamorphism and the creation of the famous Sierra Nevada gold deposits in the fractures (Forest Service 2002).

The middle Tertiary was a time of volcanic eruptions that deposited lava, mudflows, pyroclastic flows, and ash throughout the Yuba and upper Bear River basin. These deposits filled many preexisting drainages such as the ancestral Bear River, as well as emplacing a cap of volcanic rock and volcanic debris on both the plutonic rocks and the eroded and intruded remnants of the preexisting early Mesozoic rocks. From 14 to 4 Mya, these tuffs were in turn buried by andesites, andesitic mudflows, and associated volcanic sedimentary rocks (PG&E, Piedmont 2003).

Subsequent to this latest orogeny of eruptions and mudflows, three late Quaternary glacial stages, each with multiple stages, occurred in the northwestern Sierra Nevada (James 2003, James et al. 2002). Glacial till and associated moraines extend west into the upper Bear River near the town of Alta (PG&E, Piedmont 2003).

Uplift along the eastern margin of the Sierra produced erosion through the beginning of the Tertiary Period (65 Mya), exposing the gold veins that had been created during the Mesozoic. These gold veins were eroded and the gold-laden sediments re-deposited throughout the ancestral Yuba River drainage, which ran approximately north to south. The "Tertiary River Gravels" are the source for much of the gold mined during the 19th century in the Yuba River drainage (Forest Service 2002), which also includes the Bear River. The ancestral headwaters of the Bear River were captured by the Yuba River (James 1995), yet were once a part of the Yuba. Because of the gold-laden gravels deposited, uplifted and subsequently exposed, the Bear River was one of the most heavily mined and modified drainages in the Sierra (James 2004).

Specifically within the Project Area, downstream of the Camp Far West Reservoir, valley sediments are dominated by Quaternary alluvium (Figure 3.3.1-1), which comprises 64.9 percent of the Project Area (Table 3.3.1-1). Bedrock geology near the Reservoir is composed of Jurassic volcanic rocks, quartz diorite, and massive diabase of the Smartville Complex, and is the second-most common material at 22.4 percent. The Bear River arm of the Camp Far West Reservoir has an intrusive mafic dyke that strikes northwest across both the Bear River and Wolf Creek (Alpers et al. 2008).

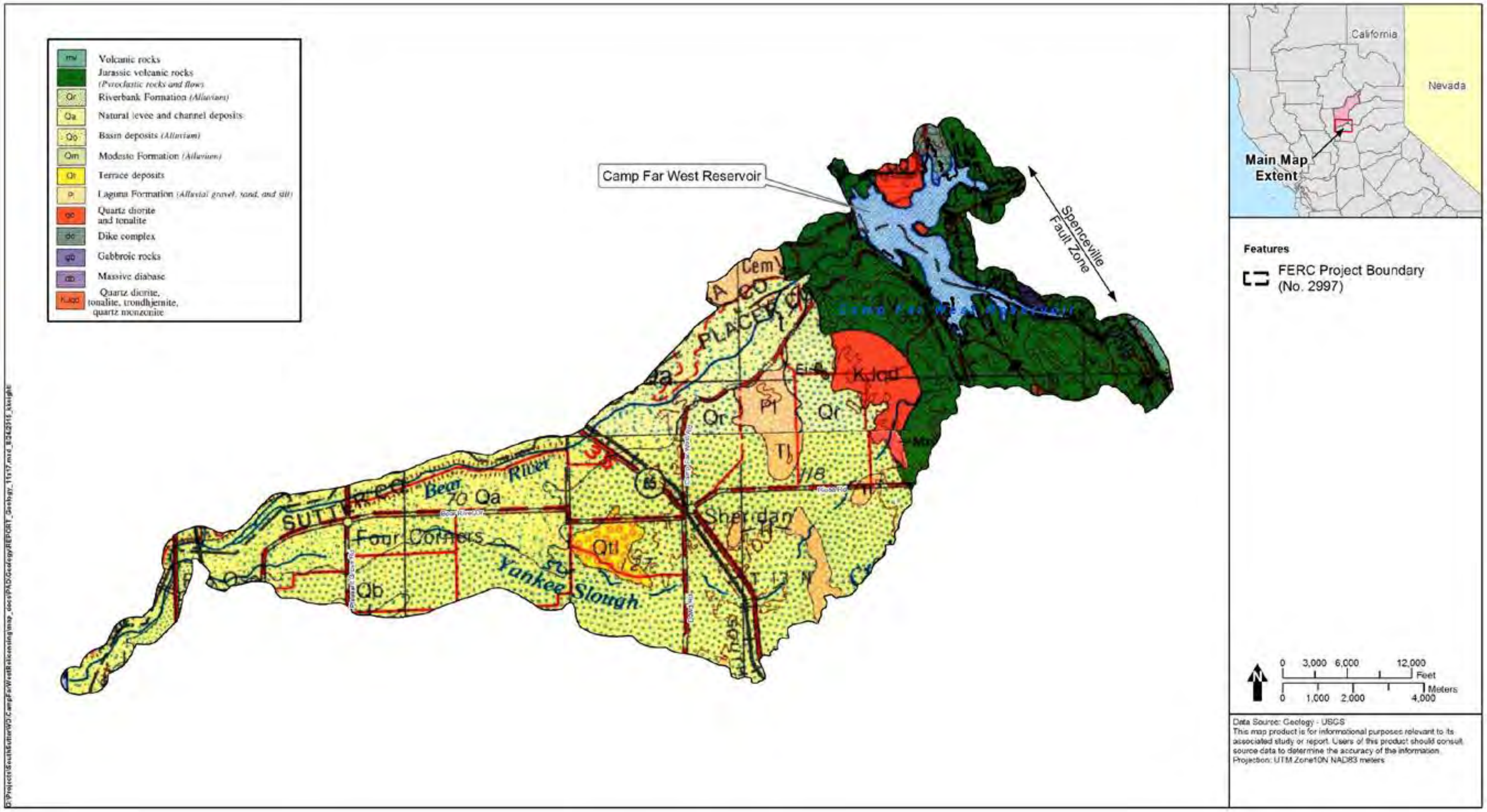

Figure 3.3.1-1. Generalized geologic map of the Project Vicinity.

Table 3.3.1-1. Description of generalized geologic rock types in the Project Vicinity.

Rock Type[1]	Area (acres)	Percent (%)	Description	Age
Quaternary Alluvium (Qr, Qb, Qa, Qt, Pl)	27,102	64.9%	Poorly consolidated gravels, sands and clays along river courses, levees, river banks, terraces adjacent to and within Dry Creek and Bear River downstream of the Project Area.	Quaternary – Pleistocene and Holocene
Laguna Formation	1,935	4.6%	Consolidated Alluvium – gravel sand and silt	Pliocene
Tailings	68	0.2%	Hydraulic and placer mining tailings	Recent, historical
Smartville Complex (Jv, qd, dc, gb)	9,352	22.4%	Pyroclastic rocks and flows, quartz diorite and tonalite, dike complex and gabbro that surround Camp Far West Reservoir.	Jurassic
Volcanic Rocks (mv)	1,432	3.4%	Undifferentiated rocks of the Smartville complex upstream of Camp Far West and dominate Wolf and Bear Creek drainages to Lake Combie.	Jurassic
Ultramafic and metasedimentary rocks	98	0.2%	Folded and faulted rocks near the Wolf Creek fault zone at the upper end of Wolf and Little Wolf Creeks.	Triassic
Water	1,775	4.3%	--	--
Total	**41,762**	**100%**	**--**	**--**

[1] Refer to Figure 3.3.1-1 for a description of each rock type.

3.3.1.1.2 Tectonic History, Faulting, and Seismicity

Uplift of the Sierra Nevada began approximately 3 to 5 Mya (Unruh 1991; Wakabayashi and Sawyer 2001; Henry and Perkins 2001), which is approximately synchronous with the uplift of the Carson Range, bordering the Tahoe basin on the east, at 3 Mya (Surpless et al. 2000). The uplift was accompanied by westward tilting of the range, stream incision, and downwarping of the Central Valley.

Most faults resulted from late Paleozoic and Mesozoic tectonic collisions. Faults that were reactivated in the late-Cenozoic are predominantly high-angle, northwest-trending, east-dipping, normal faults resulting from extensional stresses (Schwartz et al. 1977). Deformation is pronounced in bands of weak, ultramafic rock (Bennett 1983), as with the formations associated with the Wolf Creek Fault at the upper end of Wolf and Little Wolf Creeks.

The Spenceville Fault Zone trends northwest-southeast and occurs just to the east of Camp Far West Reservoir. The Wolf Creek Fault Zone bisects Wolf and Little Wolf creeks, and the Bear River downstream of Lake Combie, and several miles upstream of the Camp Far West Reservoir. The Wolf Creek Fault in the Bear River Basin is also known as the Highway 49 Lineament (Bennett 1983) and recognized as a southern extension of the Big Bend Fault (Rogers and Williams 1974). A historic seismicity map, prepared by NID for its proposed project site of the Centennial Reservoir upstream of Lake Combie on the Bear River (NID 2017) includes the Camp Far West Project area, reproduced as Figure 3.3.1-2.

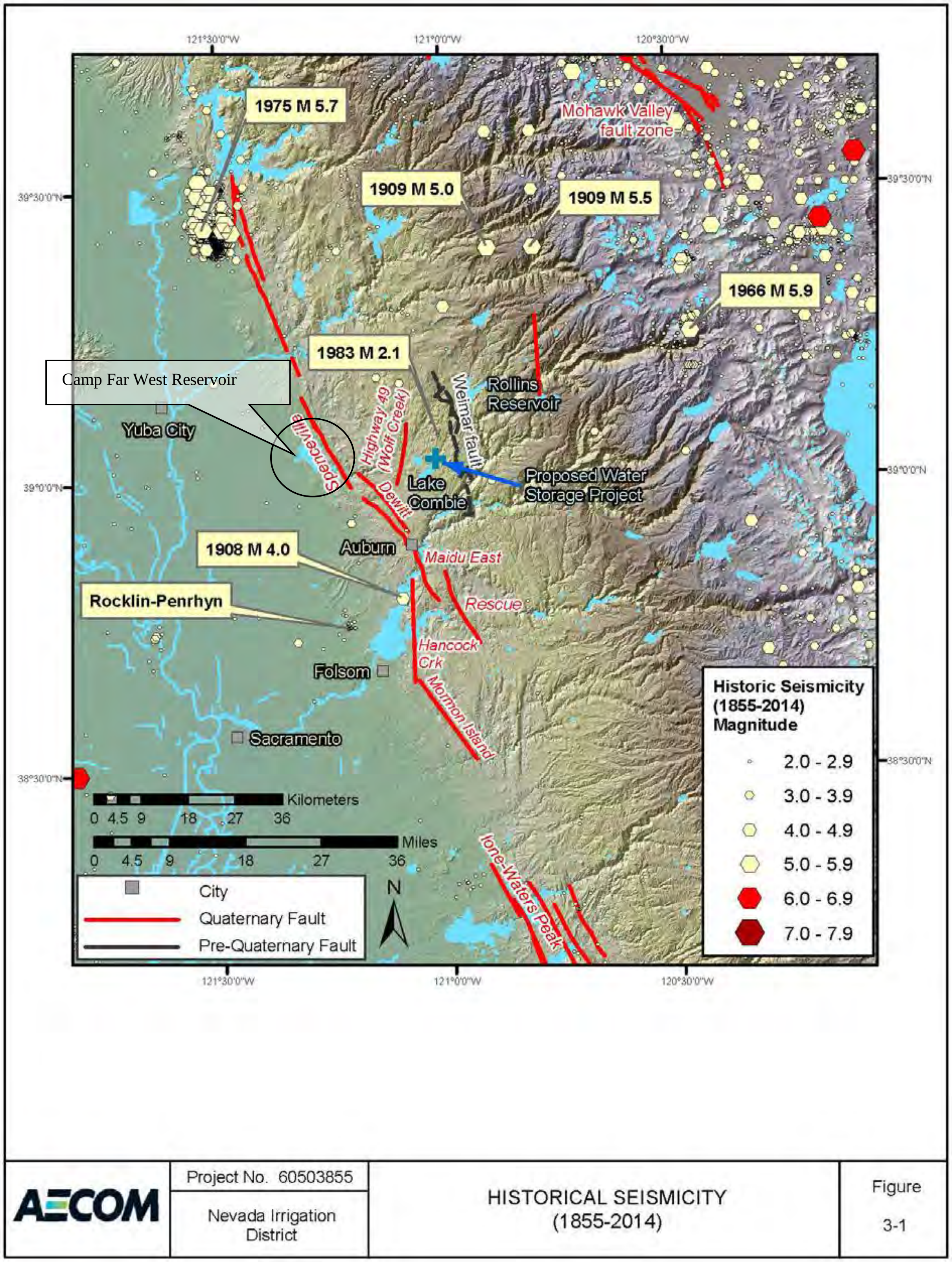

Figure 3.3.1-2. Historical seismicity in the surrounding area of the Project. Reproduced from NID Centennial Reservoir Project Geotechnical Engineering Report (NID 2017).

3.3.1.1.3 Mineral Resources

Six mines were found in the Project Vicinity, most of which were gold and copper mines, as shown in Figure 3.3.1-3 and Table 3.3.1-2.

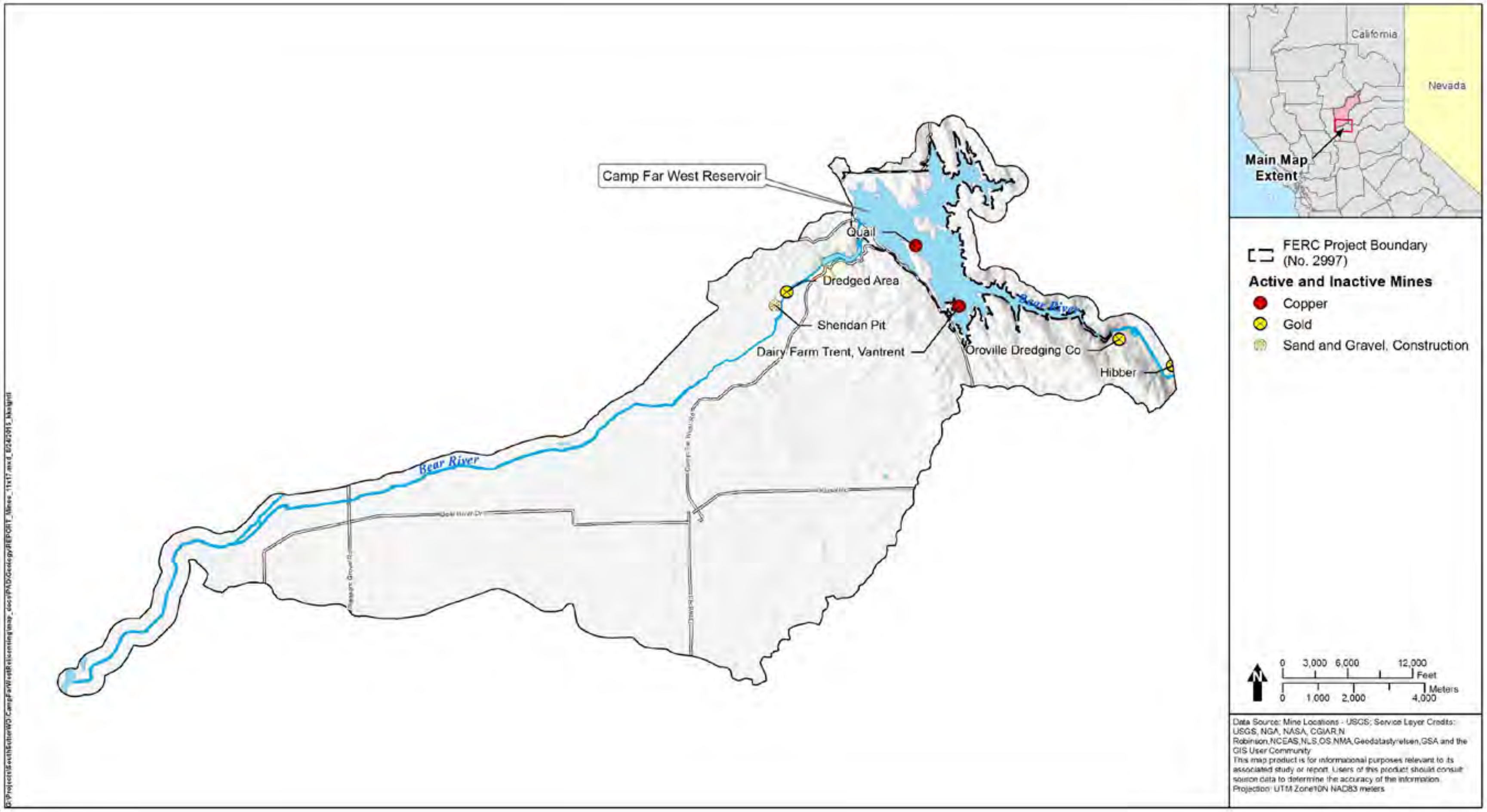

Figure 3.3.1-3. Active and inactive mines in the Project Vicinity.

Table 3.3.1-2. Mines in the Project Vicinity.

Site Name	Major	Minor	Operation	Status	Previous Name
Dairy Farm (Trent, Vantrent)	Copper, Gold	Silver	Unknown	Past Producer	--
Hibber	Gold	Copper	Unknown	Past Producer	--
Dredged Area	Gold	--	Placer	Unknown	--
Oroville Dredging Company	Gold	--	Placer	Unknown	--
Quail	Copper	Silver (trace)[1]	Unknown	Occurrence	--
Sheridan Pit	Sand and gravel	--	Surface	Producer	Sheridan Plant

[1] Not specifically defined in the database, but is assumed to be less than a "minor" component.

One of the main mines near Camp Far West Reservoir and within the FERC Project Boundary is the inactive Dairy Farm Mine (Trent Mine and Vantrent Mine). The deposit from which copper, zinc, and gold were derived is part of the Foothill Copper-Zinc Belt, which extends along the western slope of the Sierra Nevada in eastern California (Heyl 1948). Open pit and underground mining began during the 1860s and continued in the early 1900s and 1930s. The pit created during the 1920s and 1930s extends more than 150 ft below the surface, which is inundated by the Camp Far West Reservoir during high levels, yet is hydraulically isolated at low pool elevation (Alpers et al. 2008). Underground mining followed the massive-sulfide deposit to a total depth of at least 500 ft; the deposit was 10 to 60 ft thick and more than 600 ft long. In 1915, 350 tons of ore were mined per day (Waring 1919). A cyanide plant with a capacity of 100 tons per day was active on the site prior to 1915. In the 1930s, gold was recovered from the oxidized portion of the deposit (Clark 1963).

The Quail Mine is also located within the FERC Project Boundary on the shores of the Camp Far West Reservoir. It is listed as a "site" with an occurrence (i.e., presence or concentration) of copper (primary) and silver (tertiary). The USGS Mineral Resources Data System has no information as the operation type, mining method or yrs of production. It is a non-significant deposit (USGS MRDS, information downloaded April 2018)

The auriferous gravels of the Bear River were mined extensively by hydraulic mining methods in the mid to late 1800s. In addition, there was underground mining of lode gold-quartz vein deposits in the Grass Valley mining district, which drains into Wolf Creek (Alpers et al. 2008) upstream of the Project Area. Much of the fluvial deposits of hydraulic mine waste in the Bear River watershed remain to this day (James 1991, 1993, 1999).

The dredging industry was an important aspect of placer mining in the early 1900s. A small district was worked for some time near Camp Far West on the Bear River above Wheatland. However, the gravels were too low grade and operations were suspended (Lindgren 1911).

There is one active quarry site downstream of the Project Area on the Bear River, the Sheridan Pit that is mined for sand and gravel along the Bear River in both Placer and Yuba counties. Cemex Construction is expanding the existing Patterson Sand and Gravel Mine operation over a 38-year span (Placer County 2015). Currently, the company is permitted through 2028 to operate the mining operation on 326 ac at 8705 Camp Far West Road. The 448-ac proposed expansion is immediately south and west of the existing operation on the Bear River floodplain (Foster 2005).

3.3.1.1.4 Soils

Soil associations in the Project Area are shown in Table 3.3.1-3 and Figure 3.3.1-4.

Table 3.3.1-3. Soil associations in the Project Vicinity.

Soil No.	Soil Association	Acres	Percent of Total
s855	Sycamore-Shanghai-Nueva-Columbia	11,552	28
s840	Sobrante-Rock outcrop-Auburn	9,088	22
s870	Tisdale-Kilaga-Conejo	13	<1
s825	San Joaquin	6,799	16
s8369	Water	2,071	5
s821	Redding-Corning	8,533	20
s839	Xerofluvents-Ramona-Kilaga-Cometa	1,912	5
s817	Sierra-Caperton-Andregg)	1,794	4
Total	**8**	**41,762**	**100%**

Source: NRCS 2018.

The Project Vicinity soil distribution coincides with the underlying bedrock and geomorphic location. Table 3.3.1-4 provides a summary of the soil series characteristics including parent material, geomorphic position, slope, elevation range, average precipitation, mean annual temperature, and drainage. Soil descriptions have been summarized from the Natural Resources Conservation Service's "Official Soil Series Descriptions and Series Classifications" website (NRCS 2018) for each of the series.

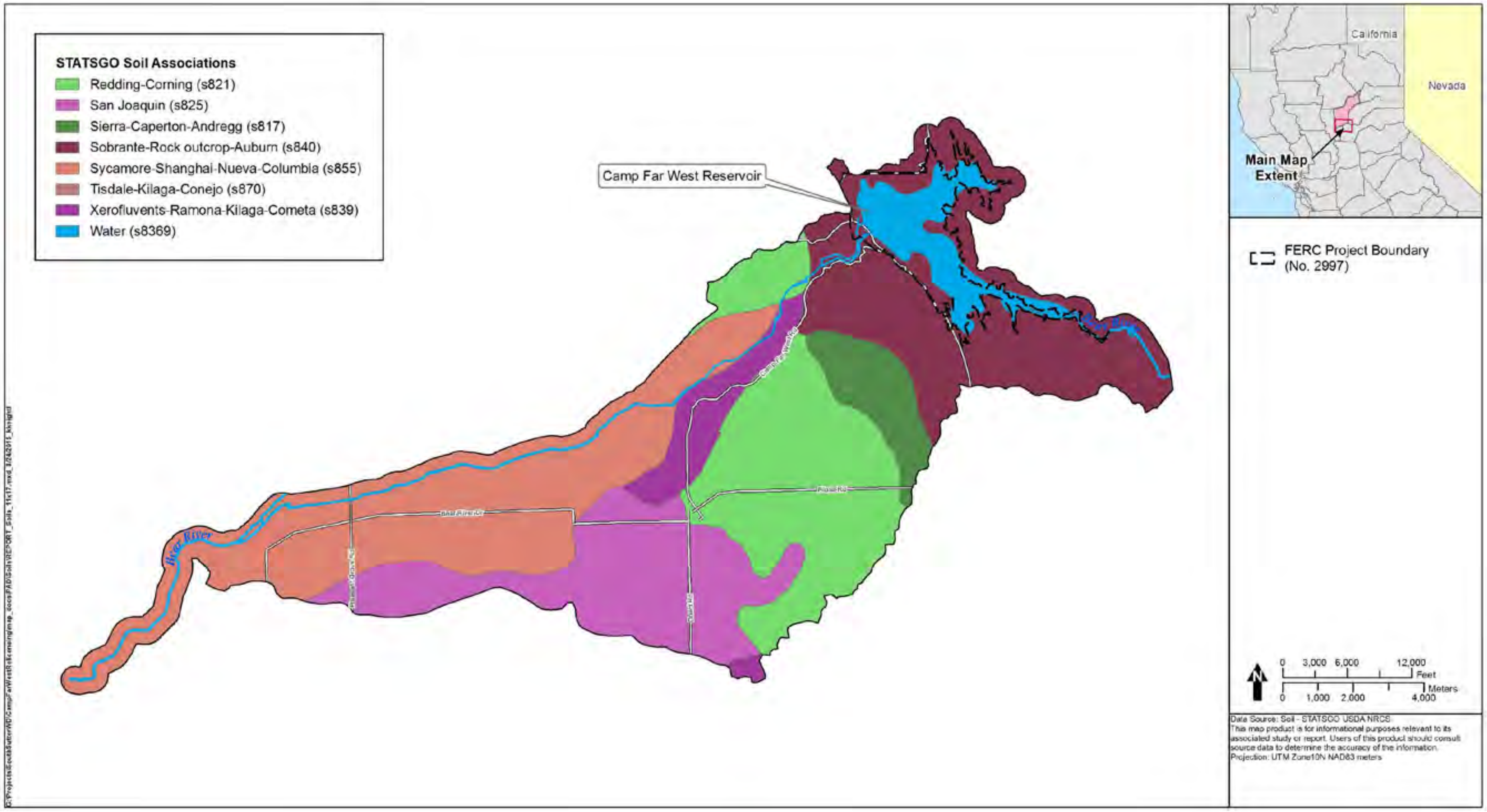

Figure 3.3.1-4. Soil associations in the Project Vicinity.

Table 3.3.1-4. Soil series and order summary description in the Project Vicinity.

Series	Parent Material	Geomorphic Position	Slope (%)	Elevation (ft)	Avg. Annual Precipitation (in.)	Mean Annual Temperature (°F)	Drainage
Andregg	Weathered granitic	Undulating to steep slopes on foothills	2-75	200-1,500	27	60°	Well-drained
Auburn	Amphibolite schist	Foothills	2-75	125-3,000	24	60°	Shallow to moderately deep, well drained
Caperton	Weathered granitic	Uplands	2-50	200-1,500	27	60°	Shallow, somewhat excessively drained
Columbia	Alluvium	Flood plains and natural levees	0-8	10-155	12-25	61°	Very deep, mod well drained
Cometa	Granitic	Gently sloping, slightly dissected older stream terraces	0-15	200-600	16	62°	Moderately well or well-drained
Conejo	Alluvium from basic igneous or sedimentary rocks	Alluvial fans/stream terraces	0-9	30-2,000	20	62°	Very deep, well drained
Corning	Gravelly alluvium	High terraces with mound, intermound relief	0-30	75-1,300	23	62°	Very deep, well or moderately well drained
Kilaga	Alluvium from mixed sources	Terraces	0-9	50-200	20	62°	Deep and very deep, well drained
Nueva	Alluvium from mixed sources	Floodplains	0-2	20-80	16	62°	Very deep, somewhat poorly drained
Ramona	Alluvium from granitic rocks	Terraces and fans	Nearly level to mod steep	25-3,500	15	63°	Well-drained
Redding	Alluvium	High terraces	0-30	40-2,000	22	61°	Moderately deep to duripan, well or mod well drained
San Joaquin	Alluvium from predom. Granitic source	Undulating low terraces	0-9	20-500	15	61°	Mod deep to duripan, well and mod well drained
Shanghai	Alluvium from mixed sources	Floodplains	0-2	20-150	18	62°	Very deep, somewhat poorly drained
Sierra	Acid igneous	Foothills	Gently sloping to steep	200-3,500	20-38	59° - 62°	Deep, well drained
Sobrante	Basic igneous and metamorphic	Foothills	2-75	125-3,500	32	60°	Mod deep well drained
Sycamore	Mixed sedimentary alluvium	Floodplains	Nearly level	10-100	15-20	60° - 62°	Poorly drained
Tisdale	Alluvium from mixed sources	Low terraces	0-2	20-80	18	62°	Mod deep, well drained
Xerofluvents	Young soils not differentiated enough to separate from soil suborder. Shallow, developed in Mediterranean climate, slopes of less than 25% and mean annual soil temperature above freezing and Holocene-age carbon; associated with low-gradient alluvial material adjacent to the lower Bear River corridor.						
Total	**18 Soil Series**						

Erosion hazard within a soil series is often strongly dependent upon slope. In general, the steeper the slope, the more erosive the soil, although erosion potential on steeper slopes may be moderated by coarse, well drained soils, such as those derived from granitic parent material.

3.3.1.1.5 Physiography

The current Bear River basin drains the northwestern Sierra Nevada via a series of deep canyons cut by mountain channels, separated by high, steep sided ridges and a parallel drainage network.

In the upper section of the Bear River above Lake Combie, downcutting, through the relatively soft Paleozoic metamorphic rock (Shoo Fly Complex) has created a deep, v-shaped canyon where short, steep-sided tributary drainages are typical (Geomatrix 1997). However, in the lower Bear River downstream of Camp Far West Dam, the river flows through alluvial material and constructed levees. According to Sacramento River Watershed Program's report on the Bear River, a high volume of mining sediment along with the levees restricting lateral movement that have caused the lower Bear River to become incised (SRWP 2010); Foothills Water Network (FWN) (2015) also cites this condition yet neither have provided data nor sources. During habitat mapping of the lower Bear River in 2015, SSWD found numerous locations where the channel is bounded by near vertical slopes between levees and vegetated, stable terraces. There are also inset floodplains, and low, semi-active terraces that are adjacent to the low flow (e.g., 25 cfs) channel.

3.3.1.1.6 Sedimentation

There are no known excessive sources of erosion that would lead to sedimentation within the Project Area. In 2008, a bathymetry study was done on Camp Far West Reservoir and compared against 1968 bathymetry. The 1968 reservoir storage volume was estimated at 104,000 ac-ft and in 2008 at 93,740 ac-ft, a reservoir capacity loss of 10,260 ac-ft[1] over 40 yrs (Mead and Hunt 2012). Based on an average specific weight of 70 pounds/cubic feet (cu ft), as estimated by Dendy and Champion (1978) for Lake Combie, this volume of sediment deposition in the reservoir indicates 16 million tons of sediment have been deposited, or 321,000 tons/yr, which translates to 2,188 tons/mi^2/yr. Accumulation rates for other reservoirs in the area are shown on Table 3.3.1-5.

Table 3.3.1-5. Accumulation rates in nearby reservoirs.

Stream	Reservoir (River Mile (RM) at Dam)	Rate of Deposition (ac-ft/mi/yr)
Bear River	Rollins Reservoir (RM 50.4)	2.1
	Lake Combie (RM 37.2)	0.75[1]
	Camp Far West (RM 18.2)	1.4
Yuba River	Englebright Reservoir (RM 24.3)	0.6

[1] Estimated by Dendy and Champion (1978).

Though sediment supply is high in the lower Bear River due to continued movement and availability of hydraulic mining debris, downstream of some dams, the channel can respond either with coarsening of the bed, or there may be no change if the downstream channel was originally transport-dominated (e.g., bedrock control with little storage of sediment). Construction of Camp Far West Dam and Lake Combie Dam (aka Van Geisen Dam) in 1928 halted downstream transport of most mining sediment (James 1988). Downstream channel responses to Van Geisen Dam were negligible in the middle Bear River because channels are dominated by bedrock. There was significant accumulation of sediment in the early 1900s at the Van Trent Gage, which was inundated by the Camp Far West Reservoir, which was attributed to historic mining sediment (James 1999).

[1] Calculated volume: 10,530 ac-ft*43,560 ft^2= 458,686,800 ft^3, multiplied by 70lbs/ft^3 = 3.2x10^{10} lbs = 16 million (m) tons/50 year = 321,000 tons/year. Camp Far West Dam drains an area of 146.7 mi^2.

Hillslopes in the Project Vicinity, shown in Figure 3.3.1-5, are generally less than 25 percent. (Table 3.3.1-6). Within the Bear River arm (the arm that comes into the Reservoir from the southeast), slopes are often greater than 50 percent, especially where it narrows upstream of the main reservoir body. However, it appears that these steeper slopes are dominated by bedrock, judging from aerial photographs and the soil survey that identifies the soil association as Sobrante-Rock Outcrop Auburn (Figure 3.3.1-4 and Table 3.3.1-4), and are likely resistant to erosion. The spillway just below the dam is also in the 25-50 percent hillslope range. However, the spillway flows over bedrock.

Table 3.3.1-6. Summary of slope classes within the Project Vicinity.

Slope Class (%)	Acres	Percent of Project Vicinity
0-25	661,664	93.6%
25-50	41,154	5.8%
50-75	3,723	0.5%
75+	389	0.1%
Total	**706,930**	**100.0%**

Excluding recreation-related roads, the Proposed Project includes one road: a short, paved road segment that accesses the Camp Far West Powerhouse. However, there are unsealed roads on the western side of the reservoir that may be contributing fine sediment. Slopes are steepest in the Bear River arm of the reservoir. However, there are few roads close to the water and the river appears to be bounded by resistant parent rock (i.e., there is no evidence of channel or hillslope instability that adds coarse or fine sediment) within the Project.

The inactive Dairy Farm Mine occupies a low terrace within the FERC Project Boundary that extends into the reservoir. Significant parts of the historic mine are within the drawdown zone and are currently being eroded. The Dairy Farm arm receives acidic, metal-rich drainage seasonally from the mined area (Alpers 2008). In the 1980s, several ac were reclaimed by removing pyrite-bearing waste rock and mill tailings to reduce the acidic runoff and pool soil quality (G. Vaughn, California Regional Water Quality Control Board-Central Valley Region, oral communication, 2001 as cited in Alpers 2008).

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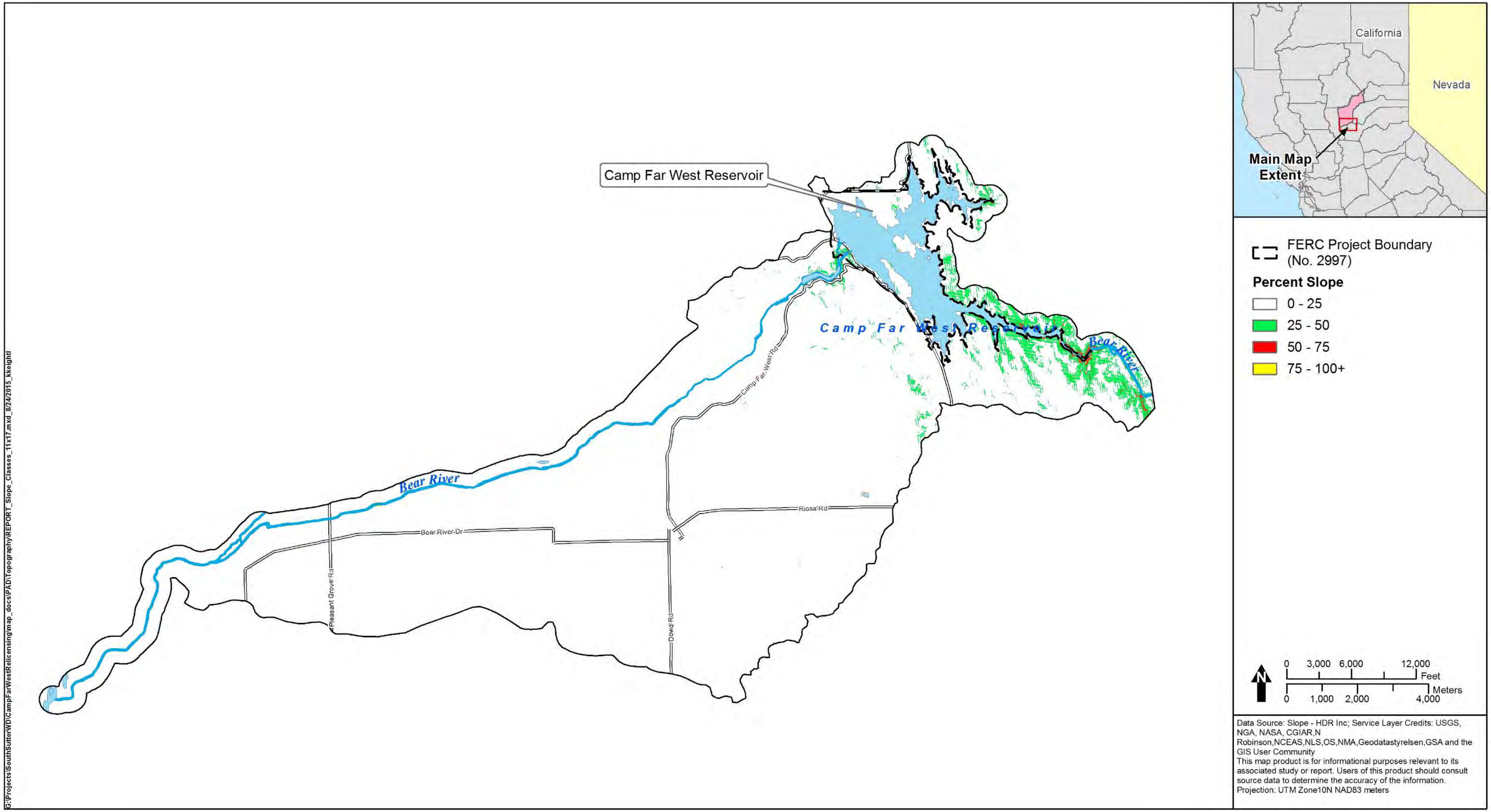

Figure 3.3.1-5. Slopes in the Project Vicinity.

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3.3.1.1.7 Existing Reach Information

This section presents existing information to describe channel setting and processes in the following reaches: 1) upstream of the Project; 2) within the Project; and 3) downstream of the Project.

Upstream of the Project

In reviewing aerial imagery (Google EarthPro 2015®), the Bear River flows through bedrock and boulder and there are substantial sections of bedrock gorge, which James (1999) characterized as a "steep gorge". James (1999) reported that there has been little sediment production and storage between Lake Combie and Camp Far West Reservoir due to the steep gorge, and there are no major obstacles to sediment transport. A rough estimate of average gradient for this reach, based on change in elevation of 1,200 ft over 13.8 mi, is 1.6 percent.

NID owns and operates the Combie development. Lake Combie has little water storage capacity and the reservoir fills with each storm event. Dredging to maintain water storage capacity has occurred over the past 40 yrs, and was halted in 2002 due to high mercury levels. While monitoring and studying the effects on water quality and biota, a sediment and mercury removal project was approved to extract mercury from dredged sediments, initially estimated to be about 150,000 to 200,000 tons of accumulated sediment. The project is estimated to take 3-5 yrs to complete, with on-going maintenance to remove the annual sediment accumulation, estimated to be 50,000 tons/yr (NID 2012). Initially, 804 milligrams of elemental mercury was removed from 944 kilograms of material from Lake Combie (NID 2012). In June 2018, NID agreed to move forward with a pilot project to remove and clean approximately 80,000 cu yd of sediment from Combie Reservoir (NID 2018).

At the request of NID, reach assessments were conducted within an approximately 5.5 mi section of the Bear River from Lake Combie to Wolf Creek (ECORP 2014). One response reach within the Bear River was selected for an instream flow and sediment study. Three potential study sites were identified and an 844-ft section of the Bear River, known as the Laursen Reach, was selected by interested parties and found to be representative of habitat types and composition. Generally, the river is controlled by bedrock and large boulders with little vegetative cover. The complete results are found in the ECORP documentation. However, the general findings were:

- Average width was 35.5 ft for the Bear River location, and 34 ft within the study area, and widths within the study area ranged from 12 to 69 ft, and depth from 1 to 23 ft.
- Mid-channel pools composed over 50 percent of the habitat type, with riffles next (25 %) and then run/glide habitat (22 %).
- Cover provided by vegetation is less than 10 percent; cover from undercut banks is about 1 percent; large boulders provide 15 percent; surface turbulence and depth provided an average of 15 percent.
- Trout spawning habitat is less than 1 percent. Sediment typically ideal for trout spawning are scarce or armored below larger imbricated cobbles.

- LWD is largely absent in the entire 5.5 mi section.
- Bear River is largely bedrock-controlled. Specifically within the Laursen Reach substrate ranged from coarse sand to bedrock, yet is dominated by 20-60 percent boulders and 10-65 percent bedrock.
- Very little sediment is present, most of which was located on point bars, behind boulders, and underneath or behind LWD. In the Laursen Reach, if sediments did exist, it was mostly gravels and to a lesser extent cobbles. Very little sediment was available for sampling.
- Bankfull discharge is estimated to be about 60-80 cfs.
- Roughly half of the available sediments between 20-43 millimeters (mm) in diameter would be entrained at flows up to 15 cfs within most of the habitat units.
- Minimum annual peak flow from 2001 to 2011 was 823 cfs.
- Flows capable of mobilizing and transporting large sediments likely occur every year. Bear River appears to be highly competent to transport 15 to 35 percent of the gravel materials at flows under 10 cfs, which makes this river unsuitable for gravel augmentation.

Channel reaches within the Bear River mining districts remain dominated by mining tailings after more than 100 yrs (James 1991). Much of the sediment produced by incision into mining tailing deposits was deposited near the aggrading confluences of Steephollow and Greenhorn creeks with the Bear River and currently forms deltas in Rollins Reservoir (James 2004). Detention of down-valley sediment deliveries by dams created a sediment-starved environment dominated by channel erosion in the lower Bear River valley below Rollins, Van Giesen, and Camp Far West dams. Channel incision below these dams reflects lowered sediment loads and effects of altered flow regime have exacerbated incision (James 1988). Anthropogenic changes due to mining changed the Bear River from a supply-limited system to a transport-limited system, and a change in geomorphic processes away from long-term drainage evolution dominated by ingrown meanders.

Within the Project

Camp Far West Reservoir may receive acidic, metal-rich drainage seasonally from the inactive Dairy Farm Mine. This mine, located within the FERC Project Boundary, is discussed in Section 3.3.1.1.3. Removal of pyrite-bearing waste rock and mill tailings in the 1980s reduced some of the acidic runoff and poor soil quality. However, the pit remains a likely source of trace metals, sulfate, and acidity to Camp Far West Reservoir and the lower Bear River. Elevated concentrations of total mercury in the water of Camp Far West Reservoir and in the biological taxa over a range of trophic levels were observed in fall and winter from October 2001 through August 2003 (Alpers et al. 2008). Alpers et al. (2008) reported mercury bioaccumulation factors are high compared to other reservoirs in northern California, which indicates relatively efficient biomagnification (Alpers et al. 2008). In contrast, SSWD's *Water Quality Study* found total mercury concentrations ranged between 2 nanograms per liter (ng/L) and 33.8 ng/L during three sampling events near Camp Far West Dam. Five of the six samples collected for mercury were less than 6 ng/L and the sixth sample (33.8 ng/L) was taken near the bottom of the reservoir in November 2017. All six samples SSWD collected and analyzed for total mercury were below the Basin Plan Water Quality Benchmark of 50 ng/L (EPA 2000). Regarding total and dissolved methyl mercury, five of the six samples were a "non-detection" and the sixth sample measured 0.1 ng/L (Table 3.3.3.2-9). These mercury concentrations were similar to those observed in the Bear River upstream of Camp Far West Reservoir where total mercury ranged between 2.4 ng/L and 11.3 ng/L over three sampling events and total and dissolved methyl mercury was a "non-detection" for two of the three samples and the third sample was 0.5 ng/L (Table 3.3.2.8). Additional discussion of mercury in Camp Far West Reservoir is in Section 3.3.2.1.2.4 of this Exhibit E.

The Bear River had a waterfall that barred upstream salmon movement in the vicinity of the Camp Far West Reservoir. The waterfall was submerged or built upon during construction of the dam (Wildland Resources Center 1996).

On the section of the Bear River, now inundated by the Camp Far West Reservoir, was the Van Trent stream flow gage that operated from 1905 to 1928. It was reported by Keyes (1878) that there was three meters (m) of aggradation that occurred in the 1870s. Channel instability and rating-curve changes were noted between 1907 and 1927. Large volumes of sediment were produced in the Bear River Basin from 1913-1914 and from 1918-1921; hydraulic mining provided sediment to the channel and high flows transported and redistributed the material downstream. These sediment volumes correspond to high flows recorded at the Van Trent gage (James 1991). Rating curve changes were noted in most yrs from 1914 to 1927, and in 1909, were specifically attributed to the movement of "mining debris" (James 1999).

The Camp Far West Dam existing spillway terminates in a chute excavated into solid rock. This unlined channel then joins the Bear River approximately 1,200 ft below the dam. Material eroded from the spillway channel has been deposited as an alluvial fan at the junction with the Bear River. The fan is approximately 450 ft long by 300 ft wide, and is composed of fairly coarse, stable material (Figure 3.3.1-6). The distal end of the alluvial fan, located about 700 ft downstream of the dam face, restricts the mainstem channel width from 70 ft to 23 ft, then the channel width increases downstream of the fan to over 200 ft. The alluvial fan material is stored within the backwater area of the diversion dam impoundment. There are no obvious additional failures or excessive sediment sources on the slopes or banks of the SSWD diversion dam impoundment below the reservoir.

Figure 3.3.1-6. Camp Far West Dam and Spillway Channel on the Bear River at RM 16.9. The red circle indicates the alluvial fan.

In most yrs, SSWD collects no LWM from the surface of Camp Far West Reservoir. Very little LWM enters the reservoir from upstream and the reservoir shoreline has very little LWM.

SSWD is unaware of any reservoir shoreline stability issues. In general, the shoreline is gently sloping and stable. At the Dairy Mine site, the historic tailings pile is creating acid mine drainage (Alpers 2008). There is a two-track road that begins in the Project Area on the historic tailings pile and continues southeast onto private property. There is an eroded mound of dirt and gravel that is yellow and full of sulfur that was likely bulldozed into the location during mine destruction as trees are undisturbed; it is unclear if the material can be directly transported to the reservoir. Most of the Dairy Mine is on private property.

Downstream of the Project

The lower Bear River is described below based on information developed by Allan James, the FWN, the Sacramento Watershed Program, and SSWD.

The lower Bear River was an anastomosing channel with a series of sloughs and with two terrace sets described by early settlers, the lowest terrace remains in-filled by deposition of mining sediments (James 1988). James estimated 164 million cu yd was stored in the lower Bear River during maximum aggradation. In the lower Bear River, incision processes dominated from 1905 to 1928. Between 1930 and 1955, the channel was relatively stable as pre-mining alluvial gravel armored the bed. The channel began to incise again in 1955 after a large flood penetrated the coarse gravel layer. Incision was unaffected by construction and enlargement of Camp Far West Dam, which suggests that changes in flow regime and sediment loads caused by the dam were much less important than penetration of the channel armor layer prior to dam construction (James 1988).

There is little urban development along the corridor. However, agricultural uses and levees influence floodplain development, water distribution, and riparian environments. In 2004, the Environmental Defense Fund, FWN and their partners reported in *Assessing Flow Improvement Needs and Opportunities in Northern California's Bear River Problemshed* various flow needs and flow-related challenges in the lower Bear River (FWN Bear River *Awakening* webpage 2015). Among the issues identified, due to past accumulation of mining sediments and presence of restricting levees, the channel has become narrow and incised, that downstream gravel recruitment had been limited for many yrs and would need to be supplemented to improve habitat, and that invasive Giant Arundo (i.e., giant cane, or *Arundo donax*) should be eradicated. They did not indicate there were data to support these identified issues. Figure 3.3.1-7 shows active and prolific sediment additions from near the CEMEX property above Highway 65 (~ RM 12) with giant cane in the active channel that had been stabilizing gravel bars. Much of the giant cane was removed by the very high flows in 2017.

Figure 3.3.1-7. An example of bank erosion, gravel bar formation, and giant cane concentration in the lower Bear River (RM 13).

The USFWS was to develop competitive Request for Proposals for studies to evaluate baseline conditions as well as fishery restoration needs and opportunities on the lower Bear River below Camp Far West Reservoir (Yardas and Eberhart 2005). As of 2013, no projects have been conducted, nor is there information for the watershed (USFWS 2013).

Between 2005 and 2009, the Bear River Setback levee was designed and constructed by the Three Rivers Levee Improvement Authority to replace an existing levee. The improved levee was approximately 9,600 ft long and replaced levee portions at the junction of the Feather and Bear rivers. The setback levee was designed to provide a 200-year flood protection level. In addition, 1 million shrubs and trees were planted in the setback area to prevent erosion and to benefit threatened and endangered species in the expanded floodway (SRWP 2015).

There are significant quantities of gravel in the lower Bear River, much of which may be derived from hydraulically mined sediments. It was estimated previously that 160 million cu yd of mining sediment are stored in the lower Bear River (FWN 2015a). The high volume of mining sediment, in combination with restricting levees, has caused the lower Bear River to change from wide and shallow to deeply incised, according to the FWN. However, no data have been collected to support this claim. The Sheridan Pit gravel and aggregate mine (now part of the CEMEX sand and gravel mining and processing operation) is testament to the high volumes of sand and gravel present in and near the Bear River. Additional discussion of gravel availability as it relates to fisheries is provided in Section 3.3.3.1.5.3.

Further characterization of stream channel characteristics downstream of the Project is described below with respect to channel form, large woody material, and instream habitat.

Channel Form

To characterize sediment storage within the lower Bear River channel, a hillslope shading map was developed by SSWD (2010) using LiDAR to delineate floodplains and terraces adjacent to the lower Bear River (Attachment 3.3.1A). These maps were used to quantify channel sediment into sediment storage types (i.e., Active, Semi-Active, Inactive, and Stable), as defined in Table 3.3.1-7. The area used to quantify the aerial extent within each stability class was limited to between the constructed levees or stream-adjacent roads that would limit lateral channel movement. If no artificial limit to lateral movement was obvious but the channel was bounded by the Stable stability class (i.e., greater than 20 ft above the water surface during low-flow), approximately 100 ft on each side of the channel was used to quantify such areas. LiDAR data were not available for the area from the non-Project diversion dam to the Camp Far West Dam so this assessment was not performed for that area.

Sediment storage volume was assessed as part of the Study 3.3, *Instream Flow*, as shown in Table 3.3.1-7. Volume was estimated using average thalweg depth assessed during the *Instream Flow Study* at the upstream (between RM 14.2 to 15.1) and downstream (between RM 7.7 to 8.3) modeling sites, then converted to tons using Dendy and Champion (1978) formula. The greatest area of stored sediment is within the semi-active classification, while the lowest is within the active channel.

Table 3.3.1-7. Estimate of sediment stored within four stability classes within and adjacent to the lower Bear River.

Stability Class	Description[1]	Height above low-flow water surface elevation (ft)[2]	Area (million ft^2)	Volume (m ft^3)[3]	Quantity (m tons)[4]
Active	Moves at least once every few years	0-6	5.7	31	1.1
Semi-Active	Susceptible to revegetation and moved every 5-20 years	6-15	19.5	254	8.8
Inactive	Moves only during extreme events every 20-100 years and becomes well-vegetated in the interim	15-20	15.3	306	10.7
Stable	Deposits are not accumulating under present climate or channel regime, yet may be susceptible to cutbank erosion	20+	8.7	217	7.6

1 After Curtis et al. 2005 and Kelsey et al. 1987
2 Estimated from 2015 LiDAR; low flow discharge ~25 cfs
3 Using average/median thalweg depth and midpoint of stability class height times area
4 Based on an average specific weight of 70 pounds/cubic feet (cu ft), as estimated by Dendy and Champion (1978)

The stability classes were quantified within sub-reaches that were defined for habitat mapping and the quantification of LWM (Table 3.3.1-8, Figure 3.3.1-8).

Table 3.3.1-8. Area within stability class by sub-reach of the lower Bear River between the Feather River and the non-Project diversion dam.

Sub-Reach Name	Location and Length	Stability Class (million ft^2)			
		Active	Semi-Active	Inactive	Stable
Feather River to Highway 70	RM 0 to 3.5 (3.5 mi)	0..6	1.1	2.2	1.1
Highway 70 to Pleasant Grove Rd	RM 3.5 to 6.8 (3.3 mi)	1.0	9.9	7.1	1.0
Pleasant Grove Rd to Highway 65	RM 6.8 to 11.5 (4.7 mi)	1.5	3.9	3.7	8.3
Highway 65 to SSWD Diversion	RM 11.5 to RM 16.9 (5.3 mi)	2.6	4.5	2.4	1.7
Highway 65 to CEMEX	RM 11.5 to 14.2 (2.7 mi)	1.0	1.8	1.3	1.1
CEMEX to non-Project diversion dam	RM 14.2 to RM 16.8 (2.6 mi)	1.6	2.7	1.1	0.6

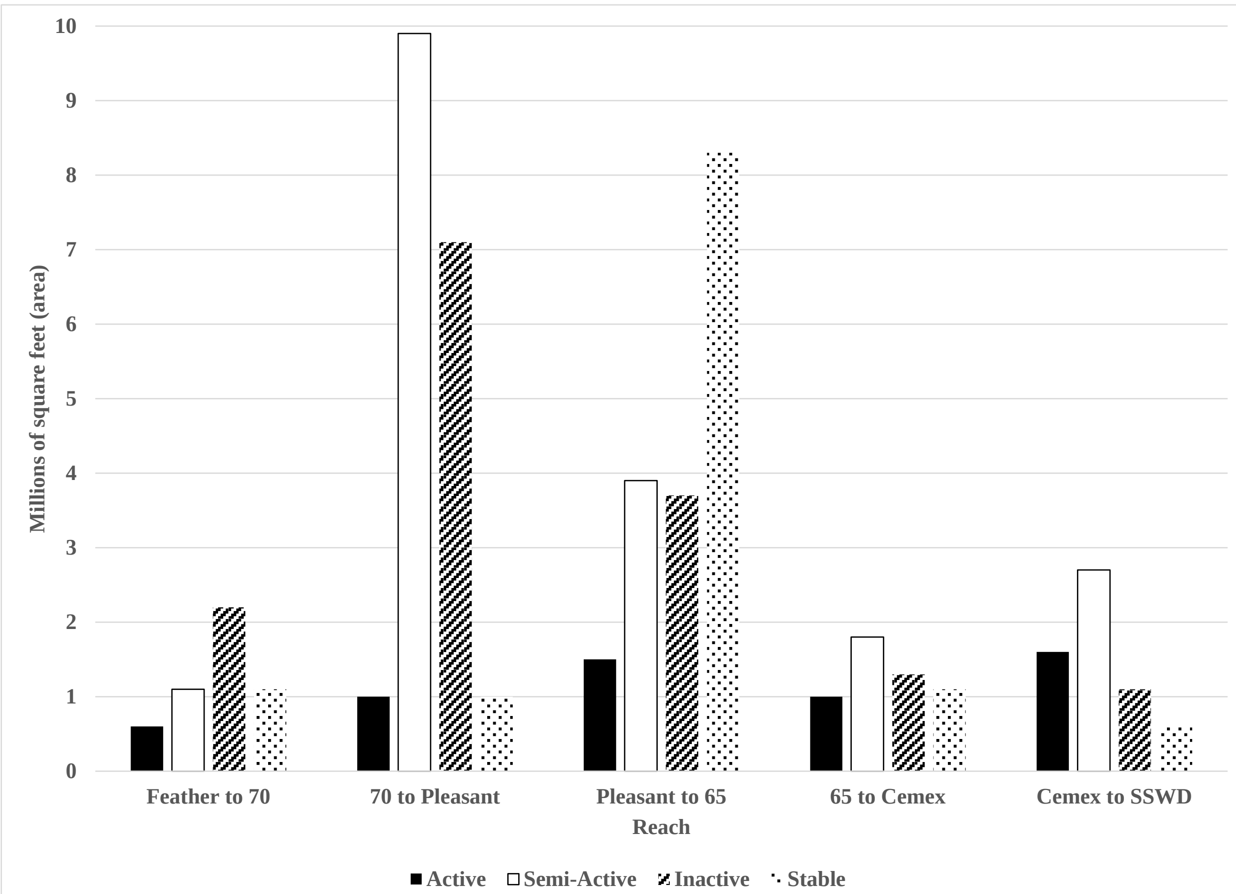


Figure 3.3.1-8. Area for each stability class within sub-reaches of the lower Bear River between the Feather River to the non-Project diversion dam.

The extent of channel confinement types was also quantified in terms of extent and location in the lower Bear River (Table 3.3.1-9). Seventy percent of the channel is defined as confined and 30 percent unconfined in the lower Bear River.

As defined above, the Active Stability class is considered the channel area within 6 ft of the low flow (~25 cfs) water surface elevation and is generally consistent with the 1.5 yr return frequency. The 1.5 yr return frequency stage height was estimated using instantaneous peak flows recorded at USGS Gage Station 11424000 on the Bear River near Wheatland at RM 11.5 along with the gage height/discharge relationship (Figures 3.3.1-9 and 3.3.1-10). Generally the river channel within a 1.5 yr return frequency is a floodplain under construction and flooded frequently at a relatively consistent recurrence interval and is important in geomorphic analysis (Dunne and Leopold 1978).

Table 3.3.1-9. Channel confinement types, extent and location in the lower Bear River between the Feather River (RM 0) and non-Project Diversion (RM 16.9).

Channel Type	River Mile		Distance (miles)	
	Start	End	Confined	Unconfined
Confined	0	3.1	3.1	--
Unconfined	3.1	3.5	--	0.4
Confined	3.5	3.9	0.4	--
Unconfined	3.9	4	--	0.1
Confined	4	4.35	0.35	--
Unconfined	4.35	4.6	--	0.25
Confined	4.6	5.6	1	--
Unconfined	5.6	6.5	--	0.9
Confined	6.5	6.7	0.2	--
Unconfined	6.7	7.4	--	0.7
Confined	7.4	9.1	1.7	--
Unconfined	9.1	10.2	--	1.1
Confined	10.2	10.9	0.7	--
Unconfined	10.9	11.3	--	0.4
Confined	11.3	11.6	0.3	--
Unconfined	11.6	11.7	--	0.1
Confined	11.7	14	2.3	--
Unconfined	14	14.4	--	0.4
Confined	14.4	15	0.6	--
Unconfined	15	15.8	--	0.8
Confined	15.8	16.9	1.1	--
Total Miles			**11.75**	**5.15**
Percent Total Reach			**70%**	**30%**

The Inactive Stability class is composed of the stable, vegetated terraces and levees located approximately 15-20 ft above the low flow 25 cfs water surface elevation. Sediment stored within the Semi-Active Stability class, typically accessed during high flow events, was often found to be composed of cohesive material that enhances lateral stability of the mainstem, in some cases including vertical slopes that resist lateral channel movement.

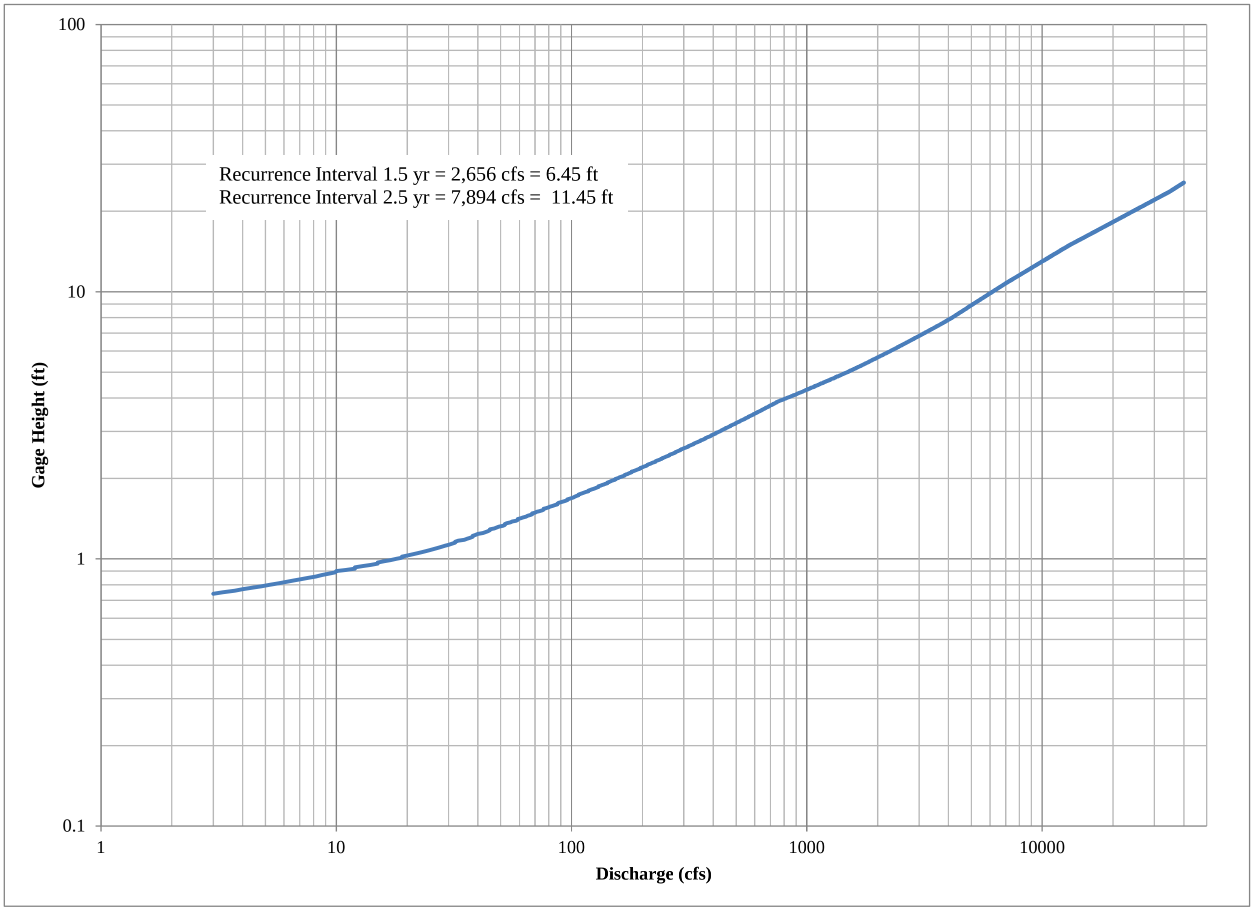
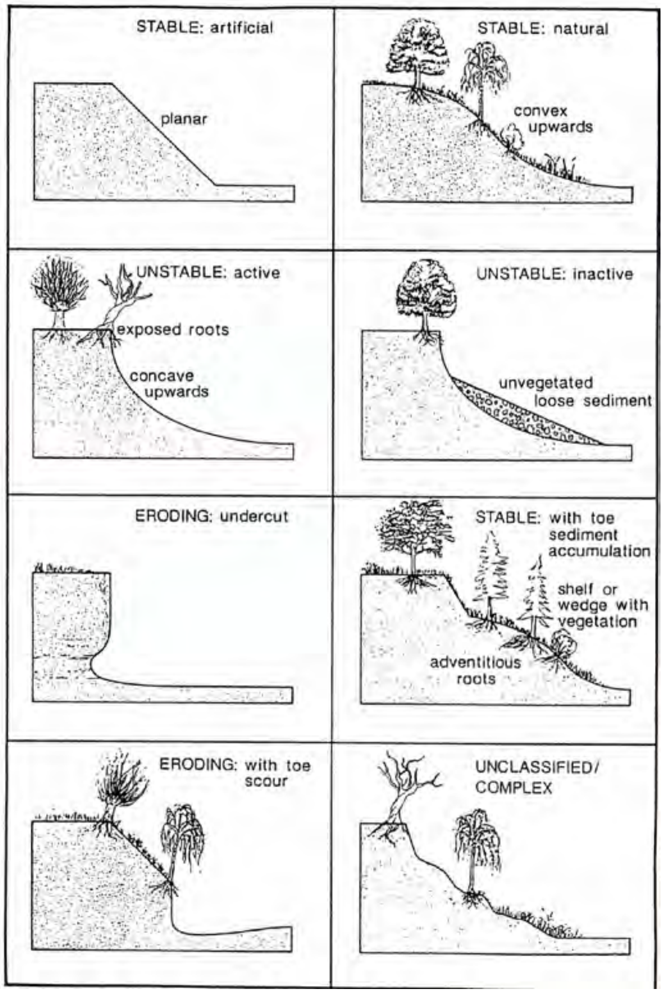


Figure 3.3.1-9. Rating curve for the Bear River at Wheatland USGS Gage 11424000 at Hwy 65 (RM 11.5) based on Instantaneous Peaks 1964 to 2015.

Figure 3.3.1-10. Determining the elevation of 1.5 yr frequency flow (2,656 cfs) for the Bear River at Hwy 65 (RM 11.5) based on instantaneous peaks 1964 to 2015 at USGS Gage station 11424000.

Channel confinement in the lower Bear River occurs between reinforced, vegetated levees or stable vegetated terraces, and also where the banks are vertical and eroding. About 50 percent of the mapped meso-habitat units were experiencing active bank erosion. Some of this erosion may be due to incision into the deposited historical mining sediments, and because levees restrict lateral channel movement. To further understand the bank types and mechanisms of erosion, the *Instream Flow Study* quantified the area (height and length) of bank types (Figure 3.3.1-11) within ten randomly selected sections of the lower Bear River, five within confined channels and five within unconfined channels (Table 3.3.1-10). Stability, for the purposes of the bank analysis exercise, refers specifically to bank erosion, and is a different type of stability than that defined for the broader sediment "Stability Classes" as above in Table 3.3.1-7.



Additional Stable Bank Types:

STABLE: Top unstable, base stable

STABLE: Toe undercut

Figure 3.3.1-11. Bank types classified in the lower Bear River at 10 random sites between the SSWD Diversion and the Feather River. From: *Figure 19. Classification and morphological interpretation of typical bank profiles* (Thorne 1998).

Table 3.3.1-10. Summary of bank erosion quantified by channel type at 10 random sites in the lower Bear River between the non-Project Diversion and the Feather River.

Site (RM)	Channel Type	Extent of Bank Erosion Area (sq ft)	
		Stable	Unstable
2.57	Confined	-0-	33,944
3.33	Unconfined	6,953	19,336
5.83	Unconfined	9,444	8,278
6.11	Unconfined	1,348	21,336
6.35	Unconfined	5,919	17,563
8.56	Confined	21,753	8,612
9.64	Unconfined	3,046	11,678
10.56	Confined	203	12,262
11.80	Confined	5,506	18,904
14.77	Confined	2,352	30,692

In general, confinement was not particularly relevant to extent or type of bank erosion. Most of the banks are exposed and actively eroding. The base of the banks are often undermined and undercut (i.e., Eroding – with toe scour [36%], Eroding – undercut [12%]), as described in Table 3.3.1-11. LWM is periodically added to the channel from these vertical banks wherein the entire tree, including the root mass is added to the channel often creating areas of bed scour and bank protection. The banks maintain a vertical profile due to fine-grained and cohesive bank material. The dominant material is composed of sand and finer, as shown in Table 3.3.1-12. The less cohesive cobble and gravel banks are associated with the extensive gravel and floodplain deposits; (refer to the hillslope shading map [Attachment 3.3.1A] where the 0-6 ft stability class occupies a larger fraction of the area between the levees, e.g., above RM 14.1). Near the toe of these coarse-grained deposits (e.g., stream-adjacent within the low flow active channel), the gravel bars have fairly resilient and resistant bank protection provided by sedges, rushes and hydrophytic vegetation within the low flow active channel. Boulders were not found except where artificially placed to stabilize the bank from lateral erosion.

Table 3.3.1-11. Area (height and length) of bank types quantified within 10 sites (20 channel widths in length) in the lower Bear River between the Feather River and the non-Project Diversion Dam.

Bank Type	Area (sq ft)	Percent Area	Stable
Eroding - with toe scour	84,943	36%	
Unstable - active	40,613	17%	
Eroding - undercut	28,185	12%	
Stable - with toe sediment accumulation	26,671	11%	x
Unclassified - complex	18,752	8%	
Stable - toe undercut	13,526	6%	x
Unstable -inactive	12,437	5%	
Stable - natural	7,250	3%	x
Stable - artificial	4,834	2%	x
Top unstable, base stable	1,917	1%	x

Table 3.3.1-12. Area (square feet) of dominant substrate of bank types quantified within 10 sites (20 channel widths in length) in the lower Bear River between the Feather River and the non-Project Diversion Dam.

Bank	Dominant Substrate (square feet)				
Type	Boulder	Cobble	Gravel	Sand	Silt and Finer
Unstable - active	0	260	1,303	26,967	12,083
Unstable -inactive	0	1,221	6,103	5,113	0
Eroding - undercut	0	1,087	1,737	10,043	15,319
Eroding - with toe scour	0	4,400	7,817	31,982	40,744
Stable - with toe sediment accumulation	0	0	4,623	7,753	14,295
Unclassified - complex	0	2,033	1,718	5,434	9,568
Top unstable, base stable	0	0	1,917	0	0
Stable - artificial	4,834	0	0	0	0
Stable - natural	0	1,356	286	0	5,608
Stable - toe undercut	0	5,964	0	720	6,843
Total	**4,834**	**16,321**	**25,504**	**88,012**	**104,460**

Large Woody Material

LWM was quantified during the habitat mapping effort. All pieces within the active channel (1.5 yr frequency elevation) that were larger than 4-in diameter at the large end, and longer than 3 ft were tallied (Table 3.3.1-13). LWM concentration ranged between 18 and 65 pieces per mile (1.1 to 4.0 pieces/100 m), and most of the pieces were within the wetted channel. The highest concentration of LWM was located between Highway 70 and Pleasant Grove bridges, and the lowest concentration was between Highway 65 (RM 11.5) and the CEMEX gravel operation (RM 14.2). The riparian area of the lower Bear River is heavily modified by levees and agricultural modifications so the recruitment potential is very low and outside of the control of Project operations. Key pieces of LWM were defined as pieces either longer than 0.5 times the low flow active channel (LFAC), or are deposited in a manner that alters channel morphology and aquatic habitat (e.g., trapping sediment or altering flow patterns). Table 3.3.1-14 summarizes the key pieces found during the habitat mapping effort in 2016. Based on incidental observations by SSWD during other field efforts, some of these pieces moved during the 2016/2017 high flows. However, new pieces were added due to bank failures.

Table 3.3.1-13. Summary of LWM count by diameter and length class within the lower Bear River between the Feather River and the non-Project diversion dam.

Reach	Diameter (in)	Length (ft)				Total Number of Pieces	Number of Pieces Within Wetted Channel	Pieces / Mile	Pieces / 100 m
		3-25	26-50	51-75	>75				
Feather River to Hwy 70	4-12	67	11	--	--	--	--	--	--
	13-24	29	12	--	1	--	--	--	--
	25-36	4	7	2	--	--	--	--	--
	>36	1	--	--	--	--	--	--	--
	SUM	**101**	**30**	**2**	**1**	**134**	**92**	**38**	**2.4**
Hwy 70 to Pleasant Grove	4-12	118	18	1	--	--	--	--	--
	13-24	25	19	5	--	--	--	--	--
	25-36	10	8	7	1	--	--	--	--
	>36	--	--	1	--	--	--	--	--
	SUM	**153**	**45**	**14**	**1**	**213**	**161**	**65**	**4**
Pleasant Grove to Hwy 65	4-12	100	16	--	--	--	--	--	--
	13-24	26	17	3	--	--	--	--	--
	25-36	4	7	3	1	--	--	--	--
	>36	--	--	2	1	--	--	--	--
	SUM	**130**	**40**	**8**	**2**	**180**	**90**	**38**	**2.4**
Hwy 65 to Cemex	4-12	26	3	--	--	--	--	--	--
	13-24	7	8	--	--	--	--	--	--
	25-36	1	4	--	--	--	--	--	--
	>36	--	--	--	--	--	--	--	--
	SUM	**34**	**15**	**0**	**0**	**49**	**43**	**18**	**1.1**
Cemex to non-Project Diversion Dam	4-12	41	2	--	--	--	--	--	--
	13-24	12	1	--	--	--	--	--	--
	25-36	5	1	--	--	--	--	--	--
	>36	--	--	--	--	--	--	--	--
	SUM	**58**	**4**	**0**	**0**	**62**	**55**	**23**	**1.4**

Table 3.3.1-14. Summary of key pieces of LWM within the lower Bear River between SSWD's non-Project Diversion Dam and Feather River.

Reach	Diameter (in)	Length (ft)				Function Provided	
		3-25	25-50	50-75	>75	Type	Percent of Function[1]
Feather River to Hwy 70	4-12	--	3	--	--	Cover Bank Protection Scour Sediment Storage No geomorphic function Vegetation trapping	40 10 15 5 25 5
	13-24	--	7	1	--		
	25-36	--	5	1	1		
	>36	--	--	--	--		
	SUM	--	15	2	1		
Hwy 70 to Pleasant Grove	4-12	6	5	--	--	Cover Bank Protection Scour Sediment Storage No geomorphic function Vegetation trapping Dam	30 20 26 8 13 2 1
	13-24	1	14	9	1		
	25-36	2	10	7	--		
	>36	1	2	1	--		
	SUM	10	31	17	1		
Pleasant Grove to Hwy 65	4-12	2	1	--	--	Cover Bank Protection Scour No geomorphic function	47 23 12 18
	13-24	--	--	1	--		
	25-36	4	2	--	--		
	>36	2	5	--	--		
	SUM	8	8	1	--		
Hwy 65 to Cemex	4-12	2	1	--	--	Cover Bank Protection Scour Sediment Storage No geomorphic function	28 28 34 7 3
	13-24	2	7	--	--		
	25-36	--	2	--	--		
	>36	--		--	--		
	SUM	4	10	--	--		
Cemex to non-Project Diversion Dam	4-12	1	--	--	--	Cover Bank Protection Scour	50 25 25
	13-24	1	--	--	--		
	25-36	--	--	1	--		
	>36	--	--	--	--		
	SUM	2	--	1	--		

[1] Some pieces have more than one function.

There was no real difference in the amount, size, species, or function of the LWM (including key pieces) found within the downstream instream flow modeling site (Tables 3.3.1-15 and 3.3.1-16) from that quantified in the lower Bear River as a whole (Table 3.3.1-14). There was no LWM in the upstream modeling site that met the minimum size criteria.

Table 3.3.1-15. LWM found in Bear River downstream instream flow study site (RM 7.7 to 8.3).

Location	Diameter (in)	Length (ft)				Total Number of Pieces	Number of Pieces Within Wetted Channel
		3-25	25-50	50-75	>75		
Downstream Instream Flow Study Site	4-12	16	2	1	--	--	--
	13-24	5	6	5	--	--	--
	25-36	--	--	1	--	--	--
	>36	--	--	--	--	--	--
	SUM	**21**	**8**	**7**	**0**	**36**	**19**

Table 3.3.1-16. Key piece characteristics within the downstream instream flow study site (RM 7.7 to 8.3).

Piece ID Number	Total Length (ft)	Diameter (in)	Orientation	Function	Root Wad Attached?
1	28	8	downstream	Bank protection	Yes
2	50	12	downstream	Bank protection	Yes
3	65	12	downstream	Bank protection	Yes
4	50	18	downstream	Bank protection	Yes
5	60	12	downstream	Bank protection	Yes
6	40	12	downstream	Scour	Yes
7	70	15	downstream	Bank protection	Yes
8	38	20	downstream	Bank protection, scour	Yes
9	64	36	downstream	None	No

Instream Habitats

In June 2015, October 2016 and August 2017 (following high flows during the winter of 2016/2017), SSWD evaluated the Bear River between Camp Far West Dam and the Feather River for habitat features and channel characteristics. The mapping consisted of assessing length of meso-habitat types and other channel features such as bank erosion and floodplain/terrace development. As part of these measurements, the LFAC was measured as a surrogate for bankfull width. The LFAC was defined as the area where vegetation was still hydrologically connected when flow was at a minimum instream flow (~10 – 25 cfs) and was identifiable in the field. Each meso-habitat had the length, LFAC width, and substrate recorded, along with a photograph. Maximum and average pool depth were also recorded for pools. In some units (a sub-set of the reach), more details were collected such as bank erosion and cover.

Meso-habitat types were dominated by pools, short riffles, runs, and long glides. The average gradient of the Bear River is generally less than 0.5 percent, with few falls, cascades, chutes, rapids, step runs, pocket water, or sheet flow habitat types. Habitat types in the Bear River are summarized in Figure 3.3.1-12. There is one exception near Highway 70 where the Bear River flows over a bedrock control and falls, rapids, and a plunge pool occur. The substrate of the mapped units in the majority of the channel is dominated by gravel with mostly cobble sub-dominant (Table 3.3.1-17). Sand is a minor component though is often the subdominant substrate present. Increasing amounts of exposed bedrock and cobble substrates occur closer to the non-Project diversion dam. The coarsening of material in the upstream direction is likely due to both a change in parent material (i.e., alluvium to volcanics) and a decrease in available sediment due to storage in Camp Far West Reservoir. Additional mudstone bedrock is exposed in the channel above HWY 65 at about RM 12.4 and upstream of Pleasant Grove Road at RM 6.7. Very little silt occurs in the active channel, though the banks are often composed of finer, sandy/silty material. There was not much in channel cover observed and most of it was from giant cane concentrations that lined and often extended across the channel (Figure 3.3.1-13). The giant cane is fairly resistant to removal from higher flows, and served to scour pools and develop some areas of spawning gravel. While the giant cane populations were reduced during the winter 2016/2017 high flows, resistant roots were observed indicating that the cane will re-sprout and re-inhabit the channel.

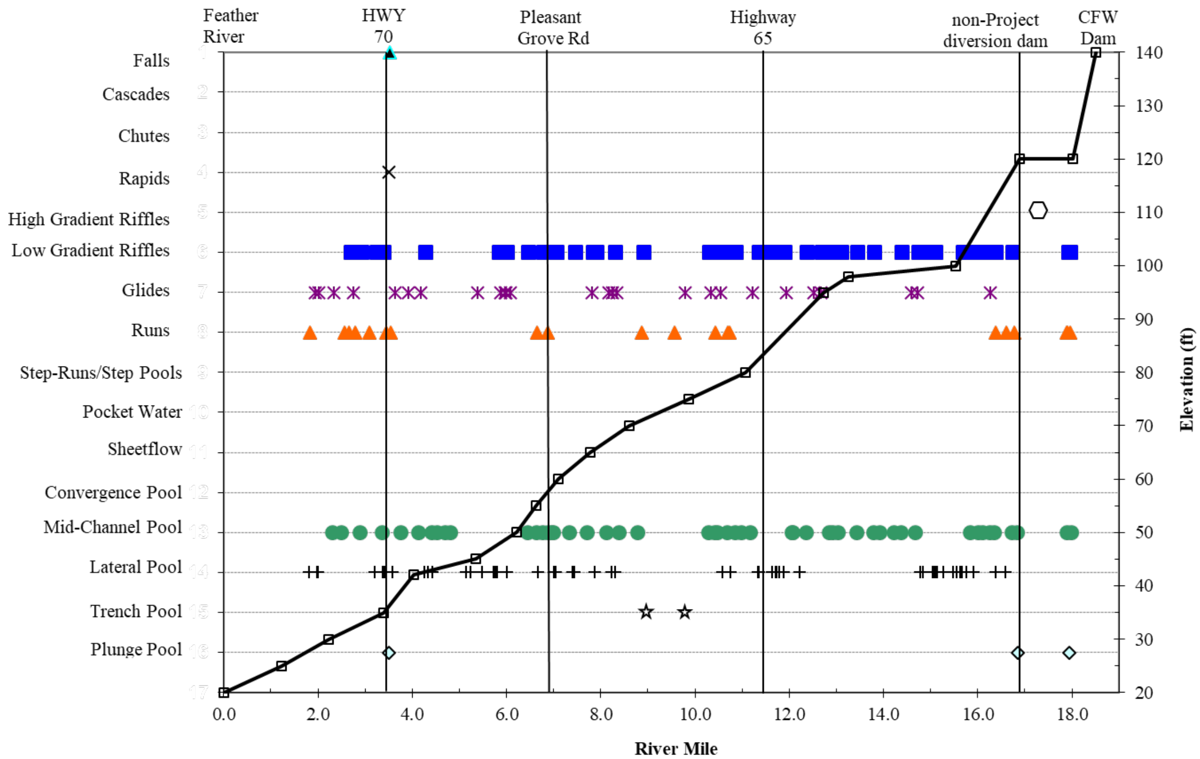


Figure 3.3.1-12. Longitudinal profile and habitat types mapped in the lower Bear River.

Table 3.3.1-17. Dominant, subdominant and bank substrate total length and frequency in the Bear River.

Substrate Type	Dominant Substrate		Subdominant Substrate		Bank Substrate	
	Total Length (ft)	Frequency (%)	Total Length (ft)	Frequency (%)	Total Length (ft)	Frequency (%)
Bedrock	696	4	603	4	872	7
Boulder	538	3	0	0	538	4
Cobble	4,893	27	4,577	29	1,257	10
Gravel	10,179	56	5,496	35	3,269	27
Sand	1,753	10	3,849	24	2,996	24
Silt	0	0	1,282	8	3,478	28
Total	**18,059**	**100**	**15,807**	**100**	**12,410**	**100**

Figure 3.3.1-13. Effects of introduced giant cane in providing cover, pool formation, gravel bar deposition and scour, and sorting of spawning-size gravels (pre-2016-17 high flows).

High flows during the winter of 2016/2017 (Figure 3.3.1-14) caused some changes to instream habitats due to scour and deposition based on observations made by SSWD before and after the high flows. SSWD observed that low gradient riffles increased in frequency and length in 2017 due to increased deposition and in areas where patches of giant cane were removed. Glides also increased in length and frequency due to deposition of gravel into areas that were previously runs or shallow pools. Some pools had enhanced scour if there were elements such as bedrock, boulder or large woody material forcing three-dimensional flow patterns (Table 3.3.1-18).

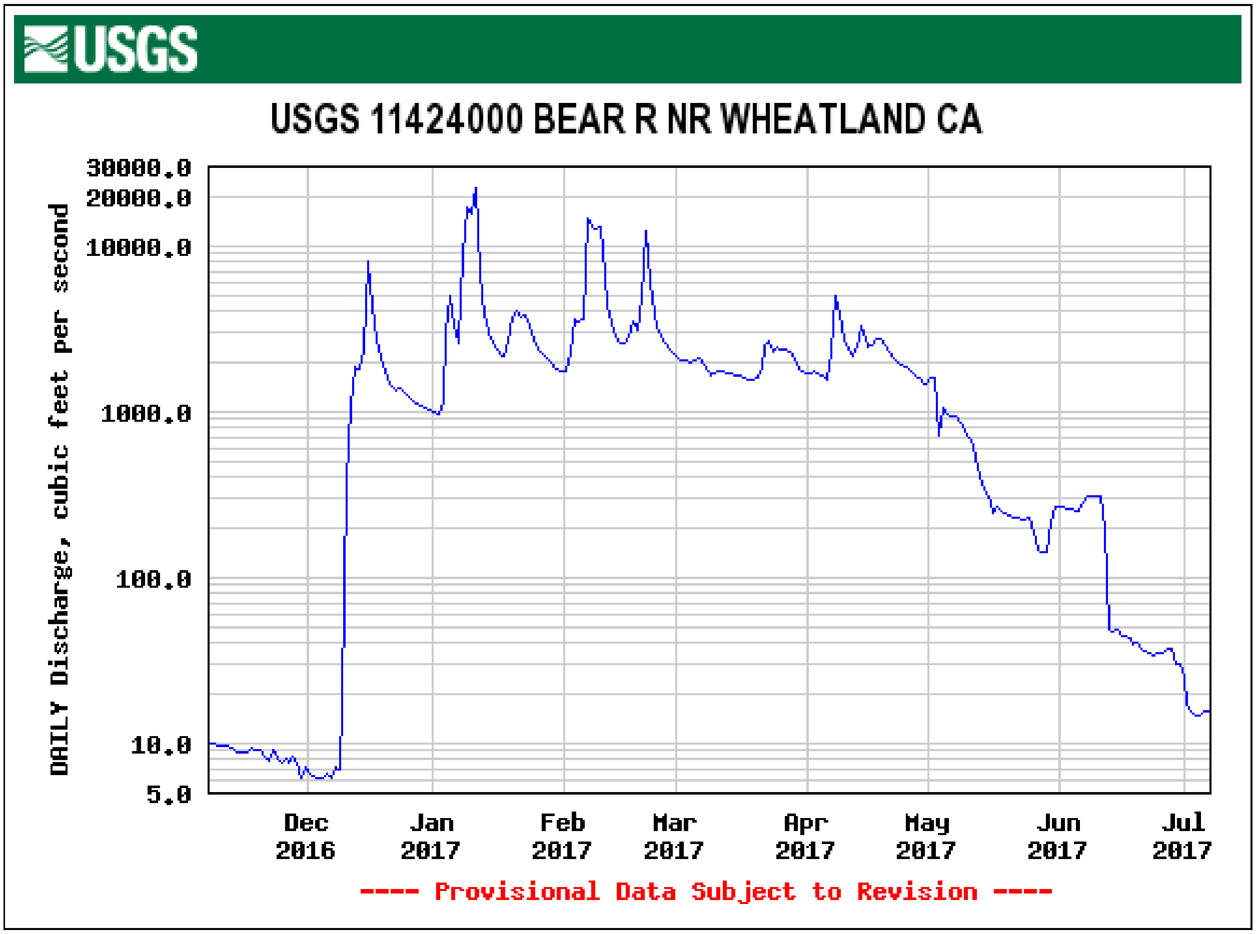


Figure 3.3.1-14. Data from USGS Gage 11324000 of Bear River near Wheatland California showing the high flows of late 2016 and early 2017. (Source: waterdata.usgs.gov. Accessed 2/8/18).

Table 3.3.1-18. 2017 Habitat type, length and frequency, and 2016 pre-flood relative frequency of habitats in the lower Bear River.

Unit Type	2016 Percent of Total Length (%)	2017 Percent of Total Length (%)	Change (%)
Mid-Channel Pool	35.9	35.1	-0.8
Lateral Scour Pool	19.5	18.7	-0.8
Glide	11.2	12.1	0.9
Backwater	10.2	10.1	-0.1
Trench Pool	6.1	5.1	-1.0
Reservoir[1]	5.3	5.3	0.0
Low Gradient Riffle	5.1	6.6	1.5
Run	4.3	4.3	0.0
Split	1.8	2.1	0.3
Rapid	0.2	0.2	0.0
Plunge Pool	0.2	0.2	0.0
Fall	0.1	0.1	0.0
High Gradient Riffle	0.1	0.1	0.0

1 Reservoir habitat is created by the non-Project diversion dam and extends approximately 5,000 ft upstream towards Camp Far West Dam.

3.3.1.2 Environmental Effects

This section discusses the potential environmental effects of SSWD's Proposed Project, as described in Section 2.2 of this Exhibit E. As part of the Project relicensing, SSWD proposes a Pool Raise of 5 ft, modifications of existing recreation facilities, and modification of the existing Project boundary.

3.3.1.2.1 Effects of Construction-Related Activities

To mitigate effects to geology and soils resources from the Pool Raise construction, SSWD will obtain and implement all permits required for construction, which may include mitigation measures related to erosion. Construction related to the Pool Raise would have short-term and local effects on geology and soils, and with implementation of all permits and approvals required for construction the effects would be less-than-significant.

3.3.1.2.2 Effects of the Pool Raise

The current effects of shoreline erosion along Camp Far West Reservoir are minor due to the lack of erodible strata. The amount of deposition in Camp Far West Reservoir since the Project was developed is fairly low as a percentage of the total volume (approximately 10% of original volume, or about 0.2% per yr). SSWD does not propose to remove sediment from Camp Far West Reservoir as part of its Proposed Project, and SSWD does not propose any activities that may increase shoreline erosion or deposition of sediment besides the Pool Raise.

Lower gradient slopes will likely experience wave action and sediment suspension initially that will diminish as the water interface develops more of an armor layer as fines are removed, leaving a surface of coarser and more resistant material. In the steeper slopes, which are largely stable bedrock, there may be increased rock fall and small local failures due to wave action and saturation of toe slopes. These failures are not expected to be extensive, given the stability of the igneous and metamorphic bedrock associated with the steeper shorelines. Table 3.3.1-19 shows the amount of area based on slope that will be inundated by the Pool Raise, most of which are less than 25 percent. The steepest slopes that will be inundated occur within the approximately 3,000 ft of additional backwatering up the Bear River that the Pool Raise will cause.

Table 3.3.1-19. Slopes inundated by the Pool Raise.

Slope Class (%)	Number of Acres Inundated by Pool Raise
0-25%	148
25-50%	9.2
50-75%	1
>75%	0.1

The inactive Dairy Mine in the Bear River Arm of the Reservoir may experience more surface erosion and sediment suspension due to the Pool Raise since approximately 1.3 ac will become newly inundated seasonally (Figure 3.3.1-15). Erosion from the Dairy Mine deposits may be rejuvenated due to wave action within the newly inundated shoreline at full pool elevation. Effects of the Pool Raise on geology and soils would be short-term and less-than-significant due to a lack of erodible strata within the additional 5-ft inundation zone, and the removal of available fines would temporary and decreasing over time as the additionally inundated shoreline would subsequently become more resistant to wave action. Potential water quality effects are discussed in Section 3.3.2.2.2.

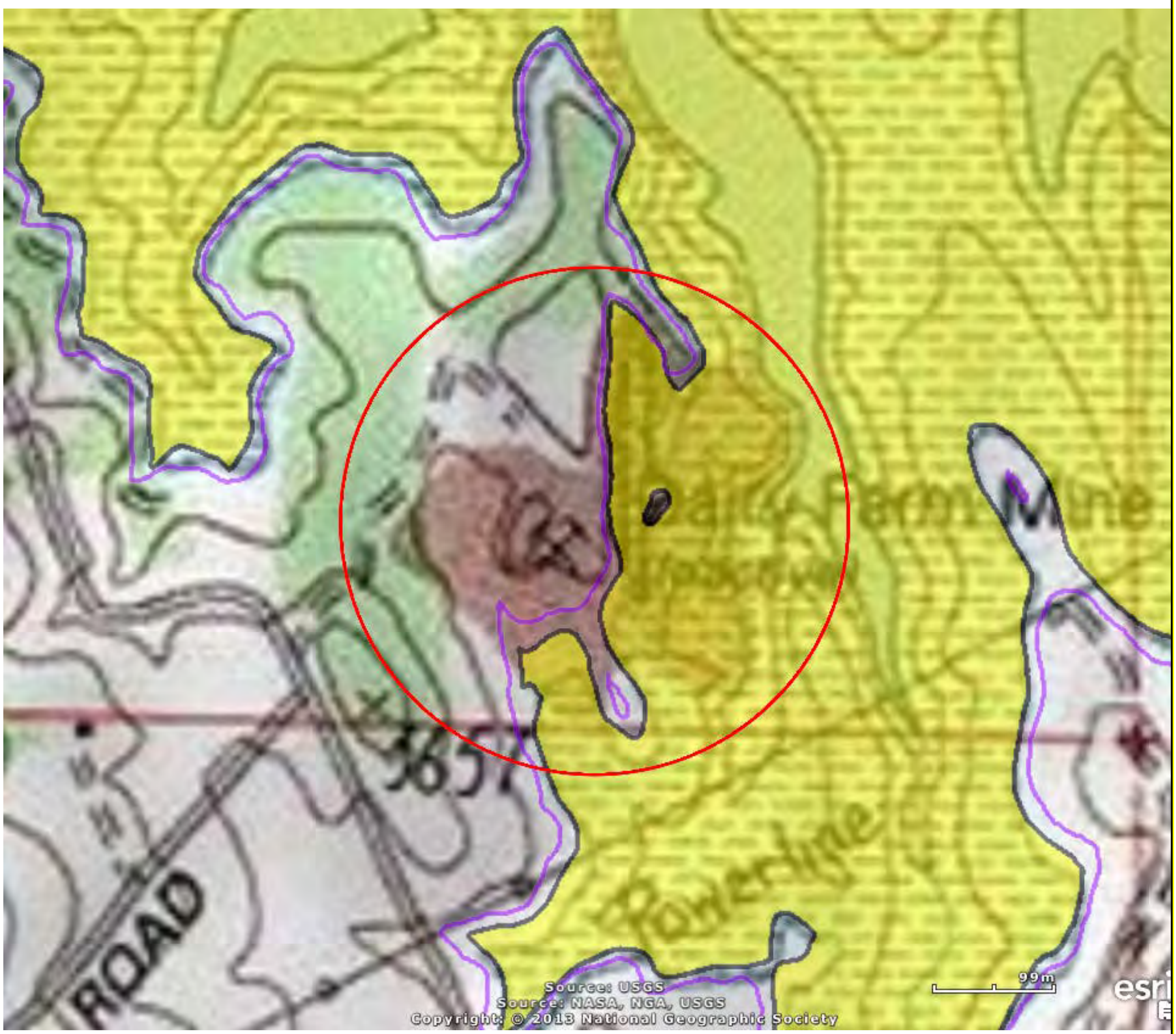


Figure 3.3.1-15. Dairy Farm Mine location adjacent to Camp Far West Reservoir. Yellow shading represents current NMWSE (300 ft) and purple line represents the estimated Pool Raise NMWSE (305 ft).

3.3.1.2.3 Effects of Proposed Project Operations and Maintenance

SSWD's Proposed Project does not include any significant changes in operations other than management of the Pool Raise which has been addressed in Section 3.3.1.2.2 regarding Camp Far West Reservoir. The Pool Raise will also slightly alter the timing and magnitude of spill events downstream of Camp Far West Dam, which could affect sediment and LWM transport in the lower Bear River. However, as discussed below, these effects are should be minimal. Flows in the Bear River downstream of the non-Project diversion dam are anticipated to decrease by approximately 4 cfs, on average, resulting from changes in the timing and magnitude of spill from Camp Far West Reservoir. Additional details regarding Project flows and reservoir storage under the Proposed Project is provided in Section 3.3.2.2.2 of this Exhibit E. Overall effects on geology and soils resources by the continued O&M of the Project will be less than significant.

SSWD considered proposing a condition to enhance sediment, especially for anadromous salmonid spawning, in the lower Bear River. However, the condition is not needed because, under existing conditions, there are adequate quantities of sediment in the lower Bear River, with estimates as high as 160 million cu yd, mostly from mining tailings (FWN 2015a). The Sheridan Pit gravel and aggregate mine, now part of the CEMEX sand and gravel mining and processing operation, is testament to the high volumes of gravel present in and near the lower Bear River. Furthermore, SSWD found suitable quantity and quality of gravel for anadromous salmonid spawning during its recent investigation. Additional discussion of gravel availability as it relates to fisheries is provided in Section 3.3.3.1.5.3 of this Exhibit E.

In addition, SSWD considered proposing a condition to enhance LWM in the lower Bear River. However, the condition is not needed because there are adequate quantities of LWM in the lower Bear River. Existing conditions show that LWM concentration range between 18 and 65 pieces per mile (1.1 to 4.0 pieces/100 m), and most of the pieces were within the low-flow, wetted channel. Furthermore, based on incidental observations by SSWD during other field efforts, some LWM moved during the 2016/2017 high flows. However, new pieces were also added due to bank failures. The lower Bear River is also not dependent exclusively on LWM to provide habitat for fish or to assist in channel forming because of beaver dams and the presence of giant cane patches that also provide these channel morphology functions.

SSWD also considered proposing a condition related to spring flows to mobilize sediment and LWM in the lower Bear River. However, the condition was not needed. Considering the amount of gravel and LWM present in the lower Bear River and SSWD's observations of how gravel and LWM were moved during 2016/2017 high flows, no additional measures are necessary to provide flows to mobilize gravel or LWM. Spill events at Camp Far West Reservoir are also largely out of the control of SSWD because of upstream water projects that capture most of the run-off in the Bear River watershed. The Pool Raise will only slightly effect the timing and magnitude of spills.

Lastly, SSWD has not proposed a measure related to erosion control because during construction of the Pool Raise, including the relocation of recreation facilities, SSWD will implement all required permit measures which will include specific mitigation for erosion. Any other O&M activities that SSWD conducts that could cause erosion (e.g., future construction and) would likely have similar measures included in applicable permits. The Pool Raise will have some short-term effects on erosion locally around Camp Far West Reservoir, as described above, yet does not warrant a specific measure. Finally, erosion in the lower Bear River is caused during high flow events that are not under the control of SSWD because they occur through the ungated spillway. Erosion in the lower Bear River is also heavily influenced by the levees that exist from the non-Project diversion dam to the Feather River confluence, which confines high flows and promotes erosions between them.

3.3.1.3 Unavoidable Adverse Effects

The Project is expected to continue to store water in the spring and as it is released from upstream water projects, and capture sediment and LWM that would otherwise be available in the lower Bear River. However, the presence of several upstream dams on the Bear River already limits the amount water, sediment and LWM transported into Camp Far West Reservoir. During spill events, sediment and LWM may be passed below Camp Far West Dam and SSWD's studies have shown that sediment (especially gravel appropriate for anadromus salmonid spawning) and LWM are present in the lower Bear River. Therefore, these effects are expected to be minor.

Project and recreation roads will continue to erode during runoff events, which is a long-term, minor effect. Under existing conditions, there appear to be no significant effects due to sedimentation from Project and recreation roads. SSWD's proposed recreation measure would maintain recreation roads in good condition. The one, short Primary Project road is paved and regularly maintained, so erosion should be minor, if at all.

Replacement of Project recreation facilities could result in site-specific erosion problems. However, the effects would be short-term and minor with implementation of required permits and mitigation measures.

3.3.1.4 List of Attachments

Attachment 3.3.1A Channel Form and Large Woody Material Maps

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Attachment 3.3.1A

Channel Form and Large Woody Material Maps

LEGEND

- Bank Erosion Site
- Key LWM Piece
- Major River Mile
- River Mile Tenth

Stability Class: Elevation Above Water Surface

- 0 - 6
- 6 - 15
- 15 - 20
- 20 - 25
- >25

DATA SOURCES: Key Piece, Bank Erosion Site, Giant Cane - HDR Inc. Service Layer Credits: Content may not reflect National Geographic's current map policy. Sources: National Geographic, Esri, Garmin, HERE, UNEP-WCMC, USGS, NASA, ESA, METI, NRCAN, GEBCO, NOAA, increment P Corp., Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

DISCLAIMER: Map information was compiled from the best available sources. No warranty is made for its accuracy or completeness. Map projection is UTM Zone 10 North.

ATTACHMENT E3.3.1A CHANNEL FORM AND LARGE WOODY MATERIAL KEY PIECES

CAMP FAR WEST HYDROELECTRIC PROJECT FERC NO. 2997

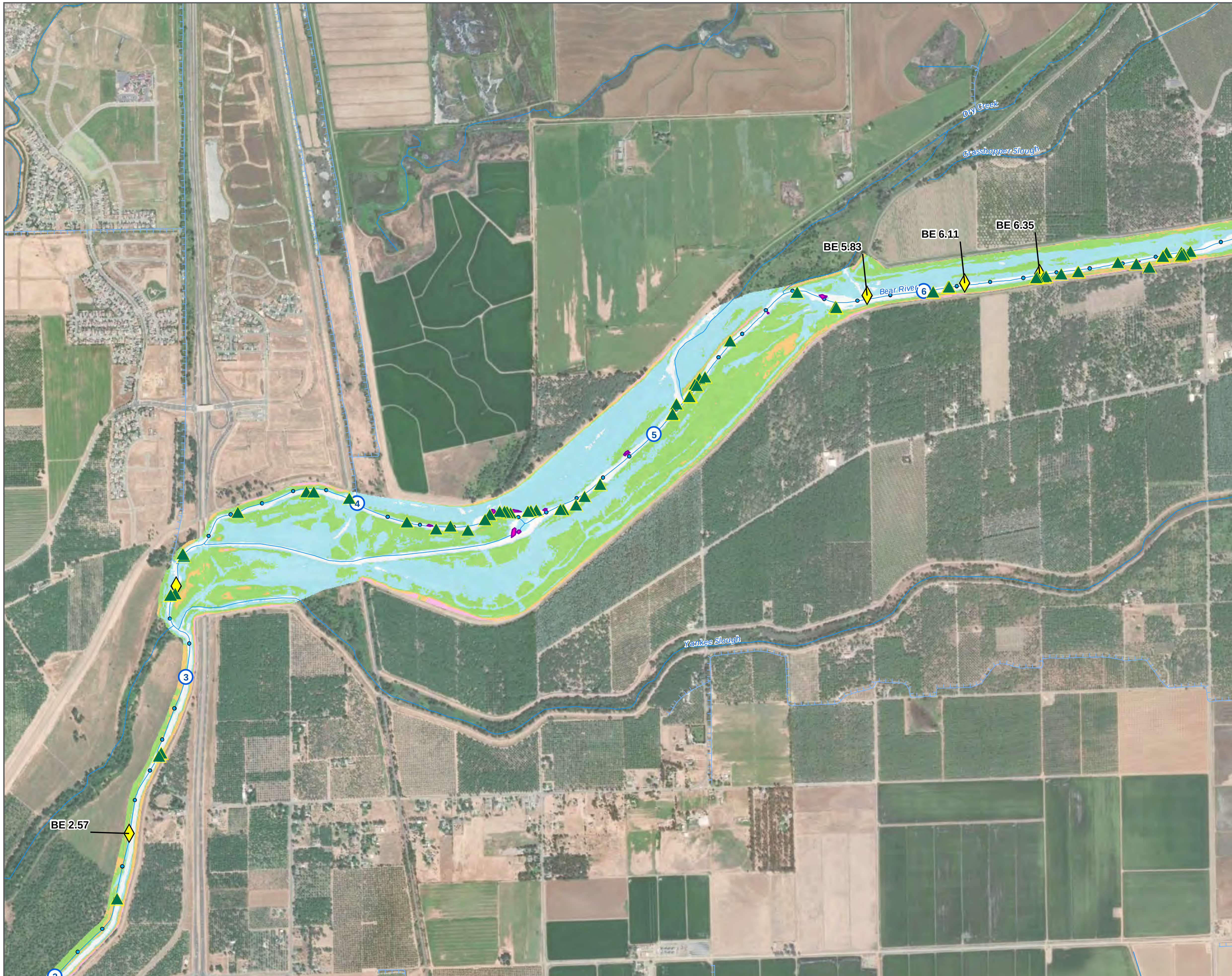
N

0 1,500

FEET

HDR

PATH: G:\PROJECTS\SOUTHSUTTERWD\CAMPFARWESTRELICENSING\7.2_WORKING\MAP_DOCS\TECHMEMO\INSTREAM\ATTACHMENT_2018_CHANNELFORM_LWM.MXD - USER: RCARIADIKI - DATE: 12/14/2018



LEGEND

- Bank Erosion Site
- Key LWM Piece
- Major River Mile
- River Mile Tenth
- Giant Cane *(Arundo donax)*

Stability Class: Elevation Above Water Surface

- 0 - 6
- 6 - 15
- 15 - 20
- 20 - 25
- >25

DATA SOURCES: Key Piece, Bank Erosion Site, Giant Cane - HDR Inc. Service Layer Credits: Content may not reflect National Geographic's current map policy. Sources: National Geographic, Esri, Garmin, HERE, UNEP-WCMC, USGS, NASA, ESA, METI, NRCAN, GEBCO, NOAA, increment P Corp., Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

DISCLAIMER: Map information was compiled from the best available sources. No warranty is made for its accuracy or completeness. Map projection is UTM Zone 10 North.

ATTACHMENT E3.3.1A CHANNEL FORM AND LARGE WOODY MATERIAL KEY PIECES

CAMP FAR WEST HYDROELECTRIC PROJECT FERC NO. 2997

N

0 1,500
FEET

HDR

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LEGEND

- Bank Erosion Site
- Key LWM Piece
- Major River Mile
- River Mile Tenth
- Giant Cane *(Arundo donax)*

Stability Class: Elevation Above Water Surface

- 0 - 6
- 6 - 15
- 15 - 20
- 20 - 25
- >25

DATA SOURCES: Key Piece, Bank Erosion Site, Giant Cane - HDR Inc. Service Layer Credits: Content may not reflect National Geographic's current map policy. Sources: National Geographic, Esri, Garmin, HERE, UNEP-WCMC, USGS, NASA, ESA, METI, NRCAN, GEBCO, NOAA, increment P Corp., Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

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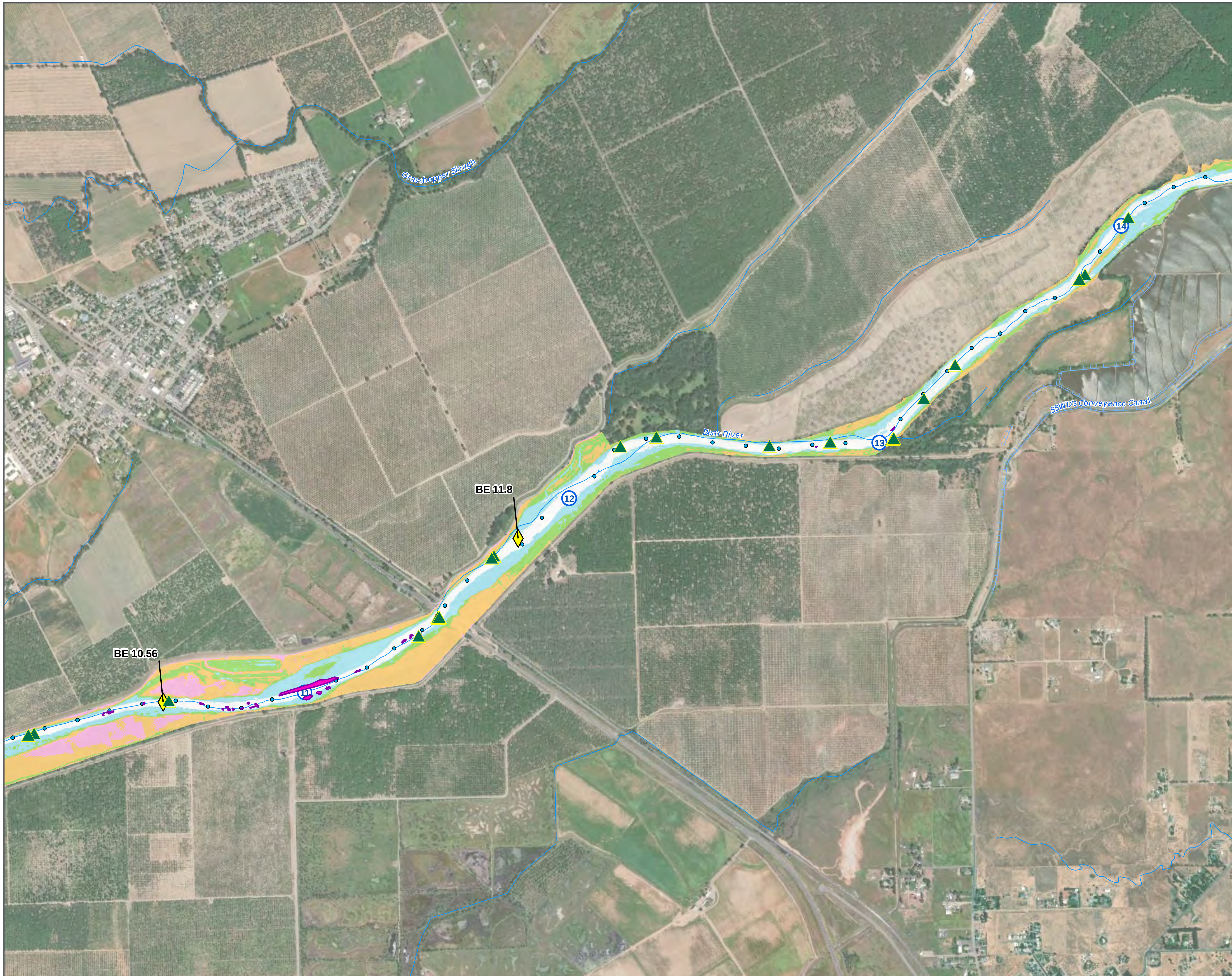

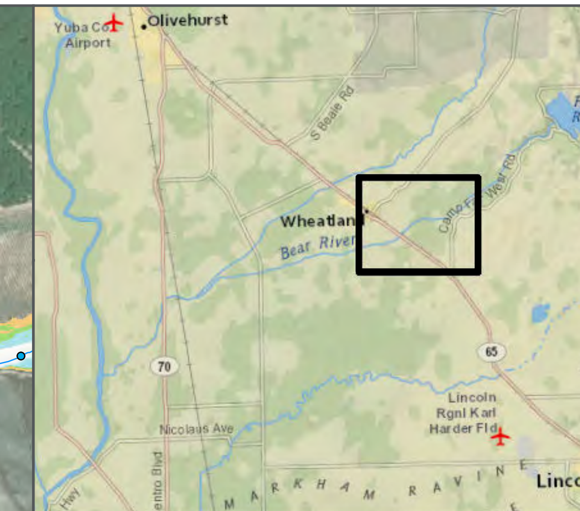

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LEGEND

- Bank Erosion Site
- Key LWM Piece
- Major River Mile
- River Mile Tenth

Stability Class: Elevation Above Water Surface

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DATA SOURCES: Key Piece, Bank Erosion Site, Giant Cane - HDR Inc.
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ATTACHMENT E3.3.1A
CHANNEL FORM AND LARGE WOODY MATERIAL KEY PIECES

CAMP FAR WEST HYDROELECTRIC PROJECT FERC NO. 2997

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3.3.2 Water Resources

The discussion of water resources is divided into four sections. The affected environment is discussed in Section 3.3.2.1, environmental effects of the Project are discussed in Section 3.3.2.2, cumulative effects are described in Section 3.3.2.3, and unavoidable adverse effects are addressed in Section 3.3.2.4.

SSWD augmented existing, relevant, and reasonably available information on water resources by conducting three studies: 1) Study 2.1, *Water Temperature Monitoring*; 2) Study 2.2, *Water Temperature Modeling*; and 3) Study 2.3, *Water Quality*.

3.3.2.1 Affected Environment

This section describes existing water resources conditions (environmental baseline) in two general areas – water quantity and water quality – for waters affected by the Project.[1, 2]

3.3.2.1.1 Water Quantity

This section describes: 1) the development of Project hydrologic datasets; 2) the Project's storage and flows; 3) the existing and proposed uses of Project waters; and 4) existing and proposed water rights that might affect or be affected by the Project.

Hydrologic Datasets

As described in Section 4.1 of Exhibit B of this Applictaion for New License, SSWD developed five hydrology datasets, each of which covers WYs 1976 through 2014 and are provided in Exhibit E, Appendix E1, of this Applictaion for New License. These datasets are: 1) Historical Hydrology; 2) Unimpaired Hydrology; 3) Baseline; 4) Near-Term Condition – Proposed Project; 5) Future Condition – Proposed Project. The first dataset is composed of gaged flow data, while the other five datasets are products of SSWD's Ops Model. The model run of the Baseline is the No Action Alternative, and is used throughout SSWD's Applictaion for New License to represent baseline reservoir and flow conditions. SSWD uses this dataset instead of the Historical Hydrology dataset to represent operations under current conditions because using historical data would be misleading given changes in Project operations overtime. The Ops Model run of the Near-Term Condition – Proposed Project is also used throughout SSWD's Applictaion for New License to represent reservoir and flow conditions under SSWD's Proposed Project as described in this Application for New License under near-term conditions. The Ops Model run of the SSWD's Future Condition – Proposed Project is used in Exhibit E Sections 3.3.2.3, which address water resources and aquatic resources cumulative effects, respectively. Each Ops Model run is provided in Exhibit E, Appendix E1.

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1 Refer to Section 3.1.2 of this Exhibit E for a description of the Bear River basin from its headwaters to the confluence with the Feather River, a description of the Feather River basin from the Yuba River to the Sacramento River.

2 Refer to Table 2.1-2 of this Exhibit E for information regarding the volume, surface area, depth and shoreline length of Camp Far West Reservoir.

Project Flows and Storage

SSWD currently operates the Project to provide irrigation water to growers in SSWD's and CFWID's service districts. A schematic of these service districts is shown in Figure 3.0-1 of Exhibit B. Water supply deliveries to SSWD's Service Area is described in Section 5.2.2 of Exhibit B. Water supply deliveries to CFWID's Service Area is described in Section 5.2.4 of Exhibit B. SSWD also operates the Project to meet Bear River flow requirements and to generate power. A complete description of the existing Project operations is provided in Exhibit E Section 2, and a description of SSWD's Ops Model's representation of Project operations under the No Action Alternative can be found in Exhibit E, Appendix E1, *Operations Model Documentation and Validation* report.

Table 3.3.2-1 provides Project flows and storage, for the 0 percent (i.e., maximum), 10 percent (i.e., wet conditions), 50 percent (i.e., median), 90 percent (i.e., dry conditions) and 100 percent (i.e., minimum) exceedance values at critical locations for the No Action Alternative model run. Long-term averages are also provided in the table.

Table 3.3.2-1. No Action Alternative flows and storage by month from Baseline dataset.

Value	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
CAMP FAR WEST RESERVOIR STORAGE (ac-ft)												
0%	69,015	94,174	94,251	94,272	94,288	94,280	94,290	94,294	94,284	94,279	86,883	71,366
10%	55,986	60,784	85,815	93,910	94,125	94,199	94,220	94,224	94,132	87,796	70,030	55,217
50%	17,159	17,795	22,445	38,861	76,726	93,737	93,859	93,917	85,076	59,539	33,685	18,638
90%	3,010	3,553	4,576	6,574	10,672	21,350	33,188	37,943	37,094	25,932	10,874	3,676
100%	1,300	1,300	1,982	3,135	3,897	7,680	12,542	11,289	7,641	4,116	1,300	1,300
Average	*21,528*	*24,317*	*33,798*	*47,687*	*62,369*	*74,113*	*79,388*	*79,509*	*74,360*	*58,216*	*37,664*	*23,212*
CAMP FAR WEST RESERVOIR WATER-SURFACE ELEVATION (ft)												
0%	286	300	300	300	300	300	300	300	300	300	296	287
10%	277	280	296	300	300	300	300	300	300	297	286	276
50%	235	236	243	262	290	300	300	300	295	279	257	237
90%	192	195	201	209	221	241	256	261	260	248	222	196
100%	175	175	183	193	197	213	226	223	213	199	175	175
Average	*231*	*234*	*245*	*261*	*274*	*285*	*289*	*289*	*286*	*275*	*255*	*236*
BEAR RIVER FLOW BELOW CAMP FAR WEST RESERVOIR FLOW (RM 12.6) (cfs)												
0%	114	8,367	27,379	46,031	29,394	13,736	11,925	4,737	1,215	680	521	399
10%	104	13	10	1,510	2,230	2,563	1,717	1,120	630	495	489	281
50%	17	11	10	10	12	510	531	494	453	476	431	110
90%	14	10	10	10	11	10	29	123	144	133	125	22
100%	5	10	10	10	10	10	26	42	47	38	5	5
Average	*41*	*63*	*370*	*504*	*803*	*916*	*733*	*575*	*415*	*391*	*366*	*135*
DIVERSION INTO CFWID NORTH CANAL (cfs)												
0%	3	1	0	1	2	2	7	18	25	29	28	17
10%	2	1	0	0	2	2	6	18	25	29	27	12
50%	2	1	0	0	2	1	4	15	23	27	26	5
90%	1	0	0	0	1	0	1	9	21	23	22	3
100%	0	0	0	0	0	0	0	4	11	13	0	0
Average	*2*	*1*	*0*	*0*	*1*	*1*	*4*	*14*	*23*	*26*	*25*	*7*
DIVERSION INTO CFWID SOUTH CANAL (cfs)												
0%	7	2	0	0	0	1	21	22	26	25	23	12
10%	7	1	0	0	0	0	21	22	25	25	22	10
50%	5	0	0	0	0	0	5	21	24	25	20	7
90%	3	0	0	0	0	0	1	19	19	23	12	5
100%	0	0	0	0	0	0	0	11	11	14	0	0
Average	*5*	*0*	*0*	*0*	*0*	*0*	*9*	*21*	*23*	*24*	*18*	*7*
DIVERSION INTO SSWD MAIN CANAL (cfs)												
0%	96	0	0	0	0	0	396	446	438	434	433	361
10%	86	0	0	0	0	0	174	396	422	431	430	244
50%	0	0	0	0	0	0	10	301	354	415	369	84
90%	0	0	0	0	0	0	0	63	70	70	67	0
100%	0	0	0	0	0	0	0	0	0	0	0	0
Average	*24*	*0*	*0*	*0*	*0*	*0*	*53*	*264*	*296*	*322*	*300*	*106*

Table 3.3.2-1. (continued)

Value	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
BEAR RIVER BELOW THE NON-PROJECT DIVERSION DAM (RM 16.9) (cfs)												
0%	10	8,366	27,379	46,031	29,392	13,735	11,923	4,502	825	210	47	47
10%	10	10	10	1,510	2,229	2,562	1,663	725	225	47	47	47
50%	10	10	10	10	10	510	425	95	25	10	10	10
90%	10	10	10	10	10	10	25	25	25	10	10	10
100%	5	10	10	10	10	10	25	25	25	10	5	5
Average	*10*	*62*	*370*	*504*	*802*	*915*	*669*	*278*	*73*	*18*	*22*	*15*
BEAR RIVER FLOW AT WHEATLAND (RM 11.5) (cfs)												
0%	14	8,369	27,384	46,036	29,396	13,739	11,927	4,508	830	216	54	52
10%	14	14	15	1,515	2,232	2,566	1,667	731	230	53	54	52
50%	14	14	15	15	14	514	430	101	30	16	17	15
90%	14	14	15	15	14	14	30	31	30	16	17	15
100%	9	14	15	15	14	14	30	31	30	16	12	10
Average	*14*	*66*	*375*	*509*	*806*	*919*	*674*	*284*	*79*	*25*	*29*	*20*
BEAR RIVER FLOW AT PLEASANT GROVE ROAD (RM 7.1) (cfs)												
0%	14	8,369	27,384	46,036	29,396	13,739	11,927	4,508	830	216	54	52
10%	14	14	15	1,515	2,232	2,566	1,667	731	230	53	54	52
50%	14	14	15	15	14	514	430	101	30	16	17	15
90%	14	14	15	15	14	14	30	31	30	16	17	15
100%	9	14	15	15	14	14	30	31	30	16	12	10
Average	*14*	*66*	*375*	*509*	*806*	*919*	*674*	*284*	*79*	*25*	*29*	*20*
BEAR RIVER FLOW AT FEATHER RIVER CONFLUENCE (RM 0.0) (cfs)												
0%	398	10,035	32,792	51,938	35,166	15,880	15,191	4,731	869	223	66	58
10%	18	33	849	1,719	2,478	2,787	1,731	778	231	54	54	52
50%	14	15	21	50	110	555	467	109	34	18	18	15
90%	14	14	16	17	18	24	35	34	31	17	17	15
100%	9	14	15	15	14	17	32	31	30	16	12	10
Average	*16*	*85*	*465*	*639*	*965*	*1,037*	*719*	*300*	*83*	*26*	*30*	*21*

Existing Designated Beneficial Uses

As described in Section 3.1.5 of Exhibit E, Basin Plan water quality standards "consist of the designated uses of the navigable waters involved and the water quality criteria for such waters based upon such uses." [33 USC § 1313(C) (2) (A)]. Section 3.1.5 of Exhibit E describes the designated Beneficial Uses of water in the Project Vicinity, which include: 1) municipal and domestic water supply; 2) agricultural water supply (irrigation); 3) industrial service supply (power generation); 4) water contact recreation; 5) non-water contact recreation; 6) warm freshwater habitat; 7) cold freshwater habitat; and 8) wildlife habitat.

Existing and Proposed Water Rights Potentially Affecting or Affected by the Project

This section provides a list of water rights held by SSWD and other existing or proposed water rights potentially affecting or affected by the Project.

Water Rights Upstream of the Project Area That Affect the Project

Numerous water rights holders divert and store waters upstream of the Project Area. The upstream projects with significant impacts on inflows to the Project include PG&E's Drum-Spaulding Project, NID's Yuba-Bear Hydroelectric Project and NID's Lake Combie. Details on PG&E's Drum-Spaulding Hydroelectric Project water rights in the Bear River are provided in Table 3.3.2-2. Details on NID's Yuba-Bear Hydroelectric Project water rights in the Bear River are provided in Table 3.3.2-3. Details on NID's water rights at Lake Combie are provided in Table 3.3.2-4.

Table 3.3.2-2. Summary of water rights held by PG&E related to the Drum-Spaulding Hydroelectric Project (FERC project number 2310) in the Bear River.

Priority Date	SWRCB Designation		Source	Amount		Place of Storage or Diversion	Season of		Beneficial Use
	Application	Permit or License Number		cfs	ac-ft		Diversion	Storage	
7/5/1928	5970	8888	Bear River	525	--	Dutch Flat 1 Intake	1/1-12/31	--	Power
2/9/1922	2753	987	Bear River	100	--	Bear River Canal Intake	1/1-12/31	--	Power
6/19/1929	6332	1375	Bear River	120	--	Bear River Canal Intake	1/1-12/31	--	Power
1852	--	957	Bear River	475	--	Bear River Canal Intake	1/1-12/31	--	Power, Irrigation, Domestic, Public Service
1864	--	--	Little Bear River	60	--	Boardman Canal below Alta PH	1/1-12/31	--	Irrigation and Domestic

Table 3.3.2-3. Summary of water rights held by NID related to the Yuba-Bear Hydroelectric Project (FERC project number 2266) in the Bear River.

Priority Date	SWRCB Designation			Source	Amount		Place of Storage or Diversion	Season of		Beneficial Use
	Application	Permit	License		cfs	ac-ft		Diversion	Storage	
2/5/1963	21151	14799	9903 (4/19/72)	Bear River	1,056	--	Chicago Park Flume	1/1-12/31	--	Power
2/5/1963	21152	14800	9902 (4/19/72)	Bear River	550	-	Dutch Flat Flume	1/1-12/31	--	Power
1/9/1976	24983	16953	In Progress	Bear River	700	62,080	Rollins Reservoir	1/1-12/31	11/30-6/1	Power
1853	S14354	--	Pre-1914 Right	Bear River	--	--	Rollins	--	--	--
1853	S14355	--	Pre-1914 Right	Bear River	--	--	Bear River Canal	--	--	--

Table 3.3.2-4. Summary of non-consumptive water rights held by NID for the purpose of power generation and irrigation.

Priority Date	SWRCB Designation			Source	Amount		Place of Storage or Diversion	Season of		Beneficial Use
	Application	Permit	License		cfs	ac-ft		Diversion	Storage	
11/22/1921	2652A	5803	10350	Bear River	--	5,555	Combie Reservoir	--	11/30-6/1	Irrigation
6/3/1981	26866	18757	--	Bear River	1,000	--	Combie Reservoir	1/1-12/31	--	Power

NID also holds senior pre-1914 water rights to the Bear River. In August 2015, NID filed an application with the SWRCB for the annual appropriation of 222,000 ac-ft of water from the Bear River, related to the development of a proposed water storage project immediately upstream of Combie Reservoir.[3]

Water Rights within the Project Area

SSWD operates the Project consistent with the terms and conditions of each of the water rights and agreements listed below.

SSWD's Water Right for Power (No Expiration Date)

SSWD holds a post-1914 appropriative water right with a priority date of January 4, 1980 for the purposes of operating the Project for hydroelectric power generation. Table 3.3.2-5 provides SWRCB designations and the key terms of the post-1914 appropriative water-right permit held by SSWD for power use.

[3] Details on NID's proposed water storage project can be found at https://centennial.nidwater.com.

Table 3.3.2-5. Water right permit held by SSWD for operation of the Camp Far West Hydroelectric Project for power generation.

Priority (date)	SWRCB Designation (application)	SWRCB Designation (permit)	SWRCB Designation (license)	Source (Waterbody)	Amount & Place of Diversion or Storage & Season (amount & place)	Place of Use (powerhouse)
1/4/80	26162	18360	Not Issued Yet	Bear River	725 cfs Direct Diversion from 1/1 – 12/31	Camp Far West Dam Powerhouse
					103,100 ac-ft Storage from 10/1 – 6/30	

For the protection of fish and wildlife, SSWD's Permit 18360 identifies a minimum required release of 25 cfs during April 1 through June 30 and 10 cfs from July 1 through March 31. If the total inflow to Camp Far West Reservoir is less than the designated amount for a given period, SSWD shall bypass that quantity.

The time to complete beneficial use for Permit 18360 expired on December 1, 1995. SSWD submitted a request for licensing of Permit 18360 to the SWRCB Division of Water Rights on September 9, 1997, which is still pending.

Water Supply Deliveries from the Bear River to SSWD's Service Area (No Expiration Date)

SSWD makes water deliveries from the Bear River and several small tributaries to its members within its service area consistent with SSWD's consumptive use water rights. Table 3.3.2-6 lists SSWD's post-1914 appropriative water-right licenses and permit for irrigation and domestic uses.

Table 3.3.2-6. Water rights held by SSWD for delivery to SSWD's members within its service area for irrigation and domestic uses.

Priority (date)	SWRCB Designation (application)	SWRCB Designation (license)	Source (Waterbody)	Purpose of Use	Amount & Place of Diversion or Storage (amount & place)	Season (period)	Place of Beneficial Use
6/13/41	10221	11120	Bear River	Irrigation, Domestic and Incidental Power[2]	250 cfs Direct Diversion	from 3/1 – 6/30 and from 9/1 – 10/31	59,000 ac within SSWD and 4,180 ac within CFWID
					40,000 ac-ft Storage	from 10/1 – 6/30	
5/2/52[1]	14804	11118	Bear River	Irrigation, Domestic and Incidental Power	330 cfs Direct Diversion	from 5/1 – 9/1	59,000 ac within SSWD and 4,180 ac within CFWID
					58,370 ac-ft Storage	from 10/1 – 6/30	
8/16/51	14430	4653	Coon Creek	Irrigation	2 cfs Direct Diversion	from 4/1 – 11/1	80 ac

Table 3.3.2-6. (continued)

Priority (date)	SWRCB Designation (application)	SWRCB Designation (license)	Source (Waterbody)	Purpose of Use	Amount & Place of Diversion or Storage (amount & place)	Season (period)	Place of Beneficial Use
4/12/65	22102	11121	East Side Canal, Coon Creek, Markham Ravine, and Auburn Ravine	Irrigation	40.3 cfs Direct Diversion 4,769 ac-ft per annum	from 4/1 – 6/1 and 9/1 – 10/31	4,000 ac
8/11/71	23838	12587	Yankee Slough	Irrigation	1.35 cfs Direct Diversion 143 ac-ft per annum	from 4/1 – 6/1 and 9/1 – 9/30	235 ac

[1] SSWD received a release from priority from Applications 5633 and 5634 for Application 14804.
[2] Incidental Power is identified as a purpose of use for Applications 10221 and 14804. The powerhouse listed in the place of use for these applications is a hydroelectric facility located along SSWD's main canal.

SSWD delivers this water from the Bear River via its Conveyance Canal, which is located on the Bear River about 1.2 mi downstream of Camp Far West Dam (Figure 3.3.2-1).

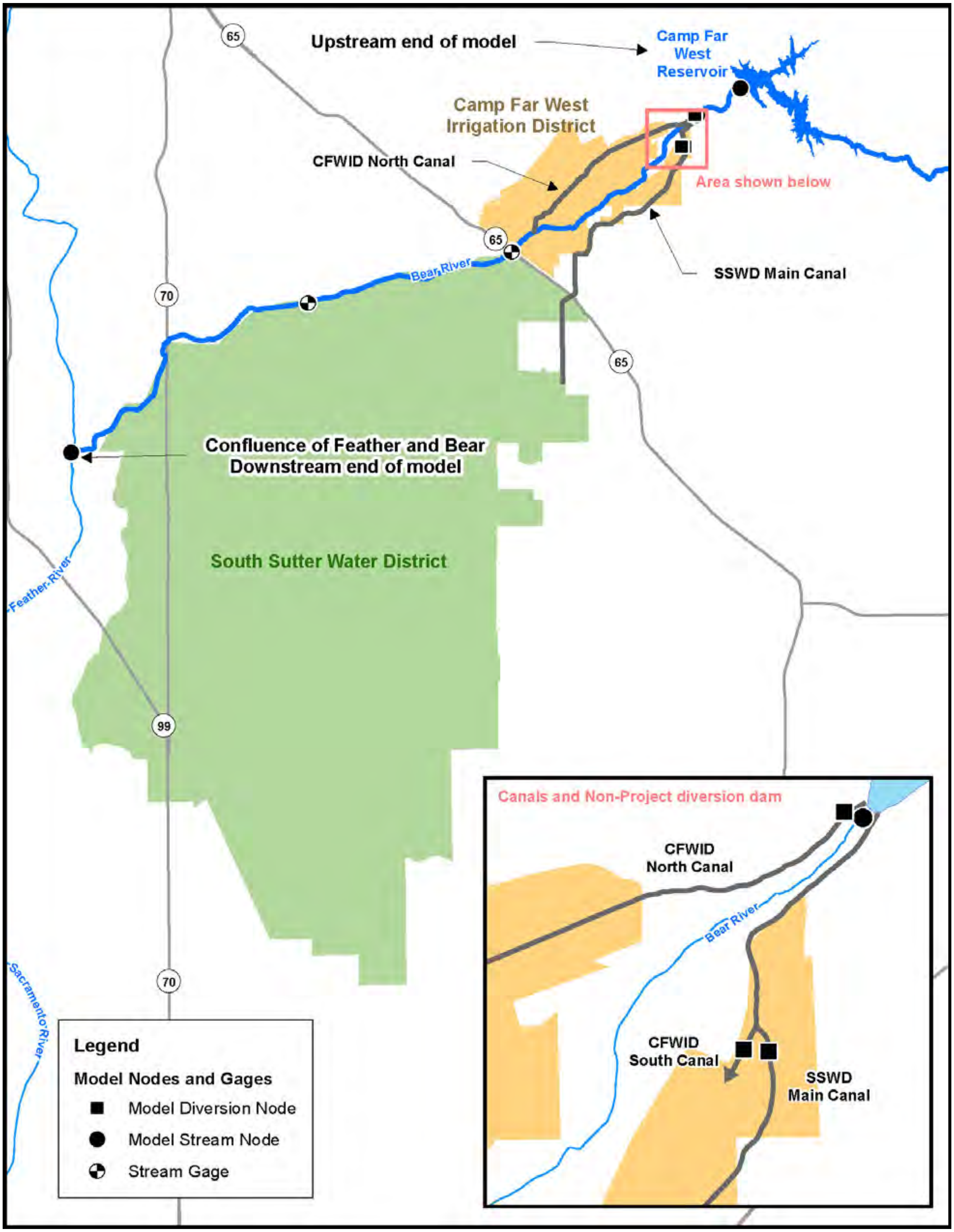

Figure 3.3.2-1. Camp Far West Hydroelectric Project, SSWD and CFWID service territories, and Ops Model nodes.

Identical to the required fish release for SSWD's power permit, Applications 10221 and 14804 identify a minimum required release of 25 cfs during April 1 through June 30 and 10 cfs from July 1 through March 31. If the total inflow to Camp Far West Reservoir is less than the designated amount for a given period, SSWD shall bypass that quantity. These required fish releases are not additive.

SSWD and CFWID entered into an Agreement in 1957 (and Supplemental Agreement in 1973) relative to the construction and subsequent enlargement of Camp Far West Reservoir. Under the Agreement, SSWD provides CFWID 13,000 ac-ft of water from the Reservoir each year to satisfy CFWID's senior water rights along the Bear River.

In February 2000, SSWD, DWR and the CFWID entered into the Bear Agreement (DWR, SSWD and CFWID 2000) to settle the responsibilities of SSWD, CFWID, and all other Bear River water rights, to implement the objectives in the *Water Quality Control Plan for the San Francisco Bay/ Sacramento-San Joaquin Delta Estuary* adopted May 22, 1995 (1995 Bay-Delta Plan).

To incorporate this agreement into SSWD's water rights, in July 2000, the SWRCB issued Order 2000-10 that amended SSWD's Water Right Licenses 11120 and 11118 to provide that:

> During releases of water in connection with the change of purpose of use and place of use of up to 4,400 acre-ft transferred to DWR during dry and critical years,[4] Licensee shall increase flows in the lower Bear River by no more than 37 cfs from July through September. To avoid stranding impacts to anadromous fish in the Bear River below Camp Far West Reservoir, Licensee shall, by the end of a release period from the reservoir in connection with said change, ramp down flows from the reservoir at a rate not to exceed 25 cfs over a 24-hour period.

The required flow volume is in addition to the minimum flow requirement in the Project license, and is measured immediately downstream of the diversion dam as spill over the diversion dam (i.e., SSWD installs notched boards on the diversion dam and controls the elevation of the diversion dam impoundment to provide the required flow).

SWRCB's Order 2000-10 states that this arrangement would terminate upon the termination of the Bear River Agreement on December 31, 2035, or sooner if the Bear River agreement was terminated sooner.

[4] SWRCB Order 2000-10 states: "*Dry and critical years are defined, for purposes of this order, as set forth on page 23 of the Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary (Adopted by the SWRCB in May, 1995), except that such years do not include a year in which water storage in Camp Far West Reservoir on April 1 is at or below 33,255 ac-ft ("extreme critical year").*"

Water Rights Downstream of the Project Affected by the Project

As previously identified, SSWD and CFWID entered into an Agreement in 1957 (and a Supplemental Agreement in 1973) to satisfy CFWID's senior water rights along the Bear River. A summary of CFWID's water rights are provided in Table 3.3.2-7. No other active water rights[5] are identified downstream of Camp Far West Dam along the Bear River.

Table 3.3.2-7. Water rights held by CFWID, downstream of Camp Far West Dam.

Priority (date)	SWRCB Designation (application)	SWRCB Designation (license)	Source (Waterbody)	Purpose of Use	Amount & Place of Diversion or Storage (amount & place)	Season (period)	Place of Beneficial Use
4/1/1918	959	385	Bear River	Agricultural Use	13.24 cfs Direct Diversion	from 4/1 to 10/1	A net irrigable area of 4,445 acres within a gross area of 5,045 acres consisting of 4,732 acres within the boundaries of CFWID and 313 acres outside of CFWID
6/13/1922	2881	2266	Bear River	Irrigation	5,000 ac-ft Storage per annum[1]	from 3/1 to 5/1	
2/11/1924	3843	2267	Bear River	Irrigation	11.76 cfs Direct Diversion	from 5/1 to 10/1	
4/28/1941	10190	2740	Bear River	Irrigation	5,000 ac-ft Storage per annum[1]	from 5/1 to 6/1	

[1] The maximum annual quantity diverted under Licenses 2740 and 2266 shall not exceed 5,000 ac-ft per annum.

Flow conditions in the Bear River downstream of the Project are described in Section 6.3 of Exhibit B.

3.3.2.1.2 Water Quality

This section first describes the regulatory context of water quality in the basin, and then describes existing water quality conditions in five areas: 1) general water quality, including results of synoptic dissolved oxygen (DO) sampling; 2) water temperature and DO conditions in reservoirs; 3) water temperature conditions in streams; 4) SSWD's relicensing water temperature model; and 5) the CWA Section 303(d) constituent mercury and existing conditions regarding mercury bioaccumulation in fish.

Existing Water Quality Objectives

Table 3.3.2-8 lists Water Quality Objectives described in the Basin Plan related to the designated Beneficial Uses.

[5] An Initial Statement of Water Diversion and Use was filed in 1978 in support of a riparian and pre-1914 water right claim; however, the SWRCB currently lists Statement S009549 as inactive.

Table 3.3.2-8. Basin Plan Water Quality Objectives to support designated Beneficial Uses in the Project Vicinity.

Water Quality Objective	Description
Bacteria	In terms of fecal coliform. Less than a geometric average of 200/100 ml on five samples collected in any 30-day period and less than 400/100 ml on ten percent of all samples taken in a 30-day period.
Biostimulatory Substances	Water shall not contain biostimulatory substances that promote aquatic growth in concentrations that cause nuisance or adversely affect beneficial uses.
Chemical Constituents	Waters shall not contain chemical constituents in concentrations that adversely affect beneficial uses. Specific trace element levels are given for certain surface waters, none of which include the waters in the vicinity of the Project. Electrical conductivity (at 77 ºF) shall not exceed 150 micromhos (µmhos)/cm (90 percentile) in well-mixed waters of the Feather River from the Fish Barrier Dam at Oroville to Sacramento River. Other limits for organic, inorganic and trace metals are provided for surface waters that are designated for domestic or municipal water supply. In addition, waters designated for municipal or domestic use must comply with portions of Title 22 of the California Code of Regulations. For protection of aquatic life, surface water in California must also comply with the California Toxics Rule (40 C.F.R. Part 131).
Color	Water shall be free of discoloration that causes a nuisance or adversely affects beneficial uses.
Dissolved Oxygen (DO)	Monthly median of the average daily dissolved oxygen concentration shall not fall below 85 percent of saturation in the main water mass, and the 95 percent concentration shall not fall below 75 percent of saturation. Minimum level of 7 mg/L. Specific DO water quality objectives below Oroville dam are 8.0 mg/L from September 1 to May 31 for Feather River from Fish Barrier Dam at Oroville to Honcut Creek (surface water body #40). When natural conditions lower dissolved oxygen below this level, the concentrations shall be maintained at or above 95 percent of saturation.
Floating Material	Water shall not contain floating material in amounts that cause a nuisance or adversely affect beneficial uses.
Oil and Grease	Water shall not contain oils, greases, waxes or other material in concentrations that cause a nuisance, result in visible film or coating on the surface of the water or on objects in the water, or otherwise adversely affect beneficial uses.
PH	The pH of surface waters will remain between 6.5 and 8.5, and cause changes of less than 0.5 in receiving water bodies.
Pesticides	Waters shall not contain pesticides or a combination of pesticides in concentrations that adversely affect beneficial uses. Other limits established as well.
Radioactivity	Radionuclides shall not be present in concentrations that are harmful to human, plant, animal or aquatic life, nor that result in the accumulation of radionuclides in the food web to an extent that presents a hazard to human, plant, animal or aquatic life.
Sediment	The suspended sediment load and suspended-sediment discharge rate of surface waters shall not be altered in such a manner as to cause a nuisance or adversely affect beneficial uses.
Settleable Material	Waters shall not contain substances in concentrations that result in the deposition of material that causes a nuisance or adversely affects beneficial uses.
Suspended Material	Waters shall not contain suspended material in concentrations that cause a nuisance or adversely affect beneficial uses.
Tastes and Odor	Water shall not contain taste- or odor-producing substances in concentrations that impart undesirable tastes and odors to domestic or municipal water supplies or to fish flesh or other edible products of aquatic origin, or that cause nuisance, or otherwise adversely affect beneficial uses.
Temperature	The natural receiving water temperature of interstate waters shall not be altered unless it can be demonstrated to the satisfaction of the Regional Water Quality Control Board that such alteration in temperature does not adversely affect beneficial uses. Increases in water temperatures must be less than 5 ºF above natural receiving-water temperature.
Toxicity	All waters shall be maintained free of toxic substances in concentrations that produce detrimental physiological responses in human, plant, animal, or aquatic life. Compliance with this objective will be determined by analyses of indicator organisms, species diversity, population density, growth anomalies, and biotoxicity tests as specified by the CVRWQCB.
Turbidity	In terms of changes in turbidity (NTU) in the receiving water body where natural turbidity is 0 to 5 NTUs, increases shall not exceed 1 NTU; where 5 to 50 NTUs, increases shall not exceed 20 percent; where 50 to 100 NTUs, increases shall not exceed 10 NTUs; and where natural turbidity is greater than 100 NTUs, increase shall not exceed 10 percent.

Source: CVRWQCB 1998.

Section 303(d) of the CWA requires that each State submit to EPA a list of rivers, lakes and reservoirs in the State for which pollution control or requirements have failed to provide for water quality every two years. The CVRWQCB and SWRCB work together to research and update the list for the Central Valley region of California. Based on a review of this list and its associated TMDL Priority Schedule in the Project Vicinity, the Bear River from Combie Lake to Camp Far West Reservoir has been identified by the SWRCB as CWA Section 303(d) State Impaired for mercury. Downstream of the Project, the Bear River has been listed as CWA Section 303(d) State Impaired for mercury, copper, and chlorpyrifos (SWRCB 2016).

General Water Quality

Water quality parameters discussed in this section include all parameters except water temperature and mercury. Conditions upstream of the Project, within the Project, and below the Project in the lower Bear River are presented.

Upstream of the Project

Water quality was measured at one location in the Bear River as part of the SWRCB's Surface Water Ambient Monitoring Program (SWAMP) Statewide Perennial Stream Assessment (SWRCB 2013); in 2013 upstream of the Little Wolf Creek confluence (RM 24). Table 3.3.2-9 provides the results of that sampling event.

Table 3.3.2-9. Water quality results from the SWAMP Perennial Streams Assessment.

Analyte	Units	Bear River above Little Wolf Creek
Nitrogen, Total, Total	mg/L	0.223
Phosphorus as P, Total	mg/L	0.0139
Silica as SiO2, Dissolved	mg/L	8.9
Ammonia as N, Total	mg/L	0.0078
OrthoPhosphate as P, Dissolved	mg/L	0.0393
AFDM_Algae, Particulate	g/m2	2.45
Chlorophyll a, Particulate	mg/m2	4.05
Total Suspended Solids, Particulate	mg/L	1.4
Sulfate, Dissolved	mg/L	2.83
Chloride, Dissolved	mg/L	8.55
Hardness as CaCO3, Total	mg/L	42.8
Dissolved Organic Carbon, Dissolved	mg/L	2.65
pH	units	7.78
Turbidity, Total	NTU	0.68
Alkalinity as CaCO3, Total	mg/L	55
Oxygen, Dissolved, Total	mg/L	9.06
Specific Conductivity, Total	uS/cm	124.2
Temperature	°C	25.2

Source: SWRCB 2013

In 2017, SSWD completed a relicensing water quality study which included one sampling location upstream of the Camp Far West Reservoir NMWSE. Results of the sampling are similar to those observed from SWRCB's 2013 sampling and provided in Table 3.3.2-10. Alkalinity was the only parameter that was inconsistent with the identified benchmark (20 mg/L) with two of the three samples only slightly higher.

Table 3.3.2-10. Water quality results from SSWD's 2017 study at the Bear River upstream of Camp Far West Reservoir.

Analyte	Benchmark	Sample Location	Bear River above CFW Reservoir		
		Sample ID	10051111-1		
		Sample Depth	1 ft		
		Date	6/14/2017	8/29/2017	11/21/2017
IN SITU MEASUREMENTS					
Temperature	--	°C	15.01	25.59	13.04
Specific Conductance	900	µSiemens/cm	60	124	NS
pH	6.5-8.5	pH units	7.12	8.06	NS
Dissolved Oxygen	> 7 mg/L	mg/L	10.14	8.27	NS
Turbidity	--	NTU	1.8	2	NS
BASIC WATER QUALITY					
Alkalinity, Total (as CaCO3)	20	mg/L	23	49	22
Ammonia (as N)	Temp & pH Dep't	mg/L	ND	0.117	ND
Calcium	--	mg/L	5.29	11.5	4.68
Carbon, Dissolved Organic	--	mg/L	1.59	3.17	1.54
Carbon, Total Organic	--	mg/L	1.46	2.53	1.54
Chloride	250	mg/L	3.26	6.5	2.19
Hardness, Total	--	mg/L	22	47.5	18.7
Magnesium	--	mg/L	2.14	4.55	1.71
Nitrate+Nitrite (as N)	10	mg/L	ND	ND	0.16
o-Phosphate (as P)	--	mg/L	0.014	ND	ND
Phosphorus, Total	--	mg/L	0.255	ND	0.018
Potassium	--	mg/L	0.4	0.71	0.59
Sodium	20	mg/L	3.17	5.25	2.12
Solids, Total Dissolved	500	mg/L	58.7	88.3	33
Solids, Total Suspended	--	mg/L	ND	ND	ND
Sulfate	250	mg/L	2.31	3.59	3.43
Sulfide, Total	--	mg/L	ND	ND	ND
Total Kjeldahl Nitrogen	--	mg/L	0.38	0.55	2.26
TOTAL METALS CONCENTRATIONS					
Aluminum	87	µg/L	32.2	8.6	66.9
Arsenic	10	µg/L	0.68	2.09	0.55
Cadmium	5	µg/L	ND	ND	ND
Chromium	50	µg/L	ND	ND	0.25
Copper	1000	µg/L	0.64	1.14	1.08
Iron	300	µg/L	117	63.5	135
Lead	15	µg/L	0.056	0.027	0.133
Nickel	100	µg/L	0.92	1.07	1.11
Selenium	50	µg/L	ND	ND	ND
Silver	100	µg/L	ND	ND	ND
Zinc	5000	µg/L	ND	2	ND
Mercury	50	ng/L	4.9	2.4	11.3
Methyl Mercury	--	ng/L	ND	0.5	ND
DISSOLVED METALS CONCENTRATIONS					
Aluminum	--	µg/L	9.2	4.1	74.9
Arsenic	--	µg/L	0.54	1.99	0.54
Cadmium	Hardness Dep't	µg/L	ND	ND	ND
Chromium	Hardness Dep't	µg/L	ND	ND	0.28
Copper	Hardness Dep't	µg/L	1.16	1.32	0.98
Iron	Hardness Dep't	µg/L	49.4	31.5	125
Lead	Hardness Dep't	µg/L	0.038	ND	0.108
Nickel	Hardness Dep't	µg/L	1.03	0.93	1.08
Silver	Hardness Dep't	µg/L	ND	ND	ND

Table 3.3.2-10. (continued)

Analyte	Benchmark	Sample Location	Bear River above CFW Reservoir		
		Sample ID	10051111-1		
		Sample Depth	1 ft		
		Date	6/14/2017	8/29/2017	11/21/2017
DISSOLVED METALS CONCENTRATIONS (continued)					
Zinc	Hardness Dep't	µg/L	ND	ND	ND
Methyl Mercury	--	ng/L	NS	0.3	ND
PESTICIDES					
Diazinon	1.2	µg/L	ND	ND	ND
Chlorpyrifos	2	µg/L	ND	ND	ND

NS = not sampled
ND = not detected based on the method detection limit

Camp Far West Reservoir

SSWD collected water quality data at one location in Camp Far West Reservoir near the dam as part of its 2017 water quality study on three occasions. Samples were collected at two depths: near the surface and below the thermocline at a depth of about 80 ft (Table 3.3.2-11). Four parameters were inconsistent with identified benchmarks during at least one sampling event; dissolved oxygen (three of six samples, all at depth), alkalinity (six of six samples), aluminum (one sample), and iron (one of six samples). DO concentrations below 7 mg/L are expected at depth in a reservoir and are discussed more below. Alkalinity concentrations in the reservoir were consistent with values both upstream and downstream, all of which were above the Basin Plan benchmark of 20 mg/L.

Table 3.3.2-11. Water quality results from SSWD's 2017 study at Camp Far West Reservoir near the dam.

Analyte	Benchmark	Sample Location	Camp Far West Reservoir near dam, surface			Camp Far West Reservoir near dam, near bottom		
		Sample ID	10051111-2			10051111-3		
		Sample Depth	1 ft			80 ft		
		Date	6/15/2017	8/31/2017	11/21/2017	6/15/2017	8/31/2017	11/21/2017
IN SITU MEASUREMENTS								
Temperature	--	°C	23.15	27.34	14.85	11.06	12.38	13.22
Specific Conductance	900	µSiemens/cm	77	80	77	71	98	54
pH	6.5-8.5	pH units	8.03	8.63	7.5	6.72	6.88	7.34
Dissolved Oxygen	> 7 mg/L	mg/L	8.93	8.25	9.39	6.45	0	0
Turbidity	--	NTU	2.9	5.3	14	8.9	8.6	30
BASIC WATER QUALITY								
Alkalinity, Total (as CaCO3)	20	mg/L	31	31	32	31	31	43
Ammonia (as N)	Temp & pH Dep't	mg/L	ND	0.082	ND	ND	0.087	0.324
Calcium	--	mg/L	6.68	6.72	7.43	6.18	6.57	8.91
Carbon, Dissolved Organic	--	mg/L	2.89	1.81	1.39	2.05	1.71	1.87
Carbon, Total Organic	--	mg/L	1.72	1.89	1.36	1.36	1.62	1.48
Chloride	250	mg/L	3.83	3.75	3.6	4.1	3.37	3.42
Hardness, Total	--	mg/L	29.4	29.1	31.7	26.8	28.3	37.2
Magnesium	--	mg/L	3.09	3	3.19	2.75	2.88	3.63
Nitrate+Nitrite (as N)	10	mg/L	ND	ND	0.055	ND	ND	ND
o-Phosphate (as P)	--	mg/L	ND	ND	ND	ND	0.01	ND
Phosphorus, Total	--	mg/L	ND	0.014	ND	0.09	0.011	0.067
Potassium	--	mg/L	0.86	0.64	0.79	0.59	0.67	1.06

Table 3.3.2-11. (continued)

Analyte	Benchmark	Sample Location	Camp Far West Reservoir near dam, surface			Camp Far West Reservoir near dam, near bottom		
		Sample ID	10051111-2			10051111-3		
		Sample Depth	1 ft			80 ft		
		Date	6/15/2017	8/31/2017	11/21/2017	6/15/2017	8/31/2017	11/21/2017
BASIC WATER QUALITY (continued)								
Sodium	20	mg/L	3.82	3.68	3.87	3.59	3.53	3.69
Solids, Total Dissolved	500	mg/L	68.7	63.3	56	55.5	61.5	67.5
Solids, Total Suspended	--	mg/L	ND	5	ND	ND	28.5	31.5
Sulfate	250	mg/L	3.85	3.37	4.18	4.02	3.74	3.59
Sulfide, Total	--	mg/L	ND	ND	ND	ND	ND	0.071
Total Kjeldahl Nitrogen	--	mg/L	0.58	0.66	0.24	0.51	0.7	0.58
TOTAL METALS CONCENTRATIONS								
Aluminum	87	µg/L	17.2	64.8	55.4	34.7	64.2	684
Arsenic	10	µg/L	0.71	0.96	0.82	0.74	1	1.74
Cadmium	5	µg/L	0.025	ND	ND	ND	ND	0.034
Chromium	50	µg/L	ND	0.36	ND	0.21	ND	1.98
Copper	1000	µg/L	1.16	1.23	1.63	1.1	1.19	3.64
Iron	300	µg/L	21.6	50.7	74.7	63.8	61	1450
Lead	15	µg/L	0.033	0.058	0.06	0.194	0.059	0.91
Nickel	100	µg/L	0.69	0.43	0.76	1.01	0.39	4.37
Selenium	50	µg/L	ND	ND	ND	ND	ND	ND
Silver	100	µg/L	ND	ND	ND	ND	ND	ND
Zinc	5000	µg/L	44.7	2.1	ND	8.5	ND	8.3
Mercury	50	ng/L	2	6	2.8	5.6	3.5	33.8
Methyl Mercury	--	ng/L	ND	0.2	ND	ND	0.1	ND
DISSOLVED METALS CONCENTRATIONS								
Aluminum	--	µg/L	5.2	13.8	41.1	ND	16.3	396
Arsenic	--	µg/L	0.67	0.81	0.79	0.66	0.84	1.25
Cadmium	Hardness Dep't	µg/L	0.07	ND	ND	ND	ND	0.037
Chromium	Hardness Dep't	µg/L	ND	ND	ND	ND	ND	1.06
Copper	Hardness Dep't	µg/L	1.82	1.18	1.64	1.3	1.32	2.83
Iron	Hardness Dep't	µg/L	5.4	3.5	38.1	9.5	12.9	760
Lead	Hardness Dep't	µg/L	0.035	ND	0.03	0.023	ND	0.503
Nickel	Hardness Dep't	µg/L	0.71	0.28	0.61	0.93	0.36	3.62
Silver	Hardness Dep't	µg/L	ND	ND	ND	ND	ND	ND
Zinc	Hardness Dep't	µg/L	7.1	ND	ND	15.7	ND	19.7
Methyl Mercury	--	ng/L	ND	ND	ND	ND	ND	0.1
PESTICIDES								
Diazinon	1.2	µg/L	ND	ND	ND	ND	ND	ND
Chlorpyrifos	2	µg/L	ND	ND	ND	ND	ND	ND

Source: SSWD 2017
ND = not detected based on the method detection limit

SSWD collected monthly water quality profiles at three locations in Camp Far West Reservoir from May 2015 to December 2017 (Table 3.3.2-12). Water temperature, DO, specific conductivity and pH were recorded at approximately 10-ft intervals at each monitoring location.

Table 3.3.2-12. SSWD reservoir water quality profile locations at Camp Far West.

Location	First Profile Date	Last Profile Date	Latitude	Longitude
Near Camp Far West Dam	4/9/2015	1/30/2018	39.05140	-121.31237
Rock Creek Arm of Reservoir	4/9/2015	1/30/2018	39.05972	-121.29323
Bear River Arm of Reservoir	4/9/2015	1/30/2018	39.03301	-121.27238

DO profiles in Camp Far West Reservoir between April and August 2017 were generally a negative heterograde curve indicating a metalimnetic oxygen minimum. DO concentrations decreased sharply in the first 50 ft below the surface before beginning to increase. Profiles taken near the dam saw DO values decrease again near the bottom. DO concentrations on the surface were usually 7 mg/L or greater, whereas DO concentrations in the metalimnion were less than 1.0 mg/L. The cause of the metalimnion minimum is unknown, yet similar curves occur in other reservoirs. In some cases, the reason is oxidizable material that is either produced in the reservoir's epilimnion (e.g., autochthonous material, such as phytoplankton), or oxidizable material that enters the reservoir from outside sources (e.g., allochthonous material, such as leaves, twigs and insects). The material sinks in the reservoir, and the rate of sinking slows down as it encounters the more dense metalimnetic water. Here, the material has more time under more conducive (i.e., warmer) water temperatures than deeper in the reservoir, to decompose. As a result, more readily oxidizable material is decomposed in the metalimnion with a concomitant consumption of oxygen by bacterial respiration. Another potential cause of the metalimnetic oxygen minimum is very high concentrations of zooplankton microcrustaceans in the metalimnion, which due to respiratory consumption, lower DO concentrations. DO profiles for 2017 are presented in Figures 3.3.2-2 through 3.3.2-4, as examples of present conditions.

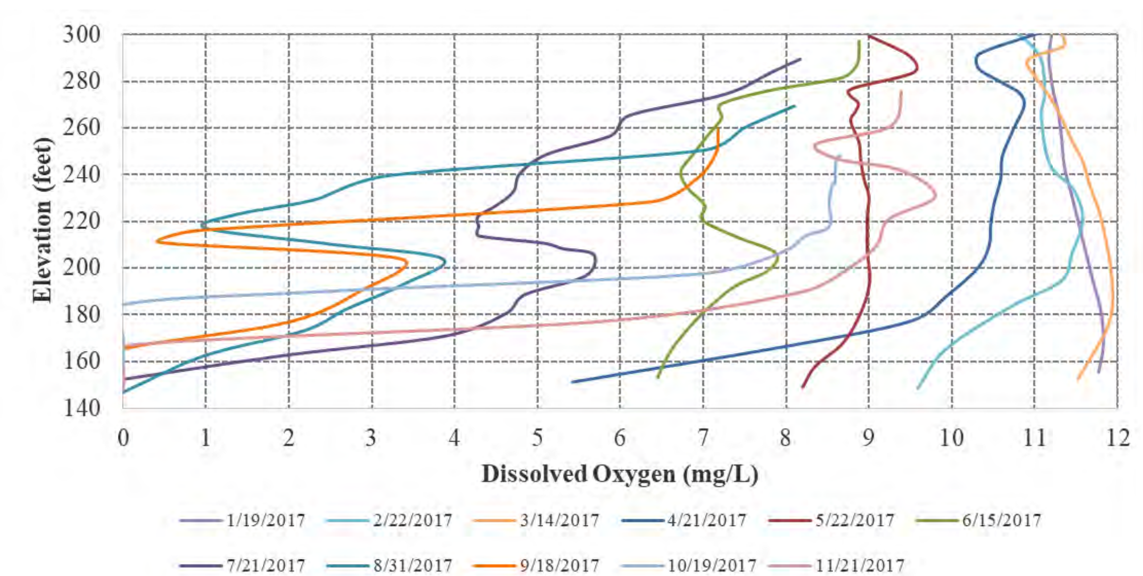

Figure 3.3.2-2. Reservoir dissolved oxygen profiles near the Camp Far West Dam.

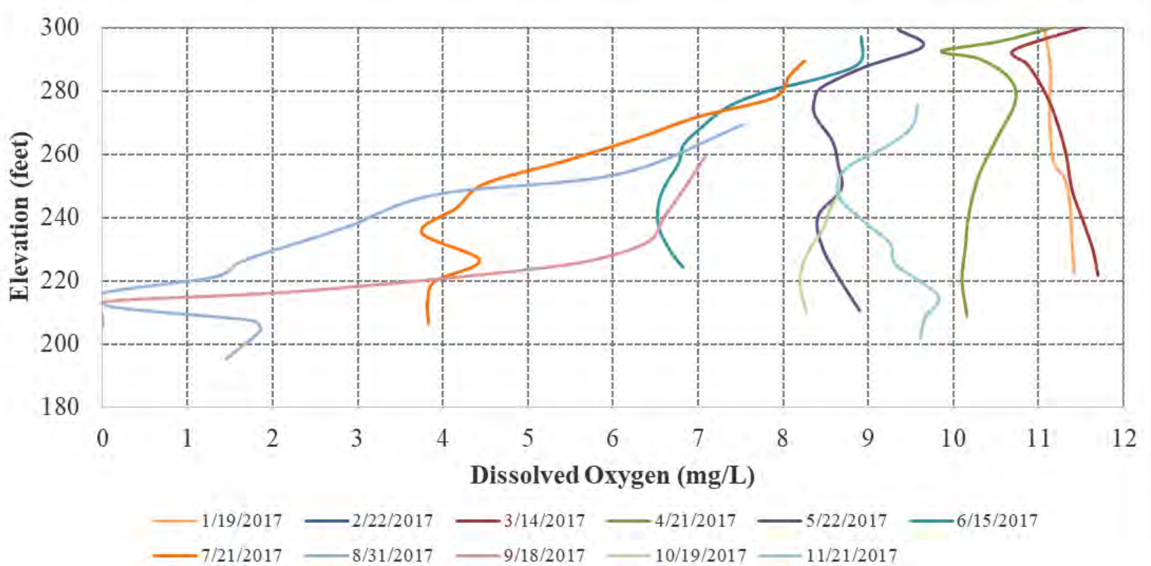

Figure 3.3.2-3. Reservoir dissolved oxygen profiles in the Rock Creek Arm of Camp Far West Reservoir.

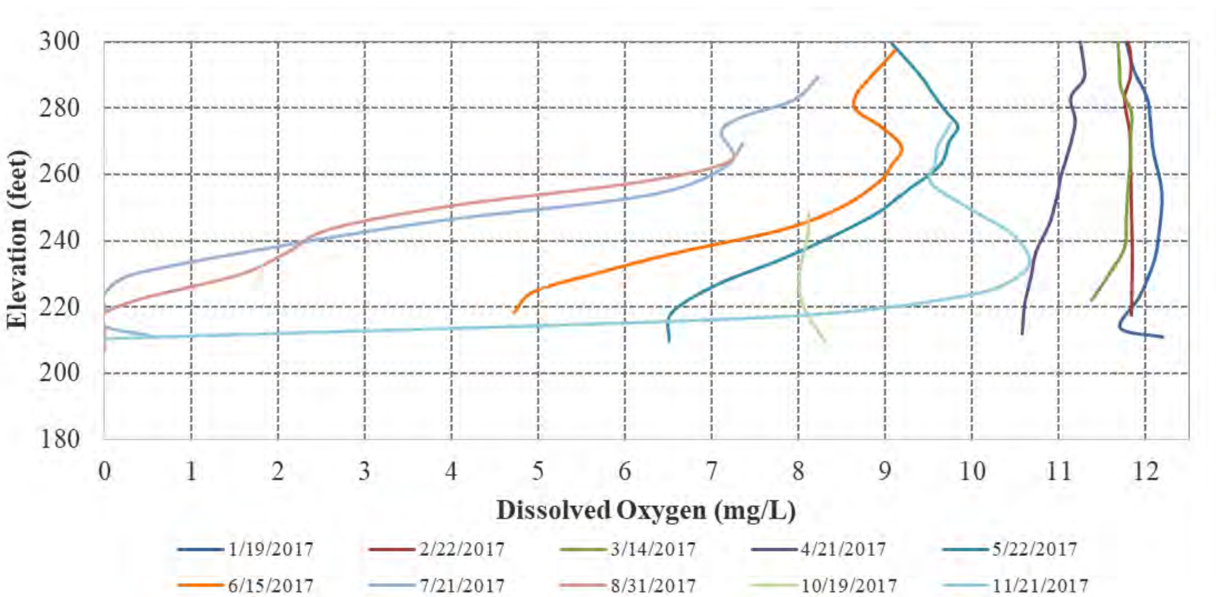

Figure 3.3.2-4. Reservoir dissolved oxygen profiles in the Bear River Arm of Camp Far West Reservoir.

Specific conductivity ranged from 11 µS/cm to 315 µS/cm during the monitoring period and tended to decrease with depth. Specific conductivity values increased as water temperatures increased during the year, particularly near the surface. Levels of pH ranged from 5.7 to 9.2 units during the monitoring period and were highest near the surface (Table 3.3.2-13). The most variation in values for specific conductivity and pH occurred at the sampling location near the dam due to the depth of water sampled.

Table 3.3.2-13. Conductivity and pH values for three monitoring locations at Camp Far West reservoir.

	Specific Conductivity (µS/cm)			pH (pH units)		
	Near Dam	**Rock Creek Arm**	**Bear River Arm**	**Near Dam**	**Rock Creek Arm**	**Bear River Arm**
MONTHLY RANGE						
January	52-68	53-71	37-64	6.8-7.5	7.3-7.5	7.2-7.5
February	54-275	58-79	55-120	7.1-7.6	7.4-7.6	7.5-7.6
March	59-86	59-81	60-80	6.8-8.0	7-8.1	7.3-7.6
April	11-93	65-93	66-111	6.5-8.5	6.7-8.5	6.8-7.8
May	66-189	60-103	60-112	6.5-8.5	6.8-8.6	6.7-8.6
June	62-79	62-81	48-75	6.3-8.7	6.8-9.0	6.7- 8.4
July	55-80	57-80	50-81	5.7-9.2	6.1-9.1	6-8.8
August	57-121	60-125	63-150	6.3-7.6	6.6-8.6	6.3-8.31
September	69-99	76-88	87-100	6.4-7.6	6.7-7.5	6.8-7.4
October	82-137	84-128	85-140	6.6-7.6	7.1-7.5	6.7-7.36
November	63-315	59-141	54-145	6.7-7.6	6.9-7.6	7.3-7.7
December	66-79	70-93	58-62	7.2-7.5	7.4-7.6	7.3-7.6
OVERALL STATISTICS						
Minimum	11	53	37	5.7	6.1	6
Average	78.4	76	75.7	7.1	7.3	7.2
Maximum	315	141	150	9.2	9.1	8.8

Alpers et al. (2008) reported on water quality samples collected from October 2001 through August 2003 in order to develop bioaccumulation factors (BAF) for reservoir dwelling biota. Water quality sampling sites were focused along the reservoir thalweg as well as sampling in the Rock Creek and Dairy Farm arms of the reservoir. Water quality samples were collected at approximately 3-month intervals during the duration of the Alpers et al. study for a total of eight samples. The results for six field measured parameters are provided in Figure 3.3.2-5. The data collected for temperature, DO, pH and specific conductance were similar to those observed by SSWD in 2015.

	Temperature (°C)	Dissolved oxygen (mg/L)	pH	Specific conductance (µS/cm)	Total suspended solids (mg/L)	Suspended silt plus clay (mg/L)
All samples						
Mean	14.6	8.1	7.0	164	9.8	8.4
Standard error of mean	0.78	0.44	0.13	32	1.0	0.9
Standard deviation	6.5	3.7	1.1	267	7.9	7.1
Minimum	7.0	0.0	3.0	69	0	0
25th percentile	9.6	6.6	6.8	84	5	3
Median	11.4	8.7	7.3	90	7.5	6
75th percentile	17.6	10.3	7.7	127	11	10
Maximum	27.5	14.6	8.4	1,660	30	30
n	69	69	71	71	68	68

Figure 3.3.2-5. Statistical data for field measurements and suspended solids concentrations.
From: Alpers et. al. 2008. Figure 8.

Bear River between Camp Far West Reservoir and the non-Project Diversion Dam

The only sources of water quality data for this reach were those collected during SSWD's 2017 relicensing water quality study. Samples were collected at one location downstream of the powerhouse and low-level outlet releases at three dates (Table 3.3.2-14). Four parameters were inconsistent with the Basin Plan during at least one sampling event: DO (one sample), alkalinity (three samples), aluminum (two samples), and iron (one sample).

Table 3.3.2-14. Water quality results from SSWD's 2017 study at the Bear River downstream of the Camp Far West Powerhouse.

Analyte	Benchmark	Sample Location	Bear River downstream of Powerhouse		
		Sample ID	10051111-4		
		Sample Depth	1 ft		
		Date	6/14/2017	8/29/2017	11/21/2017
IN SITU MEASUREMENTS					
Temperature	--	°C	14.92	24.46	13.43
Specific Conductance	900	µSiemens/cm	71	59	66
pH	6.5-8.5	pH units	6.76	6.65	7.56
Dissolved Oxygen	> 7 mg/L	mg/L	7.92	4.57	10.43
Turbidity	--	NTU	5.1	7.1	14.4
BASIC WATER QUALITY					
Alkalinity, Total (as CaCO3)	20	mg/L	29	24	27
Ammonia (as N)	Temp & pH Dep't	mg/L	ND	0.052	0.077
Calcium	--	mg/L	6.36	5.28	6.08
Carbon, Dissolved Organic	--	mg/L	1.47	1.33	2.15
Carbon, Total Organic	--	mg/L	1.47	1.23	1.88
Chloride	250	mg/L	3.74	2.54	2.84
Hardness, Total	--	mg/L	27.4	22	25.1
Magnesium	--	mg/L	2.79	2.13	2.42
Nitrate+Nitrite (as N)	10	mg/L	ND	ND	0.267
o-Phosphate (as P)	--	mg/L	0.016	ND	ND
Phosphorus, Total	--	mg/L	0.011	0.012	0.033
Potassium	--	mg/L	0.61	0.53	0.84
Sodium	20	mg/L	3.58	2.71	2.82
Solids, Total Dissolved	500	mg/L	70.5	58.7	48
Solids, Total Suspended	--	mg/L	ND	ND	11
Sulfate	250	mg/L	3.2	2.63	3.9
Sulfide, Total	--	mg/L	ND	ND	ND
Total Kjeldahl Nitrogen	--	mg/L	0.35	0.47	0.83
TOTAL METALS CONCENTRATIONS					
Aluminum	87	µg/L	61.1	95	259
Arsenic	10	µg/L	0.72	0.85	1.04
Cadmium	5	µg/L	ND	ND	0.027
Chromium	50	µg/L	0.26	0.28	0.77
Copper	1000	µg/L	1.12	1.42	2.5
Iron	300	µg/L	112	123	486
Lead	15	µg/L	0.102	0.114	0.398
Nickel	100	µg/L	1.23	0.79	2.04
Selenium	50	µg/L	ND	ND	ND
Silver	100	µg/L	ND	ND	ND
Zinc	5000	µg/L	4.7	ND	3.1
Mercury	50	ng/L	9.1	5.5	13.9
Methyl Mercury	--	ng/L	ND	ND	0.1
DISSOLVED METALS CONCENTRATIONS					
Aluminum	--	µg/L	13.9	62.1	57.8
Arsenic	--	µg/L	0.59	0.9	0.79
Cadmium	Hardness Dep't	µg/L	ND	ND	ND
Chromium	Hardness Dep't	µg/L	0.21	ND	0.29
Copper	Hardness Dep't	µg/L	1.17	1.53	1.41
Iron	Hardness Dep't	µg/L	33.3	75.4	121

Table 3.3.2-14. (continued)

Analyte	Benchmark	Sample Location	Bear River downstream of Powerhouse		
		Sample ID	10051111-4		
		Sample Depth	1 ft		
DISSOLVED METALS CONCENTRATIONS (continued)					
Lead	Hardness Dep't	μg/L	0.027	0.068	0.106
Nickel	Hardness Dep't	μg/L	0.98	0.59	1.44
Silver	Hardness Dep't	μg/L	ND	ND	ND
Zinc	Hardness Dep't	μg/L	ND	ND	3.1
Methyl Mercury	--	ng/L	ND	ND	ND
PESTICIDES					
Diazinon	1.2	μg/L	ND	ND	ND
Chlorpyrifos	2	μg/L	ND	ND	ND

Source: SSWD 2017
ND = not detected based on the method detection limit

In addition, SSWD monitored dissolved oxygen concentrations over two periods in 2017 at a location downstream of the powerhouse and low-level outlet. One sampling period was during powerhouse operations (Figure 3.3.2-6) and the second was when water was released from the low-level outlet (Figure 3.3.2-7). During the September monitoring event, DO concentrations were inconsistent with the Basin Plan Objective (greater than 7.0 mg/L) for the entire sampling period likely due to high water temperatures in Camp Far West Reservoir. During the November sampling period, DO concentrations were consistent with the Basin Plan throughout the sampling.

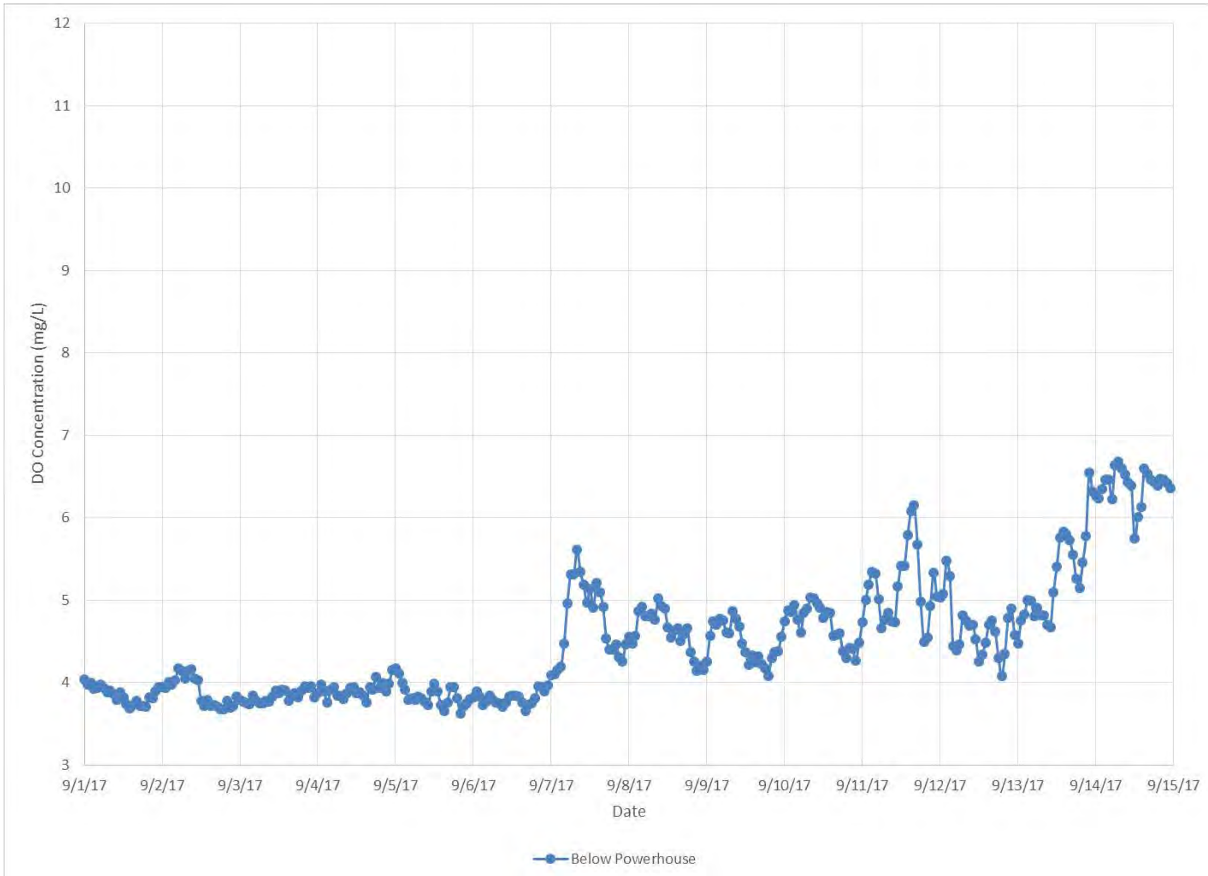

Figure 3.3.2-6. Hourly DO Concentrations (mg/L) with Camp Far West Powerhouse Operating (249-390cfs), Diversions Occurring (199-381cfs), and Flows at Wheatland Gage (13-31cfs).

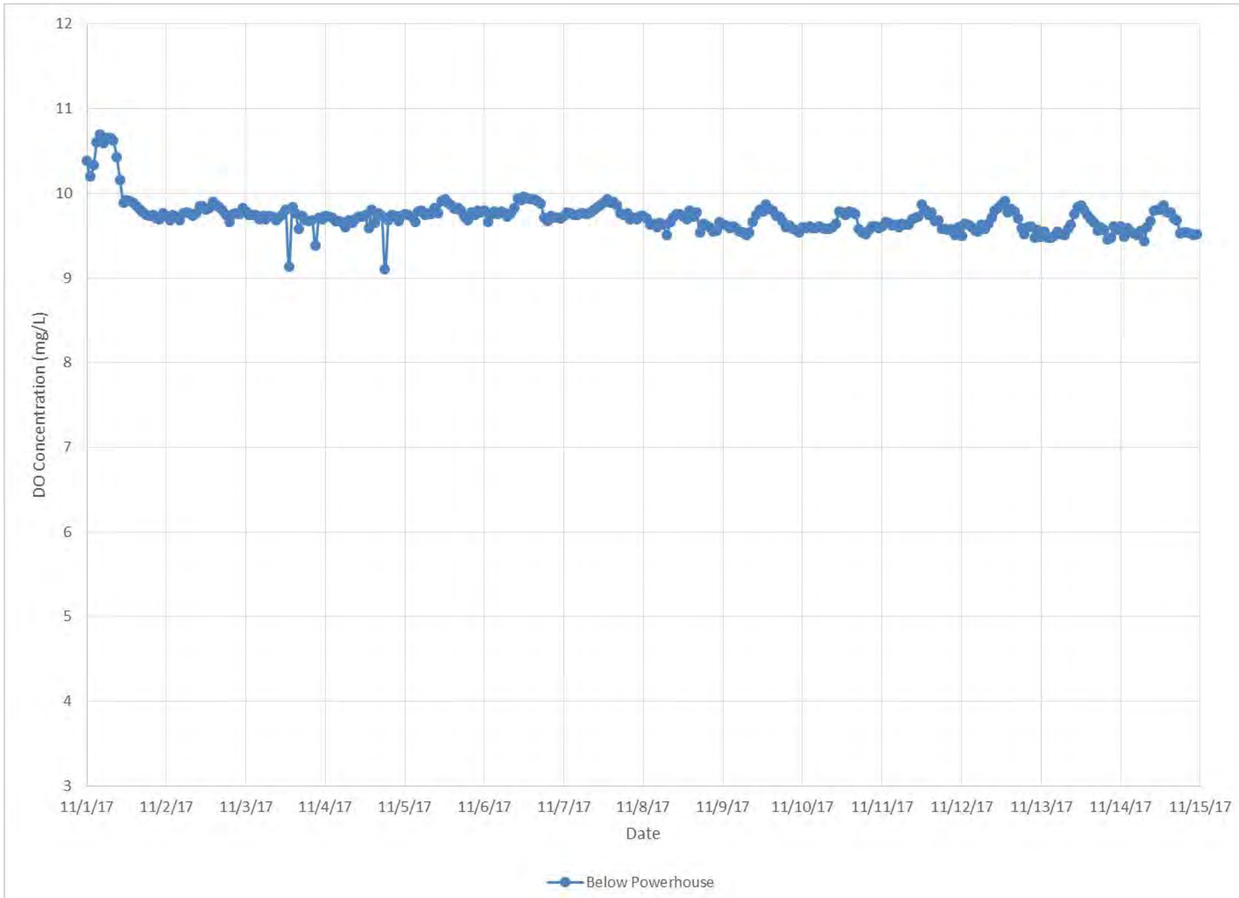

Figure 3.3.2-7. Hourly DO Concentrations (mg/L) with Camp Far West Powerhouse Not Operating, No Diversions Occurring, and Flows at Wheatland Gage (15-26cfs).

Lower Bear River

SSWD found four sources of water quality data in the lower Bear River.

Water quality was measured at two locations in the lower Bear River as part of the SWAMP Statewide Perennial Stream Assessment (SWRCB 2013); in 2011 upstream of the Pleasant Grove Bridge (RM 7.1) and in 2013 upstream of the Highway 65 Bridge (RM 11.8). Table 3.3.2-15 provides the results of those sampling events.

Table 3.3.2-15. Water quality measurements from the SWAMP Perennial Streams Assessment.

Analyte	Units	Sampling Location	
		Upstream of Pleasant Grove (9/7/11)	Upstream of Highway 65 (6/10/13)
Ammonia as N, Total	mg/L	--	0.0042
Chlorophyll a, Particulate	mg/m2	21.88	21.1
OrthoPhosphate as P, Dissolved	mg/L	0.0134	0.0166
Sulfate, Dissolved	mg/L	3.26	4.46
Silica as SiO2, Dissolved	mg/L	14.2	9.55
Nitrogen, Total, Total	mg/L	0.104	0.242

Table 3.3.2-15. (continued)

Analyte	Units	Sampling Location: Upstream of Pleasant Grove (9/7/11)	Sampling Location: Upstream of Highway 65 (6/10/13)
Total Suspended Solids, Particulate	mg/L	1	2.8
Chloride, Dissolved	mg/L	4.18	4.12
Dissolved Organic Carbon, Dissolved	mg/L	1.38	2.44
AFDM_Algae, Particulate	g/m2	9.76	4.76
Phosphorus as P, Total	mg/L	0.0092	0.0072
Hardness as CaCO3, Total	mg/L	32.8	34.3
Oxygen, Dissolved, Total	mg/L	8.72	9.92
pH	none	9.1	7.1
Alkalinity as CaCO3, Total	mg/L	41	40
Specific Conductivity, Total	uS/cm	88.6	92
Temperature	Deg C	25.9	21
Turbidity, Total	NTU	0.67	1.36

Source: SWRCB 2013

As part of DWR's Oroville Facilities relicensing, DWR completed an extensive water quality study, which included one location in the Bear River near its confluence with the Feather River. Figures 3.3.2-8 through 3.3.2-10 provide summaries of the data collected. During sampling, only turbidity and phosphorus levels exceeded the identified Water Quality Objective.

Bear R near Mouth (A6-5010.50)

	Dissolved Oxygen (ppm)	pH units	Conductivity (field) umhos/cm	Conductivity (lab) umhos/cm	Alkalinity mg/L	Turbidity NTU
Maximum detected	13.4	7.5	236	233	81	58
Minimum detected	6.7	6.8	84	83	31	2.2
Number of samples	28	29	28	29	28	29

Figure 3.3.2-8. Field measurements taken in the Bear River near the Feather River confluence.
From: DWR 2004. Appendix 2c.

Bear R near Mouth (A6-5010.50)

	Ammonia T	Ammonia D	Nitrate + Nitrite D	Ortho-phosphate D	Phosphorus T	Organic Carbon T	Organic Carbon D
Maximum detected	0.2	0.08	0.58	0.07	0.28	14.3	9.2
Minimum detected	<0.02	<0.01	<0.01	<0.01	0.03	2	2
Number of samples	29	28	28	29	29	28	28

Figure 3.3.2-9. Nutrient measurements taken in the Bear River near the Feather River confluence. T = total, D = dissolved.
From: DWR 2004. Appendix 3a-3.

Bear R near Mouth (A6-5010.50)

	Calcium		Magnesium		Sodium	Potassium	Sulfate	Chloride	Boron	Hardness	
	T	D	T	D	D	D	D	D	D	T	D
Maximum detected	13	17	8	10	16	7.0	8	21	<0.1	84	84
Minimum detected	7	6	4	3	4	0.7	3	<1.0	<0.1	30	27
Number of samples	16	29	16	29	29	29	29	29	29	29	29

Figure 3.3.2-10. Mineral measurements taken in the Bear River near the Feather River confluence. T = total, D = dissolved.
From: DWR 2004. Appendix 3b-3.

Total and fecal coliform samples were collected by DWR at this monitoring location 36 times between March 2002 and April 2004. Total coliform counts per 100 mL ranged from 0 to 231 and fecal coliform counts per 100 mL ranged from 0 to 168 (DWR 2004). None of the values exceeded SWRCB criteria.

Total suspended solids and settleable solids were sampled 29 times during the study. Total suspended solids concentrations ranged from less than 1 mg/L to 57 mg/L and settleable solids ranged from undetectable to 0.2 mL/L (DWR 2004).

Metals were also sampled at this location, and DWR determined six metals exceeded identified water quality criterion established by the California Environmental Protection Agency (Cal/EPA), EPA or the SWRCB during at least one sampling event: aluminum, arsenic, copper, iron, manganese and lead (Figure 3.3.2-11).

Bear R near Mouth (A6-5010.50)

	Aluminum		Arsenic		Cadmium		Chromium		Copper		Iron		Mercury	Methyl Mercury	Manganese		Nickel		Lead		Selenium		Silver		Zinc	
	T	D	T	D	T	D	T	D	T	D	T	D	T	T	T	D	T	D	T	D	T	D	T	D	T	D
Maximum detected	1504	1203	1.57	1.320	0.034	0.009	3.46	2.22	8.36	5.82	2880	1768	0.04070	0.000934	390	284	5.40	3.73	1.57	1.01	0.33	0.370	0.55	0.035	8.11	4.23
Minimum detected	53	5.5	0.39	0.282	<0.004	<0.004	0.23	<0.02	1.52	1.12	224	35.6	0.00205	0.000056	13.2	0.33	0.51	0.38	0.070	<0.011	<0.04	<0.04	<0.006	<0.001	0.38	0.19
Number of samples	29	29	29	29	29	29	29	29	29	29	29	29	29	28	29	29	29	29	29	29	29	29	14	14	29	29
Number of samples exceeding criteria or																										
Public Health Goal[1]	9	-	-	-	0	-	-	-	0	-	-	-	0	-	0	-	0	-	0	-	-	-	-	-	-	-
Primary MCL[2]	3	-	0	-	0	-	0	-	0	-	-	-	0	-	-	-	0	-	0	-	0	-	-	-	-	-
Secondary MCL[2]	30	-	0	-	-	-	-	-	0	-	25	-	-	-	14	-	-	-	-	-	-	-	0	-	0	-
Agricultural Goal[3]	0	-	0	-	0	-	0	-	0	-	0	-	-	-	2	-	0	-	0	-	0	-	-	-	0	-
Cal/EPA Cancer Potency Factor[4]	-	-	29	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CTR[5] Humans	-	-	-	-	-	-	-	-	0	-	-	-	0	-	-	-	0	-	-	-	-	-	-	-	-	-
CTR[5] Aquatic Life	-	-	-	0	0	0	-	0	15[9]	2[9],1[10]	-	-	-	-	-	-	-	0	1[9]	1[9]	-	-	0	0	0	0
NTR[6]	-	-	-	-	-	-	0	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	-	-	-
NAWQC[7] Humans	-	-	29	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NAWQC[7] Aquatic Life	28[9], 4[10]	-	-	-	-	-	-	-	-	-	8	-	0	-	-	-	-	-	-	-	-	-	-	-	-	-
USEPA IRIS Reference Dose[8]	-	-	-	-	-	-	0	-	-	-	-	-	-	0	-	-	-	-	-	-	0	-	0	-	0	-

Figure 3.3.2-11. Metals measurements taken in the Bear River near the Feather River confluence. T = total, D = dissolved.

Source: From DWR 2004, Appendix 3c-3.

Footnotes:

1. California Environmental Protection Agency (Cal/EPA), Office of Environmental Health Hazard Assessment, *Public Health Goals for Chemicals in Drinking Water*
2. California Department of Health Services, California Code of Regulations, Title 22, Division 4, Chapter 15, Domestic Water Quality and Monitoring
3. Food and Agriculture Organization of the United Nations, 1985. Water Quality for Agriculture
4. Cal/EPA, Office of Environmental Health Hazard Assessment, Cal/EPA Toxicity Criteria Database
5. California State Water Resources Control Board, Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California (2 March 2003)
6. U.S. Environmental Protection Agency, Federal Register, Volume 64, No. 216 (Tuesday, 9 November 1999) [National Toxics Rule revisions]
7. U.S. Environmental Protection Agency, Quality Criteria for Water, 1986 (May 1986) [The Gold Book] plus updates (various dates)
8. U.S. Environmental Protection Agency, Integrated Risk Information System [IRIS] database
9. Chronic (4 day average)
10. Acute (1 hr average)

The Irrigated Lands Regulatory Program (SWRCB 2005) regulates agricultural discharges into receiving waters through waste discharge requirements or waivers. The program had a single monitoring location on the Bear River near Pleasant Grove Road (RM 6.8) where four samples were taken in June and July 2005 (Table 3.3.2-16). None of the parameters sampled during the four events exceeded the identified water quality criteria established by SWRCB (2016), EPA (2000) or the CVRWQCB (1998).

Table 3.3.2-16. Water quality data collected near Pleasant Grove Bridge as part of the Irrigated Lands Regulatory Program.

Analyte	Units	Sampling Dates			
		6/14/05	6/27/05	7/11/05	7/25/05
Boron, Total	mg/L	0.0046	--	0.0034	--
Arsenic, Total	ug/L	0.51	0.28	0.29	0.71
Zinc, Total	ug/L	0.63	0.32	0.15	0.5
Lead, Total	ug/L	0.06	0.05	0.05	0.04
Nickel, Total	ug/L	1.05	--	0.69	--
Copper, Total	ug/L	1.39	--	1.18	1.71
Ortho Phosphate as P, Dissolved	mg/L	0.0084	--	0.0076	0.0078
Total Organic Carbon, Total	mg/L	2.256	--	1.559	1.8
Nitrate + Nitrite as N, Dissolved	mg/L	0.0601	0.0217	--	0.0091
Ammonia as N, Total	mg/L	0.042	--	--	0.095
Phosphorus as P, Total	ug/L	--	2.47	--	2.84
Total Dissolved Solids, Dissolved	mg/L	53	53	39	63
Hardness as CaCO3, Total	mg/L	28.3	25.2	25.2	--
Specific Conductivity, Total	uS/cm	83.1	80.6	77.8	107.2
Temperature	°C	17.6	19.4	22.2	32.4
Discharge	cfs	238	217.7	146	--
Oxygen, Dissolved, Total	mg/L	7.4	9.1	9.1	7.4
pH	units	7.55	7.49	7.56	8.31
Turbidity, Total	NTU	2.1	1.5	1.7	1.2

Source: SWRCB 2005

In 2017, SSWD collected water quality data at three locations in the lower Bear River as part of the water quality study; 1) downstream of the non-Project diversion dam, 2) at the Pleasant Grove Bridge, and 3) below the Highway 70 Bridge (Table 3.3.2-17). Two parameters were inconsistent with the Basin Plan Objectives for at least one sample at the location downstream of the non-Project diversion dam: alkalinity (three of three samples) and aluminum (one of three samples). One parameter was inconsistent with the Basin Plan Objective at the sampling location upstream of Pleasant Grove Bridge: alkalinity (three of three samples). Four parameters were inconsistent with Basin Plan Objectives at the sampling location downstream of the Highway 70 Bridge: dissolved oxygen (one of three samples); alkalinity (three of three samples); aluminum (two of three samples); and iron (three of three samples).

Table 3.3.2-17. Water quality results for SSWD's 2017 study at three locations in the lower Bear River.

Analyte	Benchmark	Sample Location	Bear River downstream of non-Project Diversion			Bear River upstream of Pleasant Grove Bridge			Bear River downstream of Highway 70 Bridge		
		Sample ID	10051111-5			10051111-6			10051111-7		
		Sample Depth	1 ft			1 ft			1 ft		
		Date	6/14/2017	8/29/2017	11/21/2017	6/14/2017	8/29/2017	11/21/2017	6/14/2017	8/31/2017	11/21/2017
IN SITU MEASUREMENTS											
Temperature	--	°C	16.42	24.54	13.44	24.93	29.52	12.9	24.5	24.03	12.18
Specific Conductance	900	µSiemens/cm	71	61	87	90	88	110	102	180	147
pH	6.5-8.5	stnd units	7.21	6.99	7.56	7.92	7.53	7.55	7.24	7.06	7
Dissolved Oxygen	> 7 mg/L	mg/L	10.18	8.19	10.38	9.48	7.83	9.99	7.69	6.83	8.63
Turbidity	--	NTU	3.7	5.1	6.9	2.3	2.2	2	35.1	9.5	19.6
BASIC WATER QUALITY											
Alkalinity, Total (as CaCO3)	20	mg/L	30	24	37	33	38	46	48	66	50
Ammonia (as N)	Temp & pH Dep't	mg/L	ND	ND	0.076	ND	0.108	ND	ND	0.088	0.051
Calcium	--	mg/L	6.28	5.51	8.22	7.82	7.47	9.85	10.6	13.7	11.5
Carbon, Dissolved Organic	--	mg/L	1.59	1.26	1.88	2.35	1.57	1.78	3.99	3.95	5.4
Carbon, Total Organic	--	mg/L	1.45	1.19	1.34	2.12	1.53	1.97	3.95	3.84	5.43
Chloride	250	mg/L	3.63	2.6	3.64	4.38	3.21	4.49	5.41	13.6	11.1
Hardness, Total	--	mg/L	27.3	23.1	34.2	34.3	33.8	43.3	48	64.3	52
Magnesium	--	mg/L	2.81	2.26	3.31	3.59	3.67	4.54	5.22	7.3	5.65
Nitrate+Nitrite (as N)	10	mg/L	ND	ND	0.183	0.068	ND	0.099	0.052	ND	0.147
o-Phosphate (as P)	--	mg/L	0.016	0.015	ND	0.015	ND	ND	0.021	0.054	0.047
Phosphorus, Total	--	mg/L	ND	0.011	0.02	0.176	ND	ND	0.092	0.098	0.108
Potassium	--	mg/L	0.61	0.57	0.9	0.72	0.78	0.87	1.28	1.81	3.87
Sodium	20	mg/L	3.57	2.83	3.58	4.08	3.7	4.5	5.1	9.43	7.62
Solids, Total Dissolved	500	mg/L	69.5	57.8	58.7	80	72.5	62	90.3	118	96.2
Solids, Total Suspended	--	mg/L	ND	ND	5	ND	ND	5.5	44	14	20
Sulfate	250	mg/L	3.21	2.75	4.09	4.95	3.47	5.3	5.81	2.67	9.05
Sulfide, Total	--	mg/L	ND	ND	ND	ND	ND	ND	ND	ND	ND
Total Kjeldahl Nitrogen	--	mg/L	0.63	0.7	0.93	0.54	0.52	1.54	0.84	0.68	1.09
TOTAL METALS CONCENTRATIONS											
Aluminum	87	µg/L	65.8	105	79.5	55.1	62.7	24.3	68.6	218	331
Arsenic	10	µg/L	0.81	0.91	0.84	0.82	0.64	ND	1.31	1.32	0.95
Cadmium	5	µg/L	ND	0.033	0.222	ND	ND	ND	0.022	ND	0.035
Chromium	50	µg/L	0.3	0.29	0.31	0.28	ND	ND	2.06	0.67	1.13
Copper	1000	µg/L	1.16	1.32	1.74	1.59	1.22	1.06	4.97	2.03	3.87
Iron	300	µg/L	125	132	158	150	85.6	73.4	1730	821	1400
Lead	15	µg/L	0.166	0.119	0.175	0.12	0.047	0.032	1.04	0.364	0.501
Nickel	100	µg/L	1.13	0.75	1.41	1.19	0.65	0.72	3.3	2	2.76
Selenium	50	µg/L	ND	ND	ND	ND	ND	ND	ND	ND	ND
Silver	100	µg/L	ND	ND	ND	ND	ND	ND	0.023	ND	0.022

Table 3.3.2-17. (continued)

Analyte	Benchmark	Sample Location	Bear River downstream of non-Project Diversion			Bear River upstream of Pleasant Grove Bridge			Bear River downstream of Highway 70 Bridge		
		Sample ID	10051111-5			10051111-6			10051111-7		
		Sample Depth	1 ft			1 ft			1 ft		
		Date	6/14/2017	8/29/2017	11/21/2017	6/14/2017	8/29/2017	11/21/2017	6/14/2017	8/31/2017	11/21/2017
TOTAL METALS CONCENTRATIONS (continued)											
Zinc	5000	µg/L	ND	4.5	2.5	ND	ND	ND	5.1	ND	2.8
Mercury	50	ng/L	7.10	5.0	6.40	5.2	5.5	2.3	15.3	3.8	3.7
Methyl Mercury	--	ng/L	ND	ND	0.1	0.2	0.2	0.1	0.2	0.1	0.1
DISSOLVED METALS CONCENTRATIONS											
Aluminum	--	µg/L	6.2	19.3	39	12.6	ND	15.2	206	21.1	23.3
Arsenic	--	µg/L	0.64	0.74	0.72	0.75	0.57	ND	0.9	1.03	0.57
Cadmium	Hardness Dep't	µg/L	ND	ND	ND	0.05	ND	ND	0.021	ND	ND
Chromium	Hardness Dep't	µg/L	ND	ND	0.24	ND	ND	ND	0.75	ND	0.27
Copper	Hardness Dep't	µg/L	0.74	1.34	1.8	1.68	1.24	1.43	3.44	1.39	2.52
Iron	Hardness Dep't	µg/L	19.2	20.5	72	65.7	15	42.2	609	73.8	136
Lead	Hardness Dep't	µg/L	ND	ND	0.064	0.037	ND	0.028	0.311	0.033	0.039
Nickel	Hardness Dep't	µg/L	0.94	0.51	1.28	0.99	0.39	0.77	2.16	1.46	1.87
Silver	Hardness Dep't	µg/L	ND	ND	ND	ND	ND	ND	ND	ND	ND
Zinc	Hardness Dep't	µg/L	ND	ND	6.6	ND	2.6	ND	3.6	ND	ND
Methyl Mercury	--	ng/L	ND	0.1	0.1	ND	ND	ND	ND	0.1	ND
PESTICIDES											
Diazinon	1.2	µg/L	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chlorpyrifos	2	µg/L	ND	ND	ND	ND	ND	ND	ND	ND	ND

Source: SSWD 2017.
ND = not detected based on the method detection limit

SSWD also monitored dissolved oxygen at two locations in the lower Bear River as part of its 2017 water quality study; the first location was downstream of the non-Project Diversion Dam and the second was downstream of the Highway 65 Bridge. One sampling period was during powerhouse operations and diversions (Figure 3.3.2-12) and the second was when water was released from the low-level outlet and SSWD was not diverting at the non-Project diversion dam (Figure 3.3.2-13). DO concentrations downstream of the non-Project diversion dam were consistent with the Basin Plan during both sampling periods and ranged between 8 mg/L and 10 mg/L. DO concentrations downstream of Highway 65 were inconsistent with the Bain Plan for some of the period during September 2017. The hourly DO concentrations showed a consistent diurnal fluctuation with concentrations ranging between about 6.5 mg/L and 9.5 mg/L (Figure 3.3.2-13). During the September 2017 sampling period, 116 of the 360 total readings were below the 7.0 mg/L objective (32%).

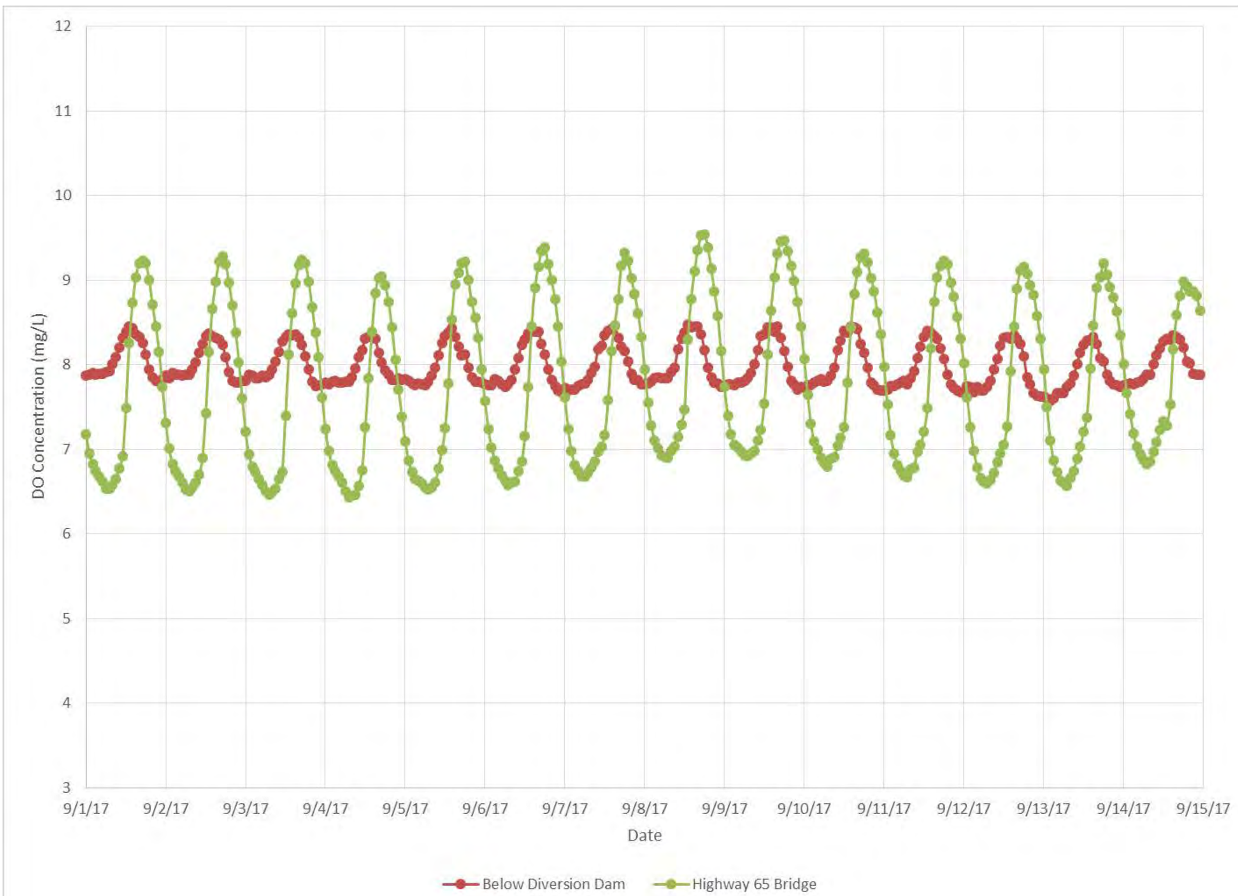

Figure 3.3.2-12. Hourly DO Concentrations (mg/L) with Camp Far West Powerhouse Operating (249-390cfs), Diversions Occurring (199-381cfs), and Flows at Wheatland Gage (13-31cfs) in September 2017.

Figure 3.3.2-13. Hourly DO Concentrations (mg/L) with Camp Far West Powerhouse Not Operating, No Diversions Occurring, and Flows at Wheatland Gage (15-26cfs) in November 2017.

Water Temperature

Data collected by SSWD since 2015 is the most comprehensive water temperature data available in Camp Far West Reservoir and in the Bear River upstream and downstream of the Project. Other water temperature sources described below are spot measurements or short-term recordings.

In 2015, SSWD installed a series of water temperature recorders as part of Study 2.1, *Water Temperature Monitoring*, to better understand conditions upstream, within, and downstream of the Project (Table 3.3.2-18). In addition, SSWD began collecting monthly reservoir profiles at three locations (Table 3.3.2-12) in April 2015 to monitor reservoir water temperatures. Monitoring continued through 2018 (Table 3.3.2-18).

Table 3.3.2-18. SSWD water temperature monitoring locations in the Bear River.

Location	Bear River Mile	Installation Date	Removal Date[1]	Latitude	Longitude
UPSTREAM OF PROJECT AREA					
Bear River above Camp Far West Reservoir	25.1	4/10/15	7/3/18	39.011685	-121.220506
Rock Creek above Camp Far West Reservoir	--	8/6/15	7/2/18	39.063471	-121.263205
DOWNSTREAM OF PROJECT AREA					
Bear River below Powerhouse Outflow	18.0	4/10/15	9/12/18	39.04898	-121.31841
Bear River below CFW Spillway Channel	17.9	9/29/15	10/25/17	39.04719	-121.31969
Bear River below Diversion Dam	16.9	4/10/15	9/12/18	39.04163	-121.33235
Bear River at BRW gage, Highway 65 Crossing	11.4	4/10/15	9/12/18	38.99901	-121.40810
Bear River at BPG gage, Pleasant Grove Bridge	7.1	5/1/15	9/12/18	38.98561	-121.48329
Dry Creek above Bear River	--	12/1/15	9/12/18	38.99596	-121.49121
Bear River near Highway 70 Crossing	3.5	5/1/15	9/12/18	38.97249	-121.54343
Bear River above Feather River Confluence	0.1	5/1/15	9/12/18	38.93906	-121.57831
Feather River above Bear River Confluence	--	8/6/15	9/12/18	38.94277	-121.57928
Feather River below Bear River Confluence	--	5/1/15	9/12/18	38.93802	-121.58038

[1] This is the date the logger was removed. In some cases there are large data gaps due to vandalism, high flows, or logger malfunction.

Upstream of the Project

SSWD monitored water temperature at two locations upstream of the Project: in Rock Creek and the Bear River upstream of Camp Far West Reservoir (Table 3.3.2-17). Water temperatures in Rock Creek were fairly consistent during the monitoring period with temperatures ranging between approximately 5 degrees Celsius (°C) and 25°C (Figure 3.3.2-14). Water temperatures in the Bear River above Camp Far West Reservoir (RM 25.1) followed the pattern expected for a lower elevation river with water temperatures ranging between approximately 5°C and over 30°C (Figure 3.3.2-15). Both locations showed similar trends across all years of monitoring.

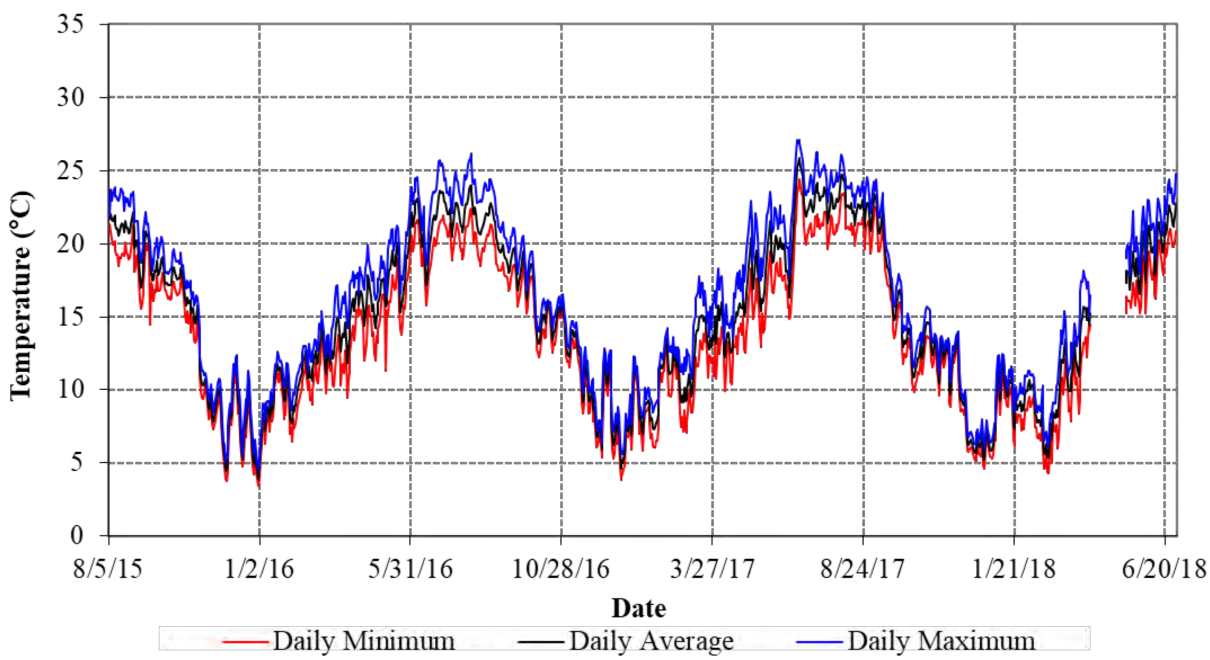

Figure 3.3.2-14. Daily minimum, average and maximum water temperature in Rock Creek upstream of Camp Far West Reservoir.

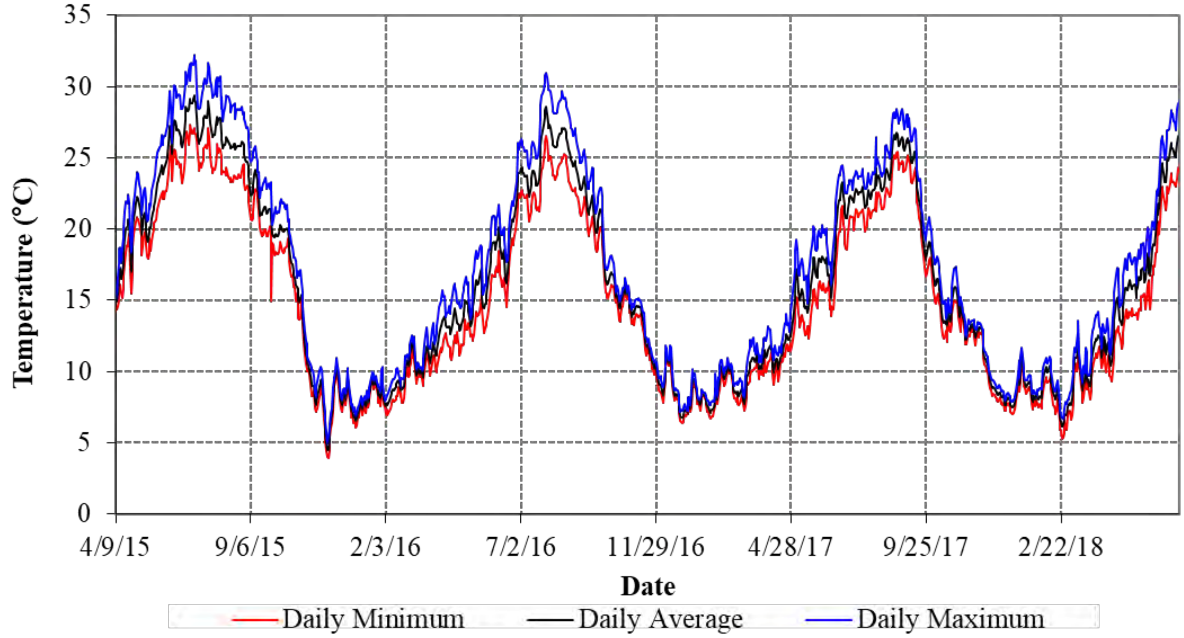

Figure 3.3.2-15. Daily minimum, average and maximum water temperature in the Bear River upstream of Camp Far West Reservoir (RM 25.1).

SSWD found no other information regarding water temperatures immediately upstream of Camp Far West Reservoir.

<u>Camp Far West Reservoir</u>

SSWD collected monthly water temperature profiles at three locations in Camp Far West Reservoir (Table 3.3.2-18) from April 2015 to November 2017. Reservoir profiles for 2017 are provided as an example of the variation seen throughout the year at each location (Figures 3.3.2-16 through 3.3.2-18)

Water temperatures in Camp Far West Reservoir followed the expected patterns for a reservoir of its size and depth. Surface water temperatures warmed through the spring and summer as air temperatures increased while temperatures near the bottom remained cooler, especially in the deeper areas near the dam. Colder water (i.e. less than 20°C) generally persisted for the entire monitoring period near the dam. However, the amount of cold water was greatly reduced between the April and October sampling events (Figure 3.3.2-16). The Rock Creek arm generally showed minimal vertical mixing from in the spring and summer until reservoir levels in the arm became low enough that water temperatures became almost vertically uniform (Figure 3.3.2-17). Water temperature profiles in the Bear River arm also showed minimal vertical mixing in the spring and summer until temperatures reached equilibrium with the Bear River inflow usually in the fall (Figure 3.3.2-18) and the vertical water temperatures became fully mixed.

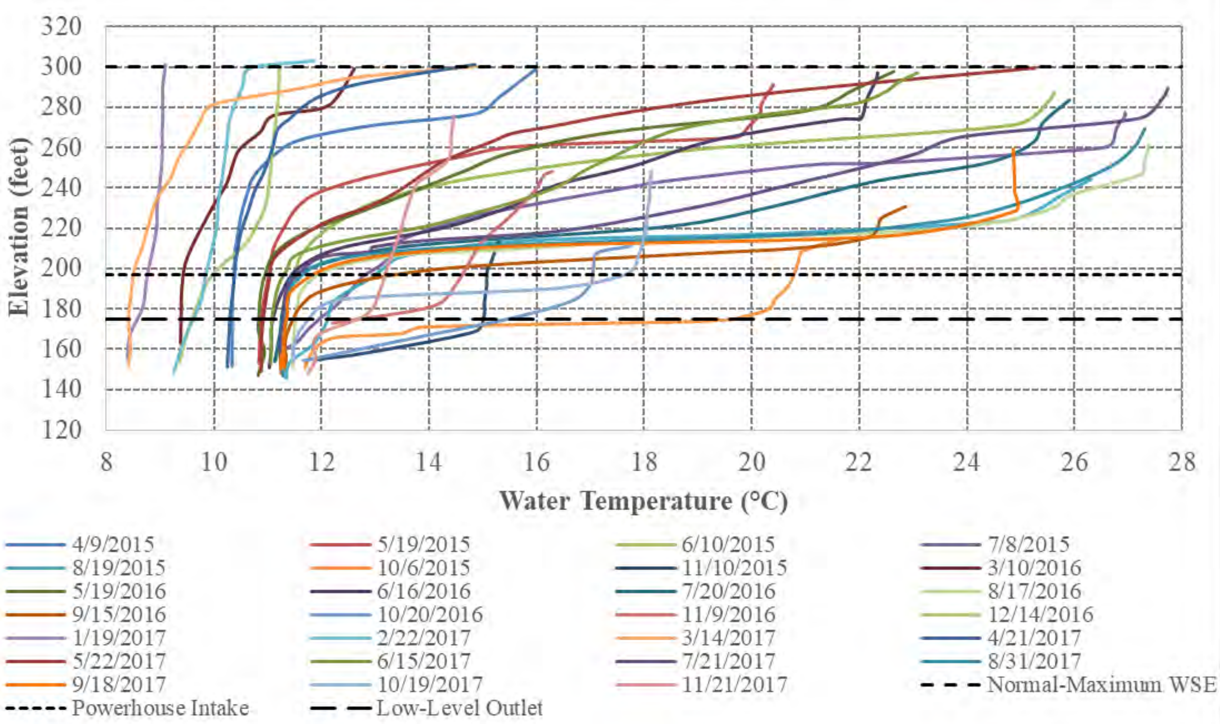

Figure 3.3.2-16. Reservoir water temperature profiles near the Camp Far West Dam.

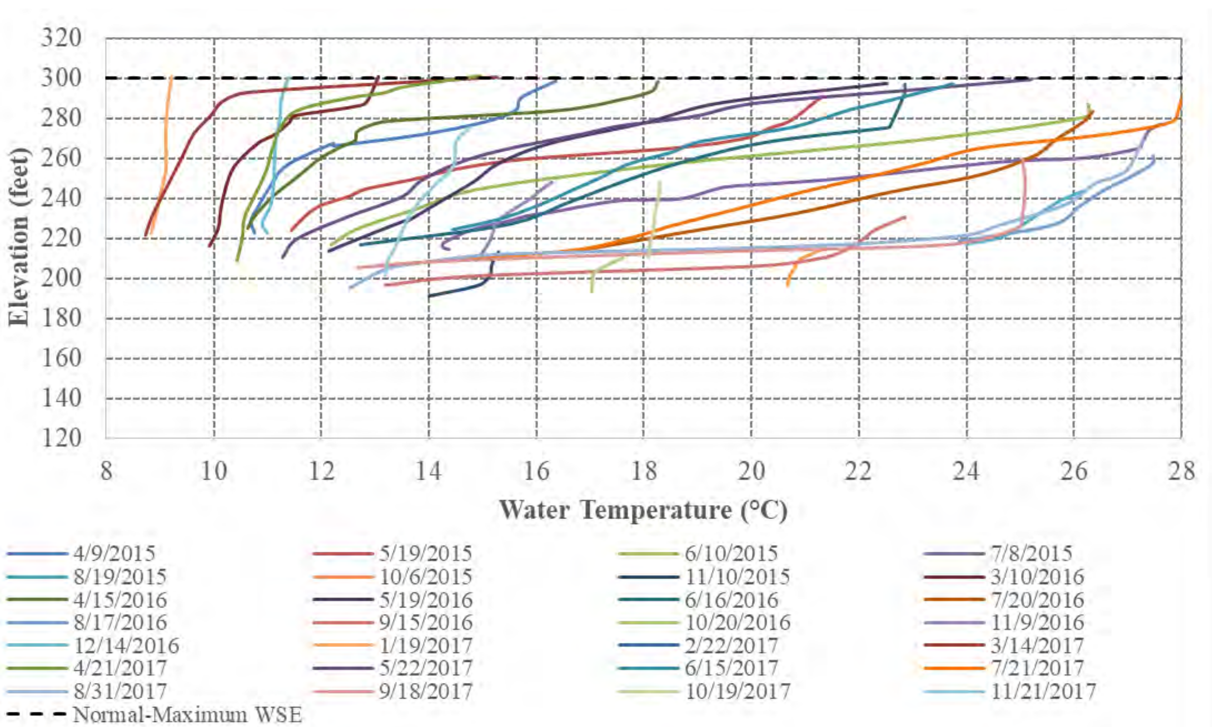

Figure 3.3.2-17. Reservoir water temperature profiles in the Rock Creek Arm of Camp Far West Reservoir.

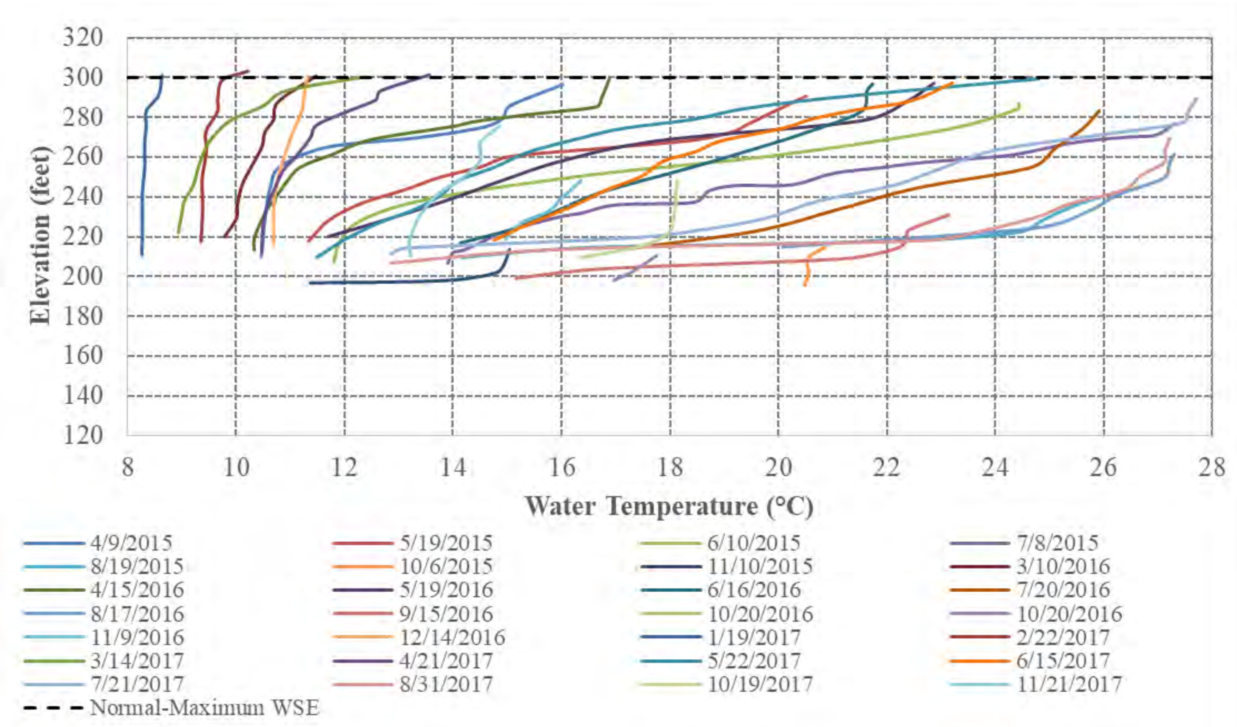

Figure 3.3.2-18. Reservoir water temperature profiles in the Bear River Arm of Camp Far West Reservoir.

Alpers et al. (2008) collected water temperature profile data in Camp Far West Reservoir at multiple locations from 2001 to 2003 during their study of environmental factors affecting mercury in the reservoir. Table 3.3.2-19 provides the minimum and maximum water temperatures observed by Alpers et al. during their sampling at three of the locations: 1) near the dam; 2) in the Bear River arm of the reservoir; and 3) in the Rock Creek arm of the reservoir. These locations are similar to where SSWD collected profiles in 2015. These three locations provide an overall picture of reservoir temperatures during the Alpers et al. study. In general, water temperatures observed by Alpers et al. are similar to those recorded by SSWD.

Table 3.3.2-19. Minimum and maximum water temperatures recorded at three locations in Camp Far West Reservoir by Alpers et al. (2008).

Date	Near Dam (Site No. 2)		Bear River Arm (Site No. 5)		Rock Creek Arm (Site No. 7)	
	Minimum Temperature (°C)	Maximum Temperature (°C)	Minimum Temperature (°C)	Maximum Temperature (°C)	Minimum Temperature (°C)	Maximum Temperature (°C)
11/01/2001	11.2	17.3	11.2	13.0	--	--
11/28/2001	11.2	13.3	--	--	--	--
1/2/2002	8.4	10.2	--	--	--	--
2/12/2002	6.7	9.5	--	--	--	--
4/22/2002	9.1	18.4	10.0	16.6	--	--
6/18/2002	10.3	25.8	11.4	26.1	--	--
8/7/2002	10.5	26.0	12.9	27.0	25.3	26.9
9/6/2002	11.3	23.4	--	--	--	--
11/4/2002	11.0	15.1	--	--	--	--
11/6/2002	11.0	14.0	--	--	--	--
11/21/2002	12.3	13.6	--	--	--	--
12/4/2002	11.5	12.2	--	--	--	--

Table 3.3.2-19. (continued)

Date	Near Dam (Site No. 2)		Bear River Arm (Site No. 5)		Rock Creek Arm (Site No. 7)	
	Minimum Temperature (°C)	Maximum Temperature (°C)	Minimum Temperature (°C)	Maximum Temperature (°C)	Minimum Temperature (°C)	Maximum Temperature (°C)
12/23/2002	8.6	9.9	8.9	9.9	--	--
1/17/2003	8.1	9.6	8.2	9.1	--	--
1/28/2003	8.1	12.0	8.2	11.0	--	--
3/7/2003	8.4	12.5	8.4	11.2	--	--
4/16/2003	9.6	15.7	10.0	15.5	10.6	17.0
7/7/2003	10.9	26.4	12.5	26.0	--	--
10/10/2013	11.2	21.8	20.5	21.9	--	--

Source: Alpers et al. 2008.
-- = No data collected

Bear River between Camp Far West Dam and the non-Project Diversion Dam

SSWD monitored water temperature at two locations in the reach between Camp Far West Dam and the non-Project Diversion Dam; downstream of the powerhouse and low-level outlet channel and downstream of the spillway channel.

Water temperatures in the Bear River downstream of Camp Far West Dam (RM 18.0) and upstream of the non-Project diversion dam pool generally ranged from 5°C to 25°C for the monitoring period. Fluctuations in water temperature were influenced by two factors: 1) water temperatures in Camp Far West Reservoir; and 2) where SSWD was drawing water from the reservoir (i.e. powerhouse intake or low-level outlet intake) (Figure 3.3.2-19). Abrupt changes in the water temperature below the dam were usually during an operational change. Water temperatures observed downstream of where the Camp Far West spillway delivers flow to the Bear River were similar to those of the upstream logger. There was limited data for this location due to the nature of flows at the installation.

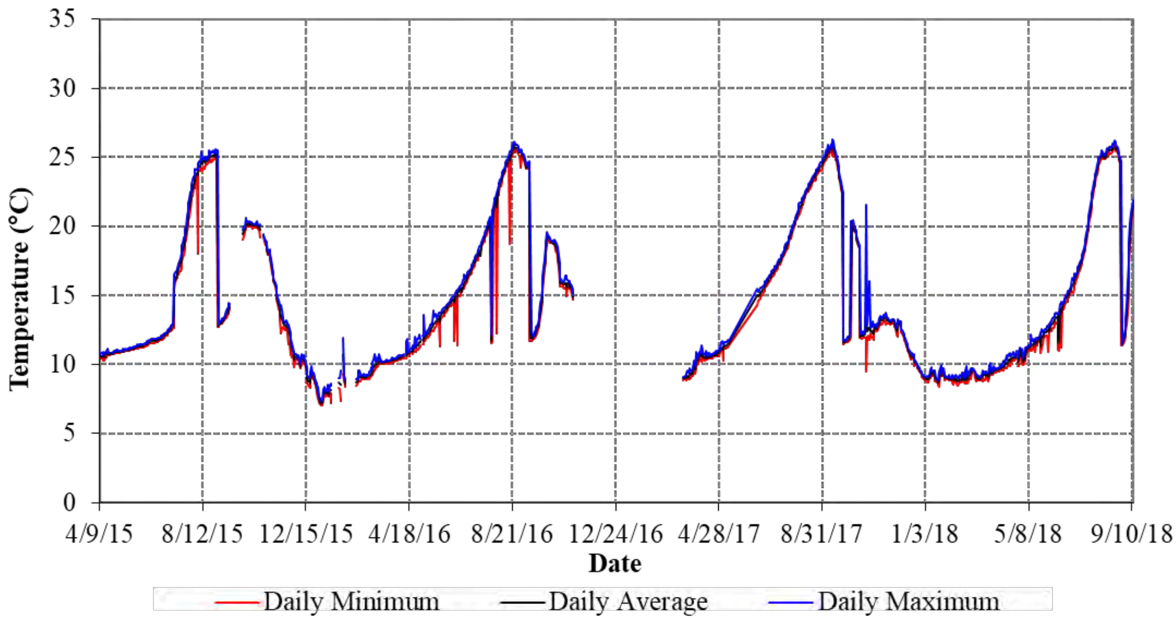

Figure 3.3.2-19. Daily minimum, average and maximum water temperature in the Bear River downstream of the Camp Far West Dam (RM 18.0).

SSWD found no other water temperature data for the Bear River between Camp Far West Dam and the non-Project diversion dam.

Lower Bear River

SSWD monitored water temperature at eight locations downstream of the non-Project Diversion Dam: five in the Bear River; one in Dry Creek; and two in the Feather River (Table 3.3.2-17).

Water temperatures in the Bear River downstream of the non-Project diversion dam (RM 16.9) ranged from approximately 6°C to 27°C during the monitoring period and were influenced by operations at Camp Far West Dam (Figure 3.3.2-20). Water temperatures followed similar trends to those observed immediately downstream of the powerhouse and low-level outlet (Figure 3.3.2-19, above).

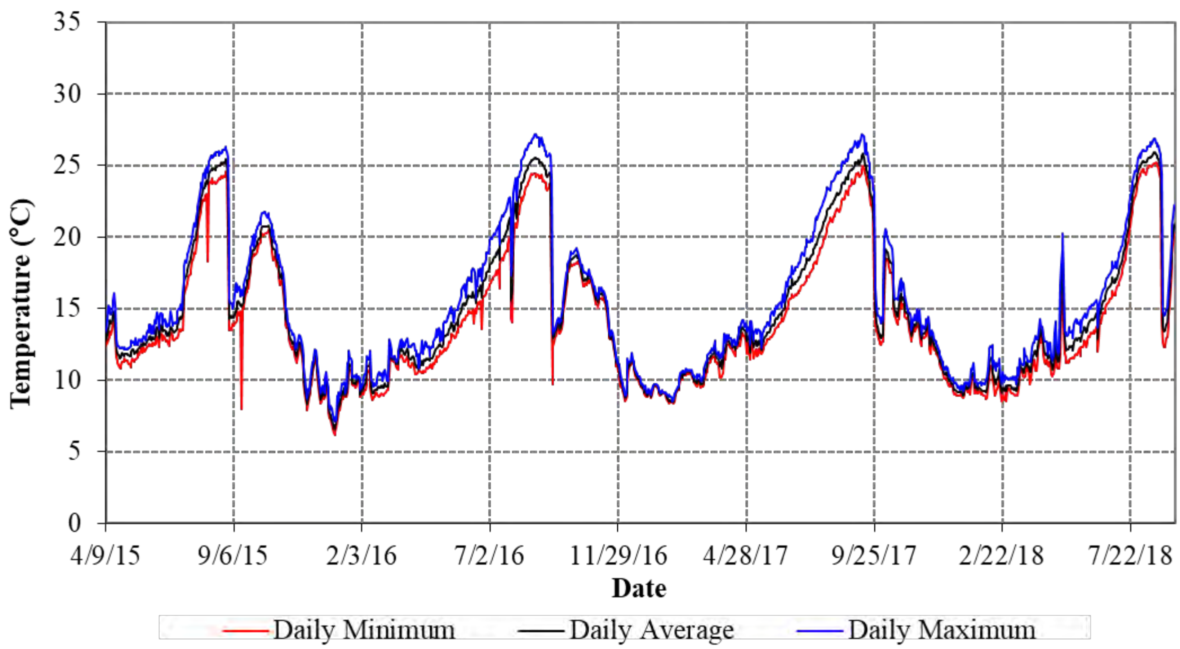

Figure 3.3.2-20. Daily minimum, average and maximum water temperature in the Bear River downstream of the SSWD Non-Project Diversion Dam (RM 16.9).

Water temperatures in the Bear River showed similar patterns and ranges at the four locations between Highway 65 (RM 11.4) and the Feather River confluence (RM 0.1) (Figures 3.3.2-21 through 3.3.2-24). The warmest summer temperatures were observed near the Pleasant Grove bright location, which was about five miles downstream of the non-Project diversion dam but just upstream of the Dry Creek confluence, which added both flow and slightly cooler water temperature to the Bear River.

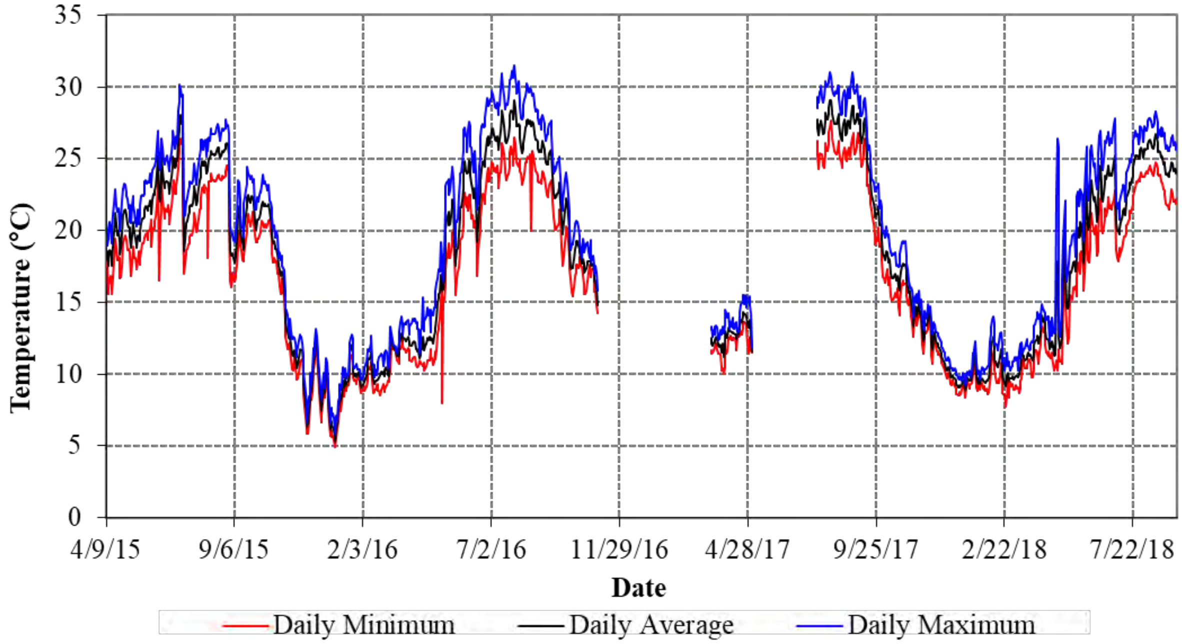

Figure 3.3.2-21. Daily minimum, average and maximum water temperature in the Bear River downstream of the Highway 65 Bridge (RM 11.4).

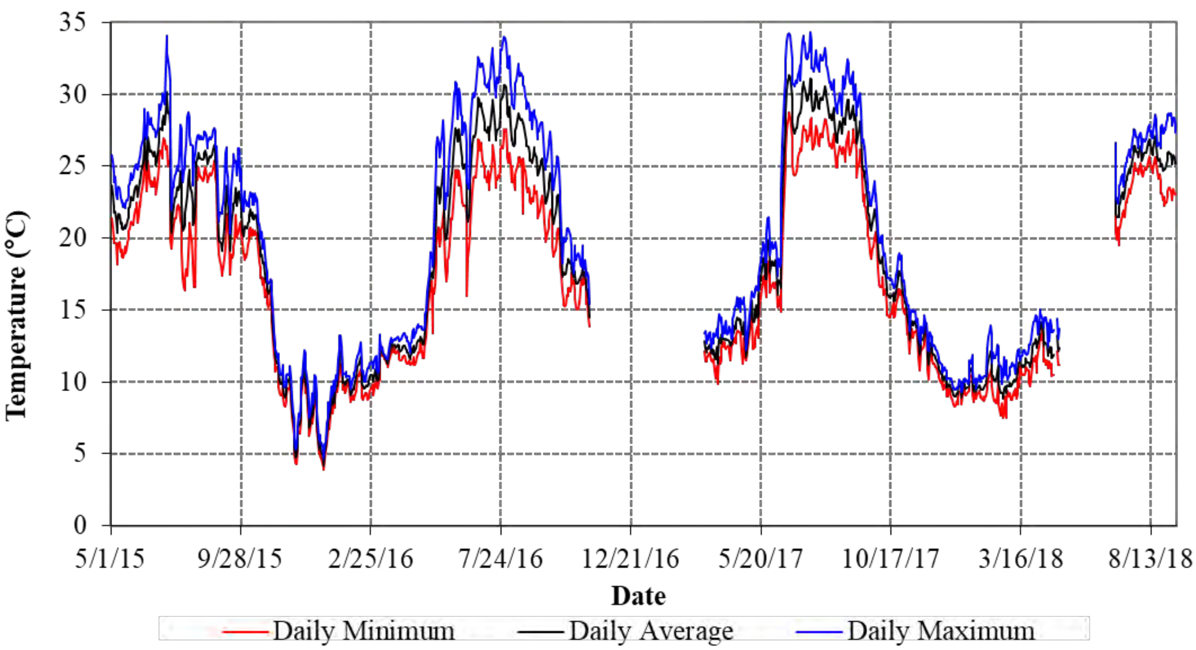

Figure 3.3.2-22. Daily minimum, average and maximum water temperature in the Bear River upstream of the Pleasant Grove Rd. Bridge (RM 7.4)

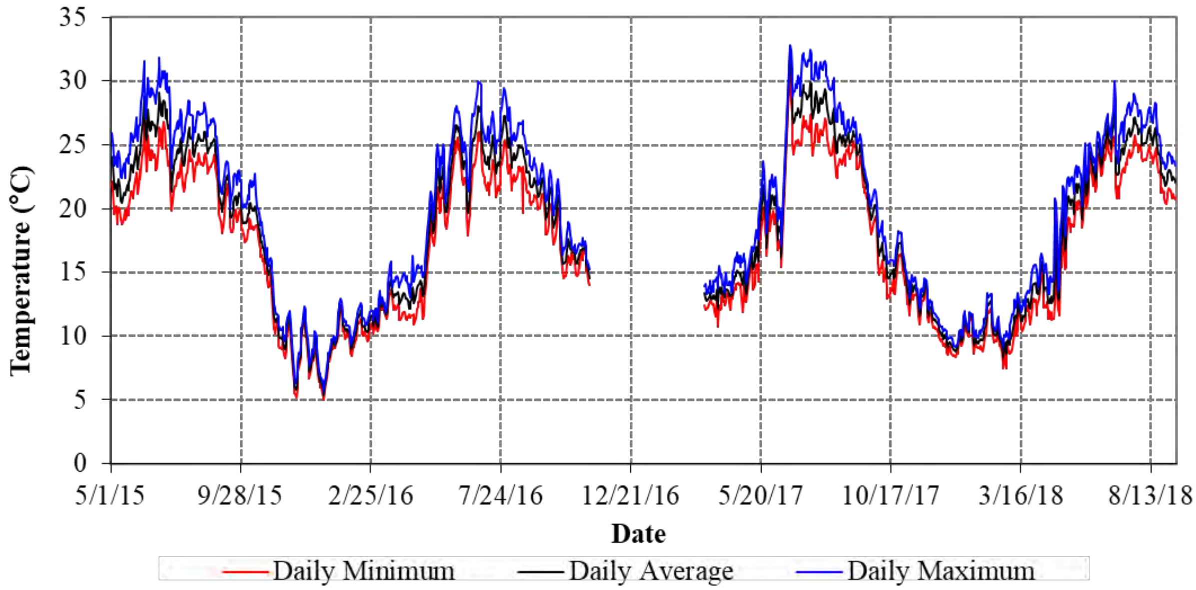

Figure 3.3.2-23. Daily minimum, average and maximum water temperature in the Bear River downstream of the Highway 70 Bridge (RM 3.5).

Water temperatures measured in the Bear River upstream of the Feather River confluence showed less diurnal variation and also lower maximum temperatures compared to the next upstream location near Highway 70, which SSWD believes is due to mixing of tributary inflow from Dry Creek.

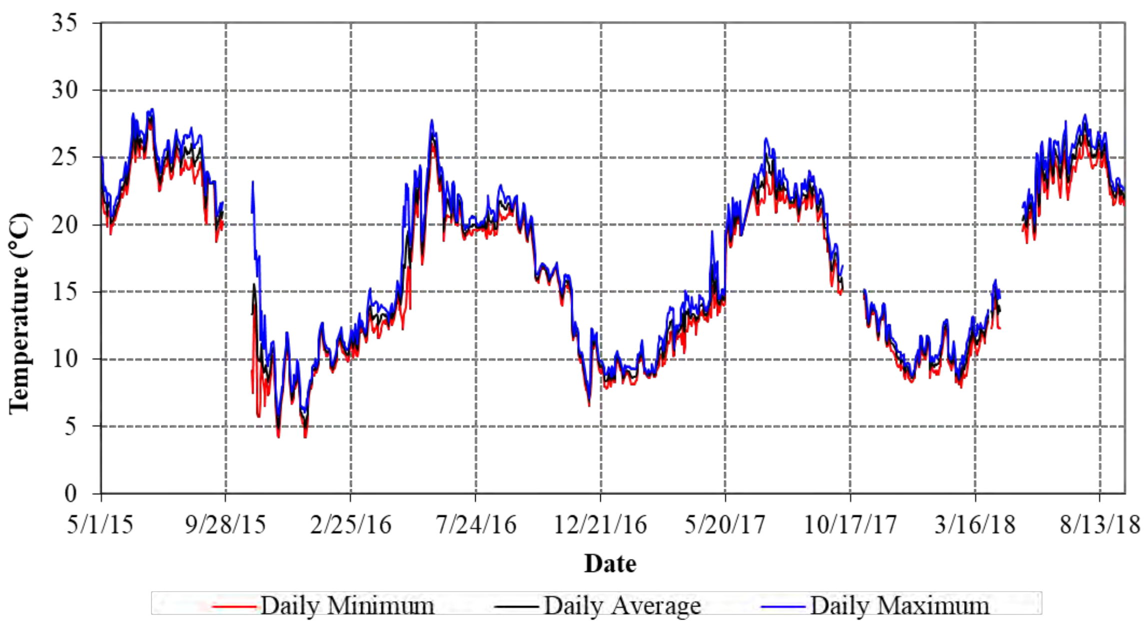

Figure 3.3.2-24. Daily minimum, average and maximum water temperature in the Bear River upstream of the Feather River confluence (RM 0.1)

SSWD also monitored water temperature in Dry Creek, which is the only major tributary in the lower Bear River and the confluence is between the Pleasant Grove and Highway 70 bridges. Due to access issues and variable flows during the monitoring period, only about 1 year of reliable data was collected. In general, water temperatures were slightly cooler in the summer compared to the Bear River but showed a similar seasonal pattern (Figure 3.3.2-25).

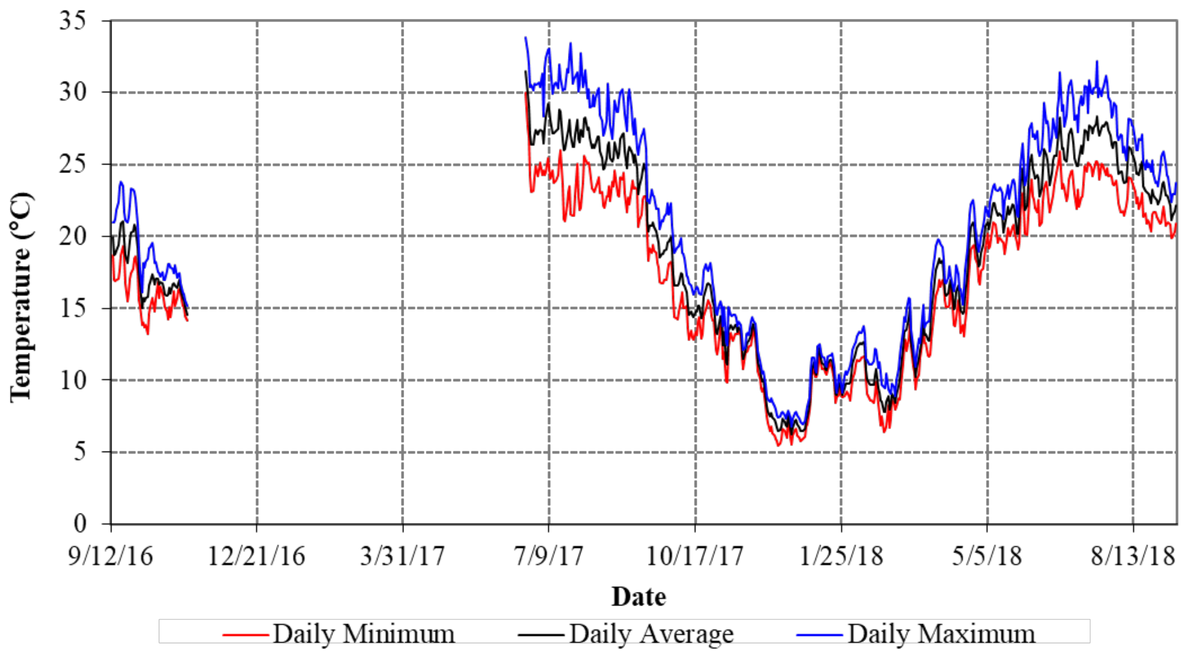

Figure 3.3.2-25. Daily minimum, average and maximum water temperature in Dry Creek upstream of the Bear River confluence.

SSWD also monitored water temperatures in the Feather River upstream and downstream of the Bear River confluence (Figures 3.3.2-26 and 3.3.2-27, respectively). The Feather River upstream of the Bear River confluence was generally cooler in the summer and warmer in the winter compared to the Bear River. The Feather River below the Bear River confluence was warmer compared to the upstream location, yet still generally cooler versus the Bear River. The water temperature at each Feather River location showed less diurnal variability (e.g., daily minimum and maximum) compared to the Bear River locations likely due to the higher flows and water depth and velocity at the installation points.

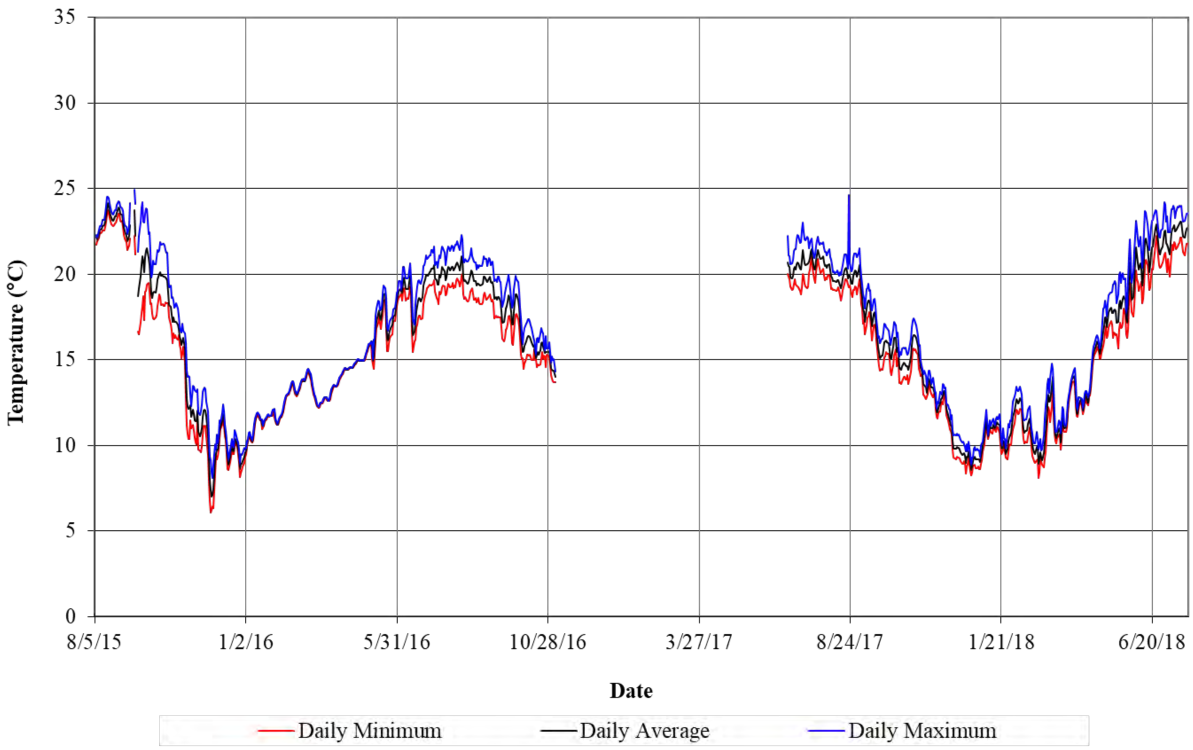

Figure 3.3.2-26. Daily minimum, average and maximum water temperature in the Feather River upstream of the Bear River confluence.

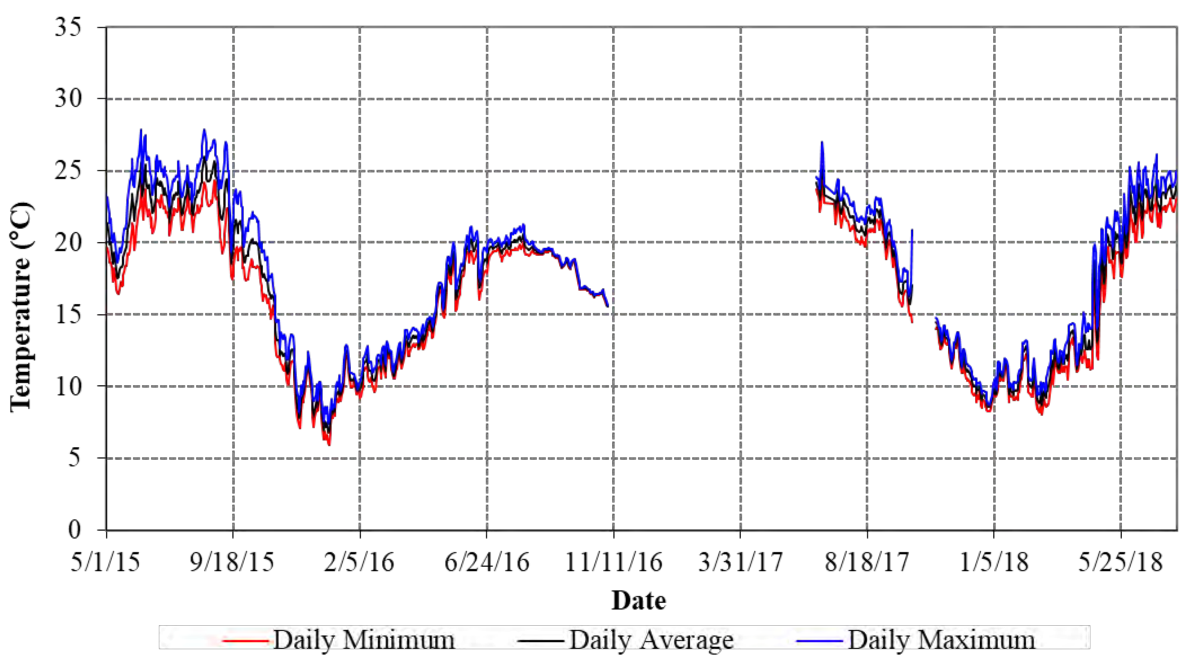

Figure 3.3.2-27. Daily minimum, average and maximum water temperature in the Feather River downstream of the Bear River confluence.

One source of long-term water temperature data available downstream of the Project was collected by DWR staff during monthly sampling from 1964 to 1987 near Wheatland, CA. While these data include only spot (i.e., once-monthly) recordings, they do show general trends in water temperature over a 24-year period (Table 3.3.2-20). These data are consistent with those collected by SSWD at a similar location.

Table 3.3.2-20. Minimum, mean and maximum monthly water temperatures in the Bear River near Wheatland. Collected once monthly by California Department of Water Resources for WY 1964 through WY 1987.

Temperatures (°C)	Month											
	Oct	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**July**	**Aug**	**Sep**
Minimum	12	11	7	6	6	7	9	12	16	21	22	17
Mean	18	14	11	9	9	11	15	19	24	26	26	22
Maximum	23	16	13	11	16	16	28	31	33	33	31	29
# of Readings	17	15	19	19	20	22	22	20	19	18	17	19

Source: CDFG 1991.

In addition, Bailey (2003) monitored water temperature at two locations near the Patterson Sand and Gravel operation: one approximately 2,000 ft downstream of the non-Project diversion dam (RM 16.5) and the second at the downstream end of the gravel operation (RM 15.0) (Figures 3.3.2-28 and 3.3.2-29). These data are also consistent with those collected by SSWD at a similar location.

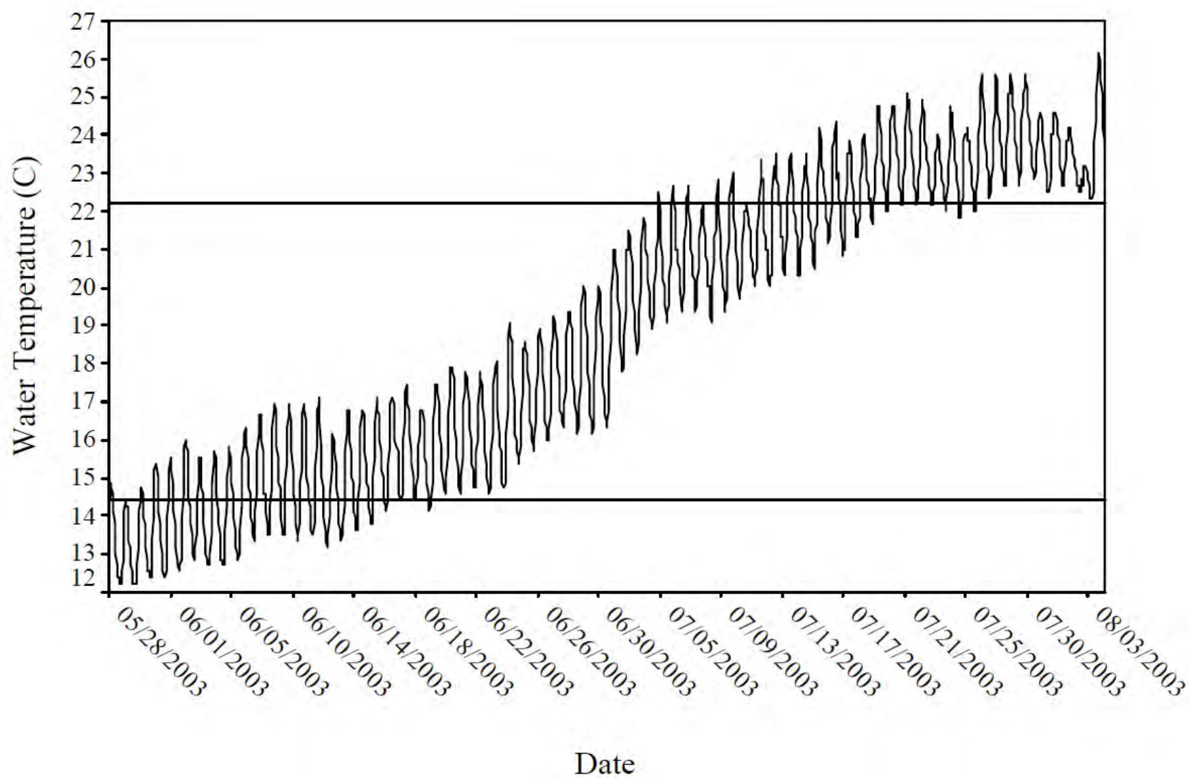

Figure 3.3.2-28. Water temperature time series from the upper Patterson Sand and Gravel site for the period of May 28 to August 4, 2003.
From: Bailey 2003, Figure 1.

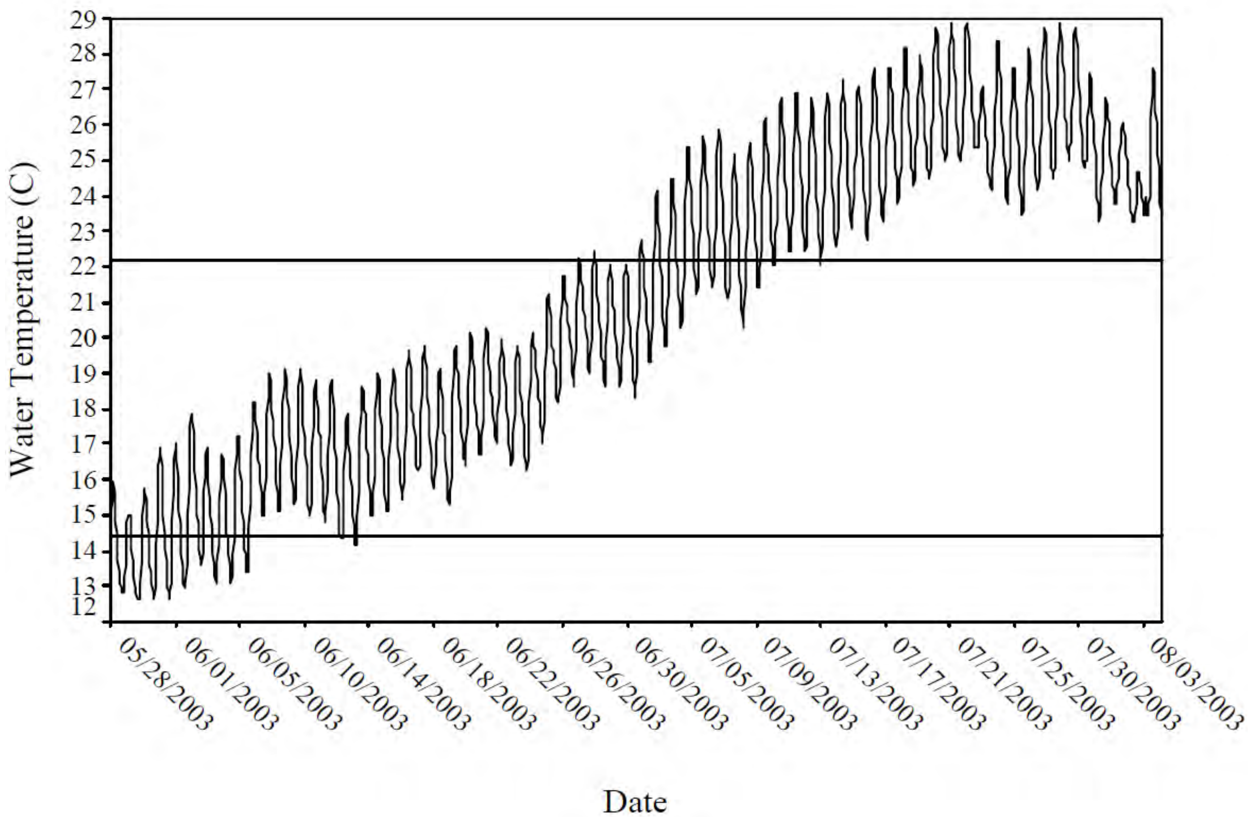

Figure 3.3.2-29. Water temperature time series from the lower Patterson Sand and Gravel site for the period of May 28 to August 4, 2003.
From: Bailey 2003, Figure 2.

A water temperature model of Dry Creek was developed by USFWS as part of the Dry Creek/Best Slough Baseline Habitat Assessment (USFWS 2016). The model simulated water temperatures at three locations in Dry Creek, including one location immediately upstream of the Bear River using the Stream Network Temperature Model (SNTEMP) modeling platform (Payne and Associates 2005). Model validation focused on a period of observed data collected from October 6, 2015 to September 29, 2016. Validation results are shown in Figure 3.3.2-30. Observed data in this figure are consistent with temperature data collected by SSWD at a similar location.

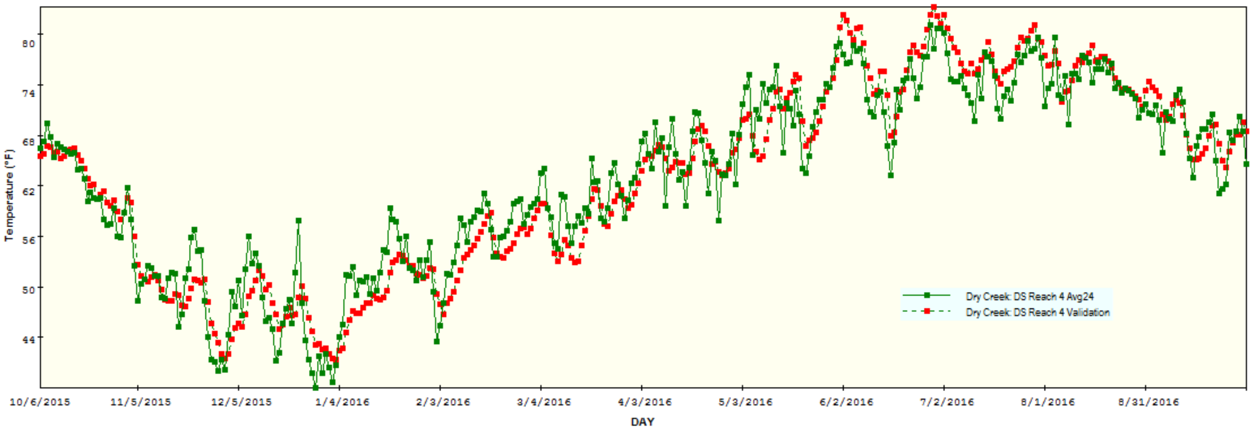

Figure 3.3.2-30. Results of water temperature model validation in Dry Creek upstream of the Bear River for the period of October 6, 2015 to September 29, 2016. Daily average simulated water temperature are red, daily average observed water temperatures are green.
From: USFWS 2016, Appendix E, Figure 3.

Relicensing Water Temperature Model

While a substantial quantity of water temperature data has been collected throughout the Project Area, available data are limited to a few years, and are generally collected from readily accessible locations and regulatory compliance points. Analysis of potential Project effects is greatly enhanced through the examination of a longer period-of-record of data than was historically available, representing a wide range of hydrologic and meteorological conditions. Accordingly, SSWD developed a water temperature model with the capability of simulating water temperatures throughout the Project Area for a period of record matching that of the Ops Model, WYs 1976 through 2014. SSWD relicensing Technical Memorandum 2-2, *Water Temperature Model Documentation, Calibration and Validation*, in Exhibit E, Appendix E1 provides a detailed description of the model platform used in the development of the water temperature model, which is summarized below.

SSWD elected to use a single model platform, CE-QUAL-W2 (Version 4.1), to develop three water temperature models that are run in series to simulate water temperatures from upstream to downstream. CE-QUAL-W2, by the Waterways Experiment Station of the U.S. Army Corps of Engineers (USACE), is a two-dimensional, laterally averaged, hydrodynamic water quality model for rivers, estuaries, lakes, reservoirs, and river basin systems (Cole and Wells 2017). The three models simulate: 1) Camp Far West Reservoir; 2) the non-Project diversion dam; and 3) the lower Bear River. Each model is summarized below.

Camp Far West Reservoir

This Temp Model uses CE-QUAL-W2 to simulate water temperature conditions in Camp Far West Reservoir. The model uses hydrologic output from the Ops Model; a historically-based synthetic time series for water temperatures in the Bear River upstream of Camp Far West Reservoir; a historically-based synthetic time series of water temperatures in Rock Creek above Camp Far West Reservoir; and historically-based synthetic meteorological conditions to simulate Project effects on Camp Far West Reservoir water temperatures. The model provides a two-dimensional (2D) representation of Camp Far West Reservoir, and includes releases from the powerhouse, low-level outlet and spillway at Englebright Dam.

Non-Project Diversion Dam

This Temp Model uses CE-QUAL-W2 to simulate water temperature conditions in the non-Project diversion dam, located immediately downstream of Camp Far West Reservoir. The model uses hydrologic output from the Ops Model, simulated water temperatures in the Bear River below Camp Far West Reservoir from the upstream model; and historically-based synthetic meteorological conditions to simulate Project effects on non-Project diversion dam water temperatures. The model provides a 2D representation of the diversion dam impoundment, including releases to the CFWID North Canal, the SSWD Conveyance Canal, and the Bear River.

Lower Bear River

This Temp Model uses CE-QUAL-W2 to simulate water temperatures in the Bear River from the non-Project diversion dam to the Bear River's confluence with the Feather River. The model uses hydrologic output from the Ops Model, simulated water temperatures in the Bear River below the non-project diversion dam from the upstream model; a historically-based synthetic time series of water temperatures in Dry Creek upstream of the Bear; and historically-based synthetic meteorological conditions to simulate Project effects on Bear River water temperatures. The model provides a 2D representation of lower Bear River, including inflows from the non-Project diversion dam and Dry Creek. The model is unable to simulate backwater effects from the Feather River.

The three Temp Models were developed using available physical information such as reservoir bathymetry and LiDAR. Historically-measured water temperature data described above were used to calibrate each water temperature model. The Camp Far West Reservoir and non-Project diversion dam temperature models calibrated well-below targeted error thresholds. The lower Bear River did not calibrate as well, yet still provides adequate representation of reach water temperature conditions. There are many possible reasons for the Bear River calibration challenges, including inadequate representation of accretion flows and accretion temperatures throughout the reach, and the lack of channel morphology data to develop the lower Bear River model grid. After calibration, each model was validated using a different period of hydrology than was used for the calibration. Validation results were similar to calibration results. For both calibration and validation, simulated water temperature output was compared to historical data when and where available. Model results were able to reasonably match observed water temperature data, and were sensitive to changes in flow meteorological conditions.

Once Temp Model development was complete, the three models were setup to run in series to simulate the full period of record, WYs 1976 through 2014. A graphical user interface (GUI) was developed in Microsoft™ Excel to streamline the process of taking hydrologic output from the Ops Model, converting it to input for the Temp Models, and then running the three models in series. The GUI was used to make three runs of the water temperature model in support of FERC license application: 1) the No Action Alternative, 2) the proposed Project-near term scenario, and 3) the proposed Project-future scenario. The GUI and the No Action Alternative are described in the *Water Temperature Model Documentation Calibration and Validation* report located in Exhibit E, Appendix E1. All three Temp Model runs use the same meteorological and water temperature boundary conditions. Hydrologic boundary conditions for each scenario come from their respective Ops Model run.

Standard water temperature model output includes mean- and maximum-daily water temperature for WYs 1976 through 2014 for the following Bear River locations:

- Below Camp Far West Reservoir (RM 18.0)
- Below the non-project diversion dam (RM 16.9)
- At Highway 65 (RM 11.4)
- At Pleasant Grove Bridge (RM 7.1)
- At Highway 70 (RM 3.5)

Below Highway 70, the Bear River is affected by backwater effects from the Feather River, which is not simulated by the water temperature model. Therefore, results downstream below Highway 70 are not included as standard model output.

Figures 3.3.2-31, 3.3.2-32, and 3.3.2-33 show simulated mean daily water temperatures under the No Action Alternative (i.e., existing conditions) for three representative WYs: 1995 (wet hydrology); 2003 (normal hydrology); and 2001 (dry hydrology). To demonstrate how simulated water temperature changes longitudinally along the Bear River, each figure shows mean-daily water temperatures for each WY at several locations. In all three WY types, water temperatures throughout the reach exceed 20°C for most of the June through September period. In each year, simulated water temperatures were very similar at all locations below Highway 65, indicating that water temperatures were at equilibrium with the ambient environment. Warming does occur at the head of the reach below Camp Far West Reservoir to Highway 65 from late spring through summer; cooling occurs at the head of the reach in the fall. Water Temperatures at Highway 70 are impacted by inflows from Dry Creek, which are slightly cooler than the Bear River in summer and fall months, and slightly warmer than the Bear River in spring months.

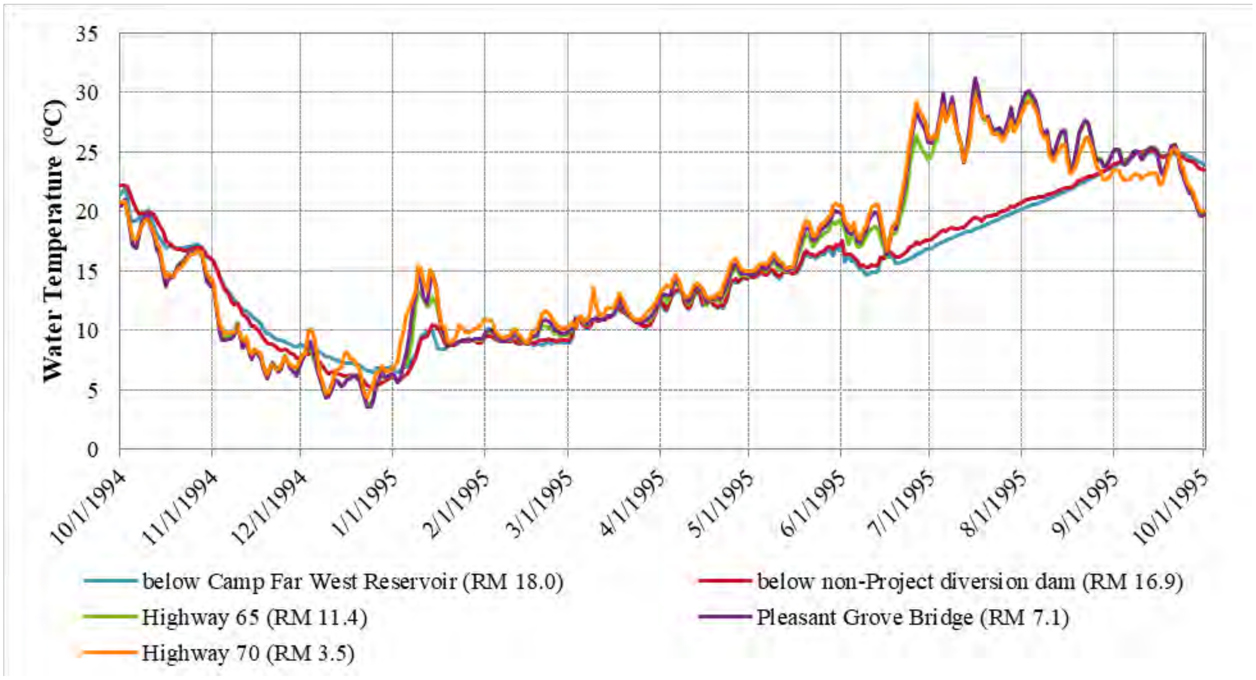

Figure 3.3.2-31. Simulated daily average water temperatures for a representative wet WY (1995) at various locations in the Bear River downstream of the non-Project diversion dam.

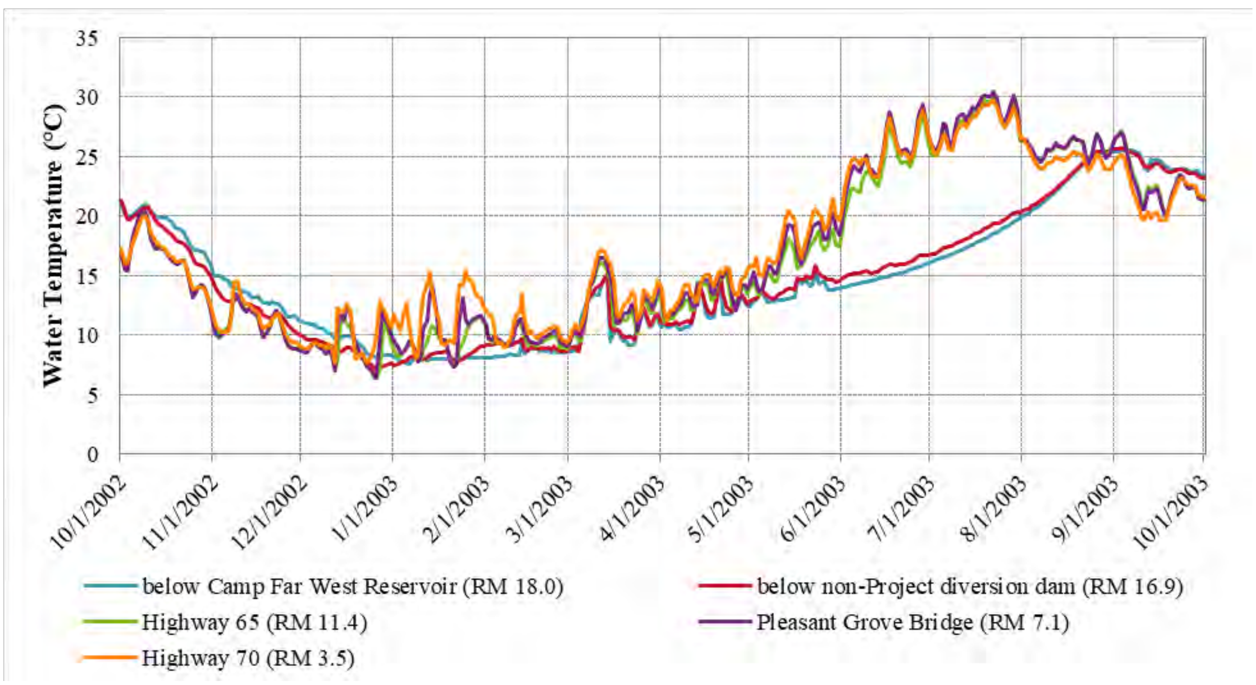

Figure 3.3.2-32. Simulated daily average water temperatures for a representative normal WY (2003) at various locations in the Bear River downstream of the non-Project diversion dam.

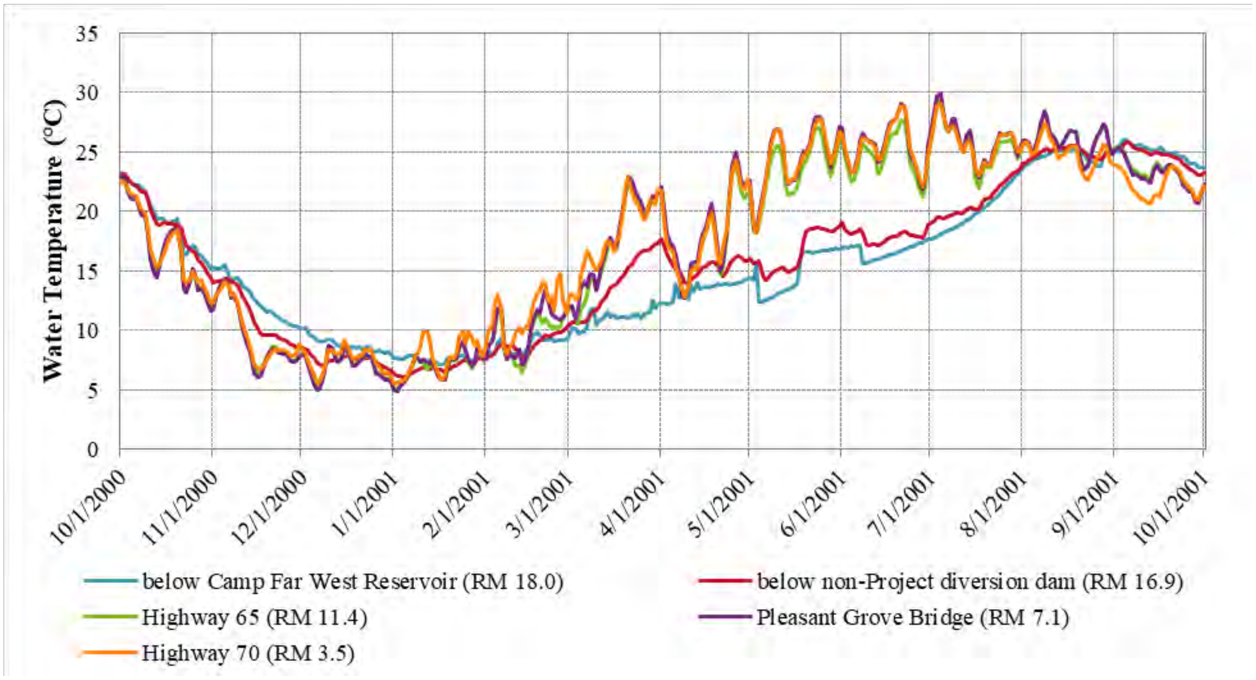

Figure 3.3.2-33. Simulated daily water temperatures for a representative dry WY (2001) at various locations in the Bear River downstream of the non-Project diversion dam.

Mercury and Related Resources

Mercury contamination is common in California aquatic food webs, affecting both the fishing and aquatic life, and beneficial uses in many areas of the state with long-term trends, indicating little change over the past few decades (Davis et al. 2007). In the Bear River watersheds, local sources of mercury, and hence of methylmercury, are a legacy of historic gold mining practices on the river, which used mercury amalgamation in the gold recovery process. Much of the mercury used was lost to the environment (Alpers et al. 2005; Hunerlach et al. 1999; May et al. 2000; Slotton et al. 1995 as cited in May et al. 2000). Regional and global atmospheric sources of mercury also substantially contribute to mercury impacts to the Sacramento–San Joaquin River system (Davis et al. 2009).

As described in Section 3.3.2.1.2, the SWRCB has identified Camp Far West Reservoir and the lower Bear River as CWA Section 303(d) State Impaired for mercury, citing fish tissue concentrations and surface water concentrations, to support their listing (SWRCB 2012).

SSWD has not and does not now introduce mercury into Project waters, nor perform any Project O&M activity associated with the release or mobilization of mercury. SSWD does participate in the SWRCB and Regional Water Board's Owner and Operators Committee to develop a statewide water quality control program for mercury (statewide mercury program or program) that will include: 1) mercury control program for reservoirs; and 2) mercury water quality objectives. It is expected that research performed on Camp Far West Reservoir will inform the TMDL development process.

Mercury has been comprehensively studied in Camp Far West Reservoir fish tissue, surface water and sediment. A brief description of recent studies related to mercury is provided below.

Camp Far West Reservoir

SSWD found five sources of information related to mercury within the Project.

Saiki et al. (2010) reported on fish collected by USGS in August 2002 and August 2003 from three locations: the Bear River arm (inflow): the Rock Creek arm; and near the dam. Total mercury (reported as dry weight concentrations) in whole fish was highest in spotted bass (mean, 0.93 ppm; range, 0.16 to 4.41 ppm) and lower in bluegill (mean, 0.45 ppm; range, 0.22 to 1.96 ppm) and threadfin shad (0.44 ppm; range, 0.21 to 1.34 ppm). Spatial patterns for mercury in fish indicated high concentrations upstream in the Bear River arm and generally lower concentrations elsewhere, including downstream near the dam. These findings coincided with patterns exhibited by methylmercury in water and sediment, and the source of mercury to Camp Far Reservoir is Bear River inflows.

Davis et al. (2009) reported on fish collected by Cal Fish and Wildlife in September 2007 from two locations, the Bear River arm of the reservoir and near the dam. A total of 23 sample composites were generated from two species: spotted bass (21) and channel catfish (2). Mercury in spotted bass ranged from 0.205 to 1.55 ppm, while mercury in catfish ranged from 0.318 to 0.44 ppm.

Alpers et al. (2008) reported on water quality samples collected from October 2001 through August 2003, and developed BAFs for reservoir dwelling biota. Water quality sampling was done at approximately 3-month intervals on eight occasions at several stations in the reservoir, including a group of three stations along a flow path in the reservoir. Concentrations of total mercury (filtered and unfiltered water) were highest during fall and winter; these concentrations decreased at most stations during spring and summer. Anoxic conditions developed in deep parts of the reservoir during summer and fall in association with thermal stratification. The highest concentrations of methylmercury in unfiltered water were observed in samples collected during summer from deep-water stations in the anoxic hypolimnion. In the shallow (i.e., ≤14 m depth) oxic epilimnion, concentrations of methylmercury in unfiltered water were highest during the spring and lowest during the fall. The ratio of methylmercury to total mercury increased systematically from winter to spring to summer, largely in response to the progressive seasonal decrease in total mercury concentrations, and also to some extent because of increases in methylmercury concentrations during summer.

Mercury BAFs were computed using data from linked studies of biota spanning a range of trophic positions: zooplankton, midge larvae, mayfly nymphs, crayfish, threadfin shad, bluegill, and spotted bass. Significant increases in total mercury in tissue with increasing organism size were observed for all three fish species and for crayfish. The BAF values were computed using the average methylmercury concentration (wet) in biota divided by the arithmetic mean concentration of methylmercury in filtered water (0.04 nanograms per liter). As expected, the BAF values increased systematically with increasing trophic position. Values of BAF were 190,000 for zooplankton; 470,000 to 930,000 for three taxa of invertebrates; 2.7 million for threadfin shad (whole body); 4.2 million for bluegill (fillet); and 10 million for spotted bass (fillet).

Kuwabara et al. (2003) conducted field and laboratory studies in April and November 2002 to provide the first direct measurements of the benthic flux of dissolved mercury species (total and methylated forms) between the bottom sediment and water column at three sampling locations within Camp Far West Reservoir: one near the Bear River inlet to the reservoir; a second at a mid-reservoir site of comparable depth to the inlet site; and the third at the deepest position in the reservoir near the dam. Results were reported in molar quantities and are not reproduced here. Kuwarbara et al. (2005) observed seasonal and spatial variation in benthic flux, and suggested the information can inform reservoir management to minimize methylmercury production.

The California Office of Environmental Health and Hazard Assessment (OEHHA 2009) implemented the following safe eating guidelines for fish in Camp Far West Reservoir based on mercury:

- Women between ages 18 to 45 and children between ages 1 to 17 should not consume more than one serving per week of bluegill or other sunfish species. OEHHA recommended that this group not consume any black bass or catfish species from the reservoir.
- Men over age 17 and women over age 45 should not consume more than three servings per week of bluegill or other sunfish. OEHHA recommended that this group not consume more than one serving per week of black bass or catfish species from the reservoir.

SSWD analyzed water samples for mercury as part of its 2017 study at one location in Camp Far West Reservoir, near the dam. Mercury concentrations ranged from 2.0 µg/L to 6.0 µg/L near the surface and between 3.5 µg/L and 33.8 µg/L near the bottom over three sampling events (Table 3.3.2-11).

<u>Lower Bear River</u>
SSWD found two sources of information related to mercury in the lower Bear River.

DWR's Oroville Facilities relicensing (DWR 2004) included collection of a total of 29 water samples at one location in the Bear River downstream of Camp Far West Reservoir, representing sixteen 30-day average samples. The total recoverable mercury concentrations in water ranged from 2.6 ng/l to 20.8 ng/l with an average of 0.84 ng/l for the sixteen 30-day average samples. None of the sixteen 30-day average samples exceeded the EPA (California Toxics Rule) mercury-based numeric criterion for human health.

Grenier et al. (2007) collected fish samples from various Sacramento-San Joaquin rivers and streams, including the lower Bear River. Fish were sampled for tissue analysis at one location from this reach, near Highway 70. A total of 5 out of 21 samples exceeded the EPA fish tissue criterion for human health. The average wet weight mercury concentration in fish tissue was 0.21 ppm for all 21 samples collected. The number of fish collected per sample, the measured mercury concentrations in fish tissue, and the number of exceedances are, by species: redear sunfish–10 samples, 0.07-0.42 ppm (average 0.14 ppm), 1 exceedance; Sacramento pikeminnow – 4 samples, 0.30-0.51 ppm (average 0.40 ppm), 4 exceedances; Sacramento sucker – 4 samples, 0.06-0.25 ppm (average 0.14 ppm), no exceedances; spotted bass – 3 samples, 0.25-0.27 ppm (average 0.26 ppm), no exceedances. All 21 samples were collected from fish with total lengths greater than 150 mm, which represent fish most commonly caught and consumed by sport fishers and their families.

SSWD analyzed water samples for mercury as part of its 2017 study at four locations in the Bear River downstream of Camp Far West Reservoir; 1) downstream of the Camp Far West Dam, 2) downstream of the non-Project diversion dam, 3) near Pleasant Grove Road Bridge, and 4) near highway 70 Bridge. Mercury concentrations ranged from 2.3 µg/L to 15.3 µg/L near the bottom over three sampling events at all locations (Table 3.3.2-16).

3.3.2.2 Environmental Effects

This section discusses the potential environmental effects of SSWD's proposed Project, as described in Section 2.2 of this Exhibit E. As part of the Project relicensing, SSWD proposes a Pool Raise, modifications of existing recreation facilities, and modification of the existing Project Boundary. SSWD proposes one license condition that will affect water resources, Measure WR1, *Minimum instream* flows. This condition would continue the minimum flow requirement in Article 29 of the existing license. The section is divided into the following areas: 1) effects of construction-related activities; 2) effects of continued Project O&M, especially with regards to a) effects on water quantity and use, b) effects on water quality, and c) effects on CWA Section 303(d) constituent – mercury.

3.3.2.2.1 Effects of Construction-Related Activities

SSWD anticipates there to be little-to-no effect from the construction of the Pool Raise on water quantity or quality under the construction sequence and schedule proposed by SSWD. Construction is anticipated to last a total of 126 days (Task 4, Table 2.2-1), which can be completed in one summer season after the preceding winter spills have ended typically by the end of June, and before the subsequent winter spills have begun typically in the month of December (Exhibit B, Figure 6.3-1). Construction activities will not impact SSWD's ability to make dam releases from either the powerhouse or the low-level outlet. SSWD will obtain all necessary permits and approvals for the Pool Raise construction and related activities, and SSWD anticipates the permits and approvals will contain conditons for the protection and mitigation of any potential impacts to water quality.

3.3.2.2.2 Effects of Proposed Project Operations and Maintenance

Under SSWD's proposed Project, water quantity and use would change slightly, as compared to the No Action Alternative. This section discusses effects of SSWD's proposed Project on: 1) Project flows and reservoir storage; 2) reservoir elevations; 3) water supply; and 4) water rights.

Effects on Water Quantity and Use

Under SSWD's proposed Project, water quantity and use could potentially change, as compared to the No Action Alternative. This section discusses effects of SSWD's proposed Project on: 1) Project flows and reservoir storage; 2) water supply; and 3) water rights. The Project is described in Exhibit B, Section 2.0.

Project Flows and Reservoir Storage

Project flows and storages are directly affected by the Pool Raise. The Pool Raise would create additional storage space in Camp Far West Reservoir, which allows for more water to be stored when Camp Far West Reservoir fills and spills. Carryover storage in Camp Far West Reservoir is anticipated to increase by approximately 5,200 ac-ft per year, on average. Flows in the Bear River downstream of the non-Project diversion dam are anticipated to decrease by approximately 4 cfs, on average, resulting from changes in the timing and magnitude of spill from Camp Far West Reservoir.

Simulated daily flows for the Bear River below the non-project diversion dam are presented in Figures 3.3.2-34 through 3.3.2-36 for the No Action and SSWD's proposed Project alternatives for representative wet, dry and normal WYs, respectively. In Figure 3.3.2-36, flow differences in August and September are the result of increased Bay-Delta Settlement Agreement releases resulting from increased carryover storage from the previous year (shown in Figure 3.3.2-37).

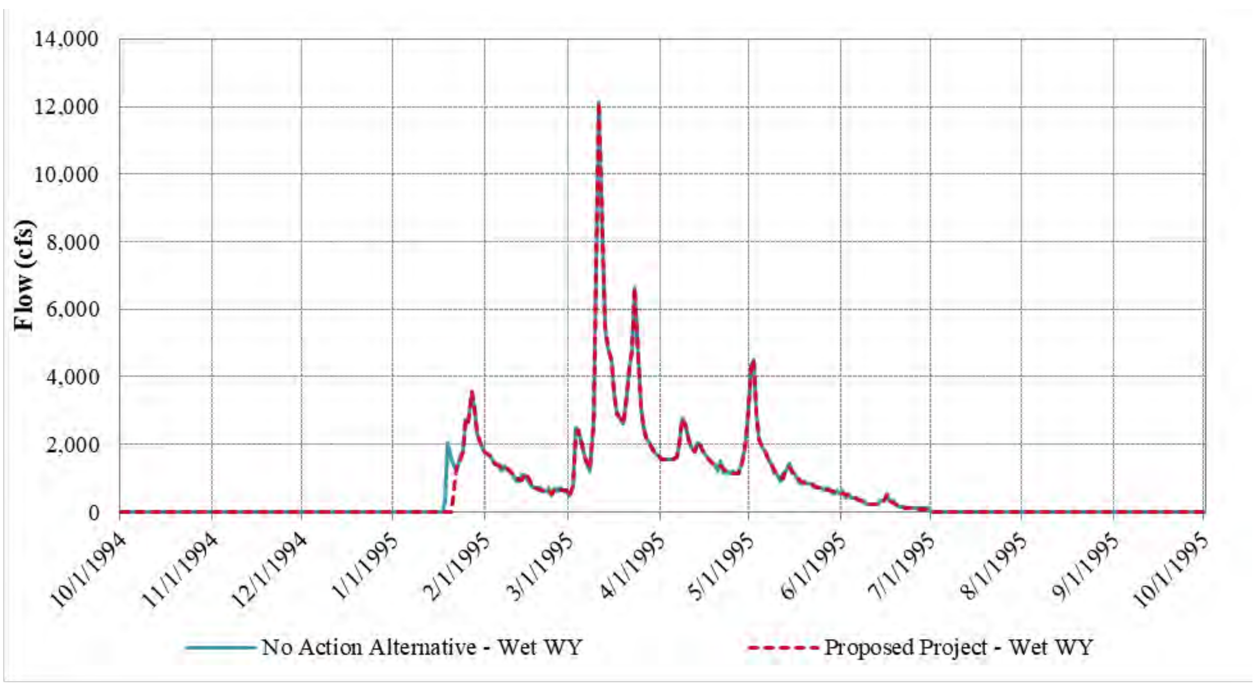

Figure 3.3.2-34. Simulated daily flows for the Bear River below the non-project diversion dam for the No Action and SSWD's proposed Project alternatives for the representative wet (1995) WY.

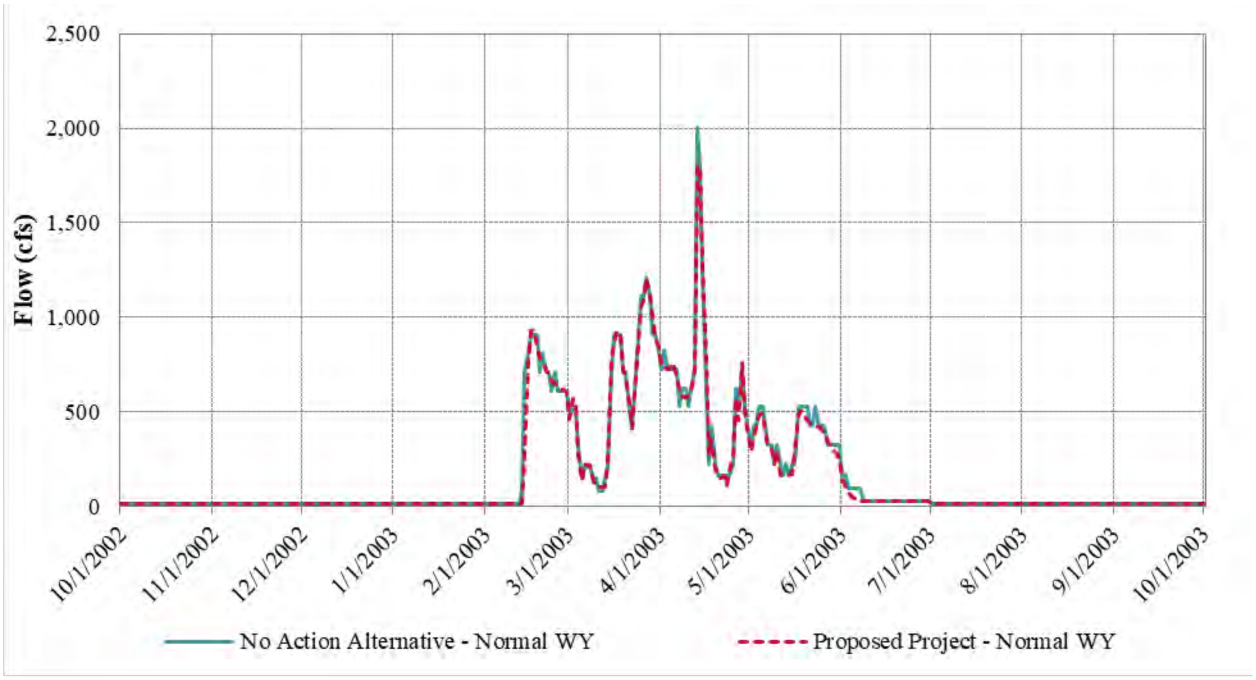

Figure 3.3.2-35. Simulated daily flows for the Bear River below the non-project diversion dam for the No Action and SSWD's proposed Project alternatives for the representative normal (2003) WY.

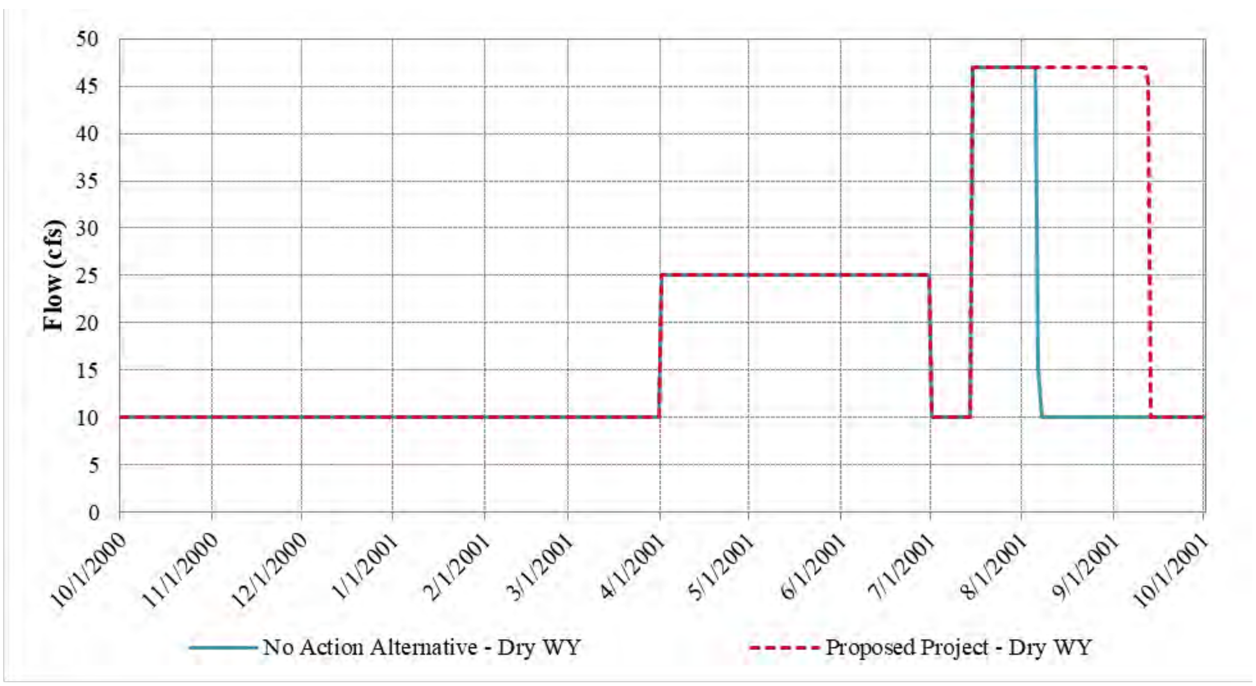

Figure 3.3.2-36. Simulated daily flows for the Bear River below the non-project diversion dam for the No Action and SSWD's proposed Project alternatives for the representative dry (2001) WY.

Simulated daily Camp Far West Reservoir storages are presented in Figure 3.3.2-37 for the No Action scenario and SSWD's proposed Project alternatives for representative wet, dry and normal WYs. Simulated daily Camp Far West Reservoir water-surface elevations are presented in Figure 3.3.2-38 for the No Action scenario and SSWD's proposed Project alternatives for representative wet, normal and dry WYs.

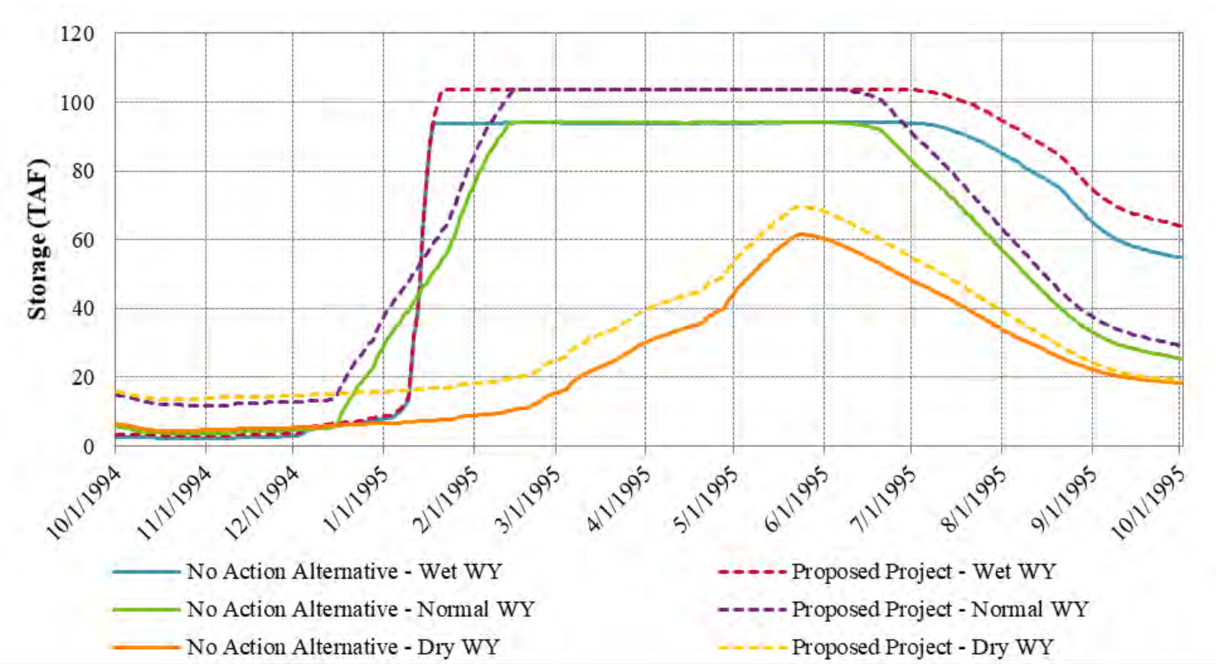

Figure 3.3.2-37. Simulated daily Camp Far West Reservoir storage for the No Action and SSWD's proposed Project for representative wet (1995), normal (2003) and dry (2001) WYs.

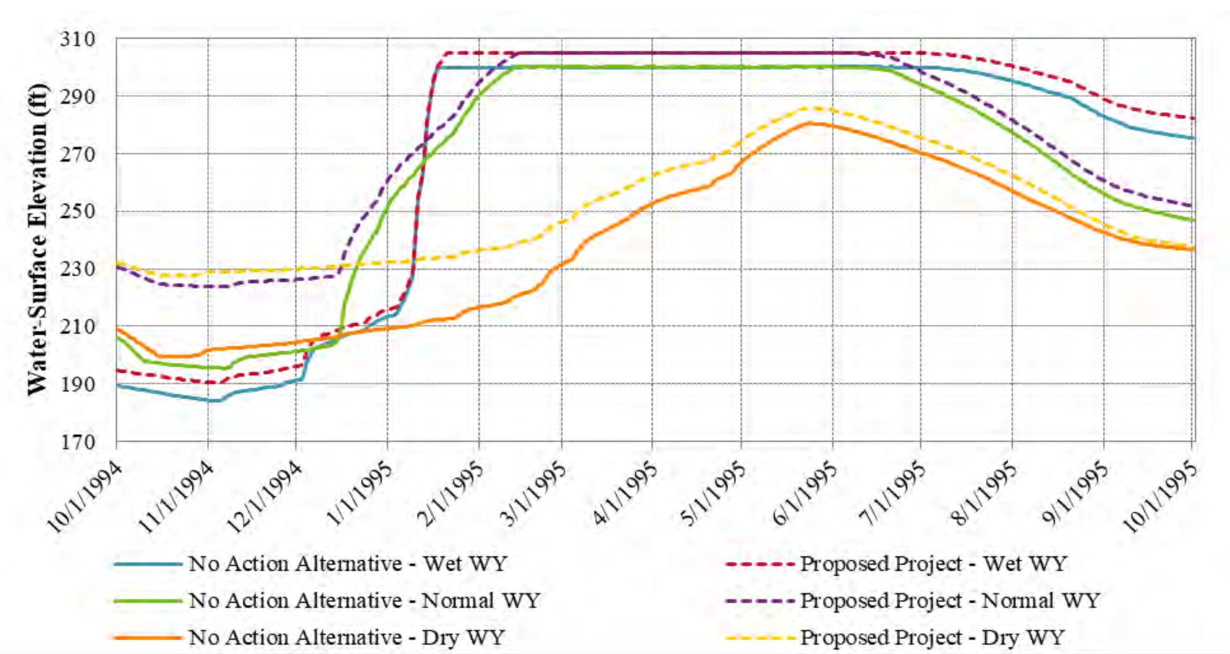

Figure 3.3.2-38. Simulated daily Camp Far West Reservoir water-surface elevation for the No Action and SSWD's proposed Project for representative wet (1995), normal (2003) and dry (2001) WYs.

Table 3.3.2-21 provides Project flows and storages exceedance values for the proposed Project Alternative similar to those provided in Table 3.3.2-1 for the No Action Alternative. Averages are also provided in the table.

Table 3.3.2-21. Proposed Project Alternative flows and storage by month from SSWD's Near-Term Condition dataset.

Value	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
CAMP FAR WEST RESERVOIR STORAGE (ac-ft)												
0%	78,480	103,573	103,573	103,573	103,573	103,573	103,573	103,573	103,573	103,573	96,515	80,918
10%	63,862	68,906	94,499	103,573	103,573	103,573	103,573	103,573	103,573	97,503	79,591	64,673
50%	19,037	19,943	24,033	46,280	80,904	103,573	103,573	103,573	94,291	67,384	39,198	21,767
90%	4,698	4,500	6,355	11,585	14,368	25,006	36,542	40,360	40,507	28,691	14,443	6,177
100%	1,300	1,300	2,192	3,135	4,630	7,680	12,754	11,499	7,847	4,317	1,300	1,300
Average	*26,687*	*29,411*	*39,062*	*53,328*	*68,629*	*81,257*	*86,936*	*86,969*	*81,556*	*64,947*	*43,800*	*28,791*
CAMP FAR WEST RESERVOIR WATER-SURFACE ELEVATION (ft)												
0%	291	305	305	305	305	305	305	305	305	305	301	293
10%	282	286	300	305	305	305	305	305	305	302	292	283
50%	238	239	245	269	293	305	305	305	300	285	262	242
90%	201	200	208	223	229	246	260	263	263	251	230	208
100%	175	175	185	193	201	213	226	223	213	200	175	175
Average	*239*	*242*	*252*	*266*	*279*	*289*	*293*	*294*	*290*	*279*	*261*	*244*
BEAR RIVER FLOW BELOW CAMP FAR WEST RESERVOIR FLOW (RM 12.6) (cfs)												
0%	114	8,371	27,385	46,035	29,405	13,745	11,931	4,737	1,195	678	521	399
10%	106	13	10	1,477	2,232	2,555	1,707	1,111	628	495	490	290
50%	17	11	10	10	12	449	529	487	454	478	436	114
90%	14	10	10	10	11	10	29	136	149	171	153	36
100%	5	10	10	10	10	10	26	42	47	38	28	5
Average	*45*	*63*	*363*	*499*	*791*	*902*	*730*	*579*	*420*	*399*	*375*	*142*
DIVERSION INTO CFWID NORTH CANAL (cfs)												
0%	3	1	0	1	2	2	7	18	25	29	28	17
10%	2	1	0	0	2	2	6	18	25	29	27	12
50%	2	1	0	0	2	1	4	15	23	27	26	5
90%	1	0	0	0	1	0	1	9	21	23	22	3
100%	0	0	0	0	0	0	0	4	11	13	11	0
Average	*2*	*1*	*0*	*0*	*1*	*1*	*4*	*14*	*23*	*26*	*25*	*7*
DIVERSION INTO CFWID SOUTH CANAL (cfs)												
0%	7	2	0	0	0	1	21	22	26	25	23	12
10%	7	1	0	0	0	0	21	22	25	25	22	10
50%	5	0	0	0	0	0	5	21	24	25	20	7
90%	3	0	0	0	0	0	1	19	19	23	12	5
100%	0	0	0	0	0	0	0	11	11	14	7	0
Average	*5*	*0*	*0*	*0*	*0*	*0*	*9*	*21*	*23*	*24*	*18*	*7*
DIVERSION INTO SSWD MAIN CANAL (cfs)												
0%	96	0	0	0	0	0	396	446	438	434	433	361
10%	88	0	0	0	0	0	176	396	424	431	430	245
50%	0	0	0	0	0	0	11	312	364	417	380	89
90%	0	0	0	0	0	0	0	75	76	76	73	14
100%	0	0	0	0	0	0	0	0	0	0	0	0
Average	*28*	*0*	*0*	*0*	*0*	*0*	*54*	*270*	*302*	*330*	*307*	*113*

Table 3.3.2-21. (continued)

Value	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
BEAR RIVER BELOW THE NON-PROJECT DIVERSION DAM (RM 16.9) (cfs)												
0%	10	8,370	27,385	46,035	29,403	13,744	11,929	4,502	810	208	47	47
10%	10	10	10	1,477	2,230	2,555	1,659	745	203	47	47	47
50%	10	10	10	10	10	449	459	97	25	10	10	10
90%	10	10	10	10	10	10	25	25	25	10	10	10
100%	5	10	10	10	10	10	25	25	25	10	10	5
Average	*10*	*62*	*363*	*499*	*789*	*901*	*664*	*275*	*71*	*19*	*24*	*15*
BEAR RIVER FLOW AT WHEATLAND (RM 11.5) (cfs)												
0%	14	8,374	27,389	46,040	29,407	13,748	11,933	4,508	815	214	54	52
10%	14	14	15	1,482	2,234	2,559	1,664	751	209	53	54	52
50%	14	14	15	15	14	453	464	103	30	16	17	15
90%	14	14	15	15	14	14	30	31	30	16	17	15
100%	9	14	15	15	14	14	30	31	30	16	17	10
Average	*14*	*66*	*368*	*504*	*793*	*906*	*668*	*281*	*77*	*25*	*31*	*20*
BEAR RIVER FLOW AT PLEASANT GROVE ROAD (RM 7.1) (cfs)												
0%	14	8,374	27,389	46,040	29,407	13,748	11,933	4,508	815	214	54	52
10%	14	14	15	1,482	2,234	2,559	1,664	751	209	53	54	52
50%	14	14	15	15	14	453	464	103	30	16	17	15
90%	14	14	15	15	14	14	30	31	30	16	17	15
100%	9	14	15	15	14	14	30	31	30	16	17	10
Average	*14*	*66*	*368*	*504*	*793*	*906*	*668*	*281*	*77*	*25*	*31*	*20*
BEAR RIVER FLOW AT FEATHER RIVER CONFLUENCE (RM 0.0) (cfs)												
0%	398	10,039	32,797	51,942	35,176	15,888	15,200	4,734	854	221	66	58
10%	18	33	862	1,672	2,477	2,774	1,687	787	217	54	54	52
50%	14	15	21	50	113	535	484	110	33	18	19	15
90%	14	14	16	17	18	24	35	34	31	17	17	15
100%	9	14	15	15	14	17	32	32	30	16	17	10
Average	*16*	*85*	*458*	*635*	*952*	*1,023*	*714*	*297*	*81*	*27*	*32*	*21*

The primary difference in flows between the proposed Project and the No Action Alternative is the difference in the timing and magnitude of spills at Camp Far West Dam resulting from the proposed Pool Raise. The Pool Raise provides additional storage to capture reservoir inflows from the Bear River and Rock Creek. During many months of the year, Project releases to the Bear River below the diversion dam are made to meet the required minimum instream flow. In these months, there is no difference between the two scenarios. Diversions to SSWD's main canal are slightly higher in moderately dry hydrologic years under the proposed Project scenario because of increased storage capacity in Camp Far West Reservoir. On average, diversions increased by 4.9 percent from April through October.

Table 3.3.2-22 shows: 1) the differences in Project flows and storages for the same locations and exceedance values shown in Tables 3.3.2-1 and 3.3.2-21 resulting from: 1) the proposed Project (Near-Term Hydrology) less SSWD's No Action Alternative; and 2) the percent change, shown in parentheses.

Table 3.3.2-22. Changes in Project flows and storage from No Action Alternative to SSWD's proposed Project.

Value	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
CAMP FAR WEST RESERVOIR STORAGE (ac-ft)												
0%	9,465 (13.7%)	9,399 (10.0%)	9,322 (9.9%)	9,301 (9.9%)	9,285 (9.8%)	9,293 (9.9%)	9,283 (9.8%)	9,279 (9.8%)	9,289 (9.9%)	9,294 (9.9%)	9,632 (11.1%)	9,552 (13.4%)
10%	7,876 (14.1%)	8,122 (13.4%)	8,684 (10.1%)	9,663 (10.3%)	9,448 (10.0%)	9,374 (10.0%)	9,353 (9.9%)	9,349 (9.9%)	9,441 (10.0%)	9,707 (11.1%)	9,561 (13.7%)	9,456 (17.1%)
50%	1,878 (10.9%)	2,148 (12.1%)	1,588 (7.1%)	7,419 (19.1%)	4,178 (5.4%)	9,836 (10.5%)	9,714 (10.3%)	9,656 (10.3%)	9,215 (10.8%)	7,845 (13.2%)	5,513 (16.4%)	3,129 (16.8%)
90%	1,688 (56.1%)	947 (26.7%)	1,779 (38.9%)	5,011 (76.2%)	3,696 (34.6%)	3,656 (17.1%)	3,354 (10.1%)	2,417 (6.4%)	3,413 (9.2%)	2,759 (10.6%)	3,569 (32.8%)	2,501 (68.0%)
100%	0 (0.0%)	0 (0.0%)	210 (10.6%)	0 (0.0%)	733 (18.8%)	0 (0.0%)	212 (1.7%)	210 (1.9%)	206 (2.7%)	201 (4.9%)	0 (0.0%)	0 (0.0%)
Average	*5,159 (24.0%)*	*5,094 (20.9%)*	*5,264 (15.6%)*	*5,641 (11.8%)*	*6,260 (10.0%)*	*7,144 (9.6%)*	*7,548 (9.5%)*	*7,460 (9.4%)*	*7,196 (9.7%)*	*6,731 (11.6%)*	*6,136 (16.3%)*	*5,579 (24.0%)*
CAMP FAR WEST RESERVOIR WATER-SURFACE ELEVATION (ft)												
0%	5 (1.7%)	5 (1.7%)	5 (1.7%)	5 (1.7%)	5 (1.7%)	5 (1.7%)	5 (1.7%)	5 (1.7%)	5 (1.7%)	5 (1.7%)	5 (1.7%)	6 (2.1%)
10%	5 (1.8%)	6 (2.1%)	4 (1.4%)	5 (1.7%)	5 (1.7%)	5 (1.7%)	5 (1.7%)	5 (1.7%)	5 (1.7%)	5 (1.7%)	6 (2.1%)	7 (2.5%)
50%	3 (1.3%)	3 (1.3%)	2 (0.8%)	7 (2.7%)	3 (1.0%)	5 (1.7%)	5 (1.7%)	5 (1.7%)	5 (1.7%)	6 (2.2%)	5 (1.9%)	5 (2.1%)
90%	9 (4.7%)	5 (2.6%)	7 (3.5%)	14 (6.7%)	8 (3.6%)	5 (2.1%)	4 (1.6%)	2 (0.8%)	3 (1.2%)	3 (1.2%)	8 (3.6%)	12 (6.1%)
100%	0 (0.0%)	0 (0.0%)	2 (1.1%)	0 (0.0%)	4 (2.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (0.5%)	0 (0.0%)	0 (0.0%)
Average	*8 (3.5%)*	*8 (3.4%)*	*7 (2.9%)*	*5 (1.9%)*	*5 (1.8%)*	*4 (1.4%)*	*4 (1.4%)*	*5 (1.7%)*	*4 (1.4%)*	*4 (1.5%)*	*6 (2.4%)*	*8 (3.4%)*
BEAR RIVER FLOW BELOW CAMP FAR WEST RESERVOIR FLOW (RM 12.6) (cfs)												
0%	0 (0.0%)	4 (0.0%)	6 (0.0%)	4 (0.0%)	11 (0.0%)	9 (0.1%)	6 (0.1%)	0 (0.0%)	-20 (-1.6%)	-2 (-0.3%)	0 (0.0%)	0 (0.0%)
10%	2 (1.9%)	0 (0.0%)	0 (0.0%)	-33 (-2.2%)	2 (0.1%)	-8 (-0.3%)	-10 (-0.6%)	-9 (-0.8%)	-2 (-0.3%)	0 (0.0%)	1 (0.2%)	9 (3.2%)
50%	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	-61 (-12.0%)	-2 (-0.4%)	-7 (-1.4%)	1 (0.2%)	2 (0.4%)	5 (1.2%)	4 (3.6%)
90%	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	13 (10.6%)	5 (3.5%)	38 (28.6%)	28 (22.4%)	14 (63.6%)
100%	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	23 (460.0%)	0 (0.0%)
Average	*4 (9.8%)*	*0 (0.0%)*	*-7 (-1.9%)*	*-5 (-1.0%)*	*-12 (-1.5%)*	*-14 (-1.5%)*	*-3 (-0.4%)*	*4 (0.7%)*	*5 (1.2%)*	*8 (2.0%)*	*9 (2.5%)*	*7 (5.2%)*
DIVERSION INTO CFWID NORTH CANAL (cfs)												
0%	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
10%	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)

Table 3.3.2-22. (continued)

Value	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
DIVERSION INTO CFWID NORTH CANAL (cfs) (continued)												
50%	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
90%	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
100%	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	11 (0.0%)	0 (0.0%)
Average	*0 (0.0%)*	*0 (0.0%)*	*0 (0.0%)*	*0 (0.0%)*	*0 (0.0%)*	*0 (0.0%)*	*0 (0.0%)*	*0 (0.0%)*	*0 (0.0%)*	*0 (0.0%)*	*0 (0.0%)*	*0 (0.0%)*
DIVERSION INTO CFWID SOUTH CANAL (cfs)												
0%	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
10%	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
50%	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
90%	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
100%	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	7 (0.0%)	0 (0.0%)
Average	*0 (0.0%)*	*0 (0.0%)*	*0 (0.0%)*	*0 (0.0%)*	*0 (0.0%)*	*0 (0.0%)*	*0 (0.0%)*	*0 (0.0%)*	*0 (0.0%)*	*0 (0.0%)*	*0 (0.0%)*	*0 (0.0%)*
DIVERSION INTO SSWD MAIN CANAL (cfs)												
0%	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
10%	2 (2.3%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	2 (1.1%)	0 (0.0%)	2 (0.5%)	0 (0.0%)	0 (0.0%)	1 (0.4%)
50%	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (10.0%)	11 (3.7%)	10 (2.8%)	2 (0.5%)	11 (3.0%)	5 (6.0%)
90%	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	12 (19.0%)	6 (8.6%)	6 (8.6%)	6 (9.0%)	14 (0.0%)
100%	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Average	*4 (16.7%)*	*0 (0.0%)*	*0 (0.0%)*	*0 (0.0%)*	*0 (0.0%)*	*0 (0.0%)*	*1 (1.9%)*	*6 (2.3%)*	*6 (2.0%)*	*8 (2.5%)*	*7 (2.3%)*	*7 (6.6%)*
BEAR RIVER BELOW THE NON-PROJECT DIVERSION DAM (RM 16.9) (cfs)												
0%	0 (0.0%)	4 (0.0%)	6 (0.0%)	4 (0.0%)	11 (0.0%)	9 (0.1%)	6 (0.1%)	0 (0.0%)	-15 (-1.8%)	-2 (-1.0%)	0 (0.0%)	0 (0.0%)
10%	0 (0.0%)	0 (0.0%)	0 (0.0%)	-33 (-2.2%)	1 (0.0%)	-7 (-0.3%)	-4 (-0.2%)	20 (2.8%)	-22 (-9.8%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
50%	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	-61 (-12.0%)	34 (8.0%)	2 (2.1%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)

Table 3.3.2-22. (continued)

Value	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
BEAR RIVER BELOW THE NON-PROJECT DIVERSION DAM (RM 16.9) (cfs) (continued)												
90%	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
100%	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	5 (100.0%)	0 (0.0%)
Average	*0 (0.0%)*	*0 (0.0%)*	*-7 (-1.9%)*	*-5 (-1.0%)*	*-13 (-1.6%)*	*-14 (-1.5%)*	*-5 (-0.7%)*	*-3 (-1.1%)*	*-2 (-2.7%)*	*1 (5.6%)*	*2 (9.1%)*	*0 (0.0%)*
BEAR RIVER FLOW AT WHEATLAND (RM 11.5) (cfs)												
0%	0 (0.0%)	5 (0.1%)	5 (0.0%)	4 (0.0%)	11 (0.0%)	9 (0.1%)	6 (0.1%)	0 (0.0%)	-15 (-1.8%)	-2 (-0.9%)	0 (0.0%)	0 (0.0%)
10%	0 (0.0%)	0 (0.0%)	0 (0.0%)	-33 (-2.2%)	2 (0.1%)	-7 (-0.3%)	-3 (-0.2%)	20 (2.7%)	-21 (-9.1%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
50%	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	-61 (-11.9%)	34 (7.9%)	2 (2.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
90%	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
100%	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	5 (41.7%)	0 (0.0%)
Average	*0 (0.0%)*	*0 (0.0%)*	*-7 (-1.9%)*	*-5 (-1.0%)*	*-13 (-1.6%)*	*-13 (-1.4%)*	*-6 (-0.9%)*	*-3 (-1.1%)*	*-2 (-2.5%)*	*0 (0.0%)*	*2 (6.9%)*	*0 (0.0%)*
BEAR RIVER FLOW AT PLEASANT GROVE ROAD (RM 7.1) (cfs)												
0%	0 (0.0%)	5 (0.1%)	5 (0.0%)	4 (0.0%)	11 (0.0%)	9 (0.1%)	6 (0.1%)	0 (0.0%)	-15 (-1.8%)	-2 (-0.9%)	0 (0.0%)	0 (0.0%)
10%	0 (0.0%)	0 (0.0%)	0 (0.0%)	-33 (-2.2%)	2 (0.1%)	-7 (-0.3%)	-3 (-0.2%)	20 (2.7%)	-21 (-9.1%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
50%	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	-61 (-11.9%)	34 (7.9%)	2 (2.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
90%	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
100%	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	5 (41.7%)	0 (0.0%)
Average	*0 (0.0%)*	*0 (0.0%)*	*-7 (-1.9%)*	*-5 (-1.0%)*	*-13 (-1.6%)*	*-13 (-1.4%)*	*-6 (-0.9%)*	*-3 (-1.1%)*	*-2 (-2.5%)*	*0 (0.0%)*	*2 (6.9%)*	*0 (0.0%)*
BEAR RIVER FLOW AT FEATHER RIVER CONFLUENCE (RM 0.0) (cfs)												
0%	0 (0.0%)	4 (0.0%)	5 (0.0%)	4 (0.0%)	10 (0.0%)	8 (0.1%)	9 (0.1%)	3 (0.1%)	-15 (-1.7%)	-2 (-0.9%)	0 (0.0%)	0 (0.0%)
10%	0 (0.0%)	0 (0.0%)	13 (1.5%)	-47 (-2.7%)	-1 (0.0%)	-13 (-0.5%)	-44 (-2.5%)	9 (1.2%)	-14 (-6.1%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
50%	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	3 (2.7%)	-20 (-3.6%)	17 (3.6%)	1 (0.9%)	-1 (-2.9%)	0 (0.0%)	1 (5.6%)	0 (0.0%)
90%	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
100%	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (3.2%)	0 (0.0%)	0 (0.0%)	5 (41.7%)	0 (0.0%)

Table 3.3.2-22. (continued)

Value	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
BEAR RIVER FLOW AT FEATHER RIVER CONFLUENCE (RM 0.0) (cfs) (continued)												
Average	*0 (0.0%)*	*0 (0.0%)*	*-7 (-1.5%)*	*-4 (-0.6%)*	*-13 (-1.3%)*	*-14 (-1.4%)*	*-5 (-0.7%)*	*-3 (-1.0%)*	*-2 (-2.4%)*	*1 (3.8%)*	*2 (6.7%)*	*0 (0.0%)*

Water Supply

Under SSWD's proposed Project (Near-Term), irrigation deliveries to SSWD customers would increase relative to the No Action Alternative. Average annual water supply deliveries increased by 2,500 ac-ft per year, ranging from an increase of 4.400 ac-ft in Below Normal and Dry WYs to 400 ac-ft in Wet WYs. A comparison of existing irrigation deliveries under the No Action Alternative and SSWD's proposed Project (Near-Term) is presented in Figure 3.3.2-39.

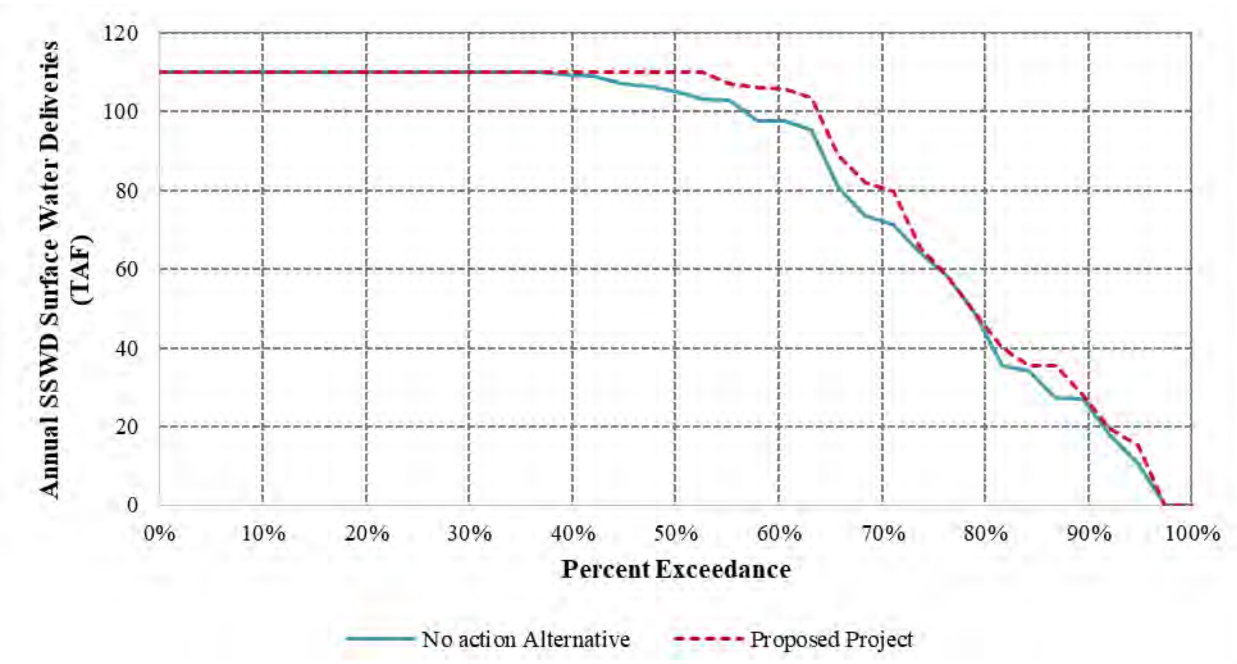

Figure 3.3.2-39. Exceedance curves of modeled annual irrigation deliveries to SSWD and CFWID customers for the No Action and SSWD's proposed Project alternatives for WYs 1970 through 2010.

Water Rights

Under SSWD's proposed Project, there would be no effect on flows downstream from the Project, as compared to the No Action Alternative, as shown in Table 3.3.2-22. As a result, there are not expected to be any effects on water rights holders either downstream or within the Project Area.

Effects on Water Quality

Camp Far West Reservoir

SSWD's proposed Project would have very little effect on water quality in Camp Far West Reservoir. Considering that the Pool Raise would increase water surface elevations and overall storage, some water quality parameters may decrease as constituents (i.e., metals, nutrients) are further diluted by the increase in water. Regarding DO, this reservoir change would not substantially alter the size or stability of the epilimnion or hypolimnion. The current DO conditions will be expected to continue to occur with SSWD's proposed Project; however, the proposed Project is not expected to cause DO concentrations to be lower than under existing conditions.

Under existing conditions, reservoir water temperatures typically exceed 20°C during May through September, at depths of up to 50 ft below the Camp Far West Reservoir surface (2015-2017, Figure 3.3.2-16). Reservoir release temperatures through the powerhouse intake regularly exceed 20°C beginning in late July and continue to exceed 20°C through the end of the irrigation season, typically in mid-October, or until reservoir water levels are too low to run water through the powerhouse (Figure 3.3.2-19). A small coldwater pool is accessible to the low-level outlet that is not accessible to the powerhouse intake, but it is typically exhausted in a few weeks (Figure 3.3.2-19).

Under SSWD's proposed Project, the Pool Raise provides additional storage in Camp Far West Reservoir to capture addition relatively cool runoff from winter storms. Table 3.3.2-23 depicts thermal conditions in Camp Far West Reservoir under the No Action Alternative and SSWD's proposed Project. There is a small increase in usable cold water as a result of the Pool Raise.

Table 3.3.2-23. Average usable storage in Camp Far West Reservoir at the 10°C and 15°C isotherms for the modeled period of record (WYs 1976 through 2014) based on Operations Model and Temperature Model results.

Operations Scenario	Average Usable Storage below 15°C Isotherm (ac-ft)		Average Usable Storage below 10°C Isotherm (ac-ft)	
	July 1	October 15	July 1	October 15
No Action Alternative	2,588	153	77	18
Proposed Project Alternative (Near-Term)	4,539	772	450	79

Figure 3.3.2-40 presents results of the proposed Project water temperature model run compared to the No Action Alternative for the Bear River below Camp Far West Reservoir. Table 3.3.2-24 presents a comparison of simulated monthly water temperatures for the same location. Simulated mean daily Camp Far West Reservoir release temperatures can exceed 20°C in August through October under both the No Action Alternative and Proposed Project Alternative (Near-Term) conditions (Table 3.3.2-24).

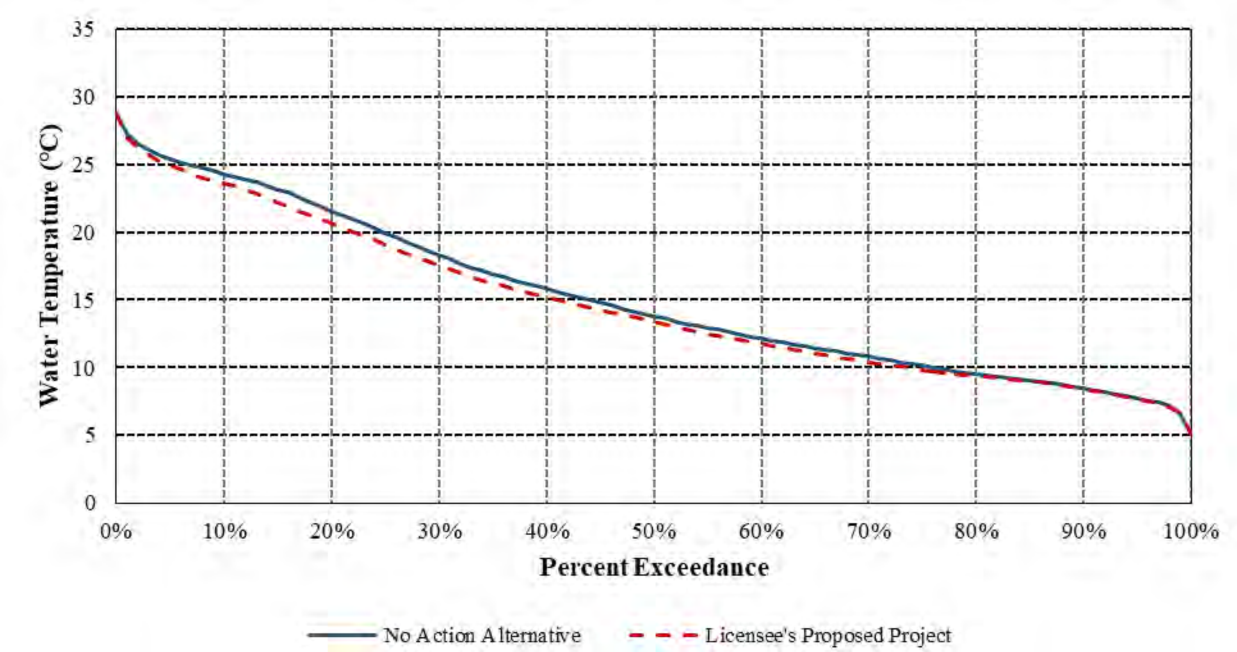

Figure 3.3.2-40. Exceedance curves of modeled mean daily water temperatures in the Bear River downstream of Camp Far West Reservoir for the No Action Alternative and Proposed Project Alternative (Near-Term) for WYs 1976 through 2014.

Table 3.3.2-24. Comparison of simulated mean monthly Camp Far West Reservoir release water temperatures for the No Action Alternative and Proposed Project Alternative (Near-Term) for WYs 1976 through 2014.

Month	No Action Alternative			Proposed Project Alternative (Near-Term)			Change		
	Min (°C)	Mean (°C)	Max (°C)	Min (°C)	Mean (°C)	Max (°C)	Min (°C)	Mean (°C)	Max (°C)
October	13.6	20.5	25.9	13.6	20.8	25.8	0.0	0.3	-0.1
November	8.7	15.2	21.3	8.9	15.5	21.3	0.2	0.3	0.0
December	5.5	10.2	15.6	5.5	10.4	15.8	0.0	0.2	0.2
January	5.1	8.1	11.1	5.1	8.2	11.5	0.0	0.1	0.4
February	6.0	9.0	15.6	6.2	8.9	15.9	0.2	-0.1	0.3
March	6.4	10.5	18.1	6.2	10.3	17.8	-0.2	-0.2	-0.3
April	6.6	12.0	21.1	6.7	11.6	21.1	0.1	-0.4	0.0
May	8.1	13.5	23.9	5.7	12.7	23.9	-2.4	-0.8	0.0
June	9.9	15.3	28.6	6.1	14.1	28.6	-3.8	-1.2	0.0
July	10.8	18.8	28.6	8.9	17.1	28.7	-1.9	-1.7	0.1
August	17.5	24.0	28.8	15.0	22.2	28.8	-2.5	-1.8	0.0
September	19.6	24.5	28.3	18.7	24.2	28.0	-0.9	-0.3	-0.3

<u>Bear River</u>

The proposed Project will have minimal effects to water quality in the Bear River downstream of the Project. In SSWD's proposed Condition WR1, minimum flows in the Bear River below the non-Project diversion dam would not change. Proposed minimum flows are 25 cfs from April through June, and 10 cfs the remainder of the year, which are the same as the No Action Alternative. Given the minor changes in flows (3.3.3-33 through 3.3.3-35) between the current and proposed Project, SSWD does not expect any changes to water quality downstream. As discussed above, water quality downstream of the Project usually meets or exceeds Basin Plan Objectives.

Figures 3.3.2-41 through 3.3.2-49 show simulated water temperatures along the Bear River downstream of the non-Project diversion dam, for three representative WYs. Figures 3.3.2-41, 3.3.2-44, and 3.3.2-47 show water temperatures increasing from upstream to downstream, particularly in the spring and summer. In the summer months, proposed Project water temperatures were slightly cooler during the No Action Alternative in the Bear River immediately downstream of the non-Project diversion dam (Figures 3.3.2-41, 3.3.2-44, and 3.3.2-47). By Highway 65, there was very little difference between the No Action Alternative and proposed Project water temperatures. Similarly, there was little difference between the No Action Alternative and proposed Project water temperatures at Pleasant Grove Bridge (Figure 3.3.2-42, 3.3.2-45, 3.3.2-48), or at Highway 70 (Figure 3.3.2-43, 3.3.2-46, 3.3.2-49).

Figure 3.3.2-41. Simulated daily water temperatures for a representative wet WY (1995) at various locations in the Bear River downstream of the non-Project diversion dam.

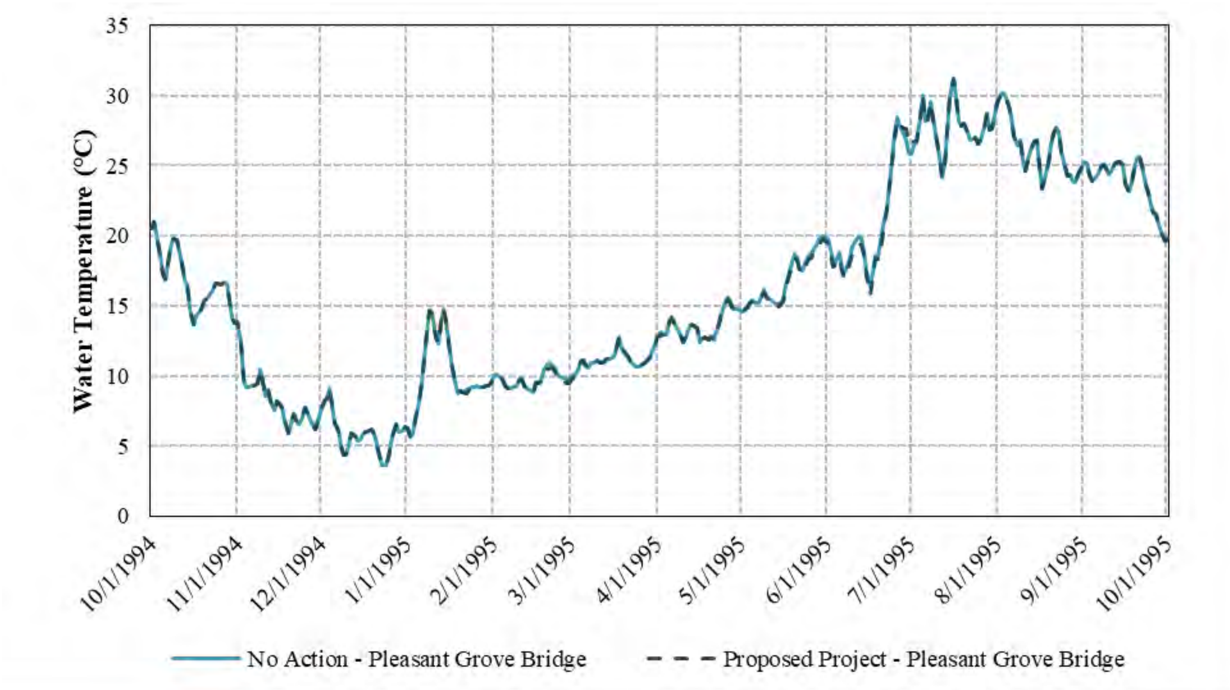

Figure 3.3.2-42. Simulated daily water temperatures for a representative wet WY (1995) at Pleasant Grove Bridge in the Bear River downstream of the non-Project diversion dam.

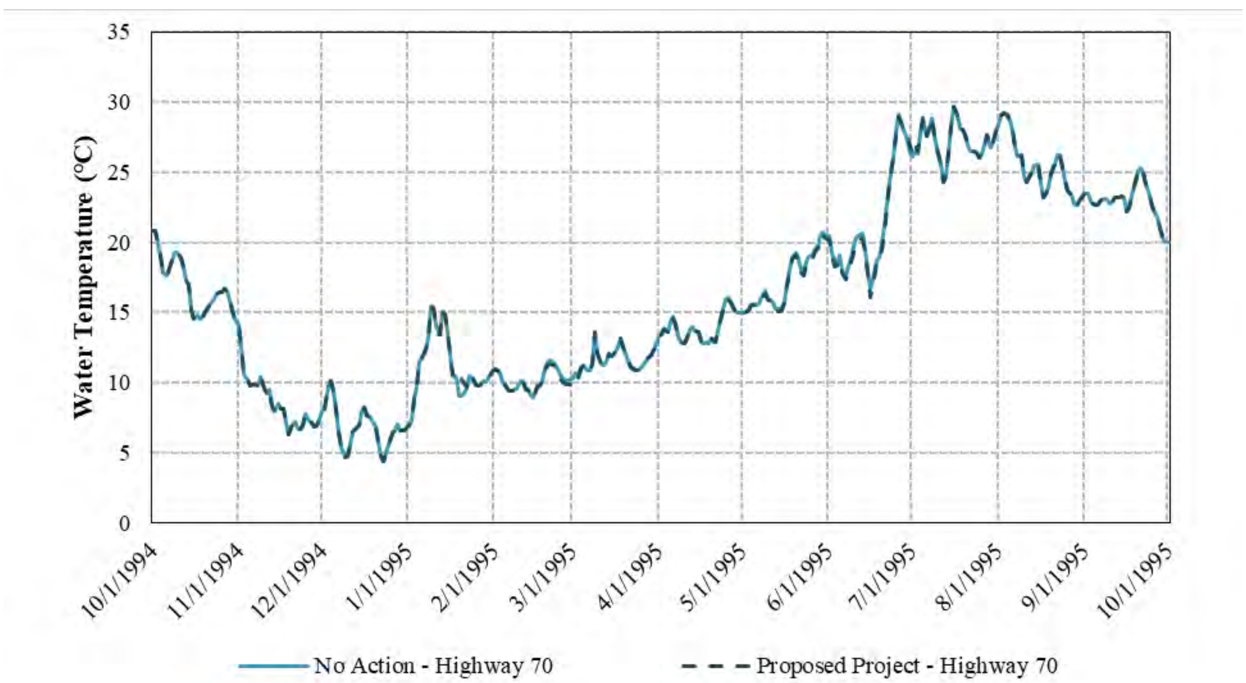

Figure 3.3.2-43. Simulated daily water temperatures for a representative wet WY (1995) at Highway 70 in the Bear River downstream of the non-Project diversion dam.

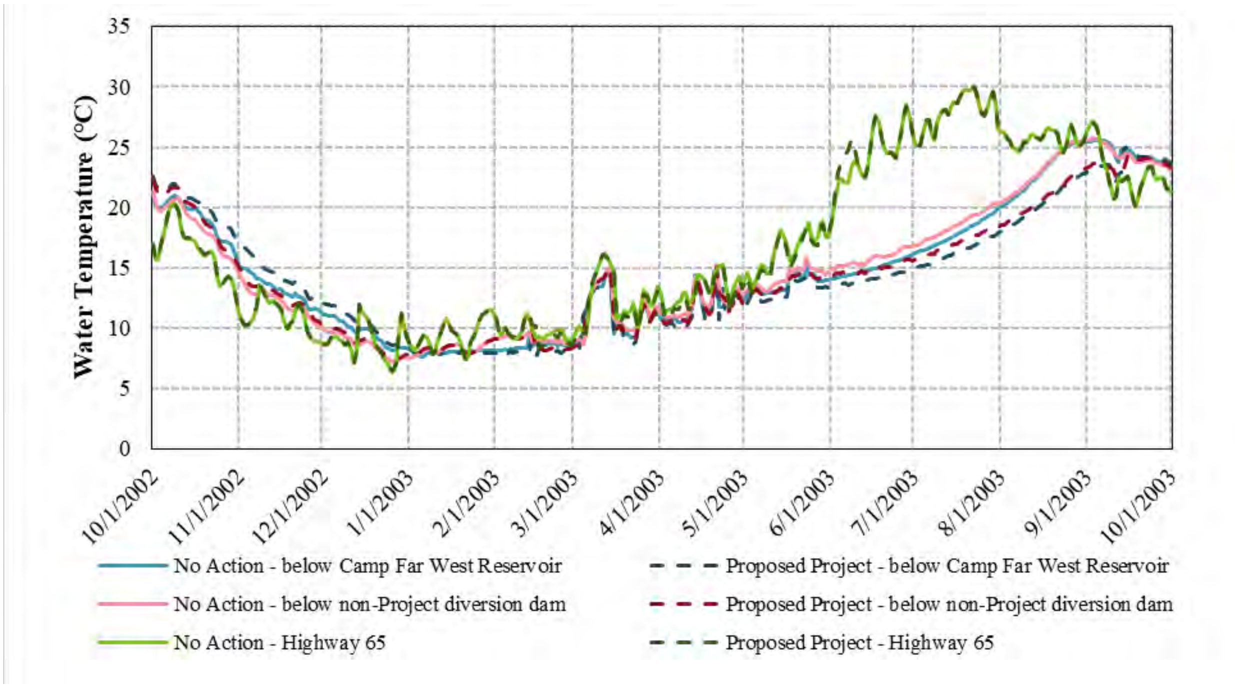

Figure 3.3.2-44. Simulated daily water temperatures for a representative normal WY (2003) at various locations in the Bear River downstream of the non-Project diversion dam.

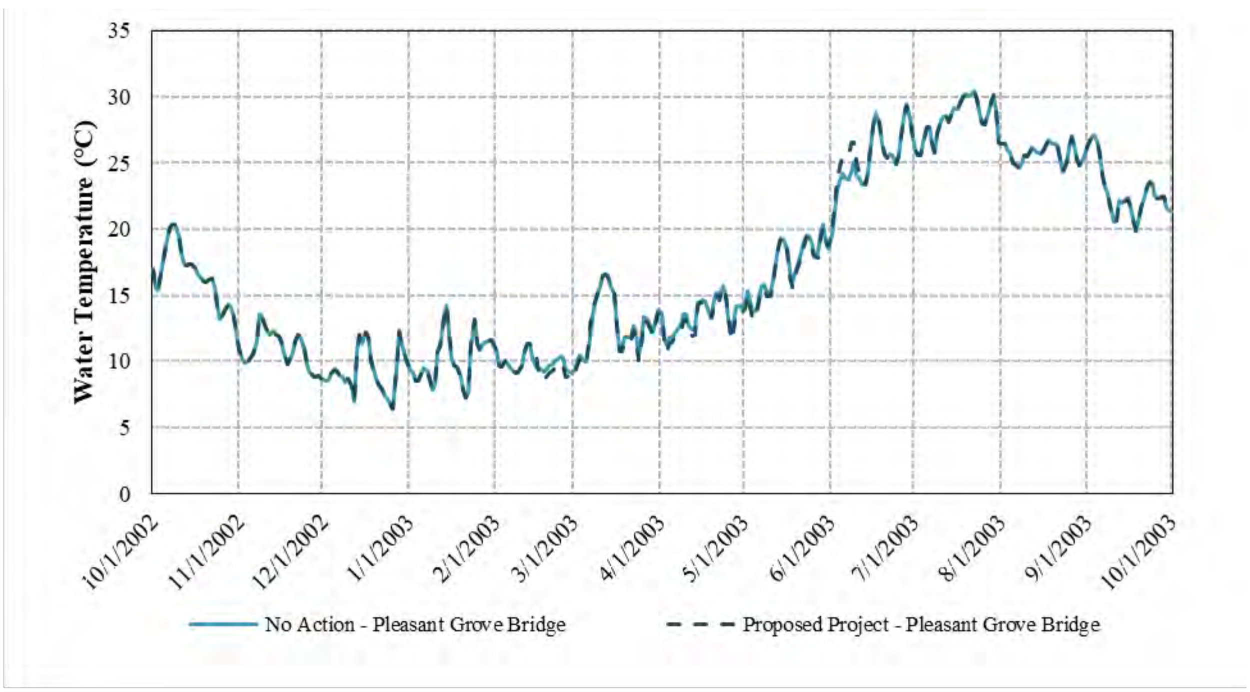

Figure 3.3.2-45. Simulated daily water temperatures for a representative normal WY (2003) at Pleasant Grove Bridge in the Bear River downstream of the non-Project diversion dam.

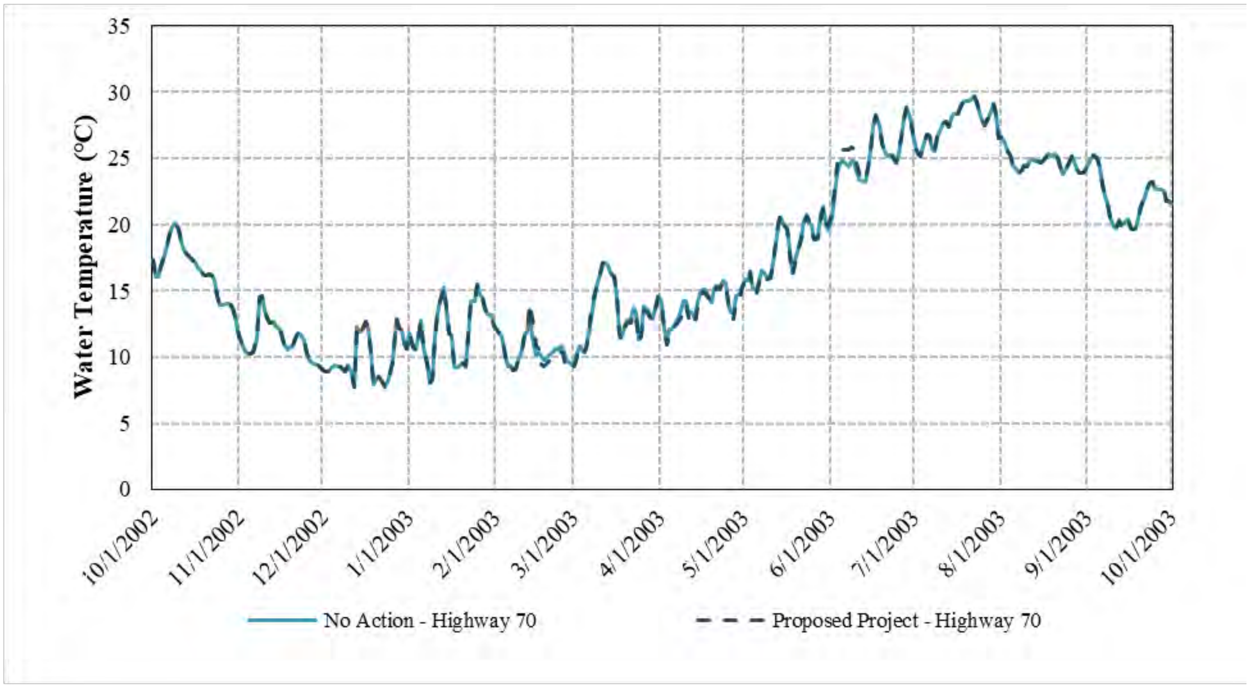

Figure 3.3.2-46. Simulated daily water temperatures for a representative normal WY (2003) at Highway 70 in the Bear River downstream of the non-Project diversion dam.

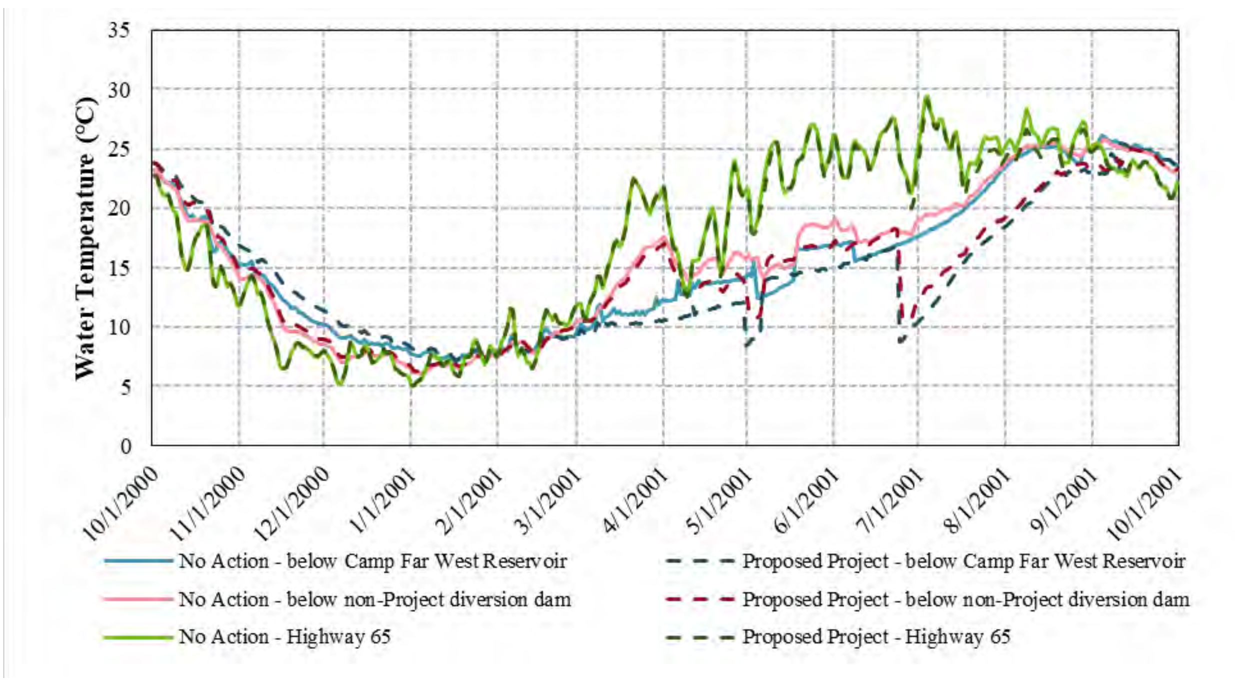

Figure 3.3.2-47. Simulated daily water temperatures for a representative dry WY (2001) at various locations in the Bear River downstream of the non-Project diversion dam.

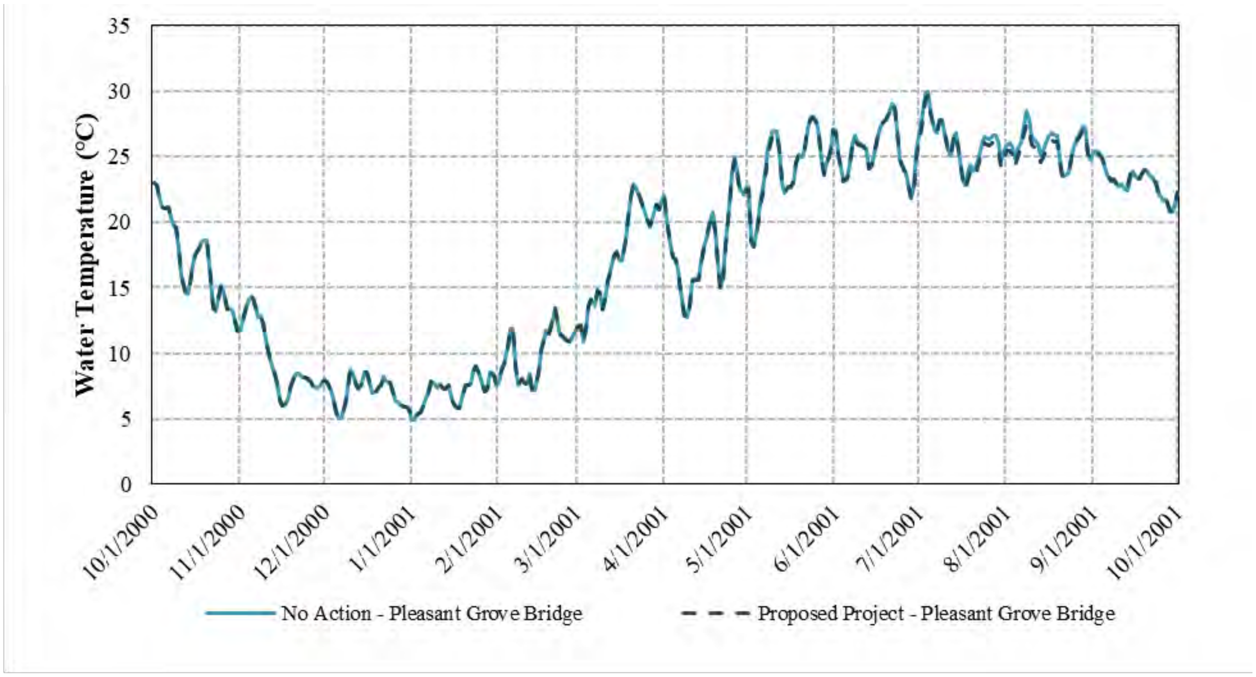

Figure 3.3.2-48. Simulated daily water temperatures for a representative dry WY (2001) at Pleasant Grove Bridge in the Bear River downstream of the non-Project diversion dam.

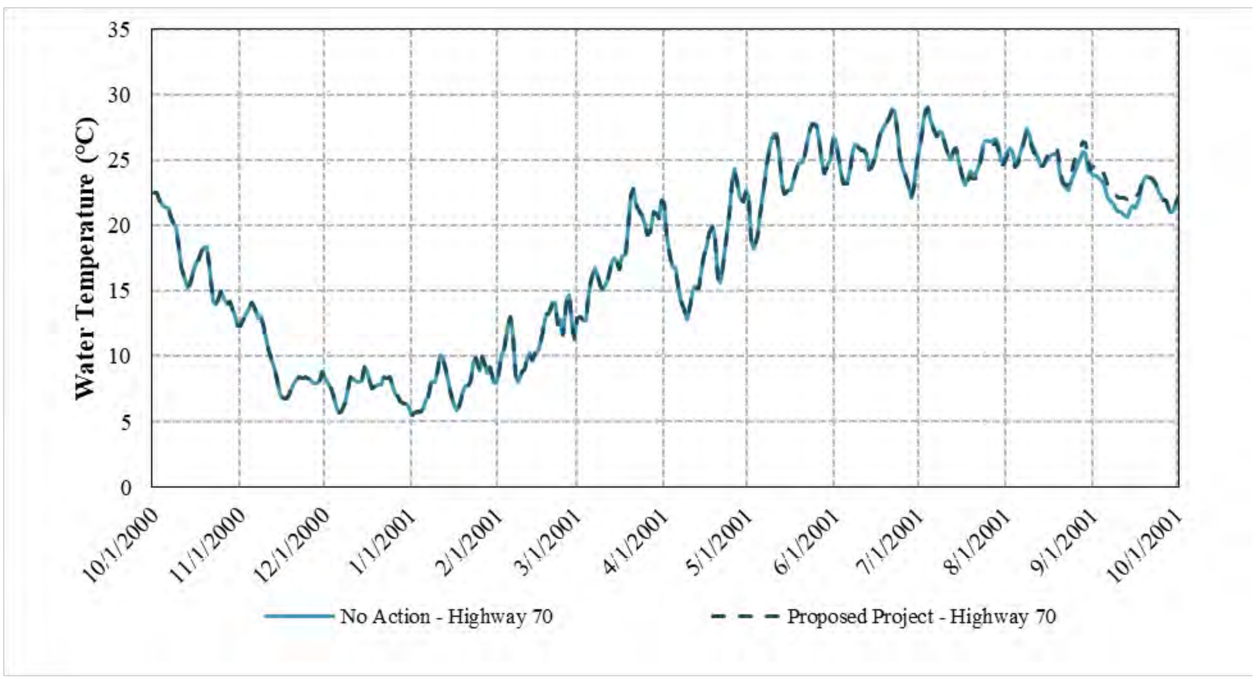

Figure 3.3.2-49. Simulated daily water temperatures for a representative dry WY (2001) at Highway 70 in the Bear River downstream of the non-Project diversion dam.

In the following sections, simulated water temperatures in the Bear River downstream of Camp Far West Reservoir are statistically presented for the full period of record (WYs 1976 through 2014). Temp Model results are presented only as far downstream as Highway 70 because of backwater effects from the Feather River that are not represented in the Temp Model.

Bear River below the Non-Project Diversion Dam

Figure 3.3.2-50 presents exceedance curves of mean daily water temperatures for the proposed Project water temperature model run compared to the No Action Alternative for the Bear River downstream of the non-Project diversion dam. Table 3.3.2-25 presents a comparison of simulated monthly water temperatures for the same location.

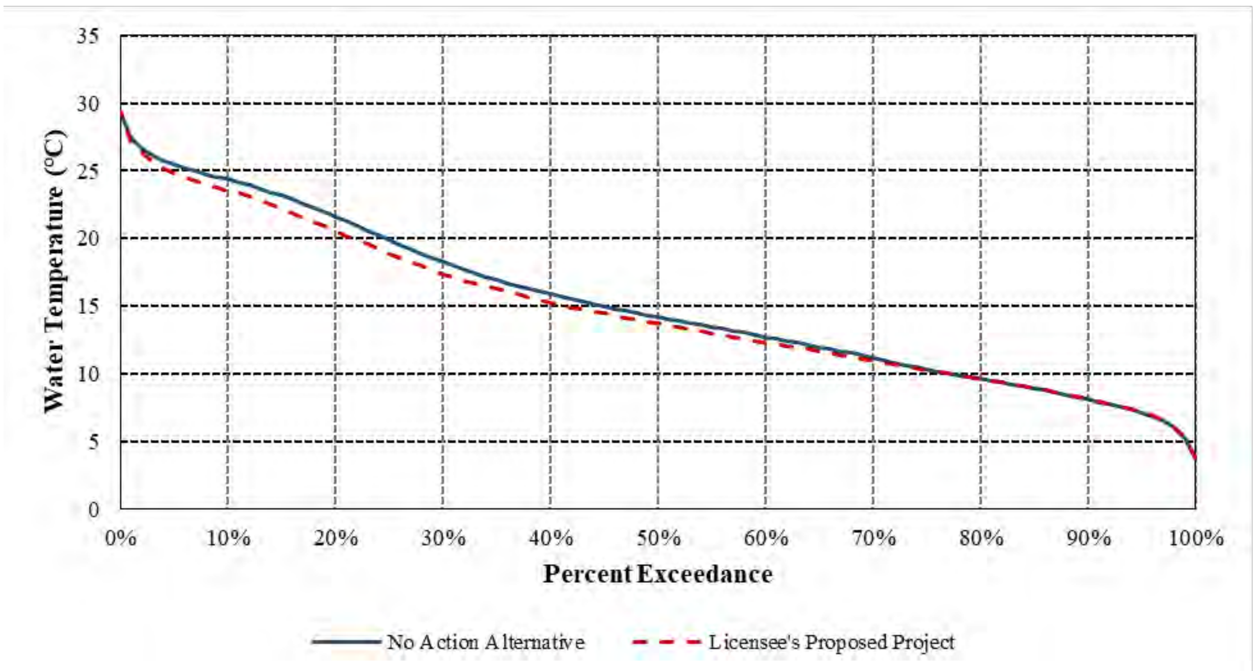

Figure 3.3.2-50. Exceedance curves of modeled mean daily water temperatures in the Bear River downstream of the non-Project diversion dam for the No Action Alternative and Proposed Project Alternative (Near-Term) for WYs 1976 through 2014.

Table 3.3.2-25. Comparison of simulated mean monthly water temperatures in the Bear River downstream of the non-Project diversion dam for the No Action Alternative and Proposed Project Alternative (Near-Term) for WYs 1976 through 2014.

Month	No Action Alternative			Proposed Project Alternative (Near-Term)			Change		
	Min (°C)	Mean (°C)	Max (°C)	Min (°C)	Mean (°C)	Max (°C)	Min (°C)	Mean (°C)	Max (°C)
October	13.5	19.9	25.5	13.9	20.1	25.6	0.4	0.2	0.1
November	7.2	13.5	19.5	7.5	13.6	19.5	0.3	0.1	0.0
December	3.8	8.5	13.4	3.8	8.6	13.4	0.0	0.1	0.0
January	4.0	7.5	11.2	4.0	7.5	11.1	0.0	0.0	-0.1
February	5.3	9.6	14.9	5.3	9.6	14.5	0.0	0.0	-0.4

Table 3.3.2.-25. (continued)

Month	No Action Alternative			Proposed Project Alternative (Near-Term)			Change		
	Min (°C)	Mean (°C)	Max (°C)	Min (°C)	Mean (°C)	Max (°C)	Min (°C)	Mean (°C)	Max (°C)
March	7.2	11.8	18.3	7.4	11.7	18.2	0.2	-0.1	-0.1
April	7.6	13.0	21.0	7.8	12.7	21.0	0.2	-0.3	0.0
May	9.0	14.3	24.5	8.6	13.5	24.5	-0.4	-0.8	0.0
June	11.0	16.2	29.2	9.2	15.1	29.2	-1.8	-1.1	0.0
July	12.1	19.5	29.3	10.2	17.9	29.3	-1.9	-1.6	0.0
August	17.8	24.2	28.9	16.0	22.5	29.0	-1.8	-1.7	0.1
September	20.0	24.4	28.4	20.4	24.2	28.0	0.4	-0.2	-0.4

Bear River at Highway 65 (Wheatland)

Figure 3.3.2-51 presents exceedance curves of mean daily water temperatures for the Proposed Project Alternative (Near-Term) water temperature model run compared to the No Action Alternative for the Bear River at Highway 65. Table 3.3.2-26 presents a comparison of simulated monthly water temperatures for the same location.

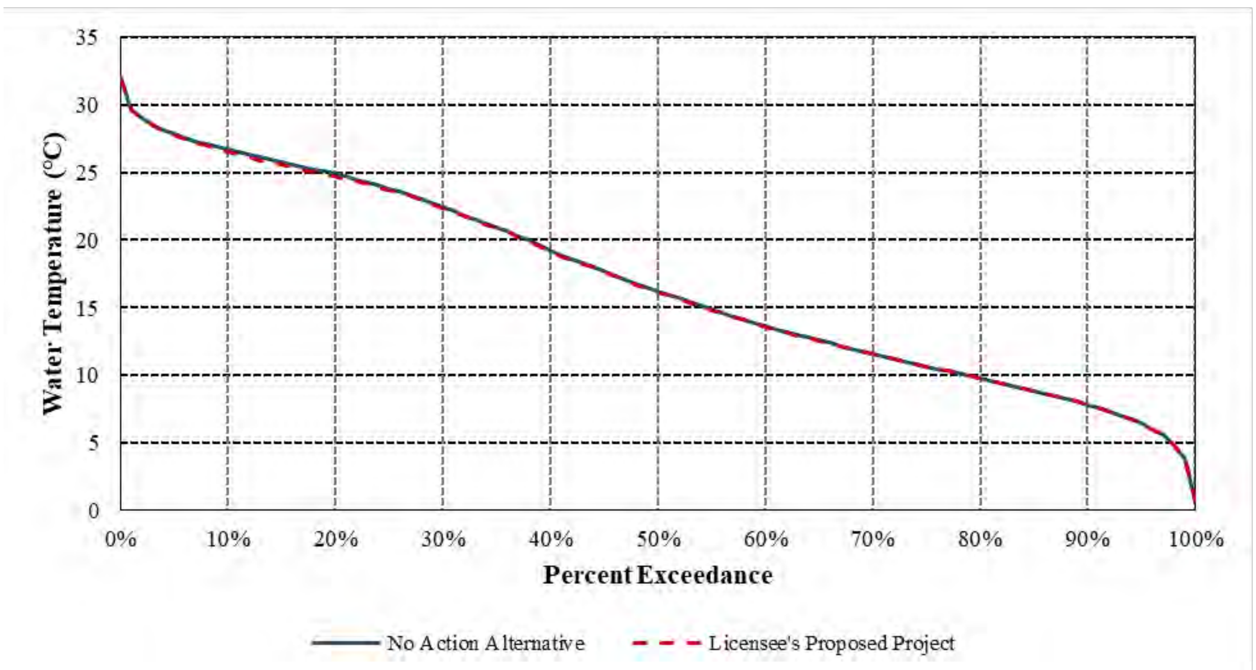

Figure 3.3.2-51. Exceedance curves of modeled mean daily water temperatures in the Bear River at Highway 65 for the No Action Alternative and Proposed Project Alternative for WYs 1976 through 2014.

Table 3.3.2-26. Comparison of simulated mean monthly water temperatures in the Bear River at Highway 65 for the No Action Alternative and Proposed Project Alternative (Near-Term) for WYs 1976 through 2014.

Month	No Action Alternative			Proposed Project Alternative (Near-Term)			Change		
	Min (°C)	Mean (°C)	Max (°C)	Min (°C)	Mean (°C)	Max (°C)	Min (°C)	Mean (°C)	Max (°C)
October	10.5	17.8	24.6	10.5	17.8	24.6	0.0	0.0	0.0
November	4.0	11.5	17.6	4.1	11.5	17.6	0.1	0.0	0.0
December	0.7	7.4	15.0	0.7	7.5	15.0	0.0	0.1	0.0
January	1.9	7.8	14.8	1.9	7.8	14.8	0.0	0.0	0.0
February	3.4	10.6	18.2	3.4	10.6	18.2	0.0	0.0	0.0
March	8.2	13.1	22.5	8.1	13.1	22.5	-0.1	0.0	0.0
April	9.2	15.3	24.1	8.6	15.2	24.1	-0.6	-0.1	0.0
May	12.3	19.0	27.4	12.1	18.9	27.3	-0.2	-0.1	-0.1
June	14.7	23.8	30.6	14.3	23.6	30.6	-0.4	-0.2	0.0
July	20.0	27.1	32.1	20.0	26.9	32.0	0.0	-0.2	-0.1
August	20.9	26.2	31.3	20.9	26.0	31.2	0.0	-0.2	-0.1
September	15.8	23.2	29.4	15.8	23.2	29.4	0.0	0.0	0.0

Bear River at Pleasant Grove Road

Figure 3.3.2-52 presents exceedance curves of mean daily water temperatures for the Proposed Project Alternative (Near-Term) water temperature model run compared to the No Action Alternative for the Bear River at Pleasant Grove Road. Table 3.3.2-27 presents a comparison of simulated monthly water temperatures for the same location.

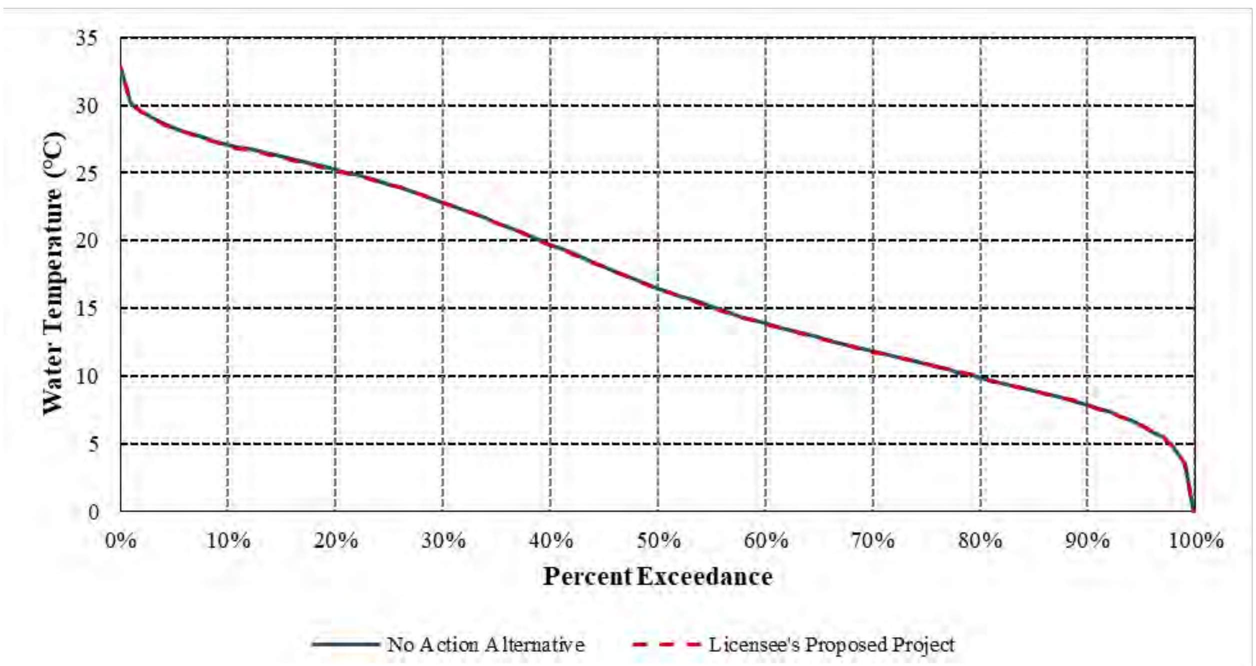

Figure 3.3.2-52. Exceedance curves of modeled mean daily water temperatures in the Bear River at Pleasant Grove Road for the No Action Alternative and Proposed Project Alternative for WYs 1976 through 2014.

Table 3.3.2-27. Comparison of simulated mean monthly water temperatures in the Bear River at Pleasant Grove Road for the No Action Alternative and Proposed Project Alternative (Near-Term) for WYs 1976 through 2014.

Month	No Action Alternative			Proposed Project Alternative (Near-Term)			Change		
	Min (°C)	Mean (°C)	Max (°C)	Min (°C)	Mean (°C)	Max (°C)	Min (°C)	Mean (°C)	Max (°C)
October	10.1	17.7	24.7	10.1	17.7	24.7	0.0	0.0	0.0
November	3.6	11.4	17.7	3.6	11.4	17.7	0.0	0.0	0.0
December	-0.8	7.4	16.2	-0.8	7.4	16.2	0.0	0.0	0.0
January	1.2	7.9	16.0	1.2	7.9	16.1	0.0	0.0	0.1
February	3.0	10.9	18.5	3.0	10.9	18.5	0.0	0.0	0.0
March	8.0	13.3	22.9	8.0	13.4	22.9	0.0	0.1	0.0
April	9.9	15.8	25.4	9.6	15.7	25.3	-0.3	-0.1	-0.1
May	12.5	20.0	28.7	12.4	19.9	28.7	-0.1	-0.1	0.0
June	15.5	24.7	31.2	15.2	24.6	31.2	-0.3	-0.1	0.0
July	20.7	27.6	32.8	20.4	27.5	32.8	-0.3	-0.1	0.0
August	20.9	26.3	31.5	20.9	26.2	31.5	0.0	-0.1	0.0
September	15.4	23.1	29.4	15.4	23.1	29.4	0.0	0.0	0.0

Bear River at Highway 70

Figure 3.3.2-53 presents exceedance curves of mean daily water temperatures for the Proposed Project Alternative (Near-Term) water temperature model run compared to the No Action Alternative for the Bear River at Highway 70. Table 3.3.2-28 presents a comparison of simulated monthly water temperatures for the same location.

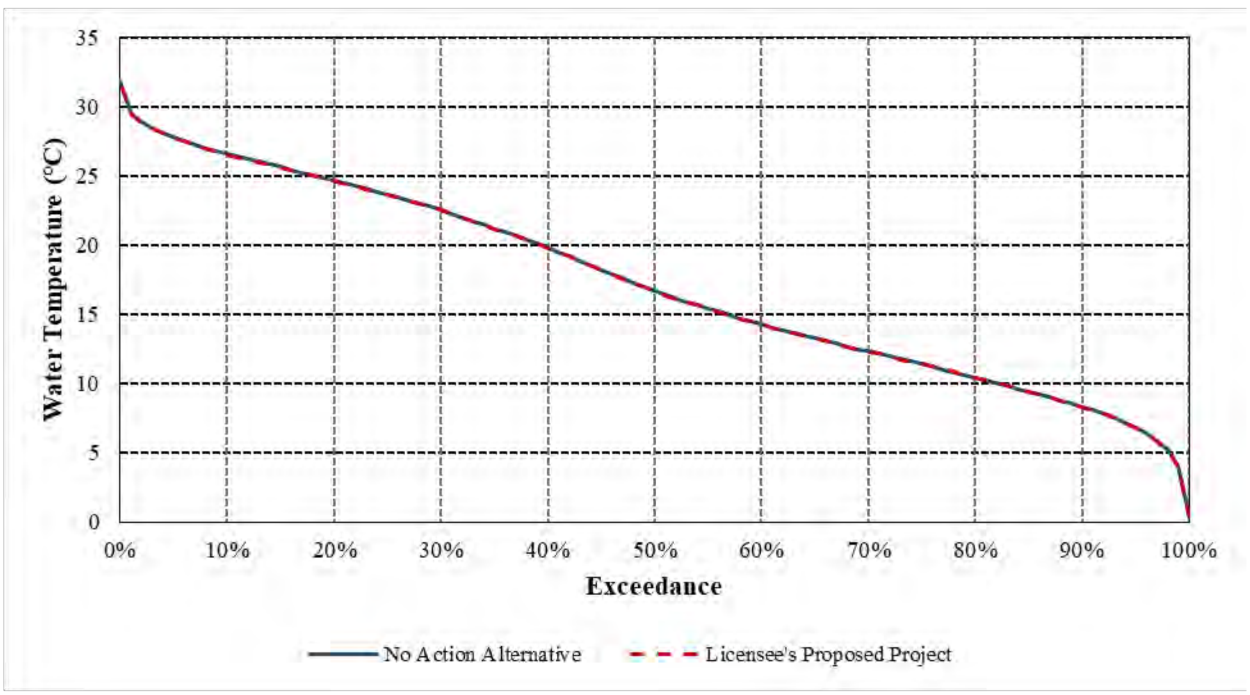

Figure 3.3.2-53. Exceedance curves of modeled mean daily water temperatures in the Bear River at Highway 70 for the No Action Alternative and Proposed Project Alternative for WYs 1976 through 2014.

Table 3.3.2-28. Comparison of simulated mean monthly water temperatures in the Bear River at Highway 70 for the No Action Alternative and Proposed Project Alternative (Near-Term) for WYs 1976 through 2014.

Month	No Action Alternative			Proposed Project Alternative (Near-Term)			Change		
	Min (°C)	Mean (°C)	Max (°C)	Min (°C)	Mean (°C)	Max (°C)	Min (°C)	Mean (°C)	Max (°C)
October	11.0	17.8	24.6	11.0	17.8	24.6	0.0	0.0	0.0
November	3.9	11.6	17.8	3.9	11.6	17.8	0.0	0.0	0.0
December	0.4	7.9	16.9	0.3	7.9	16.9	-0.1	0.0	0.0
January	1.8	8.6	16.6	1.8	8.6	16.6	0.0	0.0	0.0
February	3.8	11.4	18.0	3.8	11.4	18.0	0.0	0.0	0.0
March	8.0	13.6	22.8	8.0	13.7	22.8	0.0	0.1	0.0
April	10.4	16.0	25.1	10.2	15.9	25.1	-0.2	-0.1	0.0
May	13.0	20.3	28.4	12.9	20.2	28.4	-0.1	-0.1	0.0
June	15.9	24.6	30.3	15.6	24.6	30.3	-0.3	0.0	0.0
July	21.1	27.1	31.9	20.6	27.1	31.9	-0.5	0.0	0.0
August	20.4	25.5	30.5	20.4	25.5	30.5	0.0	0.0	0.0
September	16.4	22.4	27.9	16.4	22.4	27.9	0.0	0.0	0.0

Effects on CWA Section 303(d) Constituent

Mercury

As pointed out above, based on data collected before 2012, the SWRCB identified the lower Bear River as CWA Section 303(d) State Impaired for mercury, citing fish tissue concentrations, water samples, and sediment samples to support their listing (SWRCB 2018).

SSWD has not and does not plan to perform any Project O&M activities associated with the release or mobilization of mercury. In fact, the range of mercury concentrations in the reservoir (near the bottom) was greater than those observed in the lower Bear River.

3.3.2.3 Cumulative Effects

The cumulative effects resulting from past, present, and reasonably foreseeable future actions, including the proposed Project, have the potential to affect water quantity and water quality in Camp Far West Reservoir and the lower Bear River. As described in Section 3.3.2 of this Exhibit E, these activities include timber harvesting, livestock grazing, mining, and operation of upstream and downstream water projects.

Discussed below are the cumulative effects on water quantity and water quality of the proposed Project in combination with these past, present and future actions from the NMWSE of Camp Far West Reservoir downstream in the Bear River to the Bear River's confluence with the Feather River.

3.3.2.3.1 Cumulative Effects on Water Quantity

Upstream water projects in the Bear River, described in Section 3.1.2.1 and 3.1.2.5, control inflow into the Project. These upstream projects have recently submitted applications for renewal of their FERC licenses; the issuance of renewed licenses, along with projected increases in upstream water demands by NID and PCWA will likely result in substantial changes to inflow to the Project from the Bear River. Changes in inflow into Camp Far West Reservoir are projected to decrease by approximately 28,500 ac-ft per year by 2062, a 9 percent reduction relative to near-term average inflow. The proposed Project creates additional storage space in Camp Far West Reservoir, which allows the reservoir to compensate for the decrease in available water supply to SSWD caused by reduced reservoir inflow. Section 7.2.2.4 of Exhibit B summarizes the impacts on flows in the lower Bear River under future proposed Project conditions. Modeling results show an annual average decrease in flow below the non-Project diversion dam of 26,400 ac-ft per year. Flow reductions were greatest in WYs that were wetter hydrologically versus an average year due the increased capture of inflow with the Pool Raise.

Water diversions downstream of the Project have a major effect on flow in the lower Bear River. From approximately April 15 through October 15, flows up to 510 cfs are diverted at the non-Project diversion dam to meet downstream agricultural water demands during this period. Figure 3.3.2-54 illustrates the difference in Project releases below Camp Far West Dam and flows in the Bear River downstream of the non-Project diversion dam for the agricultural diversion period under the No Action Alternative and the proposed Project (Near-Term) Alternative. The difference in flow between these two locations is the result of agricultural diversions at the non-Project diversion dam. The Project provides water to CFWID and SSWD, but the Project itself does not include any in-basin or out-of-basin diversions. Diversions downstream of the project will continue with or without the continued operation of the Project.

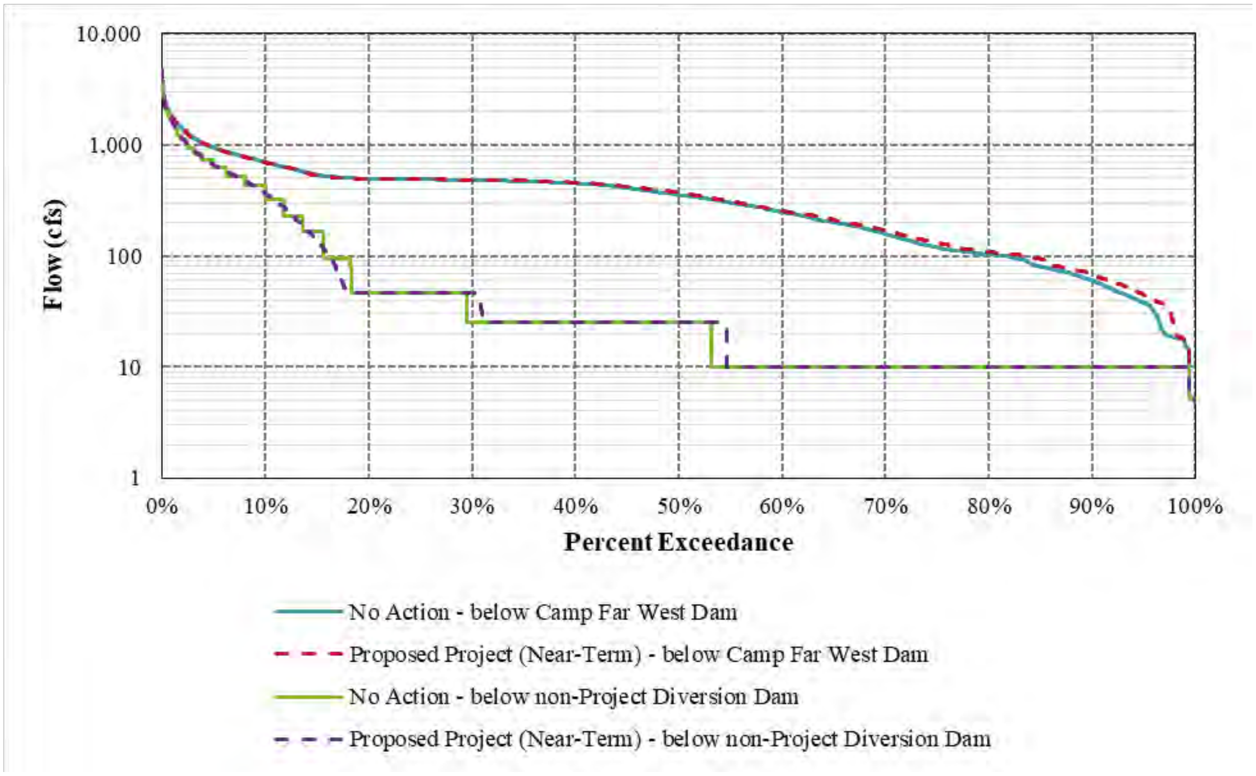

Figure 3.3.2-54. Exceedance curves of modeled mean daily flows below Camp Far West Dam and the non-Project Diversion Dam for the No Action Alternative and Proposed Project Alternative for WYs 1976 through 2014, limited to April 15 through October 15.

In addition to downstream diversions and upstream inflow, the presence of historical mining debris upstream of the Project will impact flows in the lower Bear River. Hydraulic mining debris located in streambeds upstream of the Project are mobilized during high flow events and deposited in Camp Far West Reservoir, resulting in a gradual loss of reservoir storage capacity through time. As storage capacity is lost, the ability of the reservoir to capture inflows during high flow events is reduced. As a a result, Camp Far West Reservoir will spill sooner, and will have less ability to store water for subsequent reservoir releases. While reservoir sedimentation does not effect the quantity of water in the lower Bear River, it does effect the timing and magnitude of river flows. SSWD estimated a loss of approximately 10 percent of storage due to sedimentation based on the results of bathymetry surveys in 1968 and 2008, however some of this difference is likely attributed to advances in survey technology. Additional discussion of sedimentation in Camp Far West Reservoir is provided in Section 3.3.1.1.6 of this Exhibit E.

Timber harvesting and grazing also affect water quantity. Timber harvesting and grazing has occurred historically within the watershed, although it is on the decline. A decrease in timber harvesting would result in less inflow to Camp Far West Reservoir and less flow in the lower Bear River from water uptake by trees located upstream of the Project. Conversely, a decrease in grazing would result in more inflow to Camp Far West Reservoir and more flow in the lower Bear River. Overall, impacts from timber harvesting and grazing are minor.

3.3.2.3.2 Cumulative Effects on Water Quality

Impoundment of water by the Project and upstream water projects, downstream diversions, historical mining, timber harvesting, and grazing each cumulatively affect water quality and water temperature in Camp Far West Reservoir and in the lower Bear River.

Water Quality

Generally, water quality in Camp Far West Reservoir and in the lower Bear River is good and meets Basin Plan Objectives for the majority of constituents. During SSWD's relicensing study one constituent, alkalinity, exceeded the Water Quality Benchmark for samples upstream of Camp Far West Reservoir, in the reservoir, and downstream of Camp Far West Reservoir. Aluminum and iron concentrations exceeded Water Quailty Benchmarks in Camp Far West Reservoir and downstream of the Project. Elevated metals are likely the result of legacy mining that happened throughtout the Bear River watershed. The proposed Project does not have any actions to introduce metals into Camp Far West Reservoir or the lower Bear River. If the proposed Project were removed, trace metals from historic mining would still be present and transported downstream in the Bear River.

The presence of mercury, also a legacy from the long history of mining, has led to concerns regarding mercury concentrations in edible fish (Section 3.3.2.1.2). However, these concerns occur throughout the watershed as they do in most California streams where gold mining occurred, and the potential to bioaccumulate mercury in fish is not exacerbated by the proposed Project. OEHHA, the California agency responsible for advising the public of health concerns, has issued fish ingestion advisories for Camp Far West Reservoir. Further, with the except of rainbow trout, the fish in Camp Far West Reservoir that OEHHA has issued advisories for (e.g. bass and bluegill) are not native and were stock by resource agencies or the public, not SSWD. Mercury concentrations do not exceed the Water Quality Benchmark based on SSWD's study and with the exception of one sample collected near the bottom of Camp Far West Reservoir were similar upstream, within, and downstream of the Project. The proposed Project does not have any actions to introduce mercury into Camp Far West Reservoir or the lower Bear River. If the proposed Project were removed, mercury from historic mining would still be present and transported downstream in the Bear River.

Water Temperature

SSWD's proposed Project, in combination with upstream projects and downstream diversions, affect water temperature in the lower Bear River. As discussed in 3.3.2.3.2, water diversions downstream of the Project have a major effect on flow in the lower Bear River. Consequently, water diversions also have a major effect on water temperature. With less water in the River, water temperature reach ambient equilibrium quicker. Temp Model results showed that ambient conditions are present in the lower Bear River from approximately Highway 65 to the confluence with Dry Creek for much of the year (Figures 3.3.2-31 through 3.3.2-33).

Camp Far West Reservoir releases are cooler in summer months than Bear River inflow temperatures as shown in Figure 3.3.2-54 for a representative wet WY (1995), in Figure 3.3.2-55 for a representative normal WY (2003), and in Figure 3.3.2-56 for a representative dry WY (2001) for the Proposed Project (Near-Term) Alternative. Approximately 5 miles downstream of the non-Project diversion dam, near Highway 65, Bear River water temperatures reach ambient equilibrium and are similar to water temperatures in the Bear River upstream of the Project.

Figure 3.3.2-54. Simulated daily average water temperatures for a representative wet WY (1995) at various locations Bear River downstream of the non-Project diversion dam for the Proposed Project (Near-Term) Alternative.

Figure 3.3.2-55. Simulated daily average water temperatures for a representative normal WY (2003) at various locations Bear River downstream of the non-Project diversion dam for the Proposed Project (Near-Term) Alternative.

Figure 3.3.2-56. Simulated daily average water temperatures for a representative dry WY (2001) at various locations Bear River downstream of the non-Project diversion dam for the Proposed Project (Near-Term) Alternative.

As discussed in Section 3.3.2.3.1, Bear River inflow to Camp Far West Reservoir from upstream projects is projected to decrease because of changes in upstream project operations and increased water demands. Wet season spills from upstream reservoirs will occur less, as upstream reservoirs will capture more of the watershed runoff. This will impact the volume of coldwater in Camp Far West Reservoir in wetter than average hydrologic years. Camp Far West Reservoir release temperatures would also likely increase because the cold water pool will be exhausted that much quicker. With decreased inflow and no change in Camp Far West Reservoir outflow, Camp Far West Reservoir water levels will be lower in drier than normal hyrologic years. As a result, powerhouse releases will be made from a depth that is closer to the water surface, which tends to be warmer than at depths lower in the reservoir, particularly in summer months (Figure 3.3.2-16).

3.3.2.4 Unavoidable Adverse Effects

Operating and maintaining the Project consistent with SSWD's proposed conditions would not create any significant or unavoidable adverse effects. Camp Far West Reservoir will continue to truncate high flows that enter Camp Far West Reservoir and augment low summertime and fall flows, which will affect water quantity. However, storage in Camp Far West Reservoir would occur with or without the Project since it is necessary to meet CFWID and SSWD irrigation demands now and into the future. For that reason, long-term Project effects on water quantity are considered minor and cumulative.

Camp Far West Reservoir will continue to trap sediment contaminated with mercury, a legacy of hydraulic mining which historically occurred upstream of the Project. However, sediment would be trapped in Camp Far West Reservoir with or without the Project since it is necessary to meet CFWID and SSWD irrigation demands now and into the future. For that reason, long-term Project effects on water quantity are considered minor and cumulative.

Water temperatures in the Bear River downstream of the Project exceed 20°C in every year in both the proposed Project and No Action alternatives (Tables 3.3.2-25 through 3.3.2-28). Cold water is limited in the Bear River because the watershed is relatively low in elevation (less than 5,000 ft) and experiences precipitation as rainfall rather than snowfall. As shown in Table 3.3.2-23, there is a small increase in usable cold water pool volumes below 10°C and 15°C in the proposed Project Alternative compared to the No Action Alternative. However, even if Camp Far West reservoir releases were made entirely from the low-level outlet, located approximately 46 ft below the powerhouse intake, there is not enough coldwater pool to significantly decrease water temperatures in the Bear River below the Project. For that reason, long-term Project effects on water quantity and quality are considered minor and cumulative.

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3.3.3 Aquatic Resources

The discussion of aquatic resources is divided into five sections. The affected environment is discussed in Section 3.3.3.1, environmental effects of the Project are discussed in Section 3.3.3.2, cumulative effects are described in Section 3.3.3.3, unavoidable adverse effects are addressed in Section 3.3.3.4, and attachments to this Section of Exhibit E are listed in Section 3.3.3.5.

SSWD augmented existing, relevant, and reasonably available information with four relicensing studies: 1) Study 3.1, *Salmonid Redd Study*; 2) Study 3.2, *Stream Fish Populations Study;* 3) Study 3.3, *Instream Flow Study;* and 4) Study 3.4, *Benthic Macroinvertebrate Study*. The results of these studies are incorporated into this section.

3.3.3.1 Affected Environment

This section describes the condition of existing aquatic resources in three general areas: 1) special-status aquatic species, 2) aquatic invasive species, and 3) aquatic resources of the Bear River.

3.3.3.1.1 Special-Status Aquatic Species

Four special-status aquatic species occur or have been reported to occur recently in the Project Area. These are: 1) Central Valley (CV) fall-run Chinook salmon Evolutionarily Significant Unit (ESU) (NMFS-S, CSC); 2) white sturgeon (CSC); 3) Sacramento-San Joaquin roach (CSC); and 4) Western (or Pacific) pond turtle (*Emys marmorata*) (CSC). Two other species - hardhead (CSC) and Sacramento splittail (*Pogonichthys macrolepidotus*) (CSC) – have been reported in the area, but have not been documented in recent times. A seventh species - foothill yellow-legged frog (*Rana boylii*) (CSC, CESA Candidate Species) - has never been reported to occur in the Project area and is found above elevations of 600 feet, but it is included here because it is a Candidate for listing under CESA and known extirpated populations once occurred at elevations below 300 ft in some areas (Moyle 1973; Seltenrich and Pool 2002; ECORP 2005). A description of each of these seven species, including its nearest known occurrence to Project facilities and features, is provided below.

Central Valley fall-run Chinook salmon ESU (NMFS-S, CSC)

Four principal life history variants of Chinook salmon are recognized in the California Central Valley and are named for the timing of their spawning runs: fall-run, late fall-run, winter-run, and spring-run.

Seventeen distinct groups, or ESUs, of naturally-spawned Chinook salmon occur from southern California to the Canadian border and east to the Rocky Mountains; five of these groups occur in California (Myers et al. 1998). Four groups occur in the Project Vicinity (NMFS 2008), but only the CV fall-run ESU has been documented in the lower Bear River. NMFS listed CV fall-run Chinook salmon ESU as a Species of Concern in 2004 due to concerns about population size and hatchery influence (NMFS 2009). Little information exists regarding the life history of CV Chinook salmon ESU in the lower Bear River. Therefore, much of the information in this section is based on the life history of CV fall-run Chinook salmon ESU in the lower Yuba and Feather rivers. The Bear and Yuba rivers are both tributaries to the Feather River. Therefore, it is anticipated that the life history and timing of CV fall-run Chinook salmon ESU in the Bear River are similar to that seen of the Feather and Yuba rivers.

Although it is an important commercial and recreational fish species, declines in populations resulted in harvest management restrictions throughout California. In April 2009, the Pacific Fishery Management Council and NMFS adopted a closure of all commercial ocean salmon fishing through April 30, 2010, and placed restrictions on inland salmon fisheries over the same time frame (CDFG 2009a). Currently the Bear River from the non-Project diversion dam to Highway 65 is only subject to sport fishing regulations, which is annually open from the fourth Saturday in May through October 15.

The generalized life history of Pacific salmon (*Oncorhynchus* sp.) involves spawning, incubation, hatching, emergence, and rearing in freshwater, migration to the ocean, and subsequent initiation of maturation and return to freshwater for completion of the life-cycle (Myers et al. 1998).

Chinook salmon is the largest salmonid, with adults often exceeding 40 pounds, and individuals over 120 pounds reported (NMFS 2008). Adult Chinook salmon migrate from the ocean into the freshwater streams and rivers of their birth to mate (i.e., anadromy) and, following a single spawning event, they die (i.e., semelparity). Adult CV fall-run Chinook salmon ESU generally begin migrating upstream in the Feather River annually in June, with immigration continuing through December (Moyle 2002; NMFS 2008). In the Central Valley, immigration generally peaks in November and, typically, greater than 90 percent of the run has entered their natal river by the end of November (Moyle et al. 2008).

The timing of adult Chinook salmon spawning activity is influenced by water temperatures. In general, when mean daily water temperatures decrease to approximately 60°F, female Chinook salmon begin to construct nests, which are known as redds, into which their eggs are eventually released and simultaneously fertilized by males (Moyle 2002; NMFS 2008). Chinook salmon require gravel and cobble areas, primarily at the heads of riffles, with water flow through the substrate for spawning. Gravel and cobble sizes can range from 0.1 to 6 in in diameter. Fall-run Chinook salmon spawning and embryo incubation period generally extends from October through March, but may occur earlier if temperature conditions fall below 60°F (Moyle 2002; NMFS 2008). Based on life history periodicities in the Feather and Yuba rivers, CV fall-run Chinook salmon ESU fry emergence is expected to typically occur from late December through March within the Project Vicinity (Moyle 2002). Growth rates are largely influenced by water temperature, and the optimal range of juvenile rearing temperatures is 55° through 65°F. Young Chinook salmon will survive and grow within the range of 41°F through 66°F, but steady temperatures above 75°F are lethal (UC Davis 2018).

Table 3.3.3-1 shows the CV fall-run Chinook salmon ESU life-stage periodicity developed by the Lower Yuba River Accord Management Team for the lower Yuba River (RMT 2013). SSWD expects that the lower Yuba River and lower Bear River CV fall-run Chinook salmon ESU periodicities are generally similar. The lower Yuba River is a larger basin than the Bear River, so select areas may extend beyond the suitable periods of the lower Bear River.

Table 3.3.3-1. Life stage-specific periodicities for CV fall-run Chinook salmon ESU in the Yuba River. Reproduced from Lower Yuba River Accord River Management Team (2013). Gray shading is assumed presence.

Life Stage	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Adult Immigration & Staging												
Spawning												
Embryo Incubation												
Fry Rearing												
Juvenile Rearing												
Juvenile Downstream Movement												

In addition, water temperature is very important for the support of CV fall-run Chinook salmon ESU in the lower Bear River. In 1991, using multiple sources of information, CDFG (1991) opined ranges of preferred water temperatures for each life stage of CV fall-run Chinook salmon ESU. Table 3.3.3-2 provides the CDFG preferred water temperature by life stages, including the sources cited by CDFG.

Table 3.3.3-2. CDFG 1991 water temperatures for CV fall-run Chinook salmon life stages.

CV Fall-Run Chinook Salmon Life Stage	Preferred Water Temperature Range (°C)	Sources Cited by CDFW
Upstream Migration	6.7° to 14.2°C	Bell 1986, Rich 1987
Spawning	5.0° to 13.9°C	Reiser and Bjornn 1979, Rich 1987, and Chambers 1956
Egg Incubation through Fry Emergence	5.0° to 14.4°C	Reiser and Bjornn 1979, and Rich 1987
Fry Rearing	7.0° to 14.0° C	Raleigh et al. 1986 and Rich 1987
Juvenile Rearing	7.3° to 14.6°C	Reiser and Bjornn 1979, and Rich 1987

In its 1991 report, CDFG stated that warm water temperatures near the confluence of the lower Bear and Feather rivers during September and October could delay CV fall-run Chinook salmon ESU upstream migration into the Bear River. The report concluded that the preferred water temperature range for spawning was exceeded at Wheatland until early November, thereby shortening the period for spawning that is normally October through January. CDFG also concluded that during the incubation period of October through February, water temperatures generally exceed the optimum only during October and that the temperature range for juvenile rearing was exceeded during the entire rearing period of April through June.

More recently, CDFW and other federal and state agencies have expressed a reliance on salmon and steelhead life history water temperature guidelines developed by the United States Environmental Protection Agency (EPA 2003). These guidelines are 7-day averages of the daily maxima (7DADM) water temperatures that the EPA claims will maintain protection of anadromous salmonids. The EPA-developed guidelines are based on a review of literature describing water temperature-related effects on various species of anadromous salmonids. The EPA did not develop guidelines based on local testing and some guidelines were applied to multiple species of salmonids (e.g., *O. mykiss* and Chinook salmon). Further, the EPA (2003) does not distinguish between ESUs or DPS' of conspecific anadromous salmonids (e.g., spring-run and fall-run Chinook salmon), and the EPA water temperature guidelines do not align directly with the Chinook salmon periodicities in Table 3.3.3-1. Table 3.3.3-3 shows the EPA guidelines for the anadromous salmonid lifestages.

Table 3.3.3-3. EPA water temperature guidelines (EPA 2003) for protection of anadromous salmonids by life stage.

Salmonid Life History Phase Terminology	7-Day Average of the Daily Maxima Guideline (°C)	Intended Period of Protection
Adult Migration	≤18°C	Salmon and steelhead migration
Spawning and Egg Incubation	≤13°C	Salmon and steelhead spawning, egg incubation and fry emergence
Juvenile Rearing and Emigration	≤16°C for "core" juvenile rearing;[1] ≤18°C for migration and non-core juvenile rearing	Salmon and steelhead rearing and juvenile migration
Smoltification	≤14°C	Composite criteria for salmon and steelhead smoltification[2]

[1] The EPA recommends that for areas of degraded habitat, "*core juvenile rearing*" use cover the downstream extent of low density rearing that currently occurs during the period of maximum summer temperatures (EPA 2003).

[2] The EPA establishes a guideline of ≤15°C for salmon smoltification and a guideline of less than or equal to 14°C for steelhead smoltification; but for a composite guideline for both species, the steelhead guideline of less than or equal to 14°C is applied.

The EPA recommends its guidelines because they "*describe the maximum temperatures in a stream, but is not overly influenced by the maximum temperature of a single day*." The EPA states that, because this metric uses daily maximum water temperatures, the guidelines can be used to protect against acute water temperature effects (EPA 2003). The EPA also states that its guidelines can be used to protect against sub-lethal or chronic effects, but the cumulative thermal exposure of fish over the course of a week or more needs to be considered when selecting a 7DADM value to protect against these effects (EPA 2003). Based on studies of fluctuating water temperature regimes, the EPA concludes that:

> ...fluctuating temperatures increase juvenile growth rates when mean temperatures are colder than the optimal growth temperature derived from constant temperature studies, but will reduce growth when the mean temperature exceeds the optimal growth temperature. When the mean temperature is above the optimal growth temperature, the "mid-point" temperature between the mean and maximum is the "equivalent" constant temperature. This "equivalent" constant temperature then can be directly compared to laboratory studies done at constant temperatures. For example, a river with a 7DADM value of 18°C and a 15°C weekly mean temperature (i.e., diurnal variation +/- 3°C) will be roughly equivalent to a constant laboratory study temperature of 16.5°C (mid-point between 15°C and 18°C). Thus, both maximum and mean temperatures are important when determining a 7DADM value that is protective against sub-lethal/chronic effects.

Because the 7DADM water temperature guideline is reportedly about 3°C higher than the weekly mean water temperature in many rivers in the Pacific Northwest (Dunham et al. 2001 and Chapman 2002, both as cited in EPA 2003), EPA (2003) said it first started with the constant temperatures that scientific studies indicate would be protective against chronic effects, and then added 1-2°C to develop 7DADM temperatures that would protect against chronic effects.

Table 3.3.3-4 provides a crosswalk between the Yuba River Chinook salmon periodicities and the EPA water temperature guidelines.

Table 3.3.3-4. Life history events for Yuba River Periodicity, EPA (2003) temperature guidelines, and instream flow life history variables merged into a single twelve-month calendar for comparative reference.

Yuba River Periodicity[1]	EPA (2003) Water Temp[2]	Instream Flow[3]	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Adult Immigration & Staging	Adult Migration	Spawning												
Spawning	Spawning and Egg Incubation													
Embryo Incubation														
Fry Rearing	Juvenile Rearing and Emigration	Fry Rearing												
Juvenile Rearing		Juvenile Rearing												
Juvenile Downstream Movement														
	Smoltification													

[1] As provided in Table 3.3.3-1 of this Exhibit E.
[2] As provided in Table 3.3.3-3 of this Exhibit E.
[3] As discussed in Section 3.3.1.3 of this Exhibit E.

In the Central Valley, fall-run Chinook salmon ESU are the most numerous of the four salmon runs and are the principal run raised in hatcheries (Moyle 2002). Throughout the Central Valley, the number of Chinook salmon returning in the fall to spawn has exhibited a declining trend in recent years based on data reported in GrandTab.[1] Little is known about the historical run size, but it has been reported to be highly variable from year to year depending on fall flow conditions.

Fall-run Chinook salmon are raised at five major Central Valley hatcheries that release more than 32 million smolts each year into California water bodies (CDFG 2007). Chinook salmon fry stocking occurred in the Bear River in 1981, 1983, 1985, 1986, and 1987. Stocking typically occurred at Patterson’s Gravel Plant (RM 16). Each year roughly 100,000 Feather River or Nimbus Hatchery fall-run fry were released into the river. No known plantings of Chinook salmon fry in the lower Bear River have occurred since 1987. Recently, Chinook salmon have been released in the Feather River at the Hatchery and near Live Oak (RMIS 2015).

While hatchery programs can increase overall returns to the fishery, Lindley et al. (2007) concluded that hatchery programs have negative effects on wild populations of Chinook salmon due to competition by hatchery fish with wild juveniles, and straying of hatchery fish both within and between basins and resultant introgression of hatchery stocks with native populations.

Unlike spring-run Chinook salmon, adult fall-run Chinook salmon does not exhibit an extended over-summer holding period. Rather, it stages for a relatively short period of time prior to spawning. Adult CV fall-run Chinook salmon ESU immigration and staging has been reported

[1] GrandTab is a compilation of annual population estimates for Chinook salmon, *Oncorhynchus tshawytscha*, in the Sacramento and San Joaquin River systems. GrandTab is available for download at: http://www.calfish.org/IndependentDatasets/CDFGFisheriesBranch/tabid/157/Default.aspx

to generally occur in the nearby lower Yuba River from August through November (CALFED and YCWA 2005).

Fall-run Chinook salmon embryo incubation extends from the time of egg deposition through alevin emergence from the gravel. The CV fall-run Chinook salmon ESU embryo incubation period has been reported to extend from October through March in the lower Yuba River (YCWA et al. 2007).

In the Central Valley, fall-run Chinook salmon ESU fry emergence generally occurs from late-December through March (Moyle 2002). CV fall-run Chinook salmon ESU juvenile rearing and outmigration in the lower Yuba River has been reported to primarily occur from December through June (CALFED and YCWA 2005; SWRI 2002). In the lower Yuba River, most CV fall-run Chinook salmon ESU exhibit downstream movement as fry shortly after emergence from gravels, although some individuals rear in the river for a period of up to several months and move downstream as juveniles. Thus, the fry rearing lifestage is considered to extend from December through April, and the juvenile rearing lifestage from March through June.

The Bear River has historically contained a single run of fall-run Chinook salmon (Yoshiyama et al. 2001). Adult salmon historically ascended as far as a barrier waterfall in the immediate vicinity of Camp Far West Dam (Yoshiyama et al. 2001). No waterfall currently exists in the area so it has presumably been inundated by the construction of the dam and formation of the reservoir (Yoshiyama et al. 2001). There are no known accounts of anadromous fishes of any kind upstream of the original barrier waterfall. Yoshiyama et al. (2001) estimates that less than 1 RM of salmon habitat was lost due to the creation of Camp Far West Dam. USFWS (1998) states:

> Historically, the Bear River never supported substantial runs of salmon and steelhead as a consequence of its naturally intermittent hydrology and the occurrence of a natural rock barrier located a short distance upstream from Camp Far West Reservoir. This barrier prevented salmon and steelhead from ascending the Bear River to higher elevations where streamflows and water temperatures were more suitable. Thus, fish were restricted to the Sacramento Valley floor where environmental conditions were not always favorable. In years with favorable flows, the Bear River probably supported small runs of fall-run Chinook salmon and steelhead, although run size estimates are not available.

Reports issued in 1991 and 1993 by CDFG (1991) and Reynolds et al. (1993) respectively, stated that fall flows, specifically October and November, in the lower Bear River appeared to influence the CV fall-run Chinook salmon ESU run size. During years of high water in October and November, CDFG reports runs as high as 300 CV fall-run Chinook salmon ESU in 1984 and none in 1985 (CDFG 1991, Table 3.3.3-5). However, CDFG (1991) concludes that the monthly impaired flow pattern and quantity of water closely resembled the unimpaired flow with approximately 90 percent of the unimpaired flow released annually downstream of Camp Far West, indicating that flow was not the limiting factor influencing fall-run Chinook salmon ESU production.

Table 3.3.3-5. Estimates of spawning CV fall-run Chinook salmon ESU in the lower Bear River.[1]

Year	Number of Chinook Salmon Adult Spawners	Instantaneous Flow Range (cfs)[2]		Highest Observed Instantaneous Flow in October & November (cfs)
		October	November	
1978	0	1.6 - 8.7	<1 - 14	14
1980	0	2.1 - 9.2	5 - 29	29
1982	<100	6.8 - 37	28 - 7,170	7,170
1983	>200[3]	37 - 55	484 - 4,360	4,360
1984	300	19 - 47	24 - 1,430	1,430
1985	0	4.4 - 33	10 - 28	28
1986	1	9.5 - 20	15 - 34	34

From: CDFG 1991
[1] CDFG Region 2, Rancho Cordova, file data for Bear River-Placer, Sutter, and Yuba counties, as cited in CDFG 1991.
[2] USGS Water Resources Data, California, Volume 4, various years, gage 11424000, Bear River near Wheatland, CA.
[3] Estimate of angler catch from Dry Creek.

The Central Valley Project Improvement Act (CVPIA) directed the Secretary of DOI to develop and implement a program that makes all reasonable efforts to double natural production of anadromous fish in California Central Valley streams (Section 3406(b)(1)). The program is known as the Anadromous Fish Restoration Program (AFRP). The 2001 plan was released by USFWS as a revised draft on May 30, 1997 and adopted as final on January 9, 2001 (USFWS 2001). The plan identifies restoration actions that may increase natural production of anadromous fish in Central Valley streams.

USFWS's (1995) AFRP Working Paper, from which the doubling goals were identified and presented, states that "natural production" includes up to four components: 1) in-river spawner abundance (i.e., escapement); 2) in-river sport harvest; 3) ocean sport and commercial harvest; and 4) hatchery returns. Further, it states the reference period upon which the doubling goal is based is 1967 through 1991. USFWS's Working Paper estimated the natural production from 1967 through 1991 for the Bear River is 224 adult Chinook salmon based on an average annual spawner abundance of 100 fish, an average annual in-river sport harvest of 10 fish, and an average annual ocean sport and commercial harvest of 114 fish. The doubling goal specifically excludes spring-run Chinook salmon in the Bear River because the USFWS does not recognize a viable spring-run in the Bear River, and excludes hatchery returns.

USFWS's estimate of average annual production in the Bear River from 1967 through 1991 is suspect for four reasons. First, USFWS based its calculation of average annual spawner abundance for a 25 year period on six years (i.e., according to USFWS, no spawners in 1978 and 1980, 100 in 1982, 200 in 1983, 300 in 1984 and 1 in 1986). However, the only entry of adult Chinook salmon abundance in the GrandTab CDFW archive for that period is for 300 fish in 1984. Second, basing a 25-year average on six data points, only one of which can be verified, is dubious at best. Further, given the highly skewed distribution of the data, use of a median value, rather than the average, seems a more defensible approach to express the central trend. If the median was used, it would yielded 50, rather than 100 spawner abundance. Third, USFWS's estimates of in-river and ocean harvest seem to be based on the spawner production numbers that, as just stated, are questionable. USFWS provides no empirical data and its extrapolations from spawners to in-river and ocean harvest are based on dubious data. Fourth, it is unclear how USFWS adjusted the spawner abundance for hatchery returns, since many of the spawners in the Bear River are likely hatchery returns and are not included in the Bear River production estimate.

Nevertheless, USFWS used its questionable average annual numbers to calculate a Bear River doubling goal by simply doubling each of the variables. Hence, USFWS's Bear River doubling goal is 449 based on targets of average annual spawner abundance of 200 fish, an average annual in-river sport harvest of 20 fish, and an average annual ocean sport and commercial harvest of 228 fish.

USFWS states the Bear River doubling goal is to be met by:

> Supplement flows with water acquired from willing sellers consistent with applicable guidelines or negotiate agreements to improve conditions for all life history stages of Chinook salmon and steelhead;
>
> Provide adequate water temperatures for all life-stages of Chinook salmon and steelhead, and screen all diversions to protect all life history stages of anadromous fish.

A more detailed discussion regarding CV fall-run Chinook salmon ESU in the lower Bear River is provided in Section 3.3.3.1.3.

White Sturgeon (CSC)

White sturgeon is listed as a CSC due to a lack of abundance data, concerns regarding availability of spawning and rearing habitats, and the continued recreational importance of the species. Moyle (2002) states that the number of adults fluctuates annually and appears to be the result of highly variable juvenile production; the population is dominated by a few strong year classes associated with high spring outflows. White sturgeon reside in estuaries of large rivers for much of their lives and tend to move around bays or estuaries to find optimal brackish water areas (Kohlhorst et al. 1991; USBR 2017a).

Data show that adult white sturgeon initiate their upstream migration into the lower Sacramento River from the Delta during late fall and winter (Kohlhorst and Cech 2001). The migration is believed to be triggered by photoperiod (Doroshov et al. 1997) and increases in river flow (Schaffter 1997). Mature adult white sturgeon have been documented moving up the Sacramento River until they are concentrated near Colusa from March through May (Kohlhorst et al. 1991 as cited in Kohlhorst and Cech 2001).

Onset of sexual maturity for males and females varies with photoperiod and temperature; however, male sturgeon reach maturity before females. Males are sexually mature as early as 3 to 4 years. Females mature as early as 5 years (Wang 2010). Only a small percentage of the adult population spawns in a given season. Males may spawn every 1 to 2 years, and females may spawn every 2 to 4 years. Limited data exists on preferential spawning habitat but biologists believe that white sturgeon pick deep swift water areas, such as riffles or pools with rock and gravel substrate, to spawn. Female sturgeon produce many eggs, with white sturgeon in the Sacramento River producing an average of 5,648 eggs per kilogram of body weight (Moyle 2002). Male sturgeon fertilize the eggs, giving them a tacky property that allows the eggs to stick to the substrate until the larvae emerge four to 12 days later (Wang 2010; USBR 2017a).

According to Moyle (2002), white sturgeon spawning typically occurs between February and June when water temperatures are 46° to 66°F. Biologists believe that adults broadcast spawn in the water column in areas with swift current. Fertilized eggs sink and attach to the gravel bottom, where they hatch. Eggs reportedly hatch after 4 days at 61°F (Beer 1981), but can take up to 2 weeks at lower water temperatures (PSMFC 1992). Exact white sturgeon spawning locations in the Sacramento River have not been documented, although it is likely white sturgeon spawn between Knights Landing (RM 90) and Colusa (RM 143) (CDFG 2002 and Schaffter 1997, both as cited in Beamesderfer et al. 2004; Kohlhorst 1976), or several miles upstream of Colusa (Kohlhorst 1976, and Schaffter 1997, all as cited in Israel et al. 2011). Vogel (2008) sampled adult sturgeons for a telemetry study on the Sacramento River near the Glenn-Colusa Irrigation District's diversion between 2003 and 2006 and sampled white sturgeons as far upstream as RM 165.

After hatching, larvae begin swimming around in a vertical position as they are suspended by a yolk sac, making them more susceptible to be carried down to the estuary in the current (Wang 2010). Larvae begin to swim freely and feed through their mouths once the yolk sac has been consumed (Moyle 2002; USBR 2017a). Juvenile rearing and downstream movement can occur year-round.

Little information is available regarding white sturgeon use of the lower Bear River for spawning and rearing habitat. Recent studies conducted by DWR and utilizing Dual Frequency Identification Sonar (DIDSON) documented sturgeon (species undeterminable) presence in the lower 1 mi of the Bear River, but DWR was unable to validate species (A. Seesholtz, pers. comm., 2018). Seesholtz provided brief summaries that state 24 adult sturgeon (unknown species) were documented on March 28, 2017, within the lower 1-mile portion of the Bear River. She also states that her field team documented 37 adult sturgeon (species unknown) on March 19, 2018, within 1 mile upstream of the Bear River.

Hardhead (CSC)

Hardhead has been reported to occur in the upper Yuba River, the lower Bear, Feather, and Yuba rivers and the Honcut Creek headwaters (UC Davis 2018). The report did not provide specific population counts for the lower Bear River.

Hardhead is a large cyprinid species that can reach lengths of over 23 in., and generally occurs in large, undisturbed, low- to mid-elevation, cool- to warm-water rivers and streams (Moyle 2002). Hardhead was designated CSC by CDFW in 1995, and is listed by CDFW as a Class 3 Watch List species, meaning that it occupies much of its native range but was formerly more widespread or abundant within that range (CDFG 2009a,b). Historically, hardhead was considered a widespread and locally abundant species in California, but its specialized habitat requirements, widespread alteration of downstream habitats, and predation by smallmouth bass (*Micropterus dolomieu*) have resulted in population declines and isolation of populations (Moyle 2002).

Most reservoir populations of hardhead have proved to be temporary; presumably the result of colonization of the reservoir by juvenile hardhead before introduced predators became established. Brown and Moyle (1993) observed that hardhead disappeared from the upper Kings River when the reach was invaded by bass.

Hardhead mature following their second year. Spawning migrations, which occur in the spring into smaller tributary streams, are common. The spawning season may extend into August in the foothill streams of the Sacramento and San Joaquin river basins. Spawning behavior has not been documented, but hardhead is believed to elicit mass spawning in gravel riffles (Moyle 2002). Little is known about life stage specific temperature requirements of hardhead; however, temperatures ranging from approximately 65° to 75°F are believed to be suitable (Moyle 2002).

In 1980, CDFG reported hardhead to be present in Camp Far West Reservoir. However, in 2012, CDFG conducted boat electrofishing surveys at nine sites in the reservoir and did not report any hardhead to be present. SSWD found no records of hardhead in the lower Bear River, and did not find any hardhead during its relicensing studies.

Sacramento Splittail (CSC)

The Sacramento splittail, a minnow, was listed as threatened under the ESA on February 8, 1999, and delisted on September 22, 2003 (USFWS 2003a, b). Sacramento splittail is designated as a CSC (CDFW 2018, CDFW2015b). Sacramento splittail is a large cyprinid, growing in excess of 12 in., and is adapted to living in freshwater and estuarine habitats as well as alkaline lakes and sloughs (Moyle 2002).

Historically, Sacramento splittail inhabited sloughs, lakes, and rivers of the Central Valley with populations extending upstream to Redding in the Sacramento River, to the vicinity of Colusa-Sacramento River State Recreation Area, in Butte Creek/Sutter Bypass, to Oroville in the Feather River, to Folsom in the American River, and to Friant in the San Joaquin River (Moyle et al. 2004, USFWS 2003b). Currently, the species is known to migrate up the Sacramento River to Red Bluff Diversion Dam and up the San Joaquin River to Salt Slough in wet years as well as into the lower reaches of the Feather and American rivers (USFWS 2003b).

Sacramento splittail has been documented only in the lower Feather River (UC Davis 2018) and, according to Moyle, evidence of self-sustaining populations of Sacramento splittail occurring outside of these areas is weak (Moyle et al. 2004). SSWD did not find any historic records of Sacramento splittail in the lower Bear River, and did not observe the species during its relicensing studies.

Sacramento-San Joaquin Roach (CSC)

The Sacramento-San Joaquin roach, a CSC, is part of the California roach complex, which is composed of various subspecies. The Sacramento-San Joaquin roach is found in the Sacramento and San Joaquin River drainages, except the Pit River, and in other tributaries to San Francisco Bay. There is little quantitative information available on the abundance of Sacramento-San Joaquin roach. Assuming this widely distributed form is indeed just one subspecies, it appears to be abundant in a large number of streams. However, it is now absent from many streams and stream reaches where it once occurred (Leidy 1984).

Sacramento-San Joaquin roach is generally found in small, warm intermittent streams, and is most abundant in mid-elevation streams in the Sierra foothills and in the lower reaches of some coastal streams (Moyle 2002; Moyle et al. 1982). Assuming that the Sacramento-San Joaquin roach is indeed a single taxon, it is abundant in a large number of streams although it is now extirpated from a number of streams and stream reaches where it once occurred (Moyle 2002). Roach are tolerant of relatively high temperatures of 86° to 95°F and low oxygen levels of 1 to 2 mg/L (Taylor et al. 1982). However, it is a habitat generalist, also found in cold, well-aerated clear "trout" streams (Taylor et al. 1982), in human-modified habitats (Moyle 2002; Moyle and Daniels 1982) and in the main channels of rivers.

Reproduction occurs from March through early July, depending on water temperature (Moyle 2002). Murphy (1943) in CDFG 2008 states that spawning is determined by water temperature, which must be approximately 60°F for spawning to be initiated. During the spawning season, schools of fish move into shallow areas with moderate flow and gravel/rubble substrate (Moyle 2002). Females deposit adhesive eggs in the substrate interstices and the eggs are fertilized by attendant males. Typically, 250-900 eggs are produced by a female and the eggs hatch within two to three days. Fry remain in the substrate interstices until they are free-swimming.

Sacramento-San Joaquin roach have been reported to occur in the upper Yuba River, the lower Bear and Feather rivers, the Middle Fork of the Feather River, and the Honcut Creek headwaters (UC Davis 2018). SSWD did not find any Sacramento-San Joaquin roach during its relicensing studies in the lower Bear River.

Foothill Yellow-Legged Frog (CSC, CESA Candidate Species)

The foothill yellow-legged frog (FYLF) is currently a candidate for listing as threatened under the CESA. On June 21, 2017, the California Fish and Game Commission accepted for consideration a petition from the Center for Biological Diversity to list FYLF as a threatened species, with a finding by CDFW (2017a) that the petitioned action may be warranted. Based on this finding and acceptance of the petition, the Fish and Game Commission advanced the FYLF to a candidate species under the CESA. As a candidate species, FYLF receives all the protections of a CESA-listed species for 1 year from the date it was accepted for consideration while the Fish and Game Commission and CDFW staff decide whether to provide permanent protection to FYLF as a listed species under CESA. This 1 year period has elapsed with no action by the California Fish and Game Commission, so FYLF's status as a CESA Candidate species is uncertain. Nevertheless, FYLF remains a CSC, so it is treated as an aquatic special status species in this Exhibit E.

FYLF is a stream-adapted species, usually associated with shallow, flowing streams with backwater habitats and coarse cobble-sized substrates (Jennings and Hayes 1994). Known extant populations, particularly in the Sierra Nevada, are concentrated between about 600 to 5,000 ft elevation, although populations since extirpated once occurred at elevations below 300 ft in some areas (Moyle 1973; Seltenrich and Pool 2002; ECORP 2005). The species has declined range wide, most severely in southern California, where it evidently no longer occurs (CDFW 2017c). Within the Central/Northern Sierra Nevada region, populations persist on some portions of previously occupied drainages (NatureServe© 2018), but many of these populations are smaller and more fragmented than historically (CDFW 2017c). FYLF populations may require both mainstem and tributary habitats for long-term persistence. Streams too small to provide breeding habitat for this species may be critical as seasonal habitats (e.g., in winter and during the hottest part of the summer) (VanWagner 1996; Seltenrich and Pool 2002), and there is evidence that habitat use by young-of-the-year, sub-adult, and adult frogs differs by age-class and changes seasonally (Randall 1997). Adult migrations appear to be limited to modest movements along stream corridors (Ashton et al., 1998), but the magnitude of such movements, any seasonal component, and differences between sexes remains largely unknown. FYLF is infrequent in habitats where introduced fish and bullfrogs are present (Jennings and Hayes 1994).

Breeding tends to occur in spring or early summer and eggs are laid in areas of shallow, slow-moving waters near the shore. Timing and duration of breeding activity may vary geographically and across populations. In California, egg masses have been found between April 22 and July 6, with an average of May 3 (Ashton et al. 1998). Kupferberg (1996a, b) reports an approximate breeding period of 1 month beginning late April to late May. Rainfall during a given breeding season has the potential to delay oviposition (Kupferberg 1996a, b).

Egg masses vary in size and in the number of eggs/mass. The size of an egg mass after it has absorbed water (usually a few hours after oviposition) is 5 to 10 cm in diameter and "*resembles a cluster of grapes*" (Stebbins 1985). The number of eggs in a mass can range from 300 to 2,000 (Zweifel 1955), with an average of about 900 eggs (Ashton et al., 1998). Eggs generally hatch within 5 to 37 days (Zweifel 1955; Ashton et al. 1998). Hatching rates are influenced by temperature, with faster developmental times in warmer waters, up to the critical thermal maximum temperature of about 26˚C (Zweifel 1955; Duellman and Trueb 1986). Tadpoles move away from their egg mass after hatching (Ashton et al. 1998) and typically metamorphose 3 to 4 months after hatching.

FYLF is known to occur at higher elevations within the Bear River watershed, but occurrences at the low elevations of the Project (i.e., below 320 ft) are unlikely because the Project is below the accepted elevation range of 600 ft for the species. A search of the CNDDB for the USGS 1:24,000 quadrangles of Camp Far West, Nicolaus, Sheridan, Wheatland, and Wolf found no known occurrences of FYLF (CDFW 2018). Through a search of the literature, no other studies or known occurrences of FYLF in the Project Area were found, and SSWD did not observe FYLF during its relicensing studies in the lower Bear River.

Western Pond Turtle (CSC)

The western, or Pacific, pond turtle (WPT) occurs in a wide variety of aquatic habitats up to a 6,000 ft elevation, particularly permanent ponds, lakes, side channels, backwaters, and pools of streams, but is uncommon in high-gradient streams (Jennings and Hayes 1994). Western pond turtle has declined due to loss of habitat, introduced species, and historical over-collection (Jennings and Hayes 1994), and has been designated as CSC. Isolated occurrences of WPT in lakes and reservoirs sometimes occur from deliberate releases of pets.

Although highly aquatic, WPT often overwinters in forested habitats and eggs are laid in shallow nests in sandy or loamy soil in summer at upland sites as much as 1,200 ft from aquatic habitats (Jennings and Hayes 1994). Hatchlings do not typically emerge from the covered nests until the following spring. Reese and Welsh (1997) documented WPT away from aquatic habitats for as much as 7 months in a year and suggested that terrestrial habitat use was at least in part a response to seasonal high flows. Basking sites are an important habitat element (Jennings and Hayes 1994) and basking occurs on substrates include rocks, logs, banks, emergent vegetation, root masses, and tree limbs (Reese undated). Terrestrial activities include basking, overwintering, nesting, and moving between ephemeral sources of water (Holland 1991). During the terrestrial period, Reese and Welsh (1997) found that radio-tracked WPT were burrowed in leaf litter.

Breeding activity may occur year-round in California, but egg-laying tends to peak in June and July in colder climates, when females begin to search for suitable nesting sites upslope from water. Adult WPTs have been documented traveling long distances from perennial watercourses for both aestivation and nesting, with long-range movements to aestivation sites averaging about 820 ft, and nesting movements averaging about 295 ft (Rathbun et al. 2002). Introduced species of turtles (e.g., red-eared sliders [*Trachemys scripta elegans*]) are likely to compete with western pond turtle for basking sites, while bullfrogs and predatory fish species may prey on hatchling western pond turtles. Major factors cited as limiting WPT populations include loss of aquatic habitats, elevated nest and hatchling predation, reduced availability of nest habitat, and road mortality (BLM and USFWS 2009).

CDFW (2018) reports six occurrences of WPT in the Project Vicinity, none of which are in Camp Far West Reservoir or the mainstem of the lower Bear River. The occurrences were: 1) in Dry Creek about 2.5 mi west of Wheatland, approximately 8.5 mi from Camp Far West Dam; 2) the south end of Wood Duck Slough, 2 mi north of Nicolaus, approximately 16.7 mi from Camp Far West Dam; 3) the upper end of Best Slough, South of Beale Air Force Base, approximately 4.3 mi from Camp Far West Dam; 4) along Dry Creek, approximately 1-mi east of the junction of Spenceville Road and Waldo Road in the Spenceville Wildlife Area, approximately 4.3 mi from Camp Far West Dam; 5) along Dry Creek, approximately 1.3 mi east of the junction of Spenceville Road and Waldo Road in the Spenceville Wildlife Area, approximately 4.4 mi from Camp Far West Dam; and 6) along the north bank of Dry Creek about 0.25 west/southwest of Shingle Falls and 1.6 miles northeast of Spenceville Rd at Nichols Rd within the Spenceville Wildlife Area, approximately 4.2 miles from Camp Far West Dam. No incidental observations of western pond turtle were recorded during relicensing studies. Through a search of the literature, no other studies or known occurrences of WPT were found in Camp Far West Reservoir or the lower Bear River.

3.3.3.1.2 Aquatic Invasive Species

Based on a search of the USGS Non-indigenous Aquatic Animals database (USGS 2018a) and the CalWeedMapper database (Cal-IPC 2018a) and other information, six aquatic invasive species (AIS) occur in Camp Far West Reservoir: These are: 1) Asian clam (*Corbicula fluminea*); 2) Brazilian waterweed (*Egeria densa);* 3) floating water primrose (*Ludwigia peploides* ssp. *montevidensis*); 4) parrot's feather milfoil (*Myriophyllum aquaticum*); 5) Eurasian watermilfoil (*Myriophyllum spicatum*) and 6) American bullfrog (*Lithobates catesbeianus*). Five other AIS are known to occur with 100 mi of Camp Far West Reservoir and, therefore, are considered in this Exhibit E to have a potential to occur in the reservoir. These are: 1) New Zealand mudsnail (*Potamopyrgus antipodarum): 2)* Carolina fanwort (*Cabomba caroliniana);* 3) water hyacinth (*Eichhornia crassipes);* 4) hydrilla (*Hydrilla verticillata);* and 5) curly leaf pondweed (*Potamogeton crispus).* Two other AIS - zebra mussel *(Dreissena polymorpha)* and quagga mussel *(Dreissena rostriformis bugensis)* – do not occur within 200 mi of the Project, but are included here because of the serious concern for these species in California. Table 3.3.3-6 lists these four mollusks (snails and bivalves), eight aquatic plants and one amphibian, and provides information, including listing status, on each. Each of the AIS is described below.

Table 3.3.3-6. Aquatic invasive species known or with the potential to occur in the Project Vicinity.

Common Name/ Scientific Name	Status	Habitat Requirements	Located Within Project Vicinity
MOLLUSKS			
Asian clam *Corbicula fluminea*	--	Freshwater lakes, reservoirs and streams, and often bury themselves in sandy, bottom sediments	Yes. In 2014, Asian clams were reported in Camp Far West Reservoir at NSRA and SSRA boat launches
Zebra mussel *Dreissena polymorpha*	Federal Lacey Act (18 U.S.C. 42) lists zebra mussels as injurious wildlife. C.C.R. 14 Section 671(c)(10), Restricted Species F.G.C. §§ 2301 and 2302 regulates dreissenid mussel.	Freshwater lakes, reservoirs and streams and colonize any stable substrate	No. Closest known location of zebra mussels is San Justo Reservoir in California, approximately 200 mi south of the Project
Quagga mussel *Dreissena rostriformis bugensis*	C.C.R. 14 Section 671(c)(10), Restricted Species F.G.C. §§ 2301 and 2302 regulates dreissenid mussel.	Freshwater lakes, reservoirs and streams and colonize soft and hard substrates	No. Closest known occurrence is in Southern California, over 500 mi away
New Zealand mudsnail *Potamopyrgus antipodarum*	C.C.R. 14 Section 671(c)(10), Restricted Species	Freshwater and brackish lakes, reservoirs and streams	No. Closest known occurrence is on the Yuba River below the Highway 20 bridge, approximately 10 mi from the Project
PLANTS			
Carolina fanwort *Cabomba caroliniana*	CDFA Q-rated	Mud of stagnant to slow-flowing water, including streams and smaller rivers	No. The closest occurrence to the Project is in Snodgrass Slough in Sacramento County, approximately 70 mi away
Brazilian waterweed *Egeria densa*	Cal-IPC 'high' species	Slowly moving non-turbid shallow waters of lakes, springs, ponds, streams, and sloughs	Yes, this species was reported as an occurrence in one of the coves of the northwestern portion of Camp Far West Reservoir (Cal-IPC 2018a)
Water hyacinth *Eichhornia crassipes*	Cal-IPC 'high' species CDFA C-rated	Both natural and man-made freshwater systems (e.g., ponds, sloughs and rivers)	No. The nearest occurrences of water hyacinth is just north of Mount Vernon Road,in the neighboring Lincoln quadrangle , about 15 miles southeast of Camp Far West Reservoir (Cal-IPC 2018a).
Hydrilla *Hydrilla verticillata*	C.C.R. 3 Section 3962(a)(1) Cal-IPC 'high' species CDFA A-rated	Freshwater lakes, ponds, and slow-moving waters	No, the closest occurrence of hydrilla to the Project is in Placer County (Wolf quadrangle), south of Fenton Ravine, approximately 1 mile south and downstream of Camp Far West Reservoir (Cal-IPC 2018a).
Floating water primrose *Ludwigia peploides ssp. montevidensis*	Cal-IPC 'high' species	Shallow, stagnant, nutrient-rich water such as flood control channels, irrigation ditches, and holding ponds	Yes. The species was located during SSWD's relicensing Botanical Resources Study at the NSRA and SSRA in Camp Far West Reservoir.

Table 3.3.3-6. (continued)

Common Name/ Scientific Name	Status	Habitat Requirements	Located Within Project Vicinity
PLANTS (cont'd)			
Parrot's feather milfoil *Myriophyllum aquaticum*	Cal-IPC 'high' species	Ponds, lakes, rivers, streams, canals, and ditches, usually in still or slow-moving water, but occasionally in faster-moving water of streams and rivers	Yes. The species has been reported to be located 0.5 mi northwest of Camp Far West Reservoir.
Eurasian watermilfoil *Myriophyllum spicatum*	Cal-IPC 'high' species CDFA C-rated	Surface of freshwater lakes, ponds, and slow-moving waters	Yes. The species has been reported to be located 0.5 mi northwest of Camp Far West Reservoir (Cal-IPC 2018a).
Curly leaf pondweed *Potamogeton crispus*	Cal-IPC 'moderate' species	Quiet waters, especially brackish, alkaline, or eutrophic waters of ponds, lakes, and streams	No. Curly leaf pondweed has been located about 12 miles south of the Project in Placer County (in neighboring Wolf quadrangle), but has not been documented from Camp Far West Reservoir (Cal-IPC 2018a).
AMPHIBIANS			
American bullfrog *Lithobates catesbeianus*	--	Quiet waters of ponds, lakes, reservoirs, irrigation ditches, streams, and marshes	Yes. The species was located at multiple locations around Camp Far West Reservoir during SSWD's relicensing studies
Total	**13**		

Key:
Cal-IPC Inventory (Cal_IPC 2018a):
High: Species with severe ecological impacts; high rates of dispersal; ecologically widely-distributed
Moderate: Species with substantial and apparent ecological impacts; moderate to high rates of dispersal; ecologically limited to widespread
California Department of Food and Agriculture
A: Those organisms of known economic importance subject to state enforced action (i.e., eradication, quarantine regulation, containment, rejection or other holding action)
Q: Those organisms requiring temporary "A" action
C: Those organisms subject to no state-enforced action outside of nurseries except to retard spread OR no state-enforced action except to provide for pest cleanliness in nurseries.
Sources: Cal-IPC 2018a; CDFA 2018; USGS 2018a

Asian Clam

Asian clam is a small (around 0.2-in.), freshwater mollusk, native to temperate and tropical southern Asia, eastern Mediterranean and the Southeast Asian islands to Australia. This species was first located in the U.S. in 1938 in the Columbia River and is believed to have been brought by Chinese immigrants as food. People have spread the species through bait buckets, aquaculture and intentional introductions for consumption (USGS 2018b).

In California, Asian clams are also known in the Sacramento and San Joaquin drainages, Santa Barbara County south to San Diego County, the Salton Sea and the San Francisco Bay (USGS 2018b).

Asian clams can inhabit freshwater lakes, reservoirs and streams, and often bury themselves in sandy, bottom sediments. These clams can foul complex power and water systems and have temporarily closed down nuclear power plants and weakened concrete structures in the U.S. An inhibiting factor for the species is temperature, as they have a low tolerance to cold temperatures, which can cause their populations to fluctuate (USGS 2018c). Nonetheless, Asian clams are well-established in Lake Tahoe, an area with winter time freezing temperatures, at depths from 5 ft to 250 ft, though the individuals are smaller than those in warmer waters (TERC 2015). The species is also sensitive to salinity, drying, low pH and siltation (USGS 2018b).

Management methods for Asian clam include mechanical (e.g., scraping colonies off substrate), bottom barriers, suction removal and chemical and temperature alteration, though some of these techniques cannot be used in many water bodies (USGS 2018b).

In 2014, an unspecified number of Asian clam specimens were collected in Camp Far West Reservoir at the NSRA and SSRA boat launches (USGS 2018c).

Zebra Mussel

Zebra mussel is a small (around 0.2-in.), freshwater mollusk, native to the Black, Caspian and Azov seas. Ballast water discharge from a single commercial cargo ship into the Great Lakes in 1988 is responsible for their introduction into the U.S. Since then, larval drift and recreational and commercial boating have facilitated their spread (USGS 2018d).

Zebra mussel can inhabit freshwater lakes, reservoirs and streams and colonize any stable substrate. They can also settle on submerged plants and be transported with them on bait buckets, fishing gear or boats. These mussels can cause damage to hydroelectric facilities and ecosystems once they invade a system. They clog water intakes and fish screens, as well as impede recreation opportunities by growing on recreation facilities (Forest Service 2016).

Additionally, zebra mussels consume large quantities of microscopic plants and animals, which are the basis of native communities, and thus, lead to the disturbance of the natural ecosystem, harming plants and wildlife (USFWS 2011). A single female can lay 40,000 eggs in a single reproductive cycle and up to one million in a spawning season (USGS 2018d).

Zebra mussels can tolerate only very low salinity (USGS 2018d). Currently, the best scientific data indicates that if calcium levels are low (i.e., less than 12 mg/L), introduced adult zebra mussels will not survive and veligers will not develop (Claudi and Prescott 2011). Additionally, marginal sites can be determined for their ability to support dreissenids by the concentration of calcite. A minimum calcite value of ~0.9 is necessary for supporting dreissenids long-term (Prescott et al. 2014). There are other water quality parameters that appear to also limit the ability of zebra mussel adults to survive and veligers to successfully develop, including pH, hardness and water temperature. Calcium carbonate solubility increases as pH decreases. In spite of adequate calcium, if the pH is low (i.e., less than 7.3 units) shells will become thin as they lose calcium to the external environment (Claudi and Prescott 2011). However, initial introduction can occur under a broader range of conditions.

Extensive research is currently being conducted on the management of zebra mussel once it has invaded a waterbody and although there are promising leads; prevention is the only effective management strategy (USGS 2018d). Research on natural enemies, both in Europe and North America, has focused on predators, particularly birds (i.e., 36 species) and fish (i.e., 53 species that eat veligers and attached mussels). The vast majority of the organisms that are natural enemies in Europe are not present in North America. Ecologically similar species do exist; however, they have not been observed preying on dreissenids at levels that limit populations. In

California, native and non-native species predators include redear sunfish, smallmouth bass, diving ducks and crayfish (Hoddle 2011). At the San Justo Reservoir, the Bureau of Reclamation is conducting an experiment to eradicate the zebra mussel infestation using muriate of potash. As of December 2017, an experiment had been conducted to determine the response of the mussels to different doses. Future plans include treating all of San Justo Reservoir when funding is available (USBR 2017b).

The Federal Lacey Act (18 U.S.C. 42) lists zebra mussels as injurious wildlife, whose importation, possession, and shipment within the U.S. is prohibited. If found, any zebra mussels brought into the U.S. will be promptly destroyed or exported by the USFWS at the cost of the importer.

Under C.C.R. 14 § 671(c)(10), zebra mussels are listed as a Restricted Species, which means it is *"unlawful to import, transport, or possess (zebra mussels)…except under permit issued by the department."* Additionally, pursuant to this regulation, all species of *Dreissena* are termed "detrimental," which means they pose a threat to native wildlife, the agricultural interests of the state, or to public health or safety.

In addition, F.G.C. §§ 2301 and 2302 provide specific regulations on dreissenid mussels, including quagga and zebra mussels. F.G.C. § 2301 states that nobody shall: *"possess, import, ship, or transport in the state, or place, plant, or cause to be placed or planted in any water within the state, dreissenid mussels*." This law gives the director of CDFW, or his or her designee, the right to conduct inspections of conveyances, order conveyances to be drained, impound or quarantine conveyances, and close or restrict access to conveyances to prevent the importation, shipment, or transport of dreissenid mussels. Additionally, F.G.C. § 2301 requires a public or private agency that operates a water supply to prepare and implement a plan to control or eradicate dreissenid mussels if detected in their water system. This law also requires any entity which discovers dreissenid mussels to immediately report the finding to CDFW.

Pursuant to F.G.C. § 2302, any person, or Federal, state, or local agency, district, or authority that owns or manages a reservoir where recreational, boating, or fishing activities are permitted, shall: 1) assess the vulnerability of the reservoir for introduction of dreissenid mussels; and 2) develop and implement a program designed to prevent the introduction of dreissenid mussels. At a minimum, the prevention program shall include: public education, monitoring, and management of the recreational, boating, and fishing activities that are permitted. As of 2017, the CDFW has developed a Guidance for Developing a Dreissenid Mussel Prevention Program to include all the requisite pieces of the program (CDFW 2017b).

The closest current known location of zebra mussels to the Project Area is the currently-closed San Justo Reservoir in California, approximately 200 mi south of the Project (USBR 2017b). There are no other known zebra mussel occurrences in California or Nevada (USGS 2018e).

Quagga Mussel

Quagga mussel is a small (up to 1.6 in.) freshwater mollusk, native to the Dneiper River drainage of Ukraine and Ponto-Caspian Sea. Ballast water discharge from transoceanic liners carried mollusks to North America, and larval drift and recreational and commercial boating have facilitated their spread. Quagga mussels were first found in the U.S. in 1989 in the Great Lakes and have since moved west (USGS 2017).

Quagga mussels can inhabit freshwater lakes, reservoirs and streams and colonize soft and hard substrates. The mussels can cause tremendous damage to hydro facilities and aquatic ecosystems once they invade a system. They clog water intakes and fish screens, as well as impede recreation opportunities by growing on recreation facilities (USGS 2017).

In addition, quagga mussels consume large quantities of microscopic plants and animals, which are the basis of native communities, and thus, lead to the disturbance of the natural ecosystem, harming plants and wildlife (USFWS 2011). A single female can produce over a million eggs a year (USGS 2017).

In North America, quagga mussel cannot survive in water with salinity over 5 parts per thousand (USGS 2017). Currently, the best scientific data indicates that if calcium levels are low (less than 12 mg/L), introduced adult quagga mussels will not survive and veligers will not develop (Claudi and Prescott 2011). Additionally, marginal sites can be determined for their ability to support dreissenids by the concentration of calcite. A minimum calcite value of ~0.9 is necessary for supporting dreissenids long-term (Prescott et al. 2014). There are other water quality parameters that appear to also limit the ability of quagga mussel adults to survive and veligers to successfully develop, including pH, hardness and water temperature. Calcium carbonate solubility increases as pH decreases. In spite of adequate calcium, if the pH is low (less than 7.3 units), shells will become thin as they lose calcium to the external environment (Claudi and Prescott 2011). However, initial introduction can occur under a broader range of conditions.

Research is currently being conducted on the management of quagga mussel once it has invaded a waterbody; although there are promising leads, prevention is the only effective management strategy (USGS 2017). Research on natural enemies, both in Europe and North America, has focused on predators, particularly birds (i.e., 36 species) and fish (i.e., 53 species that eat veligers and attached mussels). The vast majority of the organisms that are natural enemies in Europe are not present in North America. Ecologically similar species do exist; however, they have not been observed preying on dreissenids at levels that limit populations. In California, native and non-native species predators include redear sunfish, smallmouth bass, diving ducks and crayfish (Hoddle 2011).

Under C.C.R. 14 § 671 (c)(10), quagga mussel is listed as a Restricted Species, which means it is *"unlawful to import, transport, or possess live (quagga mussels)…except under permit issued by the department."* Additionally, pursuant to this regulation, all species of *Dreissena* are termed "detrimental," which means they pose a threat to native wildlife, the agricultural interests of the state, or to public health or safety.

In addition, F.G.C. §§ 2301 and 2302 provide specific regulations on dreissenid mussels, including quagga and zebra mussels. F.G.C. § 2301 states that nobody shall: "*possess, import, ship, or transport in the state, or place, plant, or cause to be placed or planted in any water within the state, dreissenid mussels*." This law gives the director of the CDFW, or his or her designee, the right to conduct inspections of conveyances, order conveyances to be drained, impound or quarantine conveyances, and close or restrict access to conveyances to prevent the importation, shipment, or transport of dreissenid mussels. Additionally, F.G.C. § 2301 requires a public or private agency that operates a water supply to prepare and implement a plan to control or eradicate dreissenid mussels if detected in their water system. This law also requires any entity which discovers dreissenid mussels to immediately report the finding to CDFW.

Pursuant to F.G.C. § 2302, any person, or federal, state, or local agency, district, or authority that owns or manages a reservoir where recreational, boating, or fishing activities are permitted, shall: 1) assess the vulnerability of the reservoir for introduction of dreissenid mussels; and 2) develop and implement a program designed to prevent the introduction of dreissenid mussels. At a minimum, the prevention program shall include: public education, monitoring, and management of the recreational, boating, and fishing activities that are permitted. As of 2017, the CDFW has developed a Guidance for Developing a Dreissenid Mussel Prevention Program to include all the requisite pieces of the program (CDFW 2017b).

In California, quagga mussels are in Southern California, with the closest occurrence to the Project approximately 500 mi south (USGS 2018f).

New Zealand Mudsnail

New Zealand mudsnail is a small (around 0.16 to 0.24 in.), freshwater mollusk, native to the lakes and streams in New Zealand and nearby small islands. Ballast water discharge from commercial cargo ships into the Great Lakes is most likely responsible for their introduction into the U.S. Since then, recreationists and recreational and commercial boating have facilitated their spread westward (USGS 2018g).

New Zealand mudsnails can inhabit freshwater and brackish lakes, reservoirs and streams. They can tolerate siltation and benefit from disturbance and high nutrient flows. These snails can compete with other grazers and cause decreases in species richness. Reduction in algal production can rapidly reduce food resources for native species. An inhibiting factor for the species is temperature, as it cannot tolerate temperatures below freezing or above 93°F (USGS 2018g).

There are a couple of potential management strategies for New Zealand mudsnails, mostly for small waterbodies that can be isolated from the rest of a system. Methods include chemical control and draining water to allow substrate to heat and freeze. CDFW has suggested methods for decontaminating equipment and boats after using them in known infested waters (CDFW 2015a).

Under C.C.R. 14 § 671(c)(9)(A), New Zealand mudsnails are listed as a Restricted Species, which means it is "*unlawful to import, transport, or possess live (New Zealand mudsnail)…except under permit issued by the department.*" Additionally, pursuant to this regulation, New Zealand mudsnails are termed "detrimental," which means they pose a threat to native wildlife, the agricultural interests of the state, or to public health or safety.

The closest known location of New Zealand mudsnails to the Project is on the Yuba River downstream of the Highway 20 Bridge. The species is fairly widespread in California (USGS 2018h).

Carolina Fanwort

Carolina fanwort or fanwort is a submersed, sometimes floating, but often rooted, freshwater perennial plant. Its shoots are grass green to olive green or sometimes reddish brown. The leaves are of two types: submersed and floating. The submersed leaves are finely divided and arranged in pairs on the stem. The floating leaves, when present, are linear and inconspicuous, with an alternate arrangement. They are less than 0.5-in. long and narrow (i.e., less than 0.25-in.) (DiTomaso 2010). Flowers are on stalks rising from the tips of stems and are white to pink to purplish and about 0.5-in. across (DiTomaso et al. 2013)

Fanwort grows rooted in the mud of stagnant-to slow flowing water, including streams and smaller rivers. The plants flower from May to September. Although seeds are produced, there is little known about seed viability or soil longevity. Like most aquatic plants, fanwort reproduces vegetatively from small fragments. In the late summer, fanwort stems become brittle, which causes the plant to break apart, facilitating its distribution and invasion of new water bodies (DiTomaso 2010).

In California, there have been sightings of fanwort in Contra Costa, Sacramento, and San Joaquin counties, and it is present in the Sacramento-San Joaquin Delta. The species is native to the eastern U.S., but has spread beyond its range both in North America and on other continents (DiTomaso 2010).

Mechanical control can contribute to the spread of fanwort since it easily fragments, however a venture dredge, which acts like a giant vacuum cleaner, can minimize fragmentation and extract the rootball. Draining a waterbody can provide temporary control of fanwort; growth can be suppressed if areas are dewatered in high temperatures and allowed to dry or dewatered during hard freezes. Potential biological control agents have been identified and are currently being investigated in the laboratory in Argentina, but no successful field releases have been made. Some of the same herbicides used to control Brazilian waterweed and water hyacinth can be used to control fanwort (DiTomaso et al. 2013).

The closest occurrence to the Project is in Snodgrass Slough in Sacramento County, approximately 70 mi away (USGS 2018i).

Brazilian Waterweed

Brazilian waterweed[2] is a fast-growing, shallow-water perennial aquatic plant that grows rooted in mud, submerged or floating, with stems up to 15 ft long and 1/8-in. thick. Its leaves are small, smooth, spear-shaped, 1 to 2.5 in. long, 0.06 to 0.12-in. wide, arranged in whorls of three to six leaves, with many whorls along stem. It displays prominent

[2] Also known as "*Egeria elodea*" or "Brazilian elodea."

white flowers extending 1.5 in. above the water surface on long, thread-like flower tubes attached to stems (SFEI 2014; DiTomaso et al. 2013).

All populations of Brazilian waterweed in the western U.S. reproduce vegetatively by stolon and stem fragments as all plants are male and no fruit is produced. Although similar in appearance to hydrilla, Brazilian waterweed does not produce tubers or turions. Plants easily break into free-floating fragments and disperse to new areas by water flow, waterfowl, and human activities such as fishing and boating. However, only fragments with a double node can develop into new plants (DiTomaso et al. 2013).

Native to South America, Brazilian waterweed was introduced to California more than 30 years ago and now infests approximately 12,000 ac of the 61,619 surface ac of the Sacramento-San Joaquin Delta. Commonly sold as aquarium decor, it may have been introduced to the Delta when dumped by an aquarium owner (DBOW 2012). Brazilian waterweed is found throughout the California Central Valley, especially between Stockton and Butte counties, and in the Sacramento-San Joaquin Delta and tributaries.

Brazilian waterweed prefers slowly moving non-turbid shallow waters of lakes, springs, ponds, streams, and sloughs, rarely establishing itself greater than 20 ft below the surface. Brazilian waterweed’s growth is affected by nutrient status, light intensity, day length, temperature, turbidity, salinity, and rate of water flow. The plant inhabits acidic to alkaline waters and is highly susceptible to iron deficiencies and salinity. In the Delta, plants grow year-round with maximum growth occurring in the spring. Ideal temperatures range between 50°F and 80°F, but in climates with colder temperatures, Brazilian waterweed senesces in winter (SFEI 2014).

Mechanical control and herbicides are effective methods of control. However, Brazilian waterweed can propagate from small sections of stem, so repeated treatments are often necessary for full control (Cal-IPC 2018b). Triploid grass carp may be a good option for control, as Brazilian waterweed is one of its most preferred diets, although a permit is required from CDFW for possession and use of this species. DBOW conducts annual treatments for Brazilian waterweed and is the only agency in California authorized to use herbicides in the Delta and its tributaries. In 2016, DBOW conducted herbicide treatments from March through November, including in the Sacramento area, on 1,529 surface water acres (DBOW 2017).

Brazilian waterweed is given a “high” invasive plant rating by the Cal-IPC, meaning “*the species has severe ecological impacts on physical processes, plant and animal communities, and vegetation structure*” (Cal-IPC 2018b).

The nearest known Brazilian waterweed occurrence to the Project is a record within the Camp Far West quadrangle (i.e., not in or adjacent to the reservoir) in 2011 (Cal-IPC 2018a). The population within the quadrangle was noted as high in abundance, but not spreading due to a saturated ecological niche according to CalWeedMapper (Cal-IPC 2018a). Brazilian waterweed is currently not under management in this quadrangle (Cal-IPC 2018a).

Water Hyacinth

Water hyacinth is a free-floating perennial. It has bushy, fibrous roots and is often found in large mats on the water surface measuring tens or hundreds of feet in diameter. Seedlings are most often rooted in mud along shorelines or on floating mats. Leaves are round or oval and shiny green and 3 to 8 in. across. Buoyant bulbs are present at the base of the leaf stalks an attached to a thick erect stem which can grow up to 2 ft tall (DiTomaso et al. 2013; Cal-IPC 2018b). Water hyacinth flowers are pale blue, purple to whitish with six petals (Cal-IPC 2018b).

Water hyacinth can be found in both natural and man-made freshwater systems (e.g., ponds, sloughs and rivers). It cannot tolerate brackish or saline water with salinity levels above 1.8 percent. Water hyacinth obtains nutrients directly from the water and can double its size every ten days in hot weather. Water hyacinth's transpiration rate is calculated to be almost eight times the evaporation rate of open water. It alters water quality beneath the mats by lowering pH, dissolved oxygen and light levels, and increasing carbon dioxide and turbidity (Cal-IPC 2018b).

Vegetative reproduction occurs from late spring through fall. Water hyacinth reproduces primarily from pieces of runners, and in as little as a week, the number of individuals can double. Plant fragments can spread via a number of mechanisms, "daughter" plants break off and float downstream, or the stout leaves act like sails and float downstream en masse. Water hyacinth also reproduces by seed which can spread by water flow and clinging to the feet or feathers of birds. Seeds require warm, shallow water and high light intensity for germination. Seeds can remain viable in sediment for 15 to 20 years (Cal-IPC 2018b; DiTomaso et al. 2013).

Native to Central and South America, water hyacinth was introduced into the U.S. in 1884 as an ornamental plant for water gardens. By 1904, water hyacinth had made its way into Yolo County, California. In California, water hyacinth typically is found below 660 ft elevation in the Central Valley, San Francisco Bay Area, and South Coast (Cal-IPC 2018b). The Sacramento-San Joaquin Delta and several of the rivers draining into the Delta are heavily infested.

At present, aquatic herbicides remain the primary tools available to control water hyacinth. Two weevils and a moth have been introduced as biological controls, but have not demonstrated much success. Most animals, except rabbits, do not readily eat the plant, possibly because its leaves are 95 percent water and have a high tannin content (Cal-IPC 2018b). The DBOW conducts annual treatments for water hyacinth and is the only agency in California currently authorized to use herbicides in the Delta and tributaries. In 2014, DBOW treated 4,445 surface acres of water hyacinth with herbicides and an additional 4,100 surface acres mechanically (DBOW 2017).

Cal-IPC gives water hyacinth a "high" invasive plant rating, meaning 'the species has severe ecological impacts on physical processes, plant and animal communities, and vegetation structure' (Cal-IPC 2018b).

The nearest occurrences of water hyacinth to the Project Area is north of Mount Vernon Road, in the neighboring Lincoln quadrangle, about 15 miles southeast of Camp Far West Reservoir (Cal-IPC 2018a).

Hydrilla

The submerged aquatic perennial hydrilla has small spear-shaped leaves up to 1-in. long and 1 to 4 mm-wide, with toothed edges, arranged in whorls of usually 5 to 8 leaves, with many whorls along each stem. Typically, it is found in shallow (i.e., less than 11.5 ft) water, but if the water is clear enough it may be found growing to depths of 48 ft (DiTomaso et al. 2013; Cal-IPC 2018b).

Hydrilla grows rapidly in spring and summer, creating dense mats in freshwater lakes, ponds, and slow-moving waters. In spring, when water temperatures exceed 60°F, hydrilla begins to grow, producing large amounts of biomass by late summer and early fall. It can tolerate some salinity and is sometimes found in upper estuaries. It grows better on mud than on sand. Growth is enhanced in water with agricultural runoff that raises nutrient levels. Dieback of above-ground portions of the plant usually occurs in late fall and winter (Cal-IPC 2018b).

Hydrilla can reproduce by fragmentation of stems, rhizomes, root crowns, and by the production of tubers and turions. The plant is most likely to spread when fragments are carried into new waterbodies by recreational watercraft or water dispersal. Once established, it produces a bank of tubers and turions in the soil that may remain viable for three to five years (Cal-IPC 2018b).

Hydrilla was imported into the U.S. from Asia in the late 1950s for aquarium use. In California, hydrilla was first found in Yuba County in 1976 (Cal-IPC 2018b) and has since been found in 17 of California's 58 counties. The California Department of Food and Agriculture (CDFA) implements and eradication program specifically for hydrilla. The CDFA has successfully eradicated hydrilla from fourteen counties and currently conducts hydrilla eradication efforts in four counties throughout California integrating various methods of control, though the last posted report is from 2013 (CDFA 2018). The closest occurrence of hydrilla to the Project is in Placer County about 4 miles away in a pond (USGS 2018j).

Manual removal of hydrilla can be used for small infestations, but herbicides are usually necessary for large infestations. Sterile triploid grass carp (*Ctenopharyngodon idella*) are approved for hydrilla control in the Imperial Irrigation District drainage system in southeastern California by permit issued by CDFW (Cal-IPC 2018b, SFEI 2014).

Hydrilla is listed by the CDFA as an A-rated noxious weed, which means "*a pest of known economic or environmental detriment and is either not known to be established in California or it is present in a limited distribution that allows for the possibility of eradication or successful containment* (and is) *subject to state enforced action involving eradication, quarantine regulation, containment, rejection, or other holding action*" (CDFA 2015). CDFA implements an ongoing program to eradicate hydrilla from California. Yuba and Nevada counties are designated hydrilla eradication areas pursuant to C.C.R. 3 § 3962(a)(1). Cal-IPC gives hydrilla an invasive plant rating of "high," meaning "*the species has severe ecological impacts on physical processes, plant and animal communities, and vegetation structure*" (Cal-IPC 2018b).

The closest occurrence of hydrilla to the Project is in Placer County (Wolf quadrangle), south of Fenton Ravine, approximately 1 mile south and downstream of Camp Far West Reservoir (Cal-IPC 2018a).

Water Primrose

Several native and non-native water primrose species are found in California. Native species include floating water primrose (*Ludwigia peploides peploides*). Non-native species include Uruguay water-primrose (*L. hexapetala*) and creeping water primrose (*L. peploides* ssp. *montevidensis*), among others. Water primrose is part of the aquatic plant Subfamily Ludwigioideae (Family Onagraceae), of which most species are native to South America. Water primroses are floating to emergent perennials with stems up to 10 ft long. Flowers have five petals and are bright yellow (DiTomaso et al. 2013). Stems form dense mats in waterways, reaching above and below the water surface (Cal-IPC 2018b).

Water primrose is found throughout the central and northern Central Valley, especially in Sacramento, Yuba, and Sutter counties and the Sacramento-San Joaquin Delta.

Water primrose reproduces vegetatively (roots, rhizomes, and plant fragments) and by seed, although seedlings are rarely encountered (DiTomaso et al. 2013). Water primrose establishes in areas with disturbed hydrology, high nutrient loading and flooding. The species favors areas of shallow, stagnant, nutrient-rich water such as flood control channels, irrigation ditches, and holding ponds. It is a freshwater aquatic vascular plant that is able to persist in both wet and dry transitional zones, such as lakes, ponds, reservoirs, rivers, stream, canals, bogs, marshes, riparian and bottomland habitats (Cal-IPC 2018b).

Water primrose's main mode of dispersal is by flowing water when floating mats or shoots break off, however water primrose fragments can catch onto boats and other watercraft which spreads plants to new areas. The species has also been documented to be consumed and possibly transported by ducks and other waterfowl. It is a common ornamental plant and believed to be widely-spread by humans. Since it thrives in nutrient-rich waters, its spread may be facilitated by nursery cultivation/commercial use and animals (Cal-IPC 2018b).

Water primrose is rated as a "high" level invasive by the Cal-IPC, meaning "*the species has severe ecological impacts on physical processes, plant and animal communities, and vegetation structure*" (Cal-IPC 2018b).

Incidental sightings of creeping water primrose were found in ponds within the Camp Far West Reservoir Project off of the NSRA and SSRA during SSWD's Botanical Resources Study.

Parrot's Feather Milfoil

Parrot's feather milfoil is a stout aquatic perennial that forms dense mats of intertwined brownish rhizomes in water (CDFA 2016). Stems are mostly submerged and can grow up to 16 ft in length. Submersed leaves are arranged in whorls of three to six per node; emergent leaves are similar in appearance but are slightly thicker. Additionally, emerged leaves are light gray-green and resemble a bottlebrush. The bottlebrush appearance results from the fact that the leaves appear in whorls of four to six at each node and each leaf is feather-like, the blade divided into twenty-four to thirty-six thread-like segments. Unlike other milfoils (*Myriophyllum* spp.), parrot's feather stems may grow as much as 8 in. above the water surface (DiTomaso et al. 2013).

Parrot's feather milfoil occurs in ponds, lakes, rivers, streams, canals, and ditches, usually in still or slow-moving water, but occasionally in faster-moving water of streams and rivers. It tolerates soft to very hard water and a pH range of 5.5 to 9.0. It does not tolerate brackish water and requires high light conditions (USGS 2018k). In north and central California, it is wide spread through the Central Valley and North Coast, especially in Mendocino, Butte, Yuba, and Sutter counties, with occurrences also in Nevada and Placer counties.

Introduced from South America as an aquarium plant and pond ornamental in the late 1800s to early 1900s, parrot's feather milfoil grows best in tropical regions and can survive freezing by becoming dormant. In California, parrot's feather milfoil grows most rapidly from March until September. In spring, shoots begin to grow rapidly from overwintering rhizomes as water temperature increases. Underwater leaves tend to senesce as the season advances. Plants usually flower in the spring, but may also flower in the fall (CDFA 2016).

With its tough rhizomes, parrot's feather milfoil can be transported long distances on boat trailers. Any rhizome or stem sections with at least one node, even as small as 0.2-in. long, can root and establish new plants. Rhizomes stored under moist conditions in a refrigerator survived for one year. Once rooted, these new plants produce rhizomes that spread through sediments and stems that grow until they reach the water surface (CDFA 2016). Most plants in its introduced range are female, thus only populations within its native range develop seed (DiTomaso et al. 2013).

Biological, mechanical, and chemical controls have all been attempted by researchers. Of the available methods, chemical control seems to hold the most promise for control of this milfoil. Biological control is largely ineffective, with many typical aquatic herbivores finding the plant unpalatable. Mechanical control is difficult because of the species' ability to regenerate from a small fragment of the original plant and its rapid growth rate, requiring many repeated treatments to control an infestation. There are several chemical treatments that have shown promise, but many do not specifically target milfoil and may damage native aquatic species as well (Cal-IPC 2018).

Parrot's feather milfoil is listed by the CDFA as a C-rated noxious weed, which means "*A pest of known economic or environmental detriment and, if present in California, it is usually widespread. If found in the state, they are subject to regulations designed to retard spread or to suppress at the discretion of the individual county agricultural commissioner. There is no state enforced action other than providing for pest cleanliness*" (CDFA 2016).

Parrot's feather milfoil is given a "high" invasive plant rating by the Cal-IPC, meaning "*the species has severe ecological impacts on physical processes, plant and animal communities, and vegetation structure*" (Cal-IPC 2018b).

The species was reported to be located 0.5 mi northwest outside of Camp Far West Reservoir, but within the NSRA (Cal-IPC 2018a). The population within the Camp Far West quadrangle is being managed and decreasing (Cal-IPC 2018a).

Eurasian Watermilfoil

Eurasian watermilfoil grows submerged, rooted in mud or sand, with branching stems 12 to 20 ft long that widen towards the root. Its leaves are finely divided, feather-like, 0.5 to 1.5 in. long and whorled in groups of 3 to 6 (commonly 4) around the stem. Its spike of flowers, 1.5 to 3.0 in. long, extends up from water surface, typically pink (DiTomaso et al. 2013).

Watermilfoil grows rapidly in spring (March-April), creating dense mats on the surface of freshwater lakes, ponds, and slow-moving waters (Cal-IPC 2018b). In the early 1990s, it was present, but uncommon, in San Francisco Bay Area's ditches and lake margins, as well as in the Sacramento-San Joaquin Delta (SFEI 2014). The University of Reno reports that in 2002, Eurasian watermilfoil covered over 160 ac of Lake Tahoe (Donaldson and Johnson 2002). Watermilfoil is now widespread throughout California, especially through the Central Valley in the Sacramento River Watershed, its tributaries, and the Delta.

The key factor for the establishment of Eurasian watermilfoil is still water (Donaldson and Johnson 2002). Eurasian watermilfoil reproduction is primarily vegetative via rhizomes, stem fragments, and axillary buds. Some populations produce seeds, although seed reproduction appears to be insignificant (DiTomaso et al. 2013). Watermilfoil can tolerate a wide range of environmental conditions, including low light levels, high or low nutrient waters, and freezing water temperatures. In waters where temperatures do not drop below 50°F, there is little seasonal die-back; high temperatures promote multiple periods of flowering and fragmentation. Eurasian watermilfoil also creates its own habitat by trapping sediment and initiating a favorable environment for further establishment. It is an opportunistic species that prefers disturbed substrates with much nutrient runoff (Cal-IPC 2018b). This watermilfoil can grow on sandy, silty, or rocky substrates, but grows best in fertile, fine-textured, inorganic sediments. The plant will thrive in brackish waters with a salinity of up to 10 parts per thousand. As the plant is easily spread by vegetative fragments, transport on boating equipment plays the largest role in contaminating new water bodies. A single stem fragment hitching a ride on a boat or trailer can spread the plant from lake to lake (Donaldson and Johnson 2002).

Efforts are underway to identify insects which are native to Nevada or California that prey on the plant and help control Eurasian watermilfoil. A North American native milfoil weevil (*Euhrychiopsis lecontei*) has been identified in several studies in other states and Canada as a possible control species. Triploid grass carp may also be an effective biocontrol mechanism; however, grass carp prefer other submerged plants, including native species, to watermilfoil (DiTomaso et al. 2013). Other control techniques for this species includes mechanical removal, herbicide treatment, benthic barriers (such as mats to prevent establishment), and tillage (Cal-IPC 2018b). Mechanical removal can help remove stem densities, but escaped stem fragments can drift to other areas and develop into new plants (DiTomaso et al. 2013). The most effective technique is to prevent its spread to and establishment in new waterbodies.

Eurasian watermilfoil is given a "high" invasive plant rating by the Cal-IPC, meaning "*the species has severe ecological impacts on physical processes, plant and animal communities, and vegetation structure*" (Cal-IPC 2018b).

The species has been reported to be located 0.5 mi northwest outside of Camp Far West Reservoir, but within the NSRA (Cal-IPC 2018a).

Curly Leaf Pondweed

The genus *Potamogeton* contains many widespread, variable species that are difficult to tell apart (Cal-IPC 2018b). All are native to California, except curly leaf pondweed, whose distinguishing characteristic is very wavy (undulate) leaves. Native to Eurasia, Africa and Australia, curly leaf pondweed can grow up to 0.8-in. in length and be found in water as deep as 4.7 in. (DiTomaso et al. 2013).

Most pondweeds reproduce vegetatively from rhizomes or stem fragments. Curly leaf pondweed is unusual as it both flowers and fruits in late spring and early summer, at which time it also produces turions, a wintering bud resembling brown pinecones, that becomes detached and remains dormant at the bottom of the water body it inhabits (Cal-IPC 2018b; DiTomaso et al. 2013). Turions can survive unfavorable conditions. The plants become dormant over the summer and decay, contributing to eutrophic conditions, leaving only their fruits and turions in the waterbody. The turions germinate in late summer or fall, and the plants overwinter as small plants only a few centimeters in size. Growth then continues as the water begins warming in the spring (DiTomaso et al. 2013).

Curly leaf pondweed is widely distributed throughout California, and is found throughout the Central Valley and northern Sierra foothills. The plant's production of both seed and turions makes it resistant to disturbance such as dredging. Their small size allows them to be easily transported attached to waterfowl, boats, or fishing gear (Cal-IPC 2018b).

Laboratory and field studies have found that germination is generally controlled by temperature, light intensity, photoperiod, and anoxic conditions. It grows in the fine substrates and quiet (standing or slow moving) calcium-rich waters of lakes, reservoirs, ponds, rivers, streams, springs, small ponds and ditches and is tolerant of a wide-range of water quality conditions. It can grow in clear to turbid and polluted waters, and in alkaline or brackish waters; and it is tolerant of significant nutrient pollution. The species is shade intolerant (Cal-IPC 2018b).

Effective control of curly leaf pondweed is difficult because of its vegetative reproduction. Mechanical removal can help remove stem densities, but escaped stem fragments can drift to other areas and develop into new plants. Bottom barriers can be used to cover and smother pondweed infestations. Dredging can be used to remove infestations in canals and other waterbodies. Pond drawdowns or canal detwatering may be used to suppress growth of pondweed, but plants can still resprout from rhizomes in moist, cool bottom sediments (DiTomaso et al. 2013). Triploid grass carp (*Ctenopharyngodon idella*) have also been used as a biological control mechanism, however these fish do not selectively feed on non-native plants and a permit is required by CDFW for possession and use of these fish in California. Broadcast chemical control has proved to be effective, but can damage native species (Cal-IPC 2018b).

Curly leaf pondweed is rated as a "moderate" invasive plant by the California Invasive Plant Council (Cal-IPC), which means the "*species has substantial and apparent - but generally not* *severe - ecological impacts on physical processes, plant and animal communities, and vegetation structure*" (Cal-IPC 2018b).

Curly leaf pondweed has been located about 12 miles south of the Project in in Nevada Placer County and (in neighboring Wolf quadrangle), but has not been documented from Camp Far West Reservoir (Cal-IPC 2018a).

American Bullfrog

The American bullfrog is a large frog with an average snout to vent length ranging between 3.5 and 8 in. Its color varies, with most individuals being light green to dark olive green, with dark spots and blotches. Adult American bullfrogs are opportunistic feeders taking insects, worms, crustaceans, birds, bats, rodents, lizards, snakes, turtles, newts, and other frogs and tadpoles (Nafis 2018; CDFW 2017a).

American bullfrogs occur near permanent or semi-permanent water throughout California, including the quiet waters of ponds, lakes, reservoirs, irrigation ditches, streams, and marshes.

In California, breeding and egg-laying occur from March to July (CDFW 2017a). Reproduction begins when the air temperature reaches a certain level (measured at one location in Kansas at 70°F [Nafis 2018]). Females deposit 10,000 to 20,000 eggs in disk-shaped masses about 1 egg thick and 1 ft to 5 ft in diameter. Eggs are deposited among aquatic plants or brush growing on the bottom. In some localities, they may produce more than one clutch per season. Tadpoles use shallow waters near shore while completing development, which can take up to 6 months. Individuals in many populations overwinter as tadpoles and transform during their second year (CDFW 2017a).

As demonstrated by their diet and high tadpole survival rates, bullfrogs are adaptable. In addition, they are not as sensitive to temperature and pollution as California's native frogs. Bullfrogs are found at elevation ranges from sea level to 6000 ft (Zeiner et al. 1988). In desert regions, they occur along the Mojave and Colorado rivers and in areas where irrigation creates suitable habitat. Bullfrogs can travel great distances, especially during wet periods (CDFW 2017a).

Native to central and eastern North America, American bullfrogs were introduced to California and the West for their meat (legs), as biological controls for insects, and accidentally during fish stocking. Most fish appear to be averse to eating American bullfrog tadpoles because of their undesirable taste and, other than people, the adult American bullfrog has few predators. Nevertheless, American bullfrog tadpoles, and some adults, are preyed upon by aquatic insects, fish, garter snakes, wading birds, and probably a few nocturnal mammals (CDFW 2017a).

As a result of their feeding behaviors and adaptability to natural and manmade aquatic environments, all lifestages of American bullfrogs prey upon and are able to out-compete native frogs and other aquatic species. Additionally, American bullfrogs are a known carrier of chytrid fungus, which causes the potentially fatal skin disease in frogs called chytridiomycosis. Chytridomycosis is believed to be a leading cause of the decline of native amphibian populations all over the world and responsible for the extinction of over 100 species since the 1970s (CDFW 2017a).

Management methods for American bullfrogs are limited to localized populations, as eradicating bullfrogs from large waterbodies is currently infeasible. Currently, there are only a few methods for managing bullfrogs, including chemical control, bullfrog-specific traps and hunting. Prevention remains the best means of management (Snow and Witmer 2010).

American bullfrogs were located at multiple locations during SSWD's relicensing studies at Camp Far West Reservoir in 2017, including at both recreation areas. The findings are discussed below.

3.3.3.1.3 Aquatic Resources of the Bear River Area

Information regarding aquatic resources in the Project Vicinity is provided below by: 1) immediately upstream of the Project (NID's Lake Combie to Camp Far West Reservoir); 2) within Camp Far West Reservoir; and 3) from Camp Far West Dam to the Feather River (i.e., lower Bear River). Information regarding mercury in fish, including fish ingestion advisories is discussed in Section 3.3.2.1.4 of this Exhibit E.

Upstream of the Project

Fish

Table 3.3.3-7 lists 12 fishes that are known or suspected to occur in the Bear River upstream of Camp Far Reservoir. For the most part, the fish assemblage is composed of native warmwater species.

Table 3.3.3-7. Fish species know to occur or with the potential to occur upstream, within, and downstream of the Project in alphabetical order.

Common Name	Scientific Name	Status	Native / Introduced	Upstream of Camp Far West Reservoir	In Camp Far West Reservoir	Downstream of Camp Far West Reservoir
American shad	*Alosa sapidissima*	--	I	NR	O	P
Black bullhead	*Ameriurus melas*	--	I	NR	O	NR
Black crappie	*Pomoxis nigromaculatus*	--	I	NR	O	NR
Bluegill	*Lepomis macrochirus*	--	I	NR	O	O
Brown bullhead	*Ameriurus nudbulosus*	--	I	NR	O	NR
Brown trout	*Salmo trutta*	--	I	NR	O	NR
Channel catfish	*Ictalurus punctatus*	--	I	NR	O	O
Chinook salmon	*Oncorynchus tshawytscha*	NMFS-S, CSC	N	NA	NA	O
Common carp	*Cyprinus carpio*	--	I	NR	O	O
Common shiner	*Luxilus cornutus*	--	I	NR	NR	O
Goldfish	*Carassius auratus*	--	I	NR	O	O
Green sturgeon	*Acipenser medirostris*	FT	N	NA	NA	P
Green sunfish	*Lepomis cyanellus*	--	I	NR	O	O

Table 3.3.3-7. (continued)

Common Name	Scientific Name	Status	Native / Introduced	Upstream of Camp Far West Reservoir	In Camp Far West Reservoir	Downstream of Camp Far West Reservoir
Hardhead	*Mylopharodon conocephalus*	CSC	N	P	O	P
Inland silverside	*Menidia beryllina*	--	I	NR	O	O
Largemouth bass	*Micropterus salmoides*	--	I	NR	O	O
Steelhead / Rainbow trout	*Oncorynchus mykiss*	FT[1]	N	O	P	O
Mosquitofish	*Gambusia affinis*	--	I	NR	NR	O
Pacific lamprey	*Entosphenus tridentatus*	--	N	NA	NA	O
Prickly sculpin	*Cottus asper*	--	N	P	P	O
Pumpkinseed	*Lepomis gibbosus*	--	I	NR	NR	O
Redear sunfish	*Lepomis microlophus*	--	I	NR	O	O
Riffle sculpin	*Cottus gulosus*	--	N	P	P	O
Sacramento hitch	*Lavinia exilicauda*	--	N	P	O	P
Sacramento perch	*Archoplites interruptus*	--	N	P	O	P
Sacramento pikeminnow	*Ptychocheilus grandis*	--	N	O	O	O
Sacramento splittail	*Pogonichthys macrolepidotus*	CSC	N	NA	NA	P
Sacramento sucker	*Catostomus occidentalis*	--	N	O	O	O
Sacramento-San Joaquin roach	*Lavinia s. symmetricus*	CSC	N	P	P	P
Smallmouth bass	*Micropterus dolomieu*	--	I	O	O	O
Speckled dace	*Rhinichthys osculus ssp.*	--	N	P	P	P
Spotted bass	*Micropterus punctulatus*	--	I	O	O	O
Striped bass	*Morone saxitilis*	--	I	NR	O	P
Threadfin shad	*Dorosoma petenense*	--	I	NR	O	NR
White sturgeon	*Acipenser transmontanous*	CSC	N	NA	NA	P
White catfish	*Ameiurus catus*	--	I	NR	O	O
White crappie	*Pomoxis annularis*	--	I	NR	O	O
	Subtotal	*7*	--	*12 – 10 Native, 2 Introduced*	*29 – 10 Native, 19 Introduced*	*33 – 15 Native, 18 Introduced*
	Total	**37 Species**				

Sources: CDFW 2012b, ECORP 2014, CDFW unpublished data

Key: O = observed, P = potential to occur (based on available information), NR = no record, NA = outside of historic range; N = Native; I = Introduced, NMFS-S = NMFS Species of Concern, CSC = California Species of Special Concern, FT = Threatened under ESA

[1] The anadromous form of *O. mykiss* is federally threatened, although the resident form is not recognized under this listing.

Yardas and Eberhart (2005) identified flow-related improvement needs and opportunities along with identifying key challenges in the reach between Camp Far West Reservoir and NID's Lake Combie. They concluded that contemporary conditions in this section of the Bear River are such that ecological justifications for improved flows are limited, especially when compared to the lower Bear River or the various foothill streams that continue to support anadromous fish. The authors state that colder water temperatures due to improved summer/fall flows may help to reduce the potential for mercury methylation in this reach and Camp Far West Reservoir, but could also lead to potential conflicts with non-native fisheries. Yardas and Eberhart also noted that any change to flows would require the development of multiple agreements and understandings with various agencies, companies, districts, and private water rights holders.

In addition, Yardas and Eberhart (2005) cite John Hiscox (CDFW biologist, retired) who states that the reach between Lake Combie and Camp Far West Reservoir is reputed to be a renowned area for bass fishing. He surmises during high flow events, game fish likely wash into the river from stocked ponds on private property. Mr. Hiscox states this reach is predominantly located in a deep canyon such that improved flows would likely provide few riparian benefits, and that the reach is predominantly private land holdings and provides few opportunities for public access.

Mr. Hiscox speculated that flow improvements below Combie Dam may result in both operational and structural improvement needs.

The North Central Region (NCR) (CDFW 2012a) conducted fish community surveys in October 2011 including two locations in the Bear River: 1) upstream of Camp Far West Reservoir (BR 1); and 2) downstream of Lake Combie (BR 2). The fish community surveys focused on collecting reconnaissance level fish community data utilizing single or multiple pass depletion electrofishing methods. Data relative to species composition, temporal and spatial distribution, and presence or absence of species were collected.

At the sampling location upstream of Camp Far West Reservoir (BR1), a total of 54 fish representing four species was collected during the survey. Species collected were represented by smallmouth bass (n=26, 48.1%), Sacramento sucker (n=21, 38.9%), Sacramento pikeminnow (n=5, 9.3%) and rainbow trout (n=2, 3.7%). Only six smallmouth bass were collected at the sampling location downstream of Lake Combie Dam (BR2).

At the request of NID, ECORP Consulting, Inc. (ECORP) (ECORP 2014) conducted reach assessments within an approximately 5.5 mi section of the Bear River from Lake Combie to Wolf Creek to define and understand the aquatic and sediment resources. A total of 50 smallmouth bass and two spotted bass (*Micropterus punctulatus*) were observed in mid-channel pool and flatwater habitats. Most (78%) of the smallmouth bass were young-of-year and the two spotted bass were in the 1+ age class.

<u>Benthic Macroinvertebrates</u>
As part of ECORP's (2014) study, benthic macroinvertebrate (BMI) samples were collected and identified. In general, Ephemeroptera (EPT) taxa (mayflies, stoneflies, caddisflies), which are important prey items for fish, were present in relatively low quantity. There was also a greater abundance of tolerant species (e.g. blackflies) than intolerant species (e.g. midges), indicating the Bear River is a warm-water system with more environmental stressors. When compared with other area rivers (South Fork American River, North Fork Mokelumne River, and Middle Fork Yuba River), the Bear River in the area examined by ECORP had the lowest species diversity (i.e. taxa richness) and the lowest quantity of EPT taxa.

In 2013, one sample collection was conducted in the Bear River upstream of Camp Far West Reservoir, near Little Wolf Creek (RM 24.0), as part of the Surface Water Ambient Monitoring Program (SWAMP) Statewide Perennial Streams Assessment (SWRCB 2013). While the data provided did not include any BMI metric calculations, the 14 orders and 30 families identified during sampling suggest a diverse assemblage of BMIs (Table 3.3.3-8). However, only seven of the 30 families found were from the EPT taxa suggesting a more stressed warm-water system.

Table 3.3.3-8. Orders and families of aquatic macroinvertebrates that were found at one location in the Bear River (upstream of the Project).

Order	Amphipoda (scuds)	Basommatophora (snails)	Coleoptera (aquatic beetles)	Odonata (dramsel and dragonflies)	Trombidiformes (mites)	Hemiptera (true bugs)
Family	Hyalellidae	Planorbidae	Elmidae	Coenagrionidae	Hygrobatidae	Naucoridae
	Crangonyctidae	Physidae	Psephenidae	--	Torrenticolidae	--
Order	**Ephemeroptera (mayflies)**	**Veneroida (clams)**	**Rhynchobdellida (leeches)**	**Lepidoptera (aquatic moths)**	**Megaloptera (hellgrammites)**	**Hoplonemertea (worms)**
Family	Caenidae	Corbiculidae	Glossiphoniidae	Pyralidae	Corydalidae	Tetrastemmatidae
	Baetidae	--	--	--	--	--
	Leptohyphidae	--	--	--	--	--
Order	**Diptera (true flies)**	**Trichoptera (caddisflies)**	--	--	--	--
Family	Ceratopogonidae	Helicopsychidae	--	--	--	--
	Chironomidae	Hydroptilidae	--	--	--	--
	Ceratopogonidae	Hydropsychidae	--	--	--	--
	Simuliidae	Philopotamidae	--	--	--	--
	Empididae	Leptoceridae	--	--	--	--

Source: SWRCB 2013.

Camp Far West Reservoir

Fish

Camp Far West Reservoir supports a warmwater fishery, primarily for bass. Table 3.3.3-7 lists 29 fishes that are known or suspected to occur in Camp Far West Reservoir, two-thirds of which are introduced species.

Since Camp Far West Reservoir's enlargement in 1963, stocking of warmwater game fish species by CDFW has occurred. Largemouth bass (*Micropterus salmoides*), smallmouth bass, redear sunfish, white crappie (*Pomoxis annularis*), and channel catfish (*Ictalurus punctatus*) were the first species stocked in the reservoir by CDFG. In 1965, CDFG decided to create a striped bass (*Morone saxatilis*) sport fishery in Camp Far West Reservoir. Stocking records and memoranda between CDFG employees indicated that the striped bass fishery never took hold in the reservoir. In the late 1960s, CDFG's stocking of striped bass ceased and CDFG's efforts shifted to focus on improving the smallmouth bass fishery. Limited available data documented fish survey and stocking records from 1964 through 1985, with some missing years, were obtained from CDFW and are summarized in Table 3.3.3-9 (CDFG unpublished data). There is currently no stocking in Camp Far West Reservoir by SSWD or any Resource Agency.

Table 3.3.3-9. Camp Far West Reservoir stocking records summary from 1964 to 1985, with missing years excluded from row entries.

Year	Common Name	Scientific Name	Lifestage	Quantity (pounds)
1964	Largemouth bass	*Micropterus salmoides*	NA[1]	60,734
	Smallmouth bass	*Micropterus dolomieu*	NA	8,098
	Redear sunfish	*Lepomis microlophus*	NA	12,000
	White crappie	*Pomoxis annularis*	NA	249
	Channel catfish	*Ictalurus punctatus*	NA	10,000
1966	Smallmouth bass	*Micropterus dolomieu*	Fry	18,500
	Striped bass	*Morone saxitilis*	NA	18,707
1967	Smallmouth bass	*Micropterus dolomieu*	Fry, Fingerlings	24,000
	Striped bass	*Morone saxitilis*	NA	23,835
1973	Smallmouth bass	*Micropterus dolomieu*	Fry	1,500,000
1976	Smallmouth bass	*Micropterus dolomieu*	Yearlings	5,050
1978	Smallmouth bass	*Micropterus dolomieu*	Yearlings	5,050

Table 3.3.3-9. (continued)

Year	Common Name	Scientific Name	Lifestage	Quantity (pounds)
1979	Smallmouth bass	*Micropterus dolomieu*	NA	430
	Channel catfish	*Ictalurus punctatus*	NA	4,030
1980	Smallmouth bass	*Micropterus dolomieu*	NA	4,300
1985	Spotted bass	*Micropterus punctulatus*	Adults	40
Total				7 Species 1,659,023 Pounds

Source: CDFG unpublished data.
[1] Information not available from CDFW.

In addition to the species listed in Table 3.3.3-9, CDFW records indicated that white catfish (*Ameiurus catus*) and threadfin shad (*Dorosoma petenense*) were stocked prior to 1980, but no additional details were available (CDFW unpublished data).

Internal memoranda between CDFG staff in the 1970s and 1980s also indicated the presence of 11 fishes in Camp Far West Reservoir, not stocked by CDFW, including: 1) bluegill; 2) green sunfish (*L. cyanellus*); 3) Sacramento perch; 4) brown bullhead (*Ameiurus nebulosus*); 5) black bullhead (*A. melas*); 6) common carp (*Cyprinus carpio*); 7) Sacramento hitch; 8) hardhead; 9) Sacramento sucker; 10) American shad (*Alosa sapidissima*) and; 11) Sacramento pikeminnow.

More recently, in April 2012, CDFG (CDFG 2012b) conducted boat electrofishing surveys at nine sites in Camp Far West Reservoir. The total numbers of individuals for each species are summarized is Table 3.3.3-10, but no other information was available.

Table 3.3.3-10. CDFG 2012 Camp Far West Reservoir boat electrofishing summary of capture in descending order of abundance.

Common Name	Scientific Name	Individuals Captured
Spotted bass	*Micropterus punctulatus*	446
Bluegill	*Lepomis macrochirus*	65
Sacramento sucker	*Catostomus occidentalis*	51
White catfish	*Ameiurus catus*	20
Channel catfish	*Ictalurus punctatus*	13
Inland silverside	*Menidia beryllina*	10
Green sunfish	*Lepomis cyanellus*	8
Largemouth bass	*Micropterus salmoides*	8
Common carp	*Cyprinus carpio*	7
Smallmouth bass	*Micropterus dolomieu*	6
Redear sunfish	*Lepomis microlophus*	5
Threadfin shad	*Dorosoma petenense*	4
Goldfish	*Carassius auratus*	3
Black crappie	*Pomoxis nigromaculatus*	2
Sacramento perch	*Archoplites interruptus*	1
Brown trout	*Salmo trutta*	1
Total Catch	--	**650**
Total Species	--	**16**

Source: CDFG 2012b

Lower Bear River

As context for this discussion, in June 2015, October 2016 and August 2017, SSWD evaluated the Bear River between Camp Far West Dam and the Feather River for habitat features and channel characteristics. Meso-habitat types are dominated by pools, short riffles, runs, and long glides. The average gradient of the Bear River is generally less than 0.5 percent, with few falls, cascades, chutes, rapids, step runs, pocket water, or sheet flow habitat types. The substrate of the mapped units in the majority of the channel is dominated by gravel with mostly cobble sub-dominant. Sand is a minor component though is often the subdominant substrate present. Increasing amounts of exposed bedrock and cobble substrates occur closer to the non-Project diversion dam. Very little silt occurs in the active channel, though the banks are often composed of finer, sandy/silty material. Figure 3.3.3-1 and Table 3.3.3-11 provide the results of this mapping exercise. Additional discussion regarding habitat mapping is provided in Section 3.3.1 of this Exhibit E.

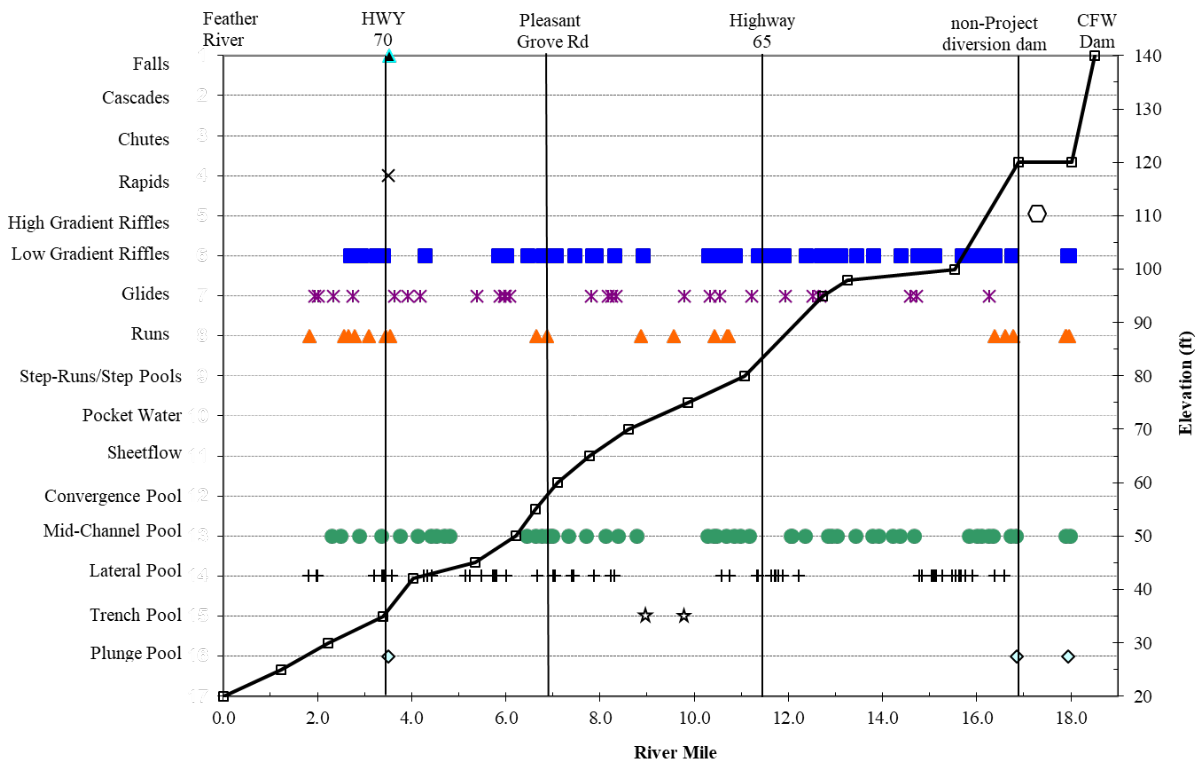

Figure 3.3.3-1. Longitudinal profile and habitat types mapped in the lower Bear River.

Table 3.3.3-11. Dominant, subdominant and bank substrate total length and frequency in the Bear River where measurements could be taken in a safe manner.

Substrate Type	Dominant Substrate		Subdominant Substrate		Bank Substrate	
	Total Length (ft)	Frequency (%)	Total Length (ft)	Frequency (%)	Total Length (ft)	Frequency (%)
Bedrock	696	4	603	4	872	7
Boulder	538	3	0	0	538	4
Cobble	4,893	27	4,577	29	1,257	10
Gravel	10,179	56	5,496	35	3,269	27
Sand	1,753	10	3,849	24	2,996	24
Silt	0	0	1,282	8	3,478	28
Total	**18,059**	**100**	**15,807**	**100**	**12,410**	**100**

LWM was quantified during SSWD's habitat mapping effort. All pieces within the active channel (1.5 yr frequency elevation) that were larger than 4-in diameter at the large end, and longer than 3 ft were tallied. LWM concentration ranged between 18 and 65 pieces per mile (1.1 to 4.0 pieces/100 m), and most of the pieces were within the wetted channel. The highest concentration of LWM was located between Highway 70 and Pleasant Grove bridges, and the lowest concentration was between Highway 65 (RM 11.5) and the CEMEX gravel operation (RM 14.2). The riparian area of the lower Bear River is heavily modified by levees and agricultural modifications, so the LWM recruitment potential is very low and outside of the control of Project operations. Additional discussion of LWM is provided in Section 3.3.1 of this Exhibit E.

<u>Fishes</u>

Table 3.3.3-7 lists 33 fishes that are known or suspected to occur in the lower Bear River, which for the most part are introduced and native warmwater species, with some anadromous salmonids. The most abundant species are centrarchids, occupying all reaches of the lower Bear River. Native species observed included Pacific lamprey, prickly sculpin, Sacramento sucker, Sacramento pikeminnow, and riffle sculpin. Adult Chinook salmon were observed during SSWD's redd surveys and juveniles were observed during the fish population surveys. No adult *O. mykiss* were observed, although a small number of *O. mykiss* parr were observed during the fish population surveys.

SSWD did not observe any sturgeon in the lower Bear River during its studies. However, on March 28, 2017, DWR biologists reported detecting 24 adult sturgeon while conducting DIDSON surveys in the lower 1 mile of the Bear River. During that same time period, DWR staff reported they received anecdotal reports of anglers landing sturgeon in Wheatland just above the Highway 65 Bridge. On March 19, 2018, DWR repeated the DIDSON survey in the lower Bear River and reported detecting a total of 37 adult sturgeon within 1 mile of the Feather River confluence. During the survey, DWR staff reported watching an angler hook and land four white sturgeon approximately 0.5 mi upstream from the confluence with the Feather River. Additionally, DWR staff reported that a friend of a DWR biologist hooked and landed an adult white sturgeon on the Bear River on March 18, 2018 (A. Seesholtz, pers. comm., 2018).

SSWD's Fish Population Surveys

As part of its relicensing studies, SSWD partitioned the Bear River into five reaches: 1) Camp Far West Dam to the non-Project diversion dam; 2) the non-Project diversion dam to the Highway 65 Bridge; 3) Highway 65 Bridge to the Pleasant Grove Bridge; 4) the Pleasant Grove Bridge to the Highway 70 Bridge; and 5) Highway 70 Bridge to the Feather River (Table 3.3.3-12).

Table 3.3.3-12. Bear River reach designations.

Reach	Upstream Location	Upstream River Mile	Downstream Location	Downstream River Mile	Distance (River Miles)
1	Camp Far West Dam	18.1	Non-Project Diversion Dam	16.9	1.2
2	Non-Project Diversion Dam	16.9	Highway 65 Bridge	11.4	5.5
3	Highway 65 Bridge	11.4	Pleasant Grove Road Bridge	6.8	4.6
4	Pleasant Grove Road Bridge	6.8	Highway 70 Bridge	3.5	3.3
5	Highway 70 Bridge	3.5	Feather River Confluence	0.0	3.5
				Total	**18.1**

Table 3.3.3-13 provides the specific locations at which SSWD conducted backpack and boat electrofishing, composite snorkel and seine surveys, and eDNA sampling.

Table 3.3.3-13. Methods, dates, and locations of sampling events for Study 3.2.

Reach	Survey Type	River Mile	Date of Survey(s)	Latitude	Longitude
Reach 1	Backpack Electrofishing	17.8	10/27/2017	39.0484111	121.3192528
Reach 1	Boat Electrofishing	17.0	9/10/2018	39.042564	121.330631
Reach 2	eDNA	16.9	2/22/2017, 3/8/2017	39.0417222	121.3322222
Reach 2	eDNA	16.7	2/22/2017, 3/8/2017	39.0394444	121.3347500
Reach 2	Snorkel/Seine	15.0	10/25/2017	39.0233500	121.3544417
Reach 2	Snorkel/Seine	15.0	4/24/2018	39.02234	121.35386
Reach 2	Snorkel/Seine	15.0	5/21/2018	39.02242	121.35387
Reach 2	Snorkel/Seine	15.0	6/21/2018	39.02239	121.35389
Reach 3	eDNA	11.4	2/23/2017, 3/8/2017	38.9996667	121.4072222
Reach 3	Snorkel/Seine	7.8	10/24/2017	38.9879889	121.4692667
Reach 3	Snorkel/Seine	7.8	4/25/2018	38.98764	121.47198
Reach 3	Snorkel/Seine	7.8	5/22/2018	38.98765	121.471918
Reach 3	Snorkel/Seine	7.8	6/20/2018	38.98775	121.472000
Reach 4	eDNA	5.1	3/1/2017, 3/15/2017	38.9783056	121.5166389
Reach 4	Snorkel/Seine	4.5	10/26/2017	38.9736389	121.5244111
Reach 4	Snorkel/Seine	4.5	4/26/2018	38.97362	121.52636
Reach 4	Snorkel/Seine	4.5	5/23/2018	38.960045	121.527953
Reach 4	Snorkel/Seine	4.5	6/19/2018	38.973611	121.526333
Reach 4	eDNA	4.0	3/1/2017, 3/15/2017	38.9740833	121.5349167
Reach 5	eDNA	0.6	2/28/2017, 3/15/2017	38.9434722	121.5709444

Figure 3.3.3-2 through Figure 3.3.3-4 show the locations and detections of fishes where SSWD conducted backpack and boat electrofishing, composite snorkel and seine surveys).

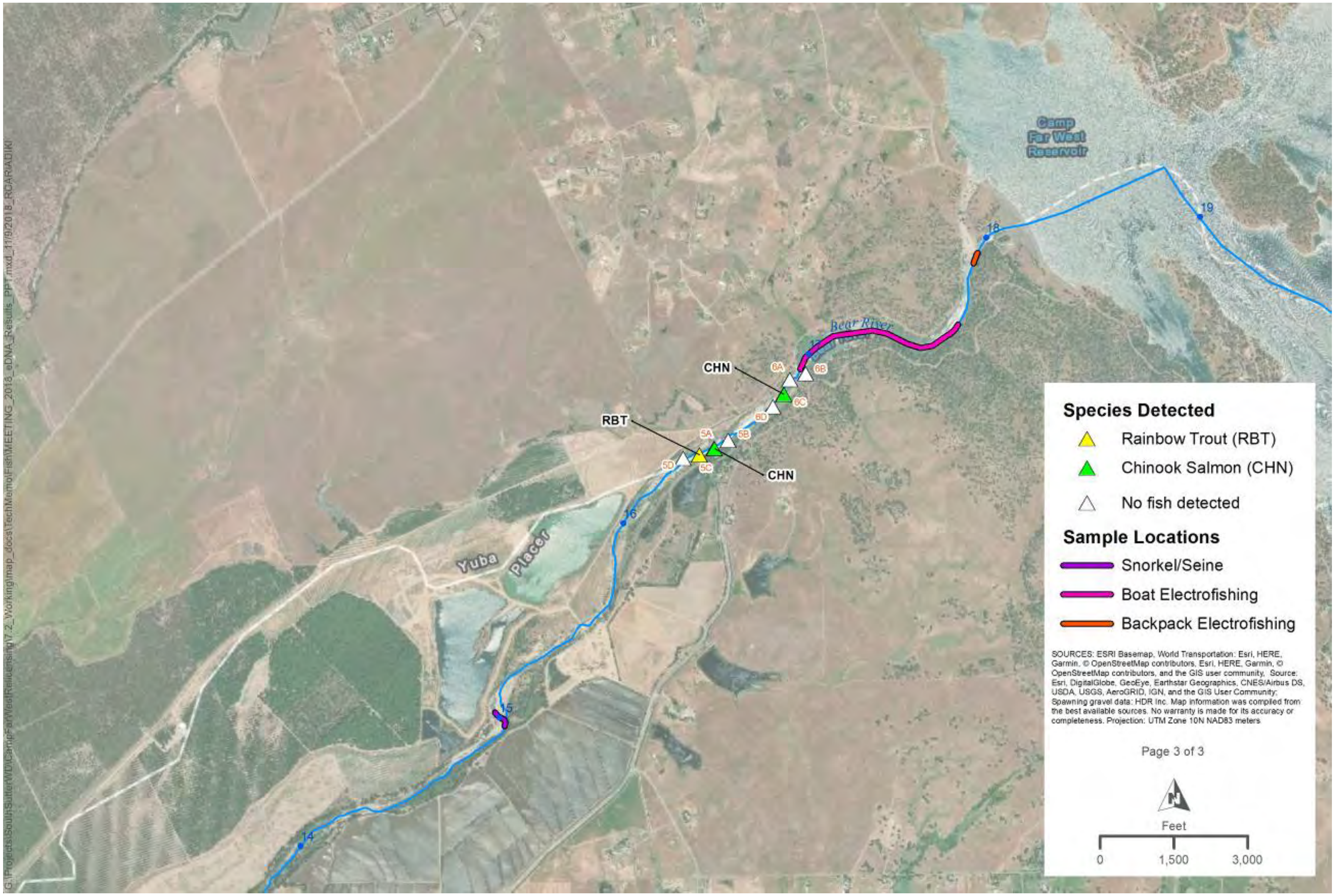

Figure 3.3.3-2. Lower Bear River Reaches 1 and 2 boat electrofishing, backpack electrofishing and snorkeling and seining sampling sites and eDNA detections.

Figure 3.3.3-3. Lower Bear River Reach 3 snorkeling and seining sampling sites and eDNA detections.

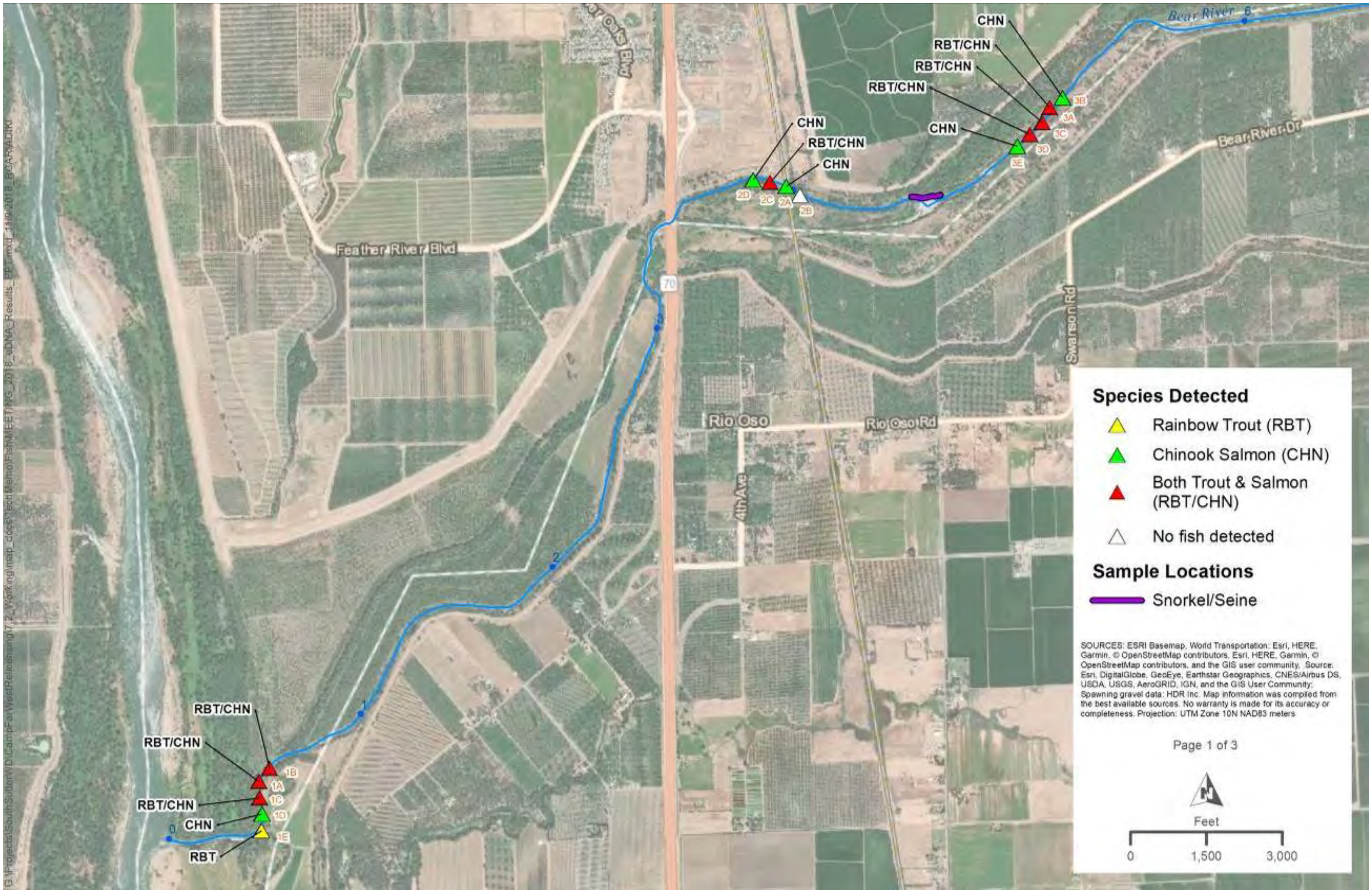

Figure 3.3.3-4. Lower Bear River Reach 4 snorkeling and seining sampling site and eDNA detections in Reaches 4 and 5.

Fish Population Surveys - Reach 1

SSWD found 14 warmwater, non-native fishes and Sacramento sucker, a native coldwater species, in Reach 1 (Table 3.3.3-14). Detailed results are provided below. In addition, 2018 summer observations made in Reaches 2 through 4 as part of water transfer fish surveys on July 24-26 and August 29-31 validated many of the general species guilds with observations of bass/sunfish, suckers, carp, and catfish. Chinook salmon and sturgeon were not observed during the summer survey period.

Table 3.3.3-14. Fishes, in alphabetical order, found in Reaches 1 through 4 during SSWD's relicensing fish population surveys.

Common Name	Scientific Name	Reach 1	Reach 2	Reach 3	Reach 4
Bluegill	*Lepomis macrochirus*	Be, Bo	Sn, Se	Sn	Sn, Se
Centrachid sp. (unknown)	--	--	--	--	Sn
Channel catfish	*Ictalurus punctatus*	Be, Bo	--	--	Sn
Chinook salmon	*Oncorynchus tshawytscha*		Sn, Se, eDNA, R	Sn, Se, eDNA, R	Sn, Se, eDNA, R
Common carp	*Cyprinus carpio*	Bo	--	--	--
Goldfish	*Carassius auratus*	Bo	--	--	--
Green sunfish	*Lepomis cyanellus*	Be, Bo	Se	Sn	Sn, Se
Inland silverside	*Menidia beryllina*	Bo	Se	--	--
Lamprey (ammocete)	*Entosphenus* spp.		Se	--	--
Largemouth bass	*Micropterus salmoides*	Bo	--	--	--
Minnow sp. (unknown)	--	--	Sn	Sn	Sn
Mosquitofish	*Gambusia affinis*	Be	Sn, Se	Sn	Sn, Se
Prickly sculpin	*Cottus asper*	--	Sn	--	--
Pumpkinseed	*Lepomis gibbosus*	--	Se	--	Se
Rainbow trout	*Oncorynchus mykiss*	--	eDNA	Sn, Se, eDNA	eDNA
Redear sunfish	*Lepomis microlophus*	Bo	--		Sn
Rifle sculpin	*Cottus gulosus*	--	--		Se
Sacramento pikeminnow	*Ptychocheilus grandis*	--	Sn, Se	Sn	Sn
Sacramento sucker	*Catostomus occidentalis*	Bo	Sn, Se	Sn	Sn, Se
Shiner spp. (unknown)		Be	--		--
Smallmouth bass	*Micropterus dolomieu*	--	--	Sn	Sn
Spotted bass	*Micropterus punctulatus*	Be, Bo	Sn, Se	Sn, Se	Sn, Se
Sculpin sp. (unknown)		--	Sn		--
White catfish	*Ameiurus catus*	Bo	--		Sn
White crappie	*Pomoxis annularis*	Be	--		--
	Subtotal	*14*	*14*	*10*	*16*
	Total	**25**			

Key: Sn = snorkeling; Ba = backpack electrofishing; Bo = boat electrofishings; Se = seining; WT = observed during SSWD's visual surveys related to a 2018 water transfer; eDNA = eDNA sampling targeted Chinook salmon; *O. mykiss*; green sturgeon; and 4) white sturgeon; R = Chinook salmon redd observed.

As observed during the fish population survey, the stream fish population sample site in Reach 1 was represented by a series of riffle, pool, and glide habitat units. The channel and substrate was visibly composed of bedrock with moderate amounts of cobble. Depth was minimal and averaged 0.2 m (Table 3.3.3-15). Few locations in Reach 1 are suitable for backpack electrofishing, since most of this reach is below the inundation elevation of the non-Project diversion impoundment. The site sampled using backpack electrofishing was representative of the short, riverine portion of Reach 1.

Table 3.3.3-15. Habitat characteristics for Reach 1 backpack electrofishing site.

Habitat Characteristics		Reach 1
Timing	Sample date	October 27, 2017
Water Quality	Air temp. (C)	16.0
	Water temp. (C)	12.9
	Dissolved oxygen (mg/l)	9.8
	Conductivity (µS)	88.7
Site Characteristics	Elevation (m msl)	41.1
	Rivermile	17.8
	Site length (m)	83.8
	Average site width (m)	7.2
	Average depth (m)	0.2
	Average Maximum depth (m)	1.0
	Estimated Flow	16 cfs
Habitat Characteristics	Dominant substrate	Bedrock/Cobble
	Sub-dominant substrate	Gravel
	Number of Large Woody Debris Pieces	0
	Suitable spawning gravel (sq ft)	0
	Low-gradient riffle	38%
	% Glide	15%
	% Mid-channel Pool	45%
	% Chute	3%

In the backpack electrofishing site, multi-pass depletion sampling was conducted using two Smith Root LR-24 backpack electrofishers in October 2017. Sampling resulted in the capture of 176 individuals representing seven warmwater, non-native species. Green sunfish and spotted bass were more abundant (n=86 and n=53, respectively). Mosquitofish also represented a large proportion of the catch (24%). Spotted bass showed the broadest range of size classes (Fork Length, FL: 49 to 167mm) and represented the highest biomass (6.7 lbs/ac). Fulton's condition for spotted bass averaged above 1.0, which is considered good. Relative condition was variable with broad ranges for most species (Table 3.3.3-16 and Figure 3.3.3-5).

Table 3.3.3-16. Population summary of backpack electrofishing site in Reach 1.

Summary Metrics		Species						
		Green Sunfish	**Spotted Bass**	**Mosquitofish**	**Bluegill**	**Channel Catfish**	**Shiner spp.**	**White Crappie**
Abundance	No. captured by pass (total)	43-30-13 (86)	42-6-5 (53)	9-11-4 (24)	6-2-2 (10)	0-1-0 (1)	0-1-0 (1)	0-1-0 (1)
	Estimated abundance	104	53	33	10	1	1	1
	95% CI	83-125	51-55	11-55	7-13	1-1	1-1	1-1
	Fish/100m[1]	124.1	63.2	39.4	11.9	1.2	1.2	1.2
	Fish/mi[1]	1,996.8	1,017.6	633.6	192.0	19.2	19.2	19.2
Length (mm)	Range (Average)	32-98 (63)	49-167 (85)	21-50 (36)	52-103 (79)	112	55	56
Weight (g)	Total	396.1	498.1	13	70.1	7.3	1.5	1.3
	Range (Average)	0.4-17.1 (4.6)	1.2-53.7 (9.4)	0.1-1.3 (0.5)	2.1-15.0 (7.0)	7.3	1.5	1.3
	Total estimated weight (g)	479.0	498.1	17.9	70.0	7.3	1.5	1.3
	Weight (g)/100m	472.6	594.2	15.5	83.6	8.7	1.8	1.6
	lbs/ac	6.5	6.7	0.2	0.9	0.1	<0.1	<0.1
	kg/ha	8.0	8.3	0.3	1.2	0.1	0.03	0.02
Condition Factor	Relative – range[1]	0.67-1.42	0.73-1.89	0.51-1.83	0.44-1.22	N/A	N/A	N/A
	Fulton's – range (average)[2]	N/A	0.86-2.21 (1.17)	N/A	N/A	0.52	N/A	N/A

[1] Relative condition factor not calculated for species when n=1.
[2] Fulton's condition factor not calculated for species without a fusiform body shape, non-game species, or when n=1.

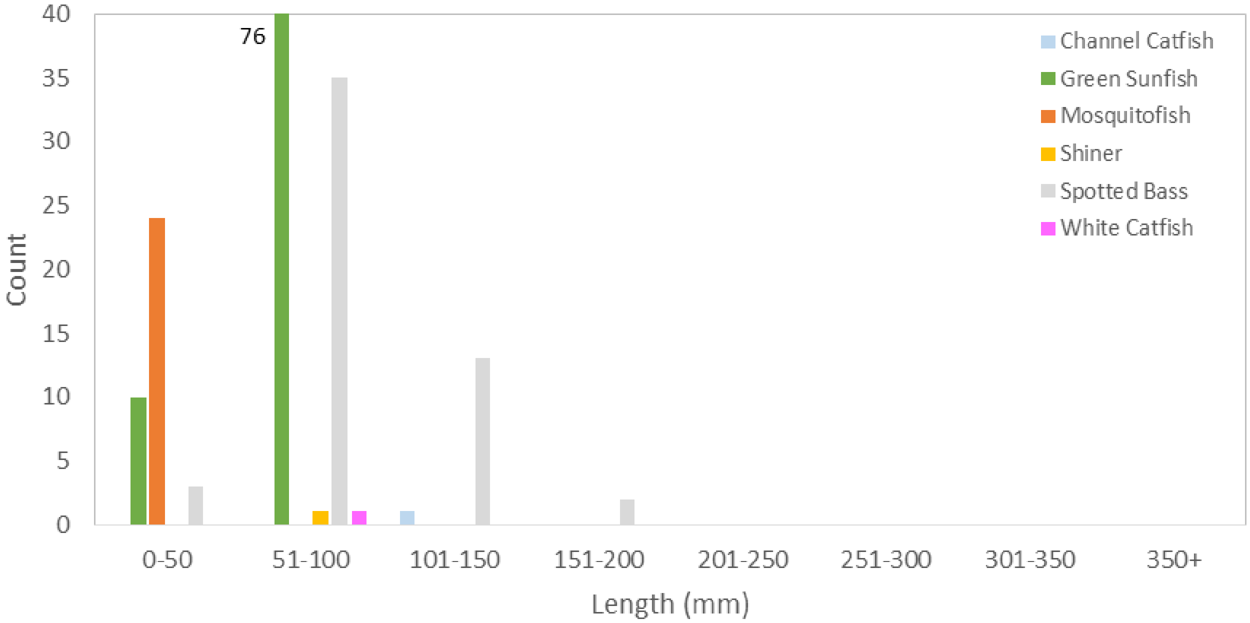

Figure 3.3.3-5. Length-frequency of fishes collected during electrofishing in Reach 1.

The impounded portion of Reach 1 was also sampled in September 2018 by boat electrofishing using a Smith Root 5.0 GPP system. The effort was divided into five unique habitat units defined by their dominant characteristics: 1) shoal and dam; 2) emergent and overhanging vegetation; 3) shoal with artificial structure; 4) drop off and overhanging vegetation; 5) and mid-channel (Figure 3.3.3-6). Average sampled depths ranged from 1.5 to 6 ft, with a maximum encountered depth of 14 ft. Boat electrofishing was completed in all areas where conditions allowed; areas of shallow water, large rocks, or heavy aquatic vegetation were not always suitable for sampling.

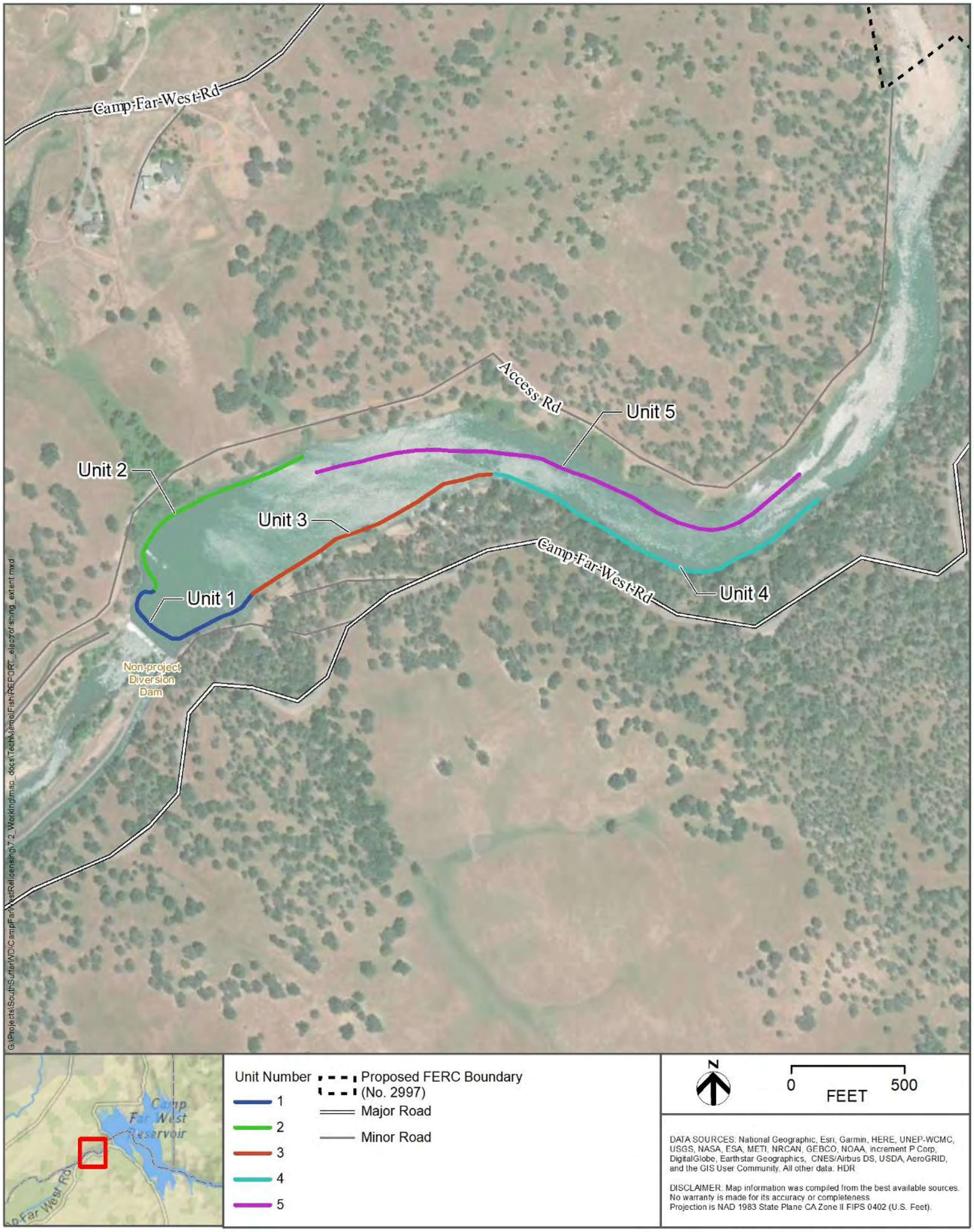

Figure 3.3.3-6. Locations of habitat units sampled during boat electrofishing.

A total of 285 individuals was captured. Bluegill (n=105), spotted bass (n=58), and Sacramento sucker (n=49) were the three more abundant species, respectively. Catch per unit effort (CPUE) (#/min) ranged from 0.8 to 5.39 per unit with an average of 2.8 over all units. Bluegill had the highest capture rate with a CPUE of 1.03 fish per minute (Table 3.3.3-17 and Figure 3.3.3-7). Units 2 and 3 yielded the highest numbers of fishes with 75 and 123 individuals captured, respectively. These units also produced the greatest number of species with 9 each (Table 3.3.3-18 and Figure 3.3.3-8).

Table 3.3.3-17. Population summary of boat electrofished habitat in Reach 1.

Common Name	Scientific Name	# Captured	Length (mm)		Weight (g)		Percent Composition	CPUE (#/min)
			Range	Mean	Range	Mean		
Bluegill	*Lepomis macrochirus*	105	62-162	109	3.7-96.9	28.5	36.8%	1.03
Spotted bass	*Micropterus punctulatus*	58	44-260	137	1.7-230.5	40.5	20.4%	0.57
Sacramento sucker	*Catostomus occidentalis*	49	76-495	412	4.2-1,540.0	913.4	17.2%	0.48
Green sunfish	*Lepomis cyanellus*	34	53-128	82	2.2-42.5	12.9	11.9%	0.33
Readear sunfish	*Lepomis microlophus*	19	70-179	128	16.0-114.9	43.6	6.7%	0.19
Silverside	*Menidia beryllina*	7	36-110	76	1.5-9.0	3.9	2.5%	0.07
Largemouth bass	*Micropterus salmoides*	5	147-400	230	38.0-890.0	279.2	1.8%	0.05
Common carp	*Cyprinus carpio*	4	507-571	539	2,170-3,450	2,670	1.4%	0.04
Goldfish	*Carassius auratus*	2	192-260	226	130-360	245	0.7%	0.02
Channel catfish	*Ictalurus punctatus*	1	482	482	1,160	1,160	0.4%	0.01
White catfish	*Ameiurus catus*	1	147	147	40.0	40.0	0.4%	0.01
Total	**11**	**285**	**--**	**--**	**--**	**--**	**100.0%**	**2.80**

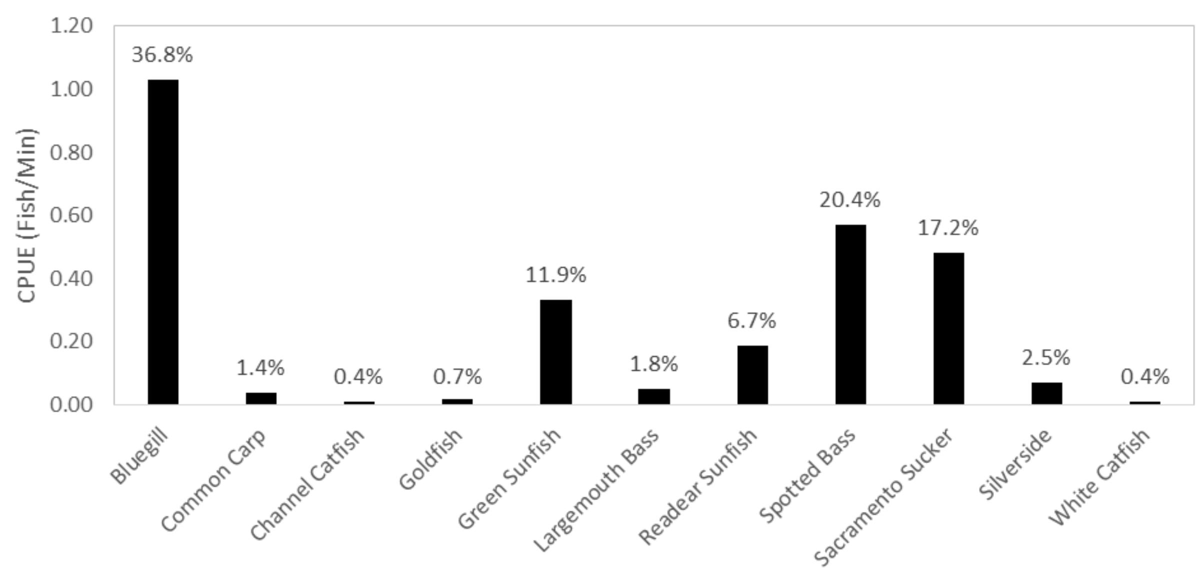

Figure 3.3.3-7. Overall CPUE (fish/min) with composition of species collected during boat electrofishing in Reach 1.

Table 3.3.3-18. Overall catch per unit effort (CPUE in fish/min) by habitat unit during boat electrofishing in Reach 1.

Species	Total Catch	Overall CPUE	Unit 1		Unit 2		Unit 3		Unit 4		Unit 5	
			Catch	CPUE	Catch	CPUE	Catch	CPUE	Catch	CPUE	Catch	CPUE
Bluegill	105	1.03	15	1.43	35	1.93	51	2.23	1	0.03	3	0.21
Spotted Bass	58	0.57	13	1.24	14	0.77	13	0.57	14	0.39	4	0.28
Sacramento Sucker	49	0.48	2	0.19	10	0.55	20	0.88	12	0.33	5	0.35
Green Sunfish	34	0.33	10	0.96	8	0.44	16	0.70	0	0.00	0	0.00
Readear Sunfish	19	0.19	1	0.10	3	0.17	15	0.66	0	0.00	0	0.00
Silverside	7	0.07	1	0.10	2	0.11	2	0.09	2	0.06	0	0.00
Largemouth Bass	5	0.05	0	0.00	1	0.06	4	0.18	0	0.00	0	0.00
Common Carp	4	0.04	1	0.10	0	0.00	1	0.04	0	0.00	2	0.14
Goldfish	2	0.02	0	0.00	1	0.06	1	0.04	0	0.00	0	0.00
Channel Catfish	1	0.01	0	0.00	1	0.06	0	0.00	0	0.00	0	0.00
White Catfish	1	0.01	0	0.00	0	0.00	0	0.00	0	0.00	1	0.07
Total Catch	**285**		**43**		**75**		**123**		**29**		**15**	
Overall #/min	**2.8**		**4.11**		**4.13**		**5.39**		**0.8**		**1.06**	

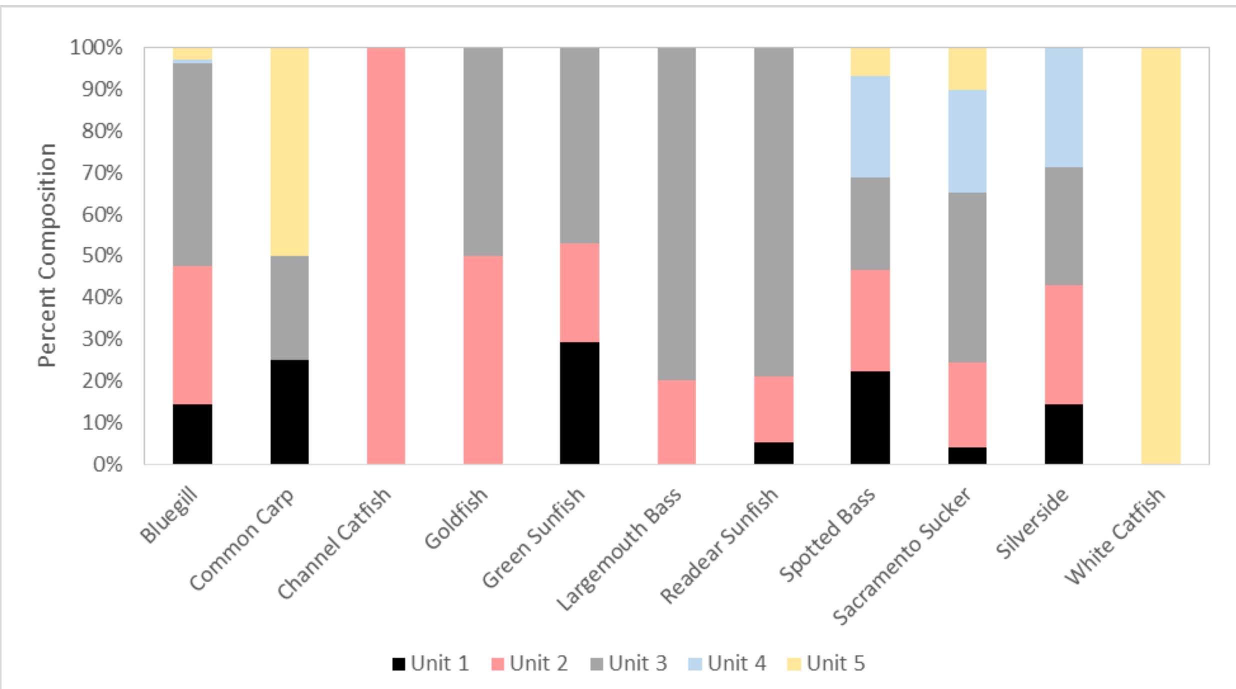

Figure 3.3.3-8. Percent composition by habitat unit during boat electrofishing in Reach 1.

Fish Population Surveys - Reaches 2 through 4

SSWD found 14, 10 and 16 fishes in Reaches 2, 3 and 4, respectively (Table 3.3.3-14). Most of the species were warmwater, introduced species. Detailed results by reach are provided below.

In accordance with Study 3.2, SSWD conducted snorkeling, seining, and eDNA sampling in Reaches 2 through 4. Fish population sample site selection prioritized representing available habitat within the selected reach and considered logistical feasibility. Sites in Reaches 2 and 3 were co-located with the Instream Flow Study sites for data comparability. The site in Reach 4 was located approximately 1 mi upstream of the Highway 70 Bridge where access was available and represented typical habitat. Table 3.3.3-19 describes habitat characteristics as observed during the fish population survey for these sites.

Table 3.3.3-19. Habitat characteristics for snorkel and seine sampling sites in Reaches 2 through 4.

Habitat Characteristics		Reach 2	Reach 3	Reach 4
Timing	Sample date	October 25, 2017 April 24, May 21, June 21, 2018	October 24, 2017 April 25, May 22, June 20, 2018	October 26, 2017 April 26, May 23, June 19, 2018
Water Quality[1]	Air temp. (C)	24.1-28.3 (26.6)	19.7-33.9 (26.1)	20.7-32.2 (26.9)
	Water temp. (C)	12.3-17.1 (15)	14.0-24.5 (19.6)	18.0-25.2 (21.1)
	Dissolved oxygen (mg/l)	9.08-10.70 (10.16)	7.79-10.40 (9.24)	7.40-10.50 (8.49)
	Conductivity (µS)	73.0-86.2 (77.1)	79.0-85.0 (82.7)	113.0-146.0 (130.7)
Site Characteristics[2]	Elevation (m msl)	29.3	21.3	20.1
	Rivermile	15	7.8	4.5
	Site length (m)[3]	139.4	265.6	170.5
	Average site width (m)	12.6	12.3	11.3
	Average depth (m)	0.5	0.3	0.6
	Average Maximum depth (m)	1.4	1.0	1.4
	Estimated Flow Range	16-246 cfs	16-37 cfs[4]	16-36 cfs[4]
Habitat Characteristics	Dominant substrate	Cobble	Gravel	Gravel
	Sub-dominant substrate	Gravel	Sand	Sand
	Fish passage impediments present	No	No	No
	Number of Large Woody Debris Pieces	0	0	0
	Suitable spawning gravel (sq ft)[5]	0-500	3,400-11,270	900-3,440
	% Low-gradient riffle	21	26	4
	% Run	11	6	7
	% Glide	8	15	26
	% Lateral Pool	27	14	0
	% Mid-channel Pool	33	38	47
	% Chute	0	2	>0
	% Trench Pool	0	0	15

1 Water quality parameters for reaches 2 through 4 are presented as a range and (average).
2 Site characteristics averaged overall all sampling events.
3 Site length fluctuated with changes in habitat and flows and is averaged over all sampling events.
4 Flows not available for the April sampling event.
5 Spawning gravel presented as a range through all sampling events.

A three-pass composite snorkel survey and three standardized 10 m seine hauls were completed once at each site in October 2017, and April, May, and June 2018. Seining was not completed in May for Reach 4 and in June for Reaches 3 and 4, because temperatures exceeded 21°C, the maximum allowed under SSWD's CDFW scientific collecting permit. October sampling yielded an assemblage of centrarchids, sculpin, Sacramento pikeminnow, and Sacramento sucker. The spring surveys showed similar species with the addition of salmonids. Sampling results are presented in Table 3.3.3-20 for snorkeling and Table 3.3.3-21 for seining.

Table 3.3.3-20. Population summary of snorkeled habitat units in Reaches 2 through 4.

Species	Abundance						Fork length (mm)	
	# Counted by Pass (Total)	% of Total Fish Counted	Estimated abundance	95% CI	Fish/100 m	Fish/mi	Min (bin)	Max (bin)
OCTOBER 2017								
SNORKELED REACH 2 - 145.4 Meters								
Mosquitofish	131-114-102 (347)	51.8%	116	113-118	80	1,280	0-50	0-50
Spotted Bass	71-76-83 (230)	34.3%	77	75-78	53	849	0-50	151-200
Sacramento Sucker	30-10-8 (48)	7.2%	16	10-22	11	177	0-50	151-200
Sacramento Pikeminnow	13-8-7 (28)	4.2%	9	7-11	6	103	51-100	151-200
Bluegill	4-9-4 (17)	2.5%	6	3-8	4	63	0-50	51-100
SNORKELED REACH 3 - 271.3 Meters								
Spotted Bass	127-162-181 (470)	57.7%	157	152-161	58	929	0-50	251-300
Mosquitofish	77-115-130 (322)	39.6%	107	102-113	40	637	0-50	0-50
Bluegill	7-3-6 (16)	2.0%	5	4-7	2	32	0-50	101-150
Sacramento Pikeminnow	2-2-2 (6)	0.7%	2	2	1	12	151-200	251-300
SNORKELED REACH 4 - 176.8 Meters								
Sunfish species.	45-66-83 (194)	49.6%	65	60-69	37	589	0-50	201-250
Spotted Bass	40-36-30 (106)	27.1%	35	34-37	20	321	0-50	301-350
Mosquitofish	30-30-30 (90)	23.0%	30	30	17	273	0-50	0-50
Sacramento Pikeminnow	0-1-0 (1)	1.0%	1	1.0	1	9	101-150	101-150
APRIL 2018								
SNORKELED REACH 2 - 140.21 Meters								
Chinook Salmon	99-100-76 (275)	98.92%	92	89-95	65	1,052	0-50	51-100
Spotted Bass	0-0-2 (2)	0.72%	1	2	1	8	0-50	51-100
Mosquito Fish	1-0-0 (1)	0.36%	1	1	<1	4	0-50	0-50
SNORKELED REACH 3 - 270.97 Meters								
Chinook Salmon	198-270-282 (750)	75.53%	250	244-256	92	1,485	0-50	101-150
Unknown Minnow	155-0-0 (155)	15.61%	52	27-76	19	307	0-50	0-50
Bluegill	5-9-21 (35)	3.52%	12	7-17	4	69	0-50	151-200
Spotted Bass	6-11-15 (32)	3.22%	11	8-14	4	63	0-50	301-350
Rainbow Trout	10-1-6 (17)	1.71%	6	2-10	2	34	0-50	51-100
Smallmouth Bass	1-0-1 (2)	0.20%	1	1.0	<1	4	>350	>350
Sacramento Pikeminnow	1-1-0 (2)	0.20%	1	1	<1	4	51-100	101-150

Table 3.3.3-20. (continued)

Species	Abundance						Fork length (mm)	
	# Counted by Pass (Total)	% of Total Fish Counted	Estimated abundance	95% CI	Fish/100 m	Fish/mi	Min (bin)	Max (bin)
APRIL 2018 (cont'd)								
SNORKELED REACH 4 - 174.80 Meters								
Chinook Salmon	16-11-7 (34)	75.56%	11	9-14	7	104	0-50	51-100
Bluegill	0-1-7 (8)	17.78%	3	0-8	2	25	0-50	151-200
Spotted Bass	0-0-3 (3)	6.67%	1	0-4	1	9	51-100	101-150
MAY 2018								
SNORKELED REACH 2 - 119.48 Meters								
Unknown Minnow	5-35-35 (75)	45.18%	25	18-32	21	337	0-50	0-50
Chinook Salmon	3-36-33 (72)	43.37%	24	17-31	20	323	51-100	151-200
Spotted Bass	1-1-10 (12)	7.23%	4	0-9	3	54	51-100	301-350
Sacramento Pikeminnow	3-1-0 (4)	2.41%	1	0-4	1	18	51-100	151-200
Bluegill	1-0-1 (2)	1.20%	1	1	1	9	151-200	151-200
Unknown Sculpin	0-1-0 (1)	0.60%	1	1	<1	5	51-100	51-100
SNORKELED REACH 3 - 283.16 Meters								
Unknown Minnow	720-1,000-1,000 (2,720)	87.26%	907	896-917	320	5,153	0-50	0-50
Chinook Salmon	71-62-61 (194)	6.22%	65	63-66	23	368	51-100	151-200
Spotted Bass	46-36-51 (133)	4.27%	44	42-47	16	252	51-100	251-300
Bluegill	8-30-29 (67)	2.15%	22	17-28	8	127	51-100	151-200
Rainbow Trout	0-2-0 (2)	0.06%	1	2	<1	4	101-150	101-150
Smallmouth Bass	0-1-0 (1)	0.03%	1	1	<1	2	101-150	101-150
SNORKELED REACH 4 - 174.80 Meters								
Unknown Minnow	50-0-0 (50)	78.13%	17	3-31	10	153	0-50	0-50
Bluegill	2-6-5 (13)	20.31%	4	2-6	3	40	51-100	51-100
Spotted Bass	0-0-1 (1)	1.56%	1	1	<1	3	51-100	51-100
JUNE 2018								
SNORKELED REACH 2 - 119.48 Meters								
Sacramento Sucker	833-778-833 (2,444)	76.90%	815	813-817	535	8,603	0-50	0-50
Unknown Minnow	50-465-200 (715)	22.50%	238	164-313	156	2,517	0-50	0-50
Spotted Bass	5-7-5 (17)	0.53%	6	5-7	4	60	51-100	>350
Prickly Sculpin	0-1-1 (2)	0.06%	1	1	<1	7	101-150	101-150
SNORKELED REACH 3 - 237.13 Meters								
Spotted Bass	586-539-563 (1,688)	56.95%	563	561-565	237	3,819	0-50	251-300
Unknown Minnow	200-200-125 (525)	17.71%	175	169-181	74	1,188	0-50	0-50
Sacramento Pikeminnow	80-133-186 (399)	13.46%	133	124-142	56	903	0-50	0-50
Bluegill	54-49-66 (169)	5.70%	56	54-59	24	382	0-50	101-150
Sacramento Sucker	13-5-62 (80)	2.70%	27	15-39	11	181	0-50	51-100
Green Sunfish	18-19-15 (52)	1.75%	17	16-18	7	118	51-100	101-150

Table 3.3.3-20. (continued)

Species	Abundance						Fork length (mm)	
	# Counted by Pass (Total)	% of Total Fish Counted	Estimated abundance	95% CI	Fish/100 m	Fish/mi	Min (bin)	Max (bin)
JUNE 2018 (cont'd)								
SNORKELED REACH 3 - 237.13 Meters (continued)								
Smallmouth Bass	8-9-11 (28)	0.94%	9	8-10	4	63	0-50	151-200
Mosquito Fish	10-7-6 (23)	0.78%	8	6-9	3	52	0-50	0-50
SNORKELED REACH 4 - 237.13 Meters								
Unknown Minnow	420-425-300 (1,145)	75.23%	382	375-389	226	3,641	0-50	0-50
Spotted Bass	54-77-70 (201)	13.21%	67	64-70	40	639	0-50	>350
Bluegill	45-47-48 (140)	9.20%	47	46-47	28	445	51-100	151-200
White Catfish	2-3-3 (8)	0.53%	3	2-4	2	25	>350	>350
Sacramento Sucker	2-4-1 (7)	0.46%	2	0-5	1	22	0-50	51-100
Channel Catfish	2-3-0 (5)	0.33%	2	0-5	1	16	251-300	>350
Sacramento Pikeminnow	1-3-1 (5)	0.33%	2	0-4	1	16	0-50	151-200
Redear Sunfish	0-1-3 (4)	0.26%	1	0-4	1	13	51-100	51-100
Smallmouth Bass	0-0-4 (4)	0.26%	1	0-6	1	13	101-150	101-150
Green Sunfish	0-1-1 (2)	0.13%	1	1	<1	6	51-100	101-150
Unknown Centrachid	1-0-0 (1)	0.07%	1	1	<1	3	101-150	101-150

Table 3.3.3-21. Population summary of 10 m standardized seine hauls in Reaches 2 through 4.

Species	Abundance			Fork length (mm)	Weight (g)	Condition Factor	
	# By Pass (Total)	% of Total Fish	CPUE (catch by pass)	Min-Max (Avg)	Min-Max (Avg)	Relative – range	Fulton's – range (average)
OCTOBER 2017							
REACH 2 SEINE (n=47)							
Spotted Bass	0-23-10 (33)	70.2%	11.0	45-152 (61)	1.1-43.9 (3.7)	0.79-0.87	0.86-2.22 (1.22)
Bluegill	0-5-0 (5)	10.6%	1.7	50-58 (54)	1.6-2.4 (1.9)	0.8-1.32	N/A[1]
Green Sunfish	0-3-0 (3)	6.4%	1.0	44-61 (52)	1.6-3.8 (2.5)	1.08-1.17	N/A[1]
Mosquito Fish	0-3-0 (3)	6.4%	1.0	30-41 (35)	0.4-0.6 (0.5)	0.89-1.38	N/A[1]
Sacramento Pikeminnow	2-0-0 (2)	4.3%	0.7	84-88 (86)	5.9-6.1 (6.0)	0.73-1.81	0.90-1.00 (0.95)
Pumpkinseed	0-1-0 (1)	2.1%	0.3	72 (72)	5.1 (5.1)	N/A[1]	N/A[1]
REACH 3 SEINE (n=6)							
Spotted Bass	5-0-1 (6)	100.0%	2.0	125-150 (136)	19.4-37.7 (28.3)	0.85-1.38	0.92-1.49 (1.10)

Table 3.3.3-21. (continued)

Species	Abundance			Fork length (mm)	Weight (g)	Condition Factor	
	# By Pass (Total)	% of Total Fish	CPUE (catch by pass)	Min-Max (Avg)	Min-Max (Avg)	Relative – range	Fulton's – range (average)
OCTOBER 2017 (cont'd)							
REACH 4 SEINE (n=60)							
Mosquitofish	0-43-0 (43)	71.7%	14.3	12-52 (27)	N/A[2]	N/A[1]	N/A[1]
Bluegill	0-3-9 (12)	20.0%	4.0	26-117 (54)	0.3-21.5 (3.3)	0.84-1.23	N/A[1]
Riffle Sculpin	0-1-3 (4)	6.7%	1.3	15-110 (63)	2.0-18.0 (6.7)	N/A[1]	N/A[1]
Spotted Bass	0-0-1 (1)	1.7%	0.3	153 (153)	37.1 (37.1)	0.97[3]	1.04
APRIL 2018							
REACH 2 SEINE[4] (n=140)							
Chinook Salmon	3-42-3-78-11 (137)	97.9%	27.4	30-74 (55.8)	0.3-4.3 (2.2)	0.5-3.2	0.58-4.46 (1.25)
Lamprey Ammocete	0-0-2-0-0	1.4%	0.4	N/A[2]	N/A[2]	N/A[1]	N/A[1]
Inland Silverside	0-0-0-1-0	0.7%	0.2	33 (33)	0.3 (0.3)	N/A[1]	N/A[1]
REACH 3 SEINE (n=183)							
Chinook Salmon	0-0-7-29-147 (183)	100.0%	36.6	45-95 (64.5)	0.9-10.3 (3.6)	0.7-1.6	0.99-1.96 (1.25)
REACH 4 SEINE (n=139)							
Chinook Salmon	0-3-6-70-17 (96)	69.1%	19.2	38-71 (55.2)	0.4-4.4 (2.0)	0.5-1.5	0.61-2.19 (1.11)
Bluegill	0-0-0-1-38 (39)	28.1%	7.8	43-80 (54.1)	1.2-7.1 (2.7)	0.8-1.6	N/A[1]
Mosquitofish	0-0-0-1-2 (3)	2.2%	0.6	36-46 (41.0)	0.3-0.6 (0.5)	0.7-1.0	N/A[1]
Spotted Bass	0-1-0-0-0 (1)	0.7%	0.2	126 (126)	25.5 (25.5)	1.2	1.27
MAY 2018							
REACH 2 SEINE (n=55)							
Chinook Salmon	1-0-49 (50)	90.9%	16.7	58-101 (82.4)	1.8-8.6 (4.7)	0.5-0.9	0.59-0.98 (0.80)
Sacramento Pikeminnow	0-0-3 (3)	5.5%	1.0	109-129 (118.7)	11.0-15.8 (14.0)	0.9-1.1	0.74-0.92 (0.83)
Sacramento Sucker	2-0-0 (2)	3.6%	0.7	76-93 (84.5)	7.0-9.1 (8.1)	1.4-1.9	1.13-1.59 (1.36)
REACH 3 SEINE (n=4)							
Chinook Salmon	0-2-0 (2)	50.0%	0.7	59-67 (63.0)	2.4-3.8 (3.1)	0.9-1.0	1.17-1.26 (1.22)
Rainbow Trout	0-1-0 (1)	25.0%	0.3	74 (74.0)	5.7 (5.7)	N/A[1]	1.41
Spotted Bass	1-0-0 (1)	25.0%	0.3	96 (96.0)	7.1 (7.1)	0.7	0.80
REACH 4 SEINE (n=0)							
No seining conducted per CDFW scientific collecting permit requirements; water temperature was above 21°C							
JUNE 2018							
REACH 2 SEINE (n=147)							
Sacramento Sucker	144-0-0 (144)	98.0%	48.0	17-34 (25.5)	1.1-2.2 (1.7)	0.6-1.9	0.56-2.24 (1.11)
Pumpkinseed	0-1-0 (1)	0.7%	0.3	46 (46.0)	0.6 (0.6)	N/A[1]	N/A[1]
Spotted Bass	0-0-1 (1)	0.7%	0.3	82 (82.0)	4.3 (4.3)	0.7	0.78
Green Sunfish	0-0-1 (1)	0.7%	0.3	76 (76.0)	5.8 (5.8)	1.0	N/A[1]

Table 3.3.3-21. (continued)

Species	Abundance			Fork length (mm)	Weight (g)	Condition Factor	
	# By Pass (Total)	% of Total Fish	CPUE (catch by pass)	Min-Max (Avg)	Min-Max (Avg)	Relative – range	Fulton's – range (average)
June 2018 (cont'd)							
REACH 3 SEINE (n=0)							
No seining conducted per CDFW scientific collecting permit requirements; water temperature was above 21°C							
REACH 3 SEINE (n=0)							
No seining conducted per CDFW scientific collecting permit requirements; water temperature was above 21°C							

[1] Condition factor could not be calculated for single individuals, because lengths and weights were not collected, or body shape was not fusiform.
[2] Lengths and weights were not collected for some species due to concerns of fish health.
[3] Condition factor for spotted bass calculated with fish pooled from all reaches and sampling occasions.
[4] Five seine hauls were completed during April 2018 due to lower visibility and higher flows at the sampling locations.

Figure 3.3.3-9. *O. mykiss* captured in Reach 3 during the May sampling event.

Chinook salmon parr were observed in Reaches 2, 3, and 4 during snorkeling events in April and May 2018. They were also captured during the April and May 2018 seine sampling in the same reaches, except for Reach 4 in May. A total of 416 Chinook salmon parr was captured in April and 52 in May. The lack of Chinook salmon during the June sampling period suggested that rearing fish had migrated downstream. The relative condition of the captured Chinook salmon over all sampling events ranged from 0.5 to 3.2. The Fulton's condition of these fish ranged from 0.58 to 4.46 with averages ranging from 0.80 to 1.25 over all sampling events. *O. mykiss* parr were observed in Reach 3 in April and May 2018. Only one *O. mykiss* parr was captured during the May seine event and is shown in Figure 3.3.3-9.

SSWD's Relicensing eDNA Sampling

SSWD's eDNA sampling targeted four species: 1) Chinook salmon; 2) *O. mykiss*; 3) green sturgeon (*Acipenser medirostris*); and 4) white sturgeon (*Acipenser transmontanous*). Sampling occurred between February 22 and March 1, 2017, and was followed by a second survey that occurred on March 8, 2017 and March 15, 2017 (Table 3.3.3-22). Samples were collected during high flows in the Bear River. Flows ranged from 1,523 to 5,659 cfs throughout sampling events (Table 3.3.3-22). As a result of the high flows, turbidity was also high, which severely limited the volume of water that could be filtered for each sample. Suspended sediment clogged the filter quickly. As a result, the field team used five filters for each sample and recorded the volume of water filtered by each filter. On average, this was approximately 1 liter (total of five filters) for each sample. Discussions with the analysis lab determined that filtering close to 1 liter would not adversely affect the results (S. Blankenship [Genidaqs], pers. comm., February 2017). SSWD originally anticipated for the use of one filter per sample location and increased the overall effort to ensure a sufficient volume of water was filtered.

DNA from all samples and controls were extracted using PowerWater Sterivex™ DNA Isolation Kit (Mo Bio Laboratories, Inc.) following the manufacturer's recommended guidelines. A DNA extraction negative control was processed in parallel to ensure sample integrity throughout extraction procedure. DNA extraction controls were processed using the same equipment utilized to extract DNA from all samples. Each sample and all controls were analyzed in triplicate for the presence of the GGS CytB mitochondrial gene using the qPCR primer and probe designed previously. DNA extracted from each sample was analyzed in triplicate with each qPCR replicate consisting of a 10 µl reaction volume. Each 10 µl qPCR reaction was composed of 2x Applied Biosystems TaqMan Universal PCR Master Mix, No AmpErase UNG (Thermo Fisher ABI), 500-900 nM initial primer concentration, 2.5-10 uM initial probe concentration, and 4 µl DNA template. Thermocycling was performed using a Bio-Rad CFX 96 Real time System (Bio-ad Laboratories, Inc.) with the following profile: 10 min at 95°C, 40 cycles of 15 second denaturation at 95°C and 1 min extension at 60°C. Six template control (NTC) reactions were run on the plate with the control sample templates consisting of 4 µl of ultrapure water replacing DNA template within reaction volume. Three positive control reactions consisting of 20 ng/µl target species genomic DNA template were also tested in parallel to ensure consistent PCR performance. All PCR master mixes were made inside an ultraviolet (UV) PCR enclosed workstation. A DNA template was added to the master mix outside of the UV PCR workstation on a dedicated PCR set up workbench. All PCR reactions were conducted on instruments located outside of the main lab in a separate portion of the building. Results of the qPCR reactions were analyzed using BioRad CFX manager v3.1 (Bio-Rad Laboratories, Inc.). A sample was considered positive for the presence of target DNA if any one of the three replicates showed logarithmic amplification within 40 cycles.

A total of 50 eDNA samples was collected over the two sampling events. Chinook salmon had 17 positive detections throughout all reaches and *O. mykiss* 11 positive detections throughout all reaches (Table 3.3.3-22 and Figures 3.3.3-10 through 3.3.3-12). No green or white sturgeons were detected during either sampling event.

Table 3.3.3-22. Environmental DNA results through both sampling events for *O. mykiss*, Chinook salmon, green sturgeon, and white sturgeon.

Sample Event	Flow (cfs)[1]	Total Samples	Detection by Target Species			
			O. mykiss	**Chinook Salmon**	**Green Sturgeon**	**White Sturgeon**
REACH 2						
1	5,659	7	0	2	0	0
2	1,640	7	1	0	0	0
REACH 3						
1	3,775	4	1	1	0	0
2	1,640	4	1	0	0	0
REACH 4						
1	1,588 to 2,120[2]	9	2	1	0	0
2	1,523	9	2	7	0	0
REACH 5						
1	1,588 to 2,120[2]	5	2	3	0	0
2	1,523	5	2	3	0	0
Total	**--**	**50**	**11**	**17**	**0**	**0**

[1] Flow recorded at USGS gauging station 1142400 – Bear River at Wheatland
[2] Sampling completed over 2 days due to accessibility issues.

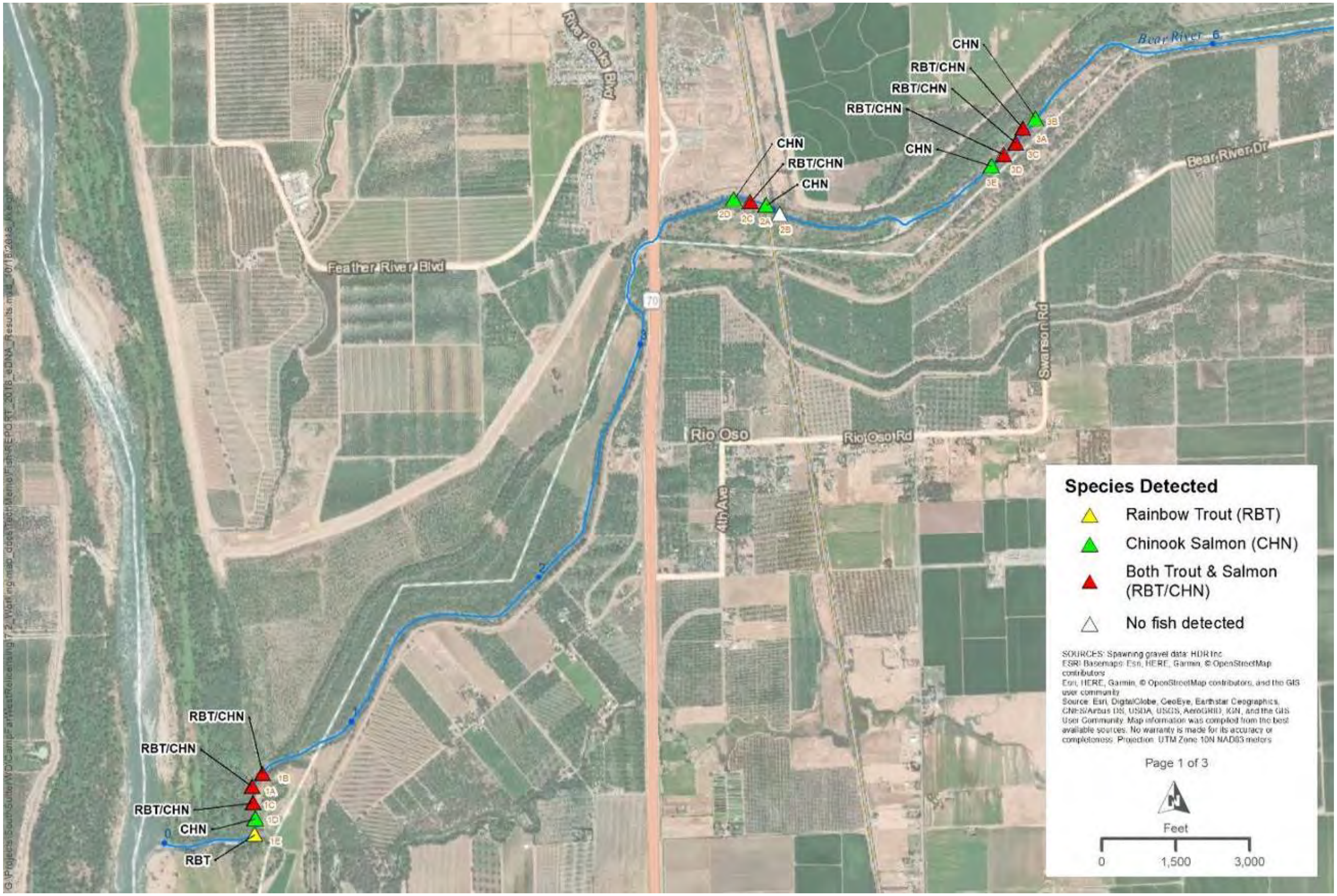

Figure 3.3.3-10. eDNA sampling locations and species detected (Reach 2).

Figure 3.3.3-11. eDNA sampling location and species detected (Reach 3).

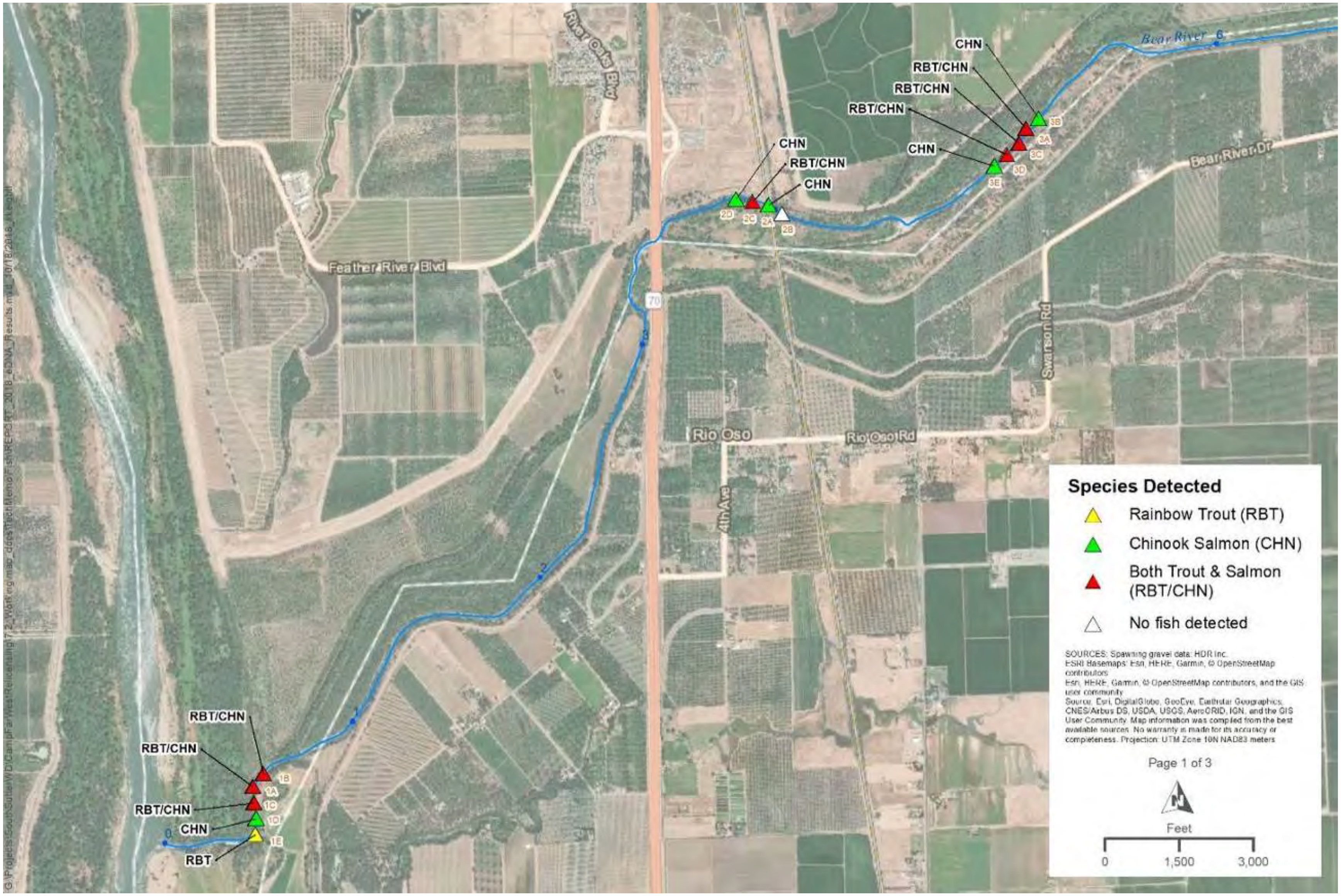

Figure 3.3.3-12. eDNA sampling locations and species detected (Reaches 4 and 5).

SSWD's Relicensing Salmonid Redd Surveys

Sporadic salmon surveys on the Bear River were documented from 1982 to 1986 by CDFG (CDFG unpublished data). Salmon numbers and redd observations depended on flows and water temperature. Salmon surveys by CDFG employees indicated the presences of roughly 100 adult salmon and steelhead strays in the Bear River in 1982. Salmon surveys were conducted from the non-Project diversion dam to Highway 70, occurred on November 16 and November 19, 1984. On November 16, 1984, CDFG employees reported seven salmon (four males and three females) were on redds and one additional unattended redd from the diversion dam to Patterson's Sand and Gravel plant (~RM 15). Also, On November 16, 1984, CDFG employees canoed from Highway 65 to Hudson Road and found five fresh carcasses (two male, two female and one jack), one carcass, six live fish and 15 redds. On November 19, 1984, CDFG employees canoed from Hudson Road to Highway 70. From Hudson Road to Pleasant Grove Road, CDFG reported finding one male carcass, one live female, and 35 redds. From Pleasant Grove Road to Highway 70, CDFG observed three skeletons (two male and one female), one pair of salmon spawning and six unattended redds. CDFG employees conducted salmon redd surveys in December of 1986 and observed only one male carcass.

SSWD conducted salmon redd surveys from October 17 through December 8, 2016. Redds were first documented on November 7, 2016 (Figure 3.3.3-13). Surveys ceased on December 8, 2016, due to high flows and low visibility (Figure 3.3.3-14). River conditions were monitored approximately every two weeks to determine if redd surveys could be resumed during the monitoring period. Secchi depths ranged from 0.2 to 0.6 m, which is less than the generally accepted minimum visibility for redd surveys of 1.2 m (PSMFC 2017). Flows ranged from 1,388 to 4,851 cfs during the periodic checks, causing visibility and safety concerns. The maximum flow during the potential survey period in the Bear River, measured at the Wheatland gage, was 34,900 cfs in January 2017. Due to these conditions, no further redd surveys were conducted during the remainder of the 2016/2017 period, which ended on March 31, 2017.

Figure 3.3.3-13. Typical Chinook salmon redd on the lower Bear River, photo taken during November 7, 2016 redd survey.

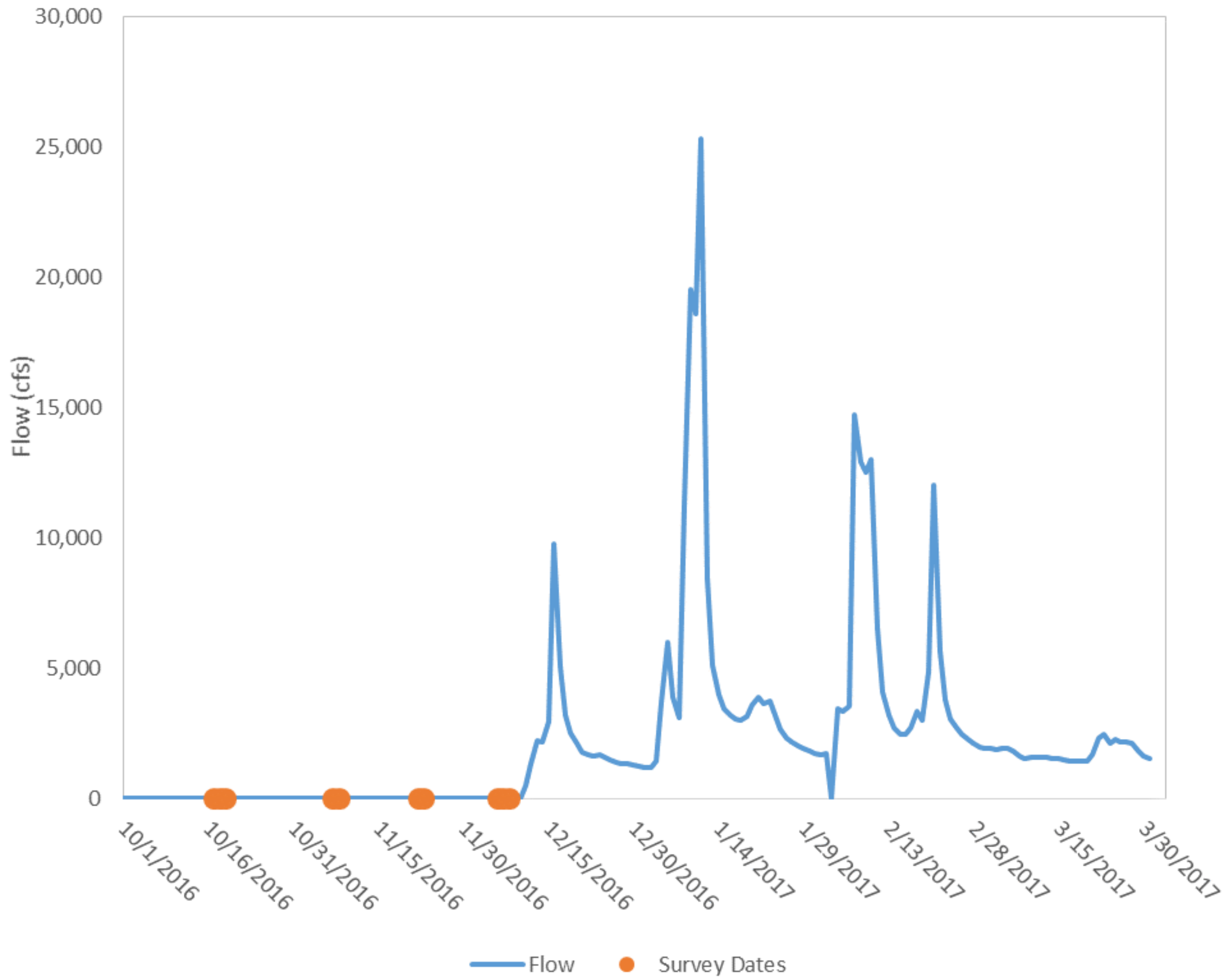

Figure 3.3.3-14. Discharge in the lower Bear River (measured at USGS Wheatland gage) during the 2016-17 redd survey season (October 1, 2016 through March 30, 2017).

The four surveys conducted in 2016 resulted in the documentation of 23 redds, four adult CV fall-run Chinook salmon ESU, and three Chinook salmon carcasses. Of the 23 redds documented in 2016, none were recorded in Reach 2; 20 in Reach 3; and 3 in Reach 4. No Chinook salmon were observed actively spawning. New redds were observed during surveys on November 7 and 8, November 22 and 23, and December 7 and 8, 2016. Estimated pot (i.e., the depression formed by the excavation of gravels by female salmon during redd construction), areas ranged from 0.29 to 8.75 square meters (sq m), and total redd area ranged from 1.27 to 36.73 sq m. Pot depths were not estimated because visual estimation of depth can be highly variable depending on water clarity, lighting conditions, and velocity.

SSWD conducted four additional salmon redd surveys between January and March 2018 to gather additional data on salmonid spawning. The first surveys were conducted from January 15 through 17, 2018, during a break in high winter flows (Figure 3.3.3-15). During this event, SSWD identified a total of 78 Chinook salmon redds, 10 adult Chinook salmon, and six Chinook salmon carcasses. Out of the 78 redds identified, 35 were found in Reach 2; 23 in Reach 3; and

20 in Reach 4 (Figures 3.3.3-16 through 3.3.3-20). Redd age was difficult to determine due to the late date of the spawning surveys, and the presence of periphyton that had begun to regrow on most of the redds. No new redds were identified in the later three redd surveys in 2018.

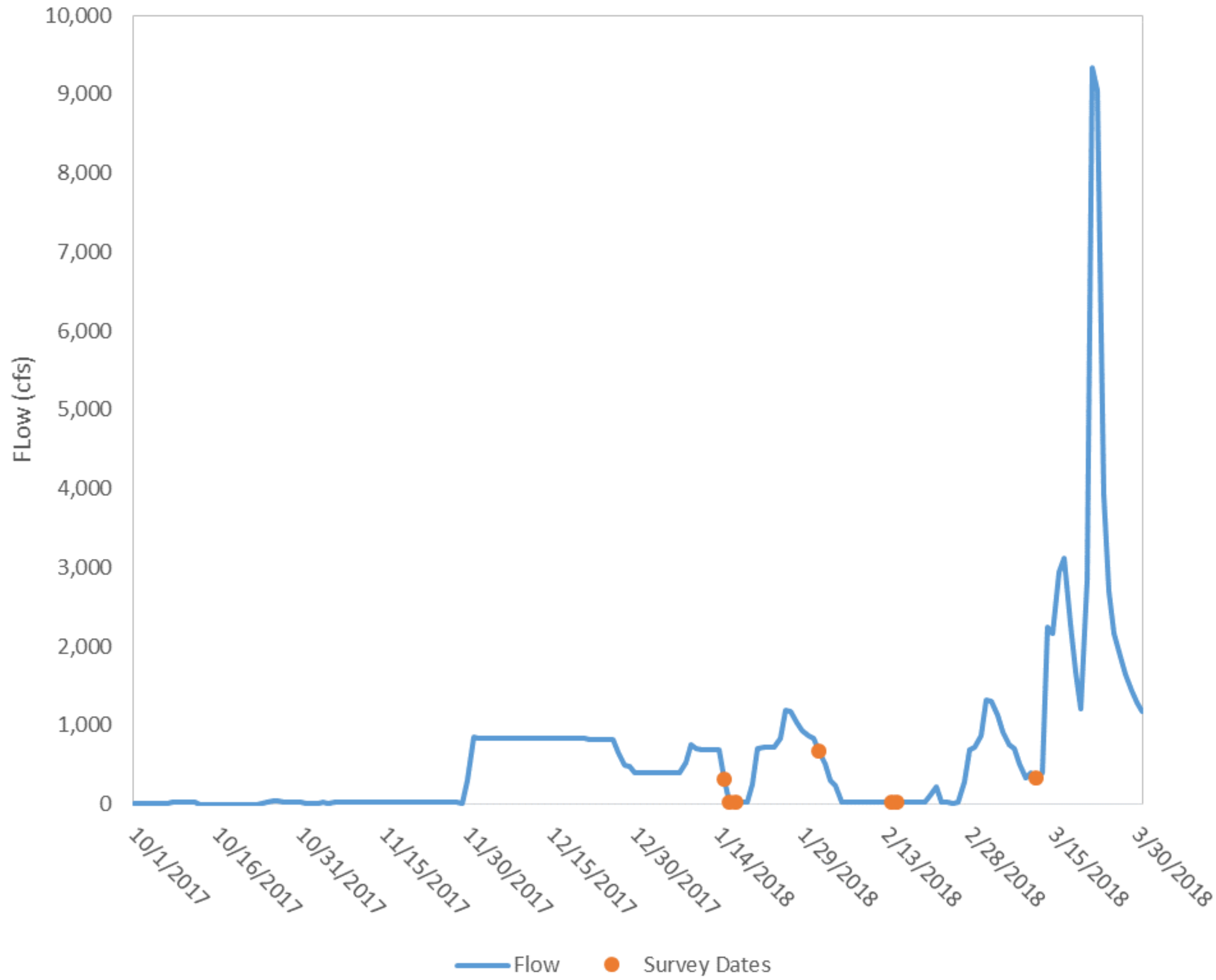

Figure 3.3.3-15. Discharge in the lower Bear River during the 2017-18 redd survey season (October 1, 2017 through March 30, 2018).

Redd area ranged from 0.36 to 39.26 sq m in 2018. Pot substrate was variable, ranging from sand to cobble, and tailspill substrate was typically one size class smaller than the associated pot substrate (Table 3.3.3-23).

Table 3.3.3-23. Minimum, maximum, and average values for redd area, pot depth and velocity, and substrate.

Range	Area (square meters)			Pot Depth (meters)	Pot Velocity (meters per second)	Substrate	
	Pot	Tail Spill	Total			Pot	Tailspill
Minimum[1]	0.22	0.13	0.36	0.1	0	sand	sand
Maximum[1]	13.37	29.64	39.26	0.6	0.7	cobble	cobble
Average[1]	2.77	4.84	7.61	0.3	0.2	cobble	coarse gravel

[1] n = 78.

Figure 3.3.3-16. Locations of redds observed during surveys in Reach 2 in 2016 and 2018.

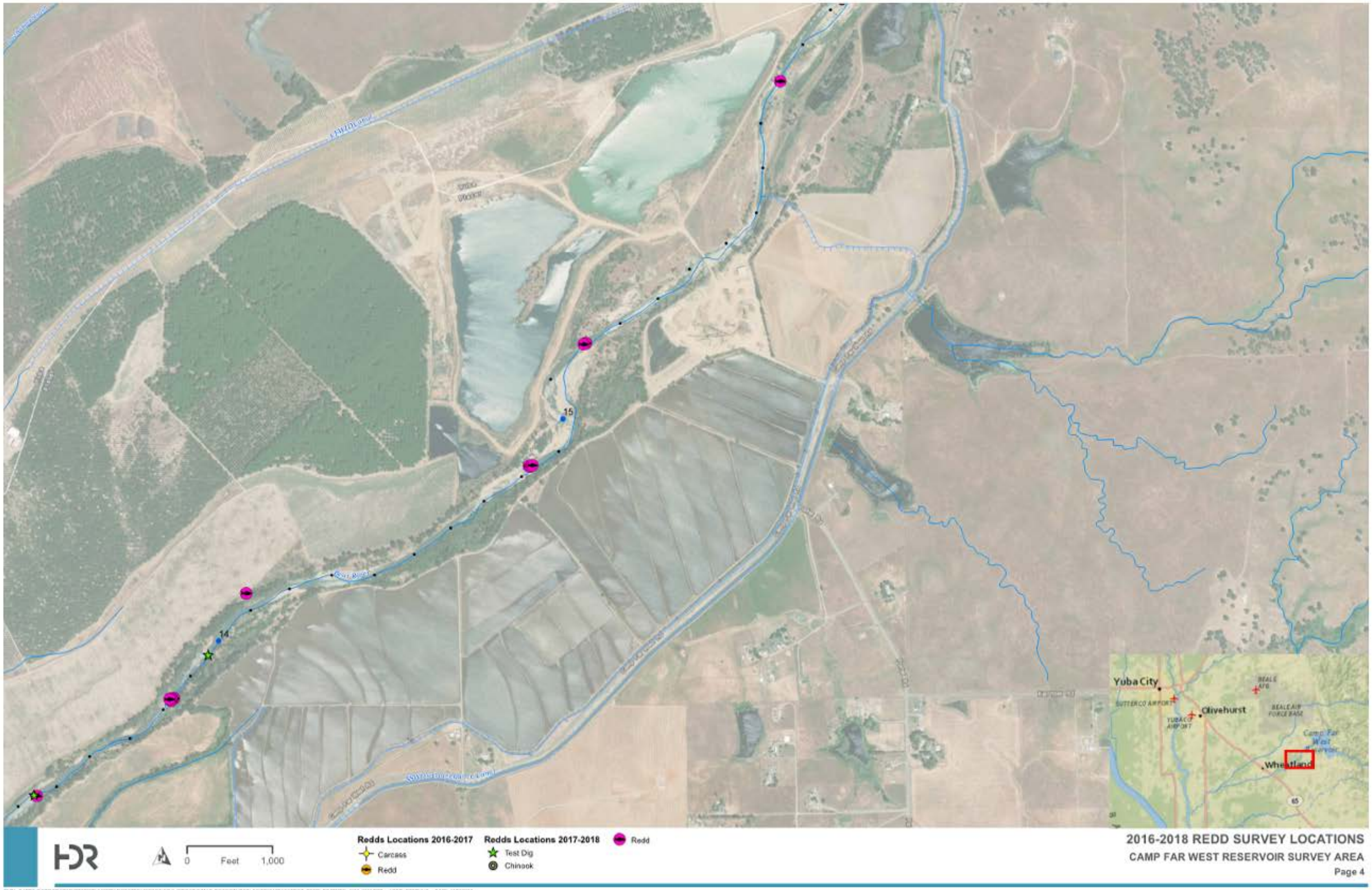

Figure 3.3.3-17. Locations of redds observed during surveys in Reach 2 in 2016 and 2018.

Figure 3.3.3-18. Locations of redds observed during surveys in Reaches 2 and 3 in 2016 and 2018.

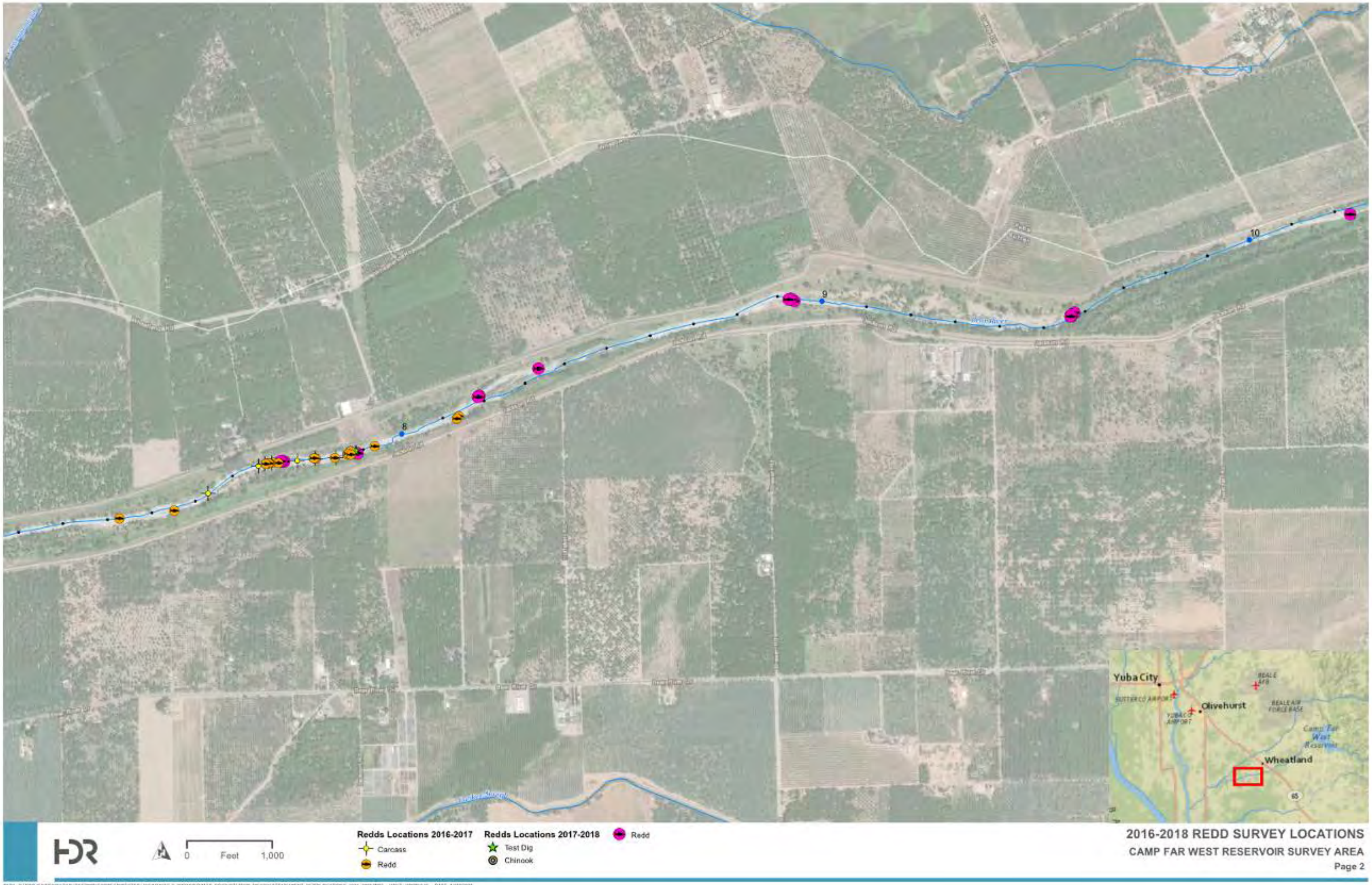

Figure 3.3.3-19. Locations of redds observed during surveys in Reach 3 in 2016 and 2018.

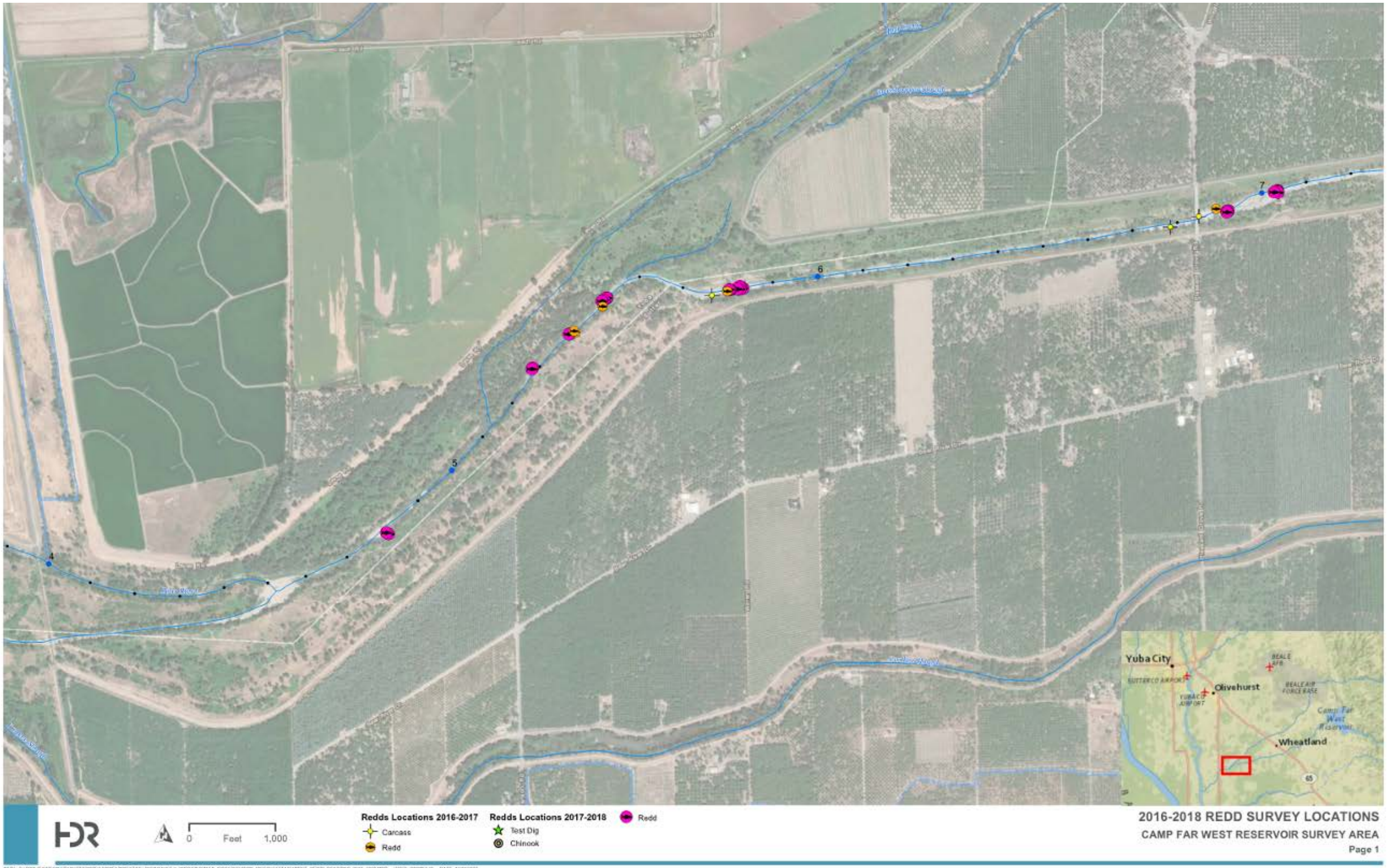

Figure 3.3.3-20. Locations of redds observed during surveys in Reach 4 in 2016 and 2018.

SSWD's Relicensing Salmonid Spawning Gravels Surveys

SSWD conducted a salmonid spawning gravel assessment survey of the lower Bear River in June 2018 as part of Study 3.2 and found that gravel conditions are suitable for anadromous salmonid spawning. Due to the extensive distribution of gravel in the D_{50} diameter of 0.11 to 5.9 in. (2.8-150 mm), a two-tiered classification system was devised to provide higher resolution to the study results. Areas that were identified in the Low Flow Active Channel (LFAC, i.e. the wetted channel) were classified as primary spawning gravel. These were areas that adult Chinook salmon could use to spawn under minimum flows requirements in the existing license. All other gravels falling within the D_{50} of 0.11 to 5.9 in. that were identified outside the LFAC, but within the bank full channel, were classified as secondary spawning gravel. Deep pools with little potential for use as spawning habitat were included in the surveys due to the systematic sampling design employed, but were accounted for separately in the calculations. Velocity transects and pebble counts were collected at areas of primary spawning gravel, but not secondary.

Representative areas surveyed at 250 m intervals showed that spawning gravels were present throughout the majority of the lower Bear River, with significant deposits in RMs 5 to 8 and 14. The primary concentration of gravel was within Reach 3 (RM 6.8-11.5), where the majority of spawning activity was noted between surveys in 2016 and 2018 (n=20 and 23, respectively). In primary habitats of surveyed areas (i.e. LFAC), suitable spawning gravels comprised an average of 24.1 percent of sampled non-pool habitats (i.e. riffle, run, or glide) by RM (minimum 0.0%, maximum 56.8%; Table 3.3.3-24), and an average of 6.9 percent of sampled pool habitats by river mile (minimum 0%, maximum 32.2%). Much of pool habitat is not considered spawning habitat due to depth, but the tailouts of pools offered suitable deposits. While deposits were concentrated in Reach 3, 9 of 16 RMs had deposits greater than 20 percent of the sampled area, offering a broad spatial range for spawning opportunities. In secondary habitats that were surveyed (i.e. outside of the wetted channel, but within bank full width), spawning gravels comprised an average of 26.8 percent of sampled habitats by river mile (minimum 0%, maximum 70.5%). Reach 4 had the highest individual maximum deposit of surveyed areas, but Reach 3 again had the greatest average overall.

Where spawning gravels were present in primary habitats, pebble counts were conducted. The average median particle size, or D_{50}, was approximately 0.98 in. (25 mm, Figure 3.3.3-21), a value that corresponds with coarse gravels. The range of D_{50} particle sizes that is commonly accepted to comprise suitable spawning gravels for Chinook salmon and steelhead is 0.11 to 5.9 in.; all but one sample site had D_{50} values within that range. The one site that had a D_{50} value of approximately 0.06 in. (1.6mm) had a subdominant substrate component of silt/clay. Velocities were also measured where primary spawning gravels were identified. Velocities ranged from 0.03 ft/s to 5.48 ft/s, and the average median velocity (averaged across all sites) was 1.86 ft/s (Figure 3.3.3-23).

Table 3.3.3-24. Spawning gravel availability for primary (i.e. within the low-flow active channel) and secondary habitats that were surveyed, presented as the average percent of available habitat comprised by spawning gravels and shown by river mile. Primary habitats are further partitioned into non-pool (i.e. riffle/run/glide) and pool habitats.

General Reach Boundary	River Mile	Average Percent of Primary Spawning		Proportion of Non-Pool Habitats (%)	Average Percent of Secondary Spawning Gravels (%)
		Non-Pool Habitats (Riffle/Run/Glide)	Pool Habitats		
4	3	5.0	0.0	0.33	12.0
	4	16.2	8.9	0.25	27.1
	5	32.8	6.7	0.33	32.4
	6	30.0	0.0	0.25	0.0
3	7	56.8	20.4	0.57	62.1
	8	49.0	32.2	0.71	48.4
	9	20.0	0.9	0.14	45.7
	10	20.7	1.7	0.43	26.5
	11	21.6	12.2	0.50	23.0
2	12	26.9	8.2	0.43	70.5
	13	19.4	3.1	0.29	19.0
	14	32.5	2.1	0.57	8.6
	15	0.0	0.7	0.17	0.0
	16	7.0	0.0	0.57	0.3
	Average	**24.1**	**6.9**	**0.40**	**26.8**

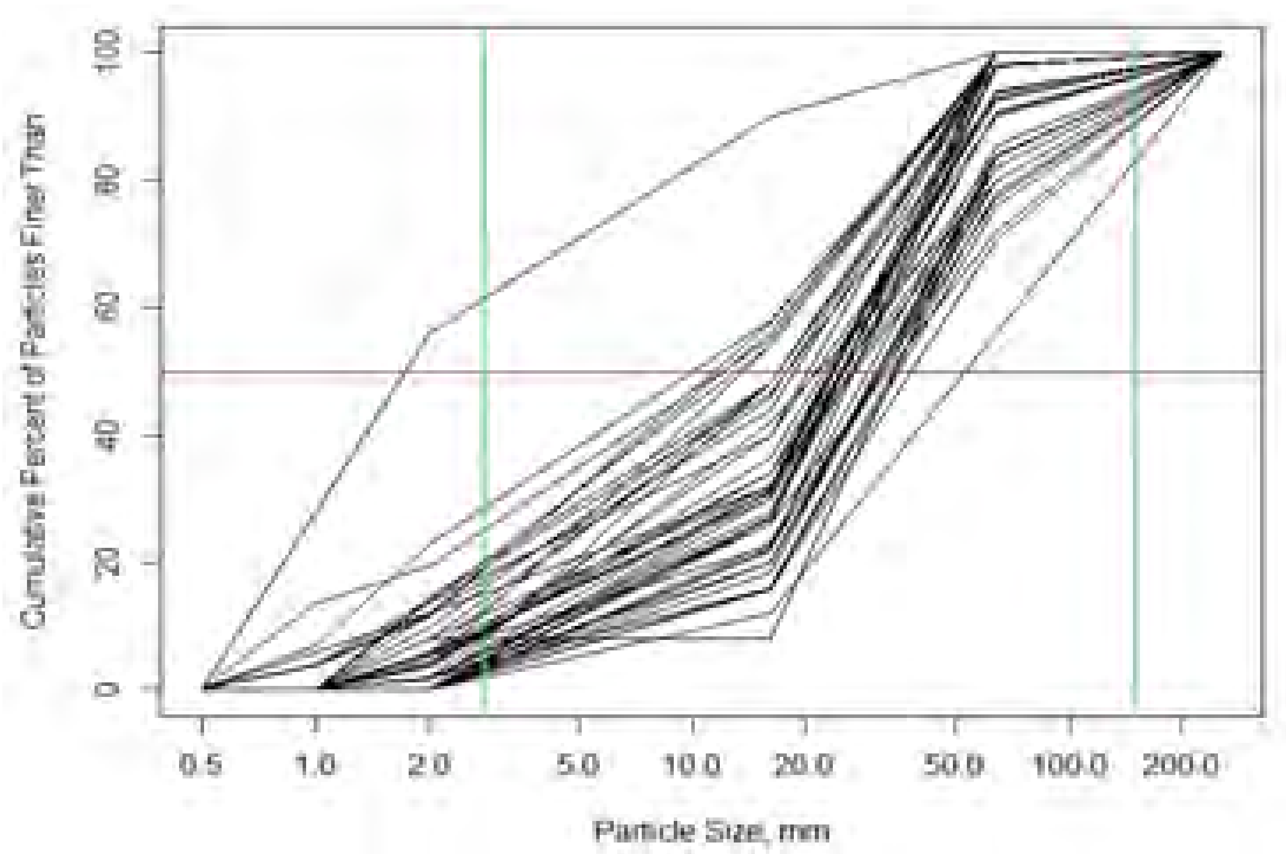

Figure 3.3.3-21. Cumulative size distribution of gravels at sites in the lower Bear River deemed to be suitable for salmonid spawning. Each black line represents a distribution of substrate sizes at a single site. The horizontal red line indicates the location of the 50th percentile of particle diameters, or D50 value. The vertical green lines indicate the lower and upper threshold diameters of gravel particle sizes that are commonly deemed suitable for salmonid spawning (0.11-5.9 in., or 2.8-150 mm).

SSWD's Relicensing Instream Flow Study for Target Species

CDFG (1991) found that fall flows in the lower Bear River are not usually high enough to attract salmon to migrate up and spawn. During years where the October and November flows are high, CDFG estimated adult spawning runs as high as 300 fish (Table 3.3.3-2). Based on the evaluation of Chinook salmon life stage periodicities and analysis of WUA/streamflow indices, CDFG developed a set of instream flow recommendations. In 1991, CDFG recommended the following flows in the lower Bear River, as measured at the Wheatland gage (Gage 11424000) to optimize CV fall-run Chinook salmon ESU habitat:

- 100 cfs from October 1 to 14 to provide ample depth and attraction for upstream adult migration and early spawning of fall-run Chinook salmon
- 250 cfs from October 15 to December 31 to provide maximum spawning habitat for fall-run Chinook salmon, when the majority of spawning occurs
- 190 cfs from January through March to prevent dewatering of fall-run Chinook salmon redds, alevins, and/or stranding of fry
- 100 cfs from April through June to provide maximum fall-run Chinook salmon juvenile salmon rearing habitat and facilitate their downstream movement
- 10 cfs from July through September for fall-run Chinook salmon juveniles' migration to the ocean by June

CDFG noted that its recommended flows may provide habitat and water temperatures favorable to CV fall-run Chinook salmon ESU, but would likely not meet the requirements for steelhead. CDFG also acknowledged that water diversions and operations upstream of Camp Far West Reservoir may limit the ability to deliver the recommended flows and subsequent improvements to habitat and water temperature. Recommendations for future studies included increased upstream analysis, steelhead-specific studies, and consideration of dry year criteria. CDFG's flow recommendations were not implemented.

Jones & Stokes (2005) stated that the Bear River historically experienced high winter flows and low summer flows, but present-day flow timing and volume is highly regulated by storage reservoir releases and diversions. The exportation of water diverted from the Bear River watershed is made through the conveyance facilities of NID and PG&E. The flow is diverted for irrigation, power generation, and domestic supply uses in the Auburn area. The report stated that upstream diversions from the Bear River basin have depleted the streamflow downstream of the non-Project diversion dam. Jones and Stokes stated that minimum flow releases are 25 cfs in the spring and 10 cfs during the rest of the year and that flows in the Bear River below the diversion dam range between zero and 40 cfs from June to December. Its report found that current winter flows during wet years are similar to unimpeded flows, averaging 2,500 to 5,200 cfs, and that summer flows are currently 30 to 50 percent less than the unimpaired flows.

During a water transfer in 2018, SSWD recorded velocities in the Bear and Feather rivers using an acoustic Doppler current profiler (ADCP). During this period, flows in the Feather River ranged from approximately 2,500 to 6,000 cfs measured at Star Bend (CDEC – FSB) during the transfer and the Bear River flows ranged from approximately 125 to 150 cfs measured at

Pleasant Grove (CDEC – BPG) (Figure 3.3.3-22). On average, flows in the Feather River were 20 to 50 times greater than in the Bear River. The higher flows in the Feather River resulted in a reduction to the velocity signature of Bear River flows at the confluence, as indicated by velocity measurements recorded by SSWD. Velocities in the Feather River at the confluence ranged from approximately 1.5 to 4 fps, while in the Bear River at the confluence, velocities ranged from approximately 0 to 0.8 fps (Figure 3.3.3-23). This demonstrates a backwatering effect of the Feather River up the Bear River, which was found to extend approximately 1 mi upstream of the confluence, and denotes a lack of attraction flow from the Bear River even when Bear River flows are greater than the existing minimum instream flows during the summer months.

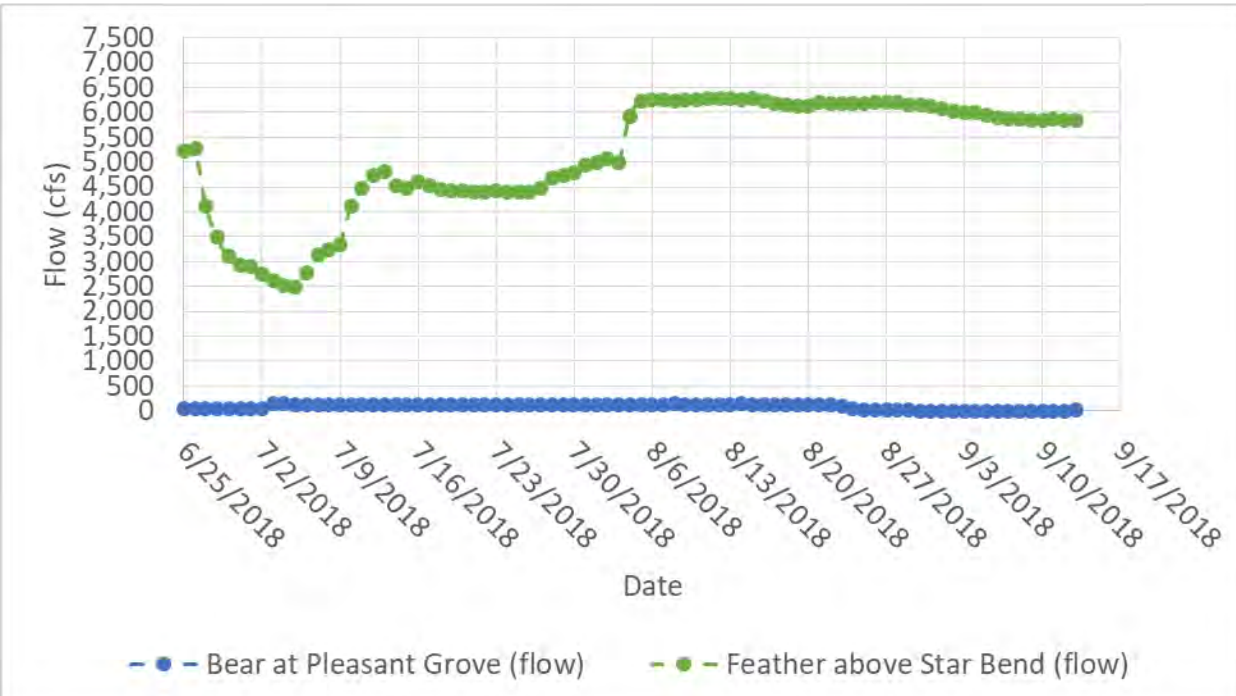

Figure 3.3.3-22. Flows in the Bear and Feather Rivers during the 2018 SSWD water transfer.

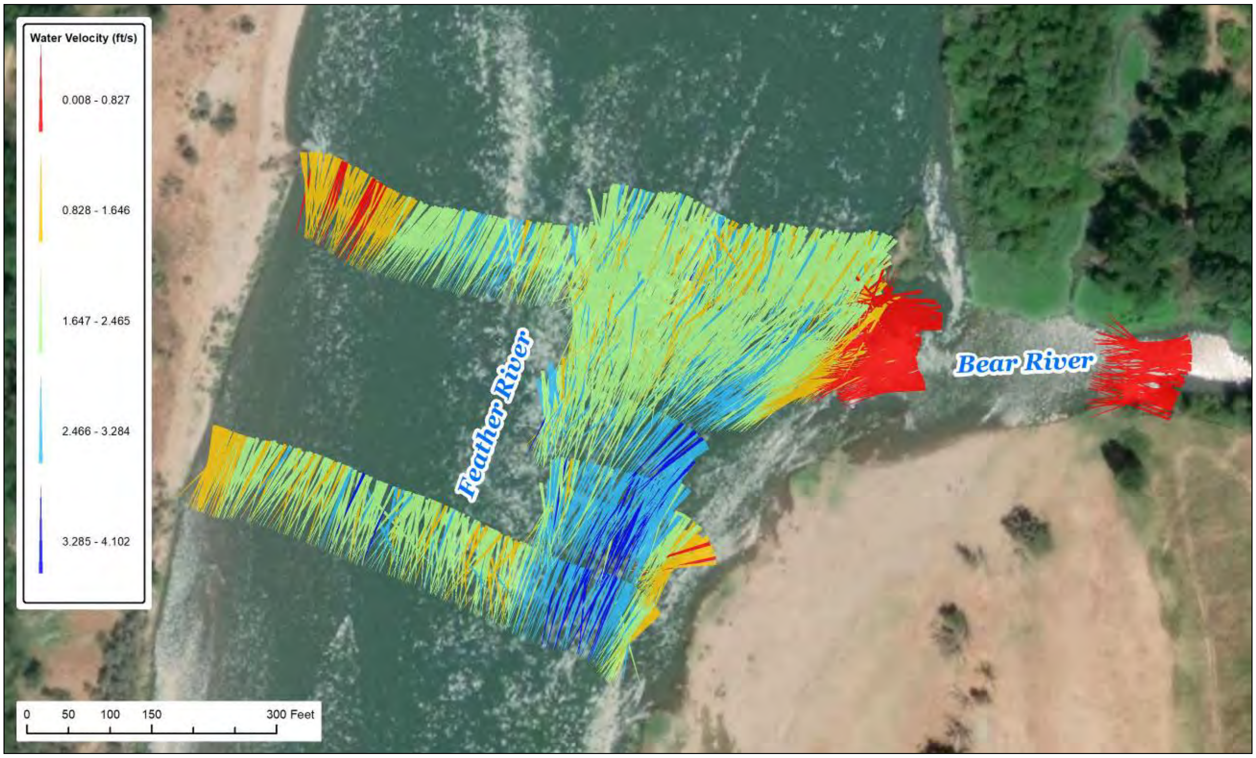

Figure 3.3.3-23. Measured velocities at the confluence of the Bear and Feather rivers during the 2018 SSWD water transfer. Red indicated little to no velocity and green and blue represents higher velocities.

SSWD performed an instream flow study using River 2D (i.e., 2 dimensional) habitat modeling to simulate the relationship for stream flows to fish habitat suitability – defined by water depth and velocity, and substrate availability – at two study sites downstream of the non-Project diversion dam at locations where fish spawning and breading are known to occur. The two sites, named 'Upstream' and 'Downstream' in the relicensing Instream Flow Study, were selected in collaboration with Relicensing Participants in August 2017. Habitat types and lengths from habitat mapping completed in 2017 were used to assess reach-wide habitat composition to habitat composition within each site. One site was in Reach 2 and extended from RM 14.2 to RM 15.05. The second site was located in the Reach 3 and extended from approximately RM 7.7 to RM 8.3. (Figure 3.3.3-24.) SSWD collected topographic data at both sites from levee to levee. A comparison of reach habitat frequency and study site habitat frequencies is provided in Table 3.3.3-25.

Figure 3.3.3-24. Location of instream flow 2-D sampling sites.

Table 3.3.3-25. Reach wide and instream flow study site habitat frequency.

Unit Type	Length Frequency	Number of Units	Number of Units Frequency	Unit Length Frequency	Number of Units Frequency
UPSTREAM SITE (REACH 2)					
Glide	11.6%	6	7.7%	29.6%	12.5%
Lateral Pool	32.9%	18	23.1%	35.4%	37.5%
Low Gradient Riffle	7.1%	26	33.3%	10.4%	37.5%
Mid-channel Pool	45.4%	20	25.6%	24.6%	12.5%
Run	1.1%	5	6.4%	0.0%	0.0%
Totals[1]	**98.1%**	**75**	**96.2%**	**100.0%**	**100.0%**
DOWNSTREAM SITE (REACH 3)					
Glide	17.4%	12	19.0%	35.4%	28.6%
Lateral Pool	10.9%	12	19.0%	12.3%	14.3%
Low Gradient Riffle	8.3%	17	27.0%	13.6%	35.7%
Mid-channel Pool	32.0%	14	22.2%	36.3%	14.3%
Run	4.4%	4	6.3%	2.4%	7.1%
Trench Pool	24.4%	2	3.2%	0.0%	0.0%
Totals[2]	**97.5%**	**61**	**96.8%**	**100.0%**	**100.0%**

[1] Reach 2 frequencies do not include one 144 foot plunge pool and two split channels totaling 400 ft.
[2] Reach 3 frequencies do not include two split channels totaling 511 ft.

A third site was selected by USFWS in Reach 4 and was surveyed and modeled by USFWS in 2017 and 2018 independently of the SSWD data collection and modeling efforts. The USFWS Site maintained habitat frequencies similar to reach-wide composition and extended from approximately RM 4.2 to RM 4.8 (Figure 3.3.3-24). Results from the USFWS modeling effort are provided as a supplement to results generated by SSWD models. Specific details on the USFWS effort are provided where available.

SSWD collected the majority of field data, including topographic data and hydraulic calibration measurements between October 2017 and February 2018. Additional hydraulic calibration measurements were collected in July 2018 near the target calibration flow of 100 cfs. A summary of flows and calibration data obtained at the study sites is provided in Table 3.3.3-26. At the Upstream Site a total of 52,455 topographic data points were collected. At the Downstream Site a total of 27,083 topographic data points were collected.

Table 3.3.3-26. Calibration data collection summary for SSWD Instream Flow Study sites.

Location	Date	Measured Discharge (cfs)[1]	Wheatland Gage (cfs)[2]	Obtained Calibration Criteria[3]
Upstream Study Site	12/14/17	674.1	827	Boundary conditions
	01/19/18	17.0	23	Boundary conditions and 46 calibration nodes
	02/20/18	15.9	16.9	Boundary Conditions
	02/21/18	332.9	300	Boundary conditions and 21 calibration nodes
	07/19/18	127.2	120	Boundary conditions and 50 calibration nodes

Table 3.3.3-26. (continued)

Location	Date	Measured Discharge (cfs)[1]	Wheatland Gage (cfs)[2]	Obtained Calibration Criteria[3]
Downstream Study Site	12/14/17	734.5	827	Boundary Conditions
	01/18/18	15.6	22.3	Boundary conditions and 49 calibration nodes
	02/19/18	12.9	17.5	Boundary Conditions
	02/22/18	319.7	300	Boundary conditions and 49 calibration nodes
	07/18/18	125.0	116	Boundary conditions and 52 calibration nodes

1 Measured discharges above 200 cfs are an average of three or more individual discharge measurements utilizing an ADCP. Measured discharges below 200 cfs were measured manually utilizing a recently calibrated Swoffer current velocity meter and USGS top setting wading rod.
2 Wheatland gage flows are approximate and showed minor variation from the values.
3 Boundary conditions include water surface elevations at the upstream and downstream model boundaries. Calibration nodes are random and discrete locations within each modeling site where water surface, depth and mean column velocity were measured.

In addition to field data collection for hydraulic and habitat model development, four level loggers were installed to measure stage change in the Bear River downstream of the non-Project diversion dam in November of 2017. Level loggers were installed immediately upstream of the modeling site in Reach 2, approximately 1,000 ft downstream of the Highway 65 bridge, approximately 1,200 ft upstream of the Pleasant Grove Road bridge, and 2,000 ft downstream of the Highway 70 bridge. Loggers at all locations were recovered unfixed from their original deployment location after high flows in December 2017 and were redeployed in January 2018. Complete stage information for a full calendar year is not yet available.

Topographic data for the Upstream and Downstream sites were post processed and verified in Trimble Business Center and Microsoft™ Excel to ensure that there were no obvious elevation errors in the survey data. Once initial quality control measures were completed, topographic data were entered into ArcGIS for the development of a Triangulated Irregular Network (TIN). The TIN was then imported to ArcScene for a visual verification of the topographic data. After visual verification field collected topographic data were integrated with publically available LiDAR data to fully characterize channel topography from Levee to levee.

Hydraulic modeling for each study site was completed using River2D (Steffler and Balckburn 2002). Verified and reviewed channel topography was further assessed in River2D Bed to look for areas with data gaps and bed files were modified in some locations to produce bed contours and channel features more representative of observed conditions. Most modifications were made in areas where dense vegetation, overhead canopy cover, or terrain characteristics made field collection of accurate topography data difficult.

Once bed files were completed, a computational mesh for each study site was developed. Mesh development followed procedures outlined in the River2D mesh User manual, 2002 (Waddle and Steffler 2002). Each mesh was developed in four steps: uniform fill at 5.0 meters, wet refine at 1,500 cfs, region refinement, quality index (QI) improvement. Region refinement is the most intensive step in mesh development and reconciled high elevation differences remaining between the bed file and the mesh after the two preceding steps. The River 2D Mesh program pinpoints mesh triangles with elevation differences exceeding a specified threshold by highlighting them yellow. Region refinement was completed by further densifying the mesh in locations with yellow triangles with the elevation threshold set to 0.2 meters. Region refinement was considered complete when yellow triangles were eliminated or where the resulting size would have limited to no effect on model results. Comparison of mesh generated contours to bed file contours at 0.2 meter intervals was performed concurrently with yellow triangle reduction and elimination as part of the region refinement step. During each step in mesh development the QI is monitored. After completion of region refinement small changes were made to specific mesh node locations throughout each mesh to improve QI. One base mesh for each study site was used for all simulation runs, representing the model domain. Minor changes to the mesh were made in each simulation to improve model run time errors and improve model characterization at especially low flows. A summary of mesh metrics for the Upstream and Downstream Sites is provided in Table 3.3.3-27. Mesh metrics from the USFWS Site are also provided in Table 3.3.3-27 but the development process may have varied slightly from that used for the two SSWD sites.

Table 3.3.3-27. Mesh development metrics for SSWD and USFWS sites.

Location	Mesh Nodes	Mesh Elements	Quality Index (QI)
Upstream Site	32,294	64,546	0.349
Downstream Site	32,316	64,610	0.382
USFWS Site	35,146	70,258	0.299

For each hydraulic model, initial hydraulic calibration tests were conducted using the surveyed calibration data collected at each modeling site, summarized in Table 3.3.3-27. Hydraulic calibration data measured in January and February 2018 were the primary datasets used for calibration. The data measured in July 2018 were not used given the hydraulic control changes measured at each site after flows of in excess of 14,000 cfs in March 2018. Six iterations of bed roughness (Ks) modifications were made to match WSEs measured in the field. WSE, velocity and depth model predictions were compared to measured field data to evaluate the effects of changes made to channel roughness. A summary of the absolute mean error between modeled and measured WSE, depth and velocity for the final selected bed roughness values at the Upstream and Downstream sites is provided in Table 3.3.3-28. Examples of final model files, including topographic contours and water depth at 25 cfs are presented in Figures 3.3.3-25 through Figure 3.3.3-27.

Table 3.3.3-28. Summary of absolute mean error for final bed files.

Location	Calibration Type	Discharge (cfs)	Calibration Nodes	Absolute Mean Error (ft)		
				Water Surface Elevation (ft)	Velocity (ft/sec)	Depth (ft)
Upstream Site	High Flow	332.9	21	0.074	0.394	0.330
	Low Flow	17.0	46	0.061	0.217	0.204
Downstream Site	High Flow	319.7	49	0.089	0.413	0.164
	Low Flow	15.6	49	0.034	0.158	0.204

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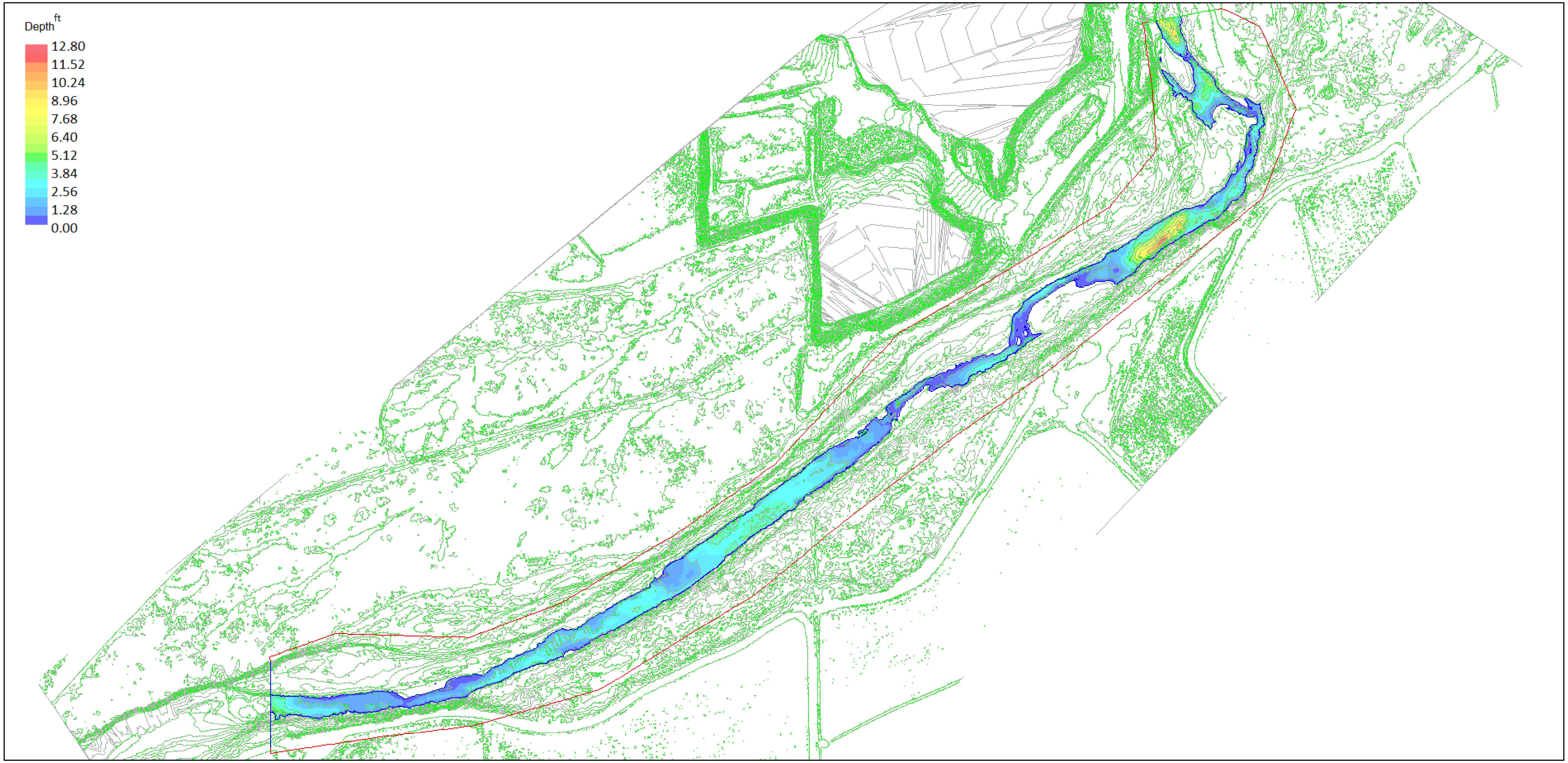

Figure 3.3.3-25. SSWD Upstream Site topographic contours and depth at 25 cfs.

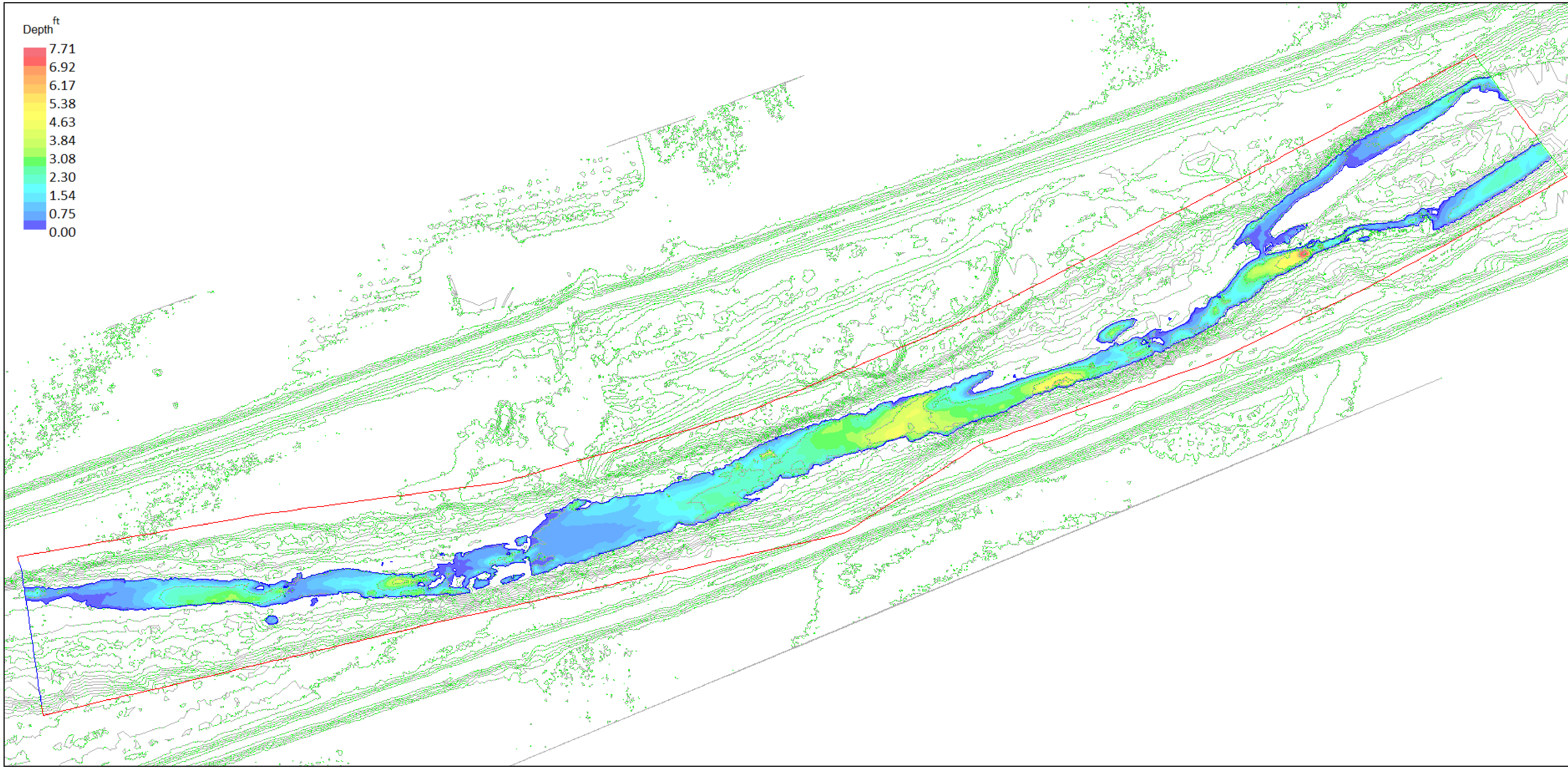

Figure 3.3.3-26. SSWD Downstream Site topographic contours and depth at 25 cfs.

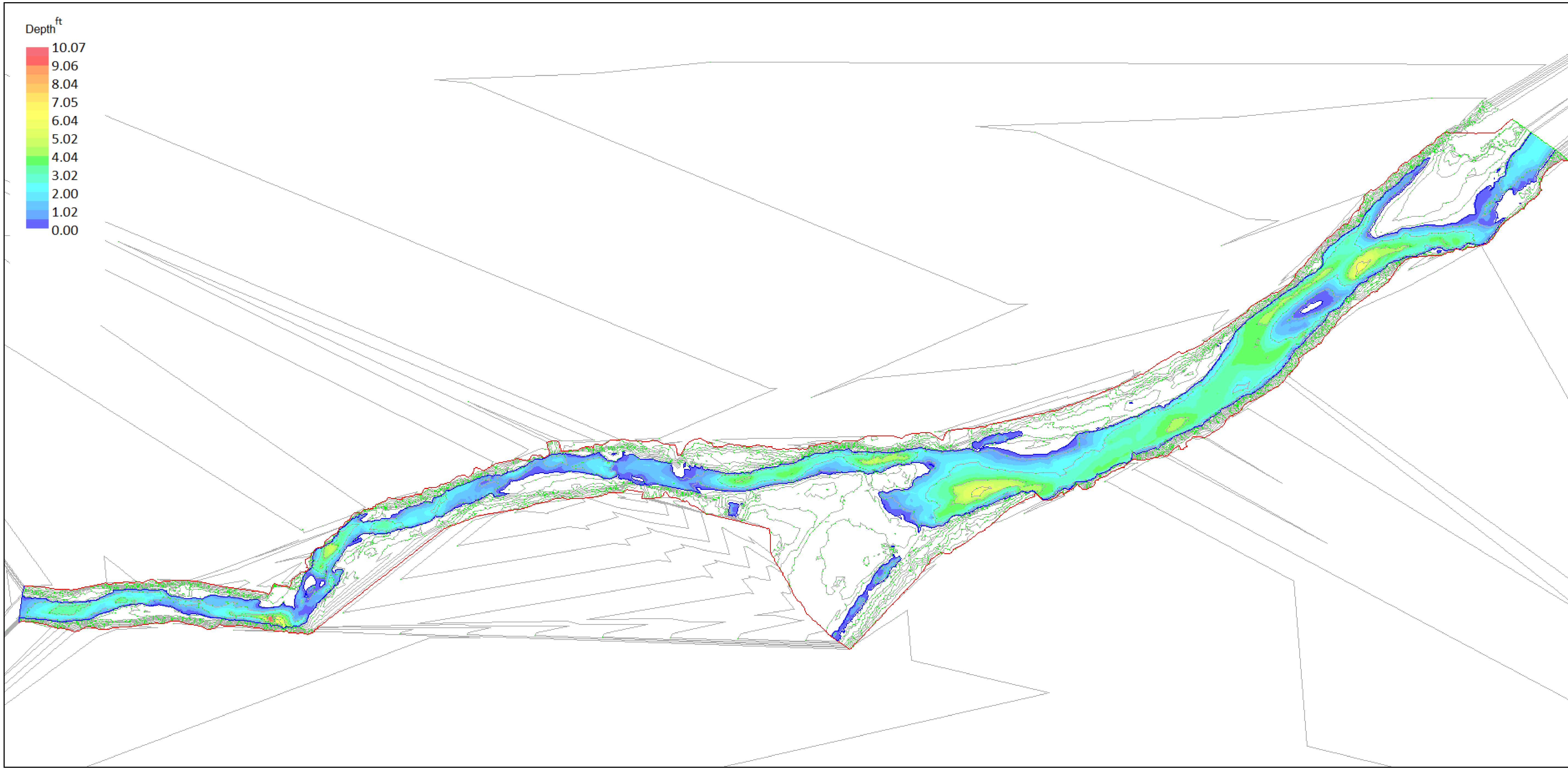

Figure 3.3.3-27. USFWS Site topographic contours and depth at 25 cfs.

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Rating curves provide initial model stage and discharge conditions for a range of modeled flow simulations and are used as model boundary conditions. Rating curves for each study site were developed using field measurements collected during each calibration field effort. Final rating curves for the Upstream and Downstream sites are provided in Attachment E3.3.3A.

Target fish species and habitat suitability criteria (HSC) were selected through a collaborative process with Relicensing Participants. Study target species and life stages were confirmed in the collaborative process and include Chinook Salmon spawning, fry, and juvenile; steelhead spawning, fry, and juvenile; sturgeon spawning; and hardhead adult and juvenile rearing. Final HSC and a description of the HSC selection procedure are provided in Attachment 3.3.3B.

A total of 18 discharges were simulated at each of SSWD's study sites. Simulation flows ranged from 10 cfs, the lowest minimum instream flow requirement for the lower Bear River, to 700 cfs, the typical maximum operational release from Camp Far West Reservoir (Table 3.3.3-29). At a flow of 700 cfs, the inundation level equates to areas of 363,344 sq ft, 332,235 sq ft and 271,037 sq ft for the Upstream, Downstream and USFWS sites, respectively. A tapered step-up approach was used for selection of specific simulations flows, with small increases between low flows from 10 cfs to 100 cfs, and graduated larger changes between higher flows (150 cfs to 700 cfs).

Table 3.3.3-29. Simulation discharges run for SSWD and USFWS models.

Simulation Discharge (cfs)	Simulation Description
10	Minimum Flow Requirement from July through March
15	Simulation only
20	Simulation only
25	Minimum Flow Requirement from April through June
30	Simulation only
35	Simulation only
40	Simulation only
50	Simulation only
75	Simulation only
100	Simulation only
125	Simulation only
150	Simulation only
175	Simulation only
200	Simulation only
250	Simulation only
300	Simulation only
450	Simulation only
700	Operational Capacity of Camp Far West Dam

Habitat suitability and weighted usable area (WUA), for all target species and life stages was calculated at each simulation flow. WUA is the product of a composite habitat suitability index at every node in the model domain and the area associated with each node. Four data inputs are required to calculate habitat suitability: a preference file, a channel index, depth, and velocity. Preference files were created from the final target species and life stage HSC. Two channel index files were developed for each study site: a substrate channel index for spawning life stages, and a cover channel index for salmonid fry and juvenile rearing life stages. Hardhead juvenile and adult HSC only include preferences for depth and velocity and no channel index file was used in these WUA calculations. To improve efficiency through revisions and production of maps and assessment tools, final WUA was calculated using a modeling tool developed in the Python programming language. A subset of River 2D output WUA calculations were compared to calculations from the tool. Resulting differences from this comparison were generally less than 3 percent.

Several open source libraries were used to develop the tool, namely ‘numpy’, ‘scipy’, ‘pandas’, and ‘pyqtgraph’. ‘Scipy’ (scientific python) is used to interpolate the irregular triangulated mesh output from River2D into regularly spaced gridded data. Each grid cell throughout the model domain is 0.25 m^2. ‘Numpy’ (numerical python) is used to perform arithmetic operations on the gridded data, such as interpolation of depth and velocity, application of the suitability curves, and multiplication of the gridded data.

Modeling results from Upstream and Downstream Sites developed by SSWD, and results from the USFWS Site generated a total of 486 distinct WUA calculations. The results are driven by the geomorphic character of each study site and the specific species requirements described by the HSC information. Figures 3.3.3-28 through 3.3.3-36 provide the amount of WUA at each site for each target species life stage. Detailed data are provided in in Attachment 3.3.3C.

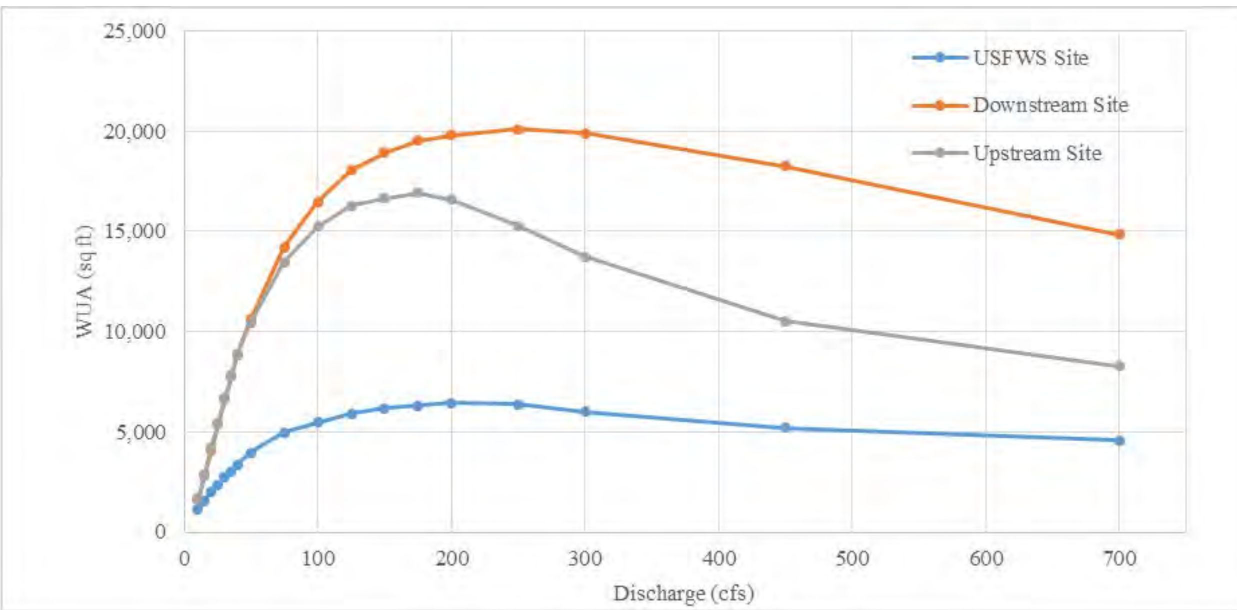

Figure 3.3.3-28. Chinook salmon spawning WUA at SSWD and USFWS sites.

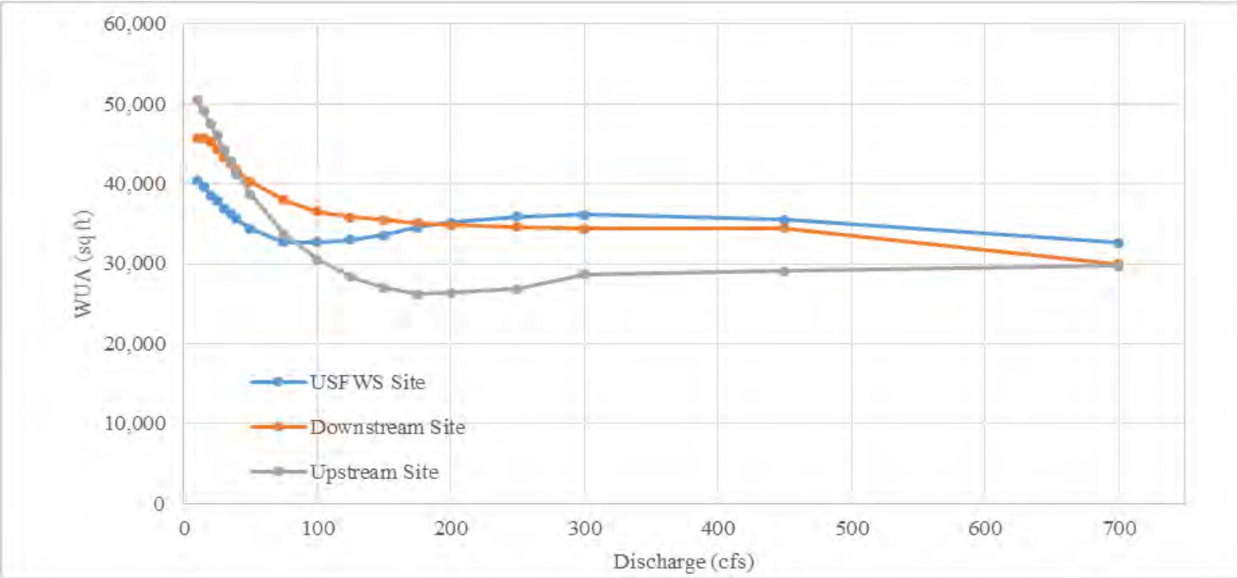

Figure 3.3.3-29. Chinook salmon fry rearing WUA at SSWD and USFWS sites.

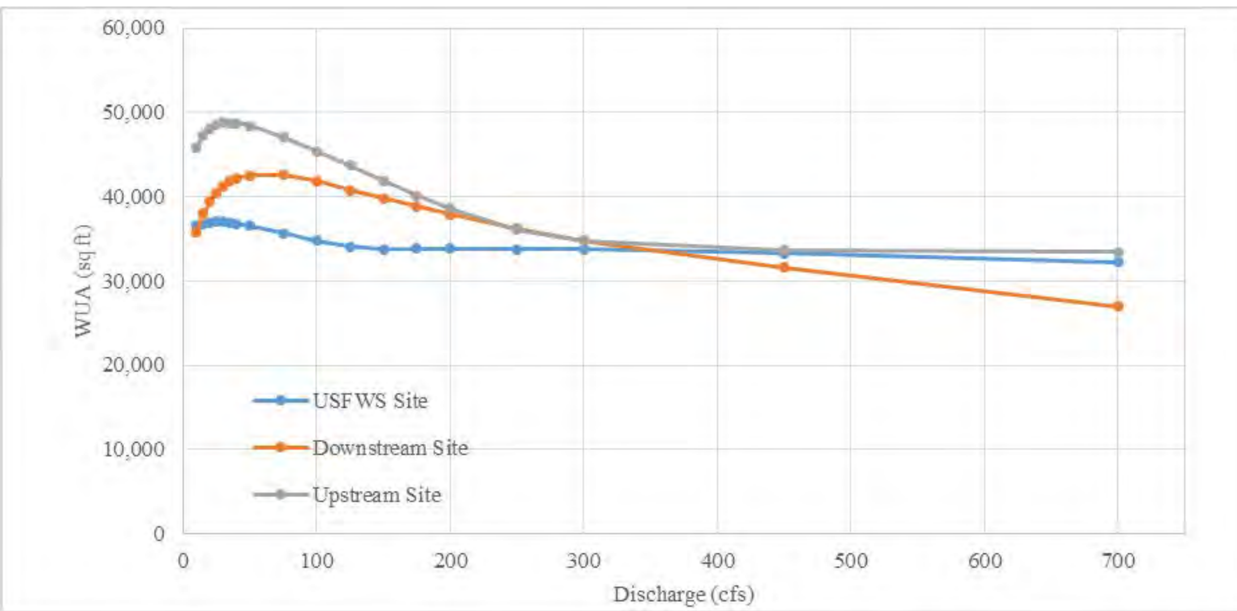

Figure 3.3.3-30. Chinook salmon juvenile rearing WUA at SSWD and USFWS sites.

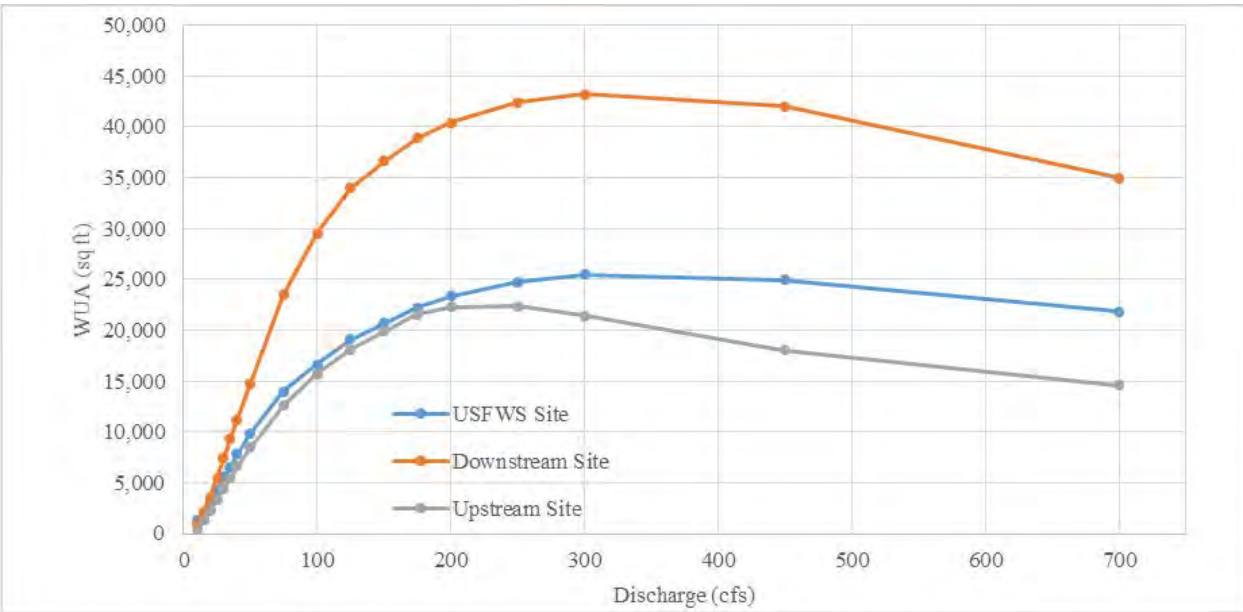

Figure 3.3.3-31. Steelhead spawning WUA at SSWD and USFWS sites.

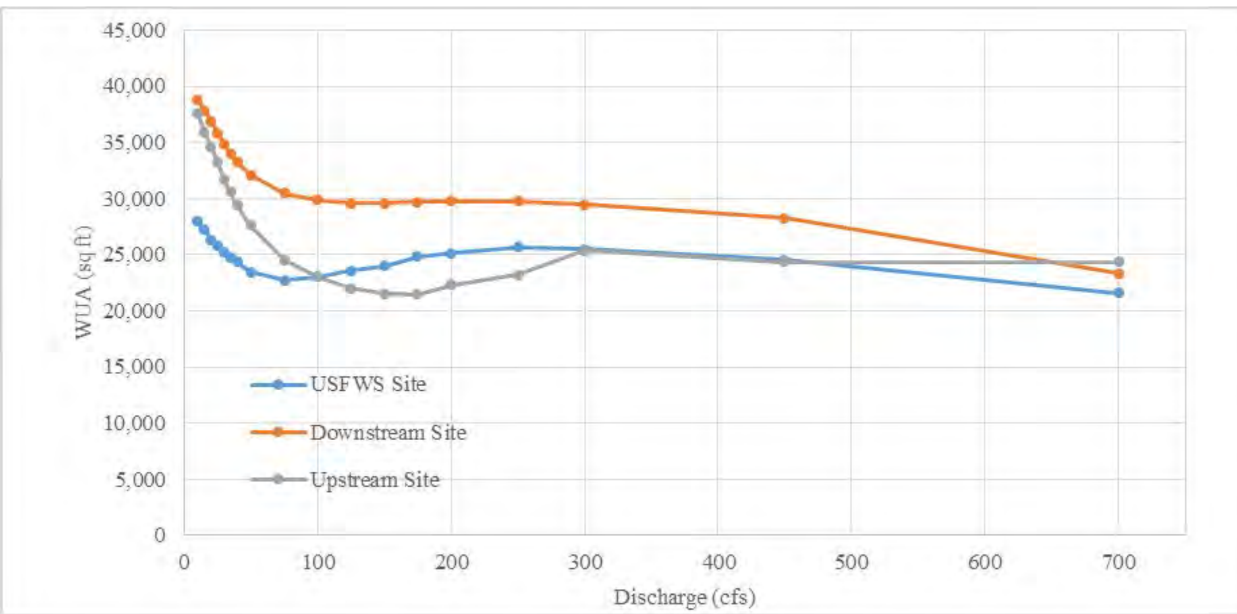

Figure 3.3.3-32. Steelhead fry rearing WUA at SSWD and USFWS sites.

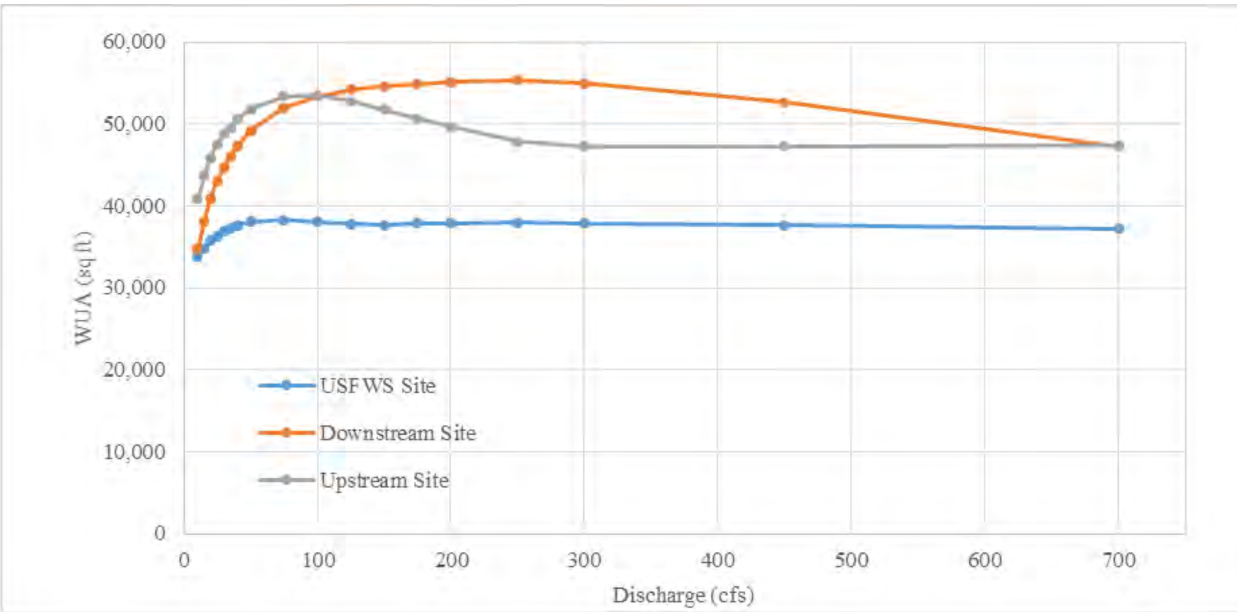

Figure 3.3.3-33. Steelhead juvenile rearing WUA at SSWD and USFWS sites.

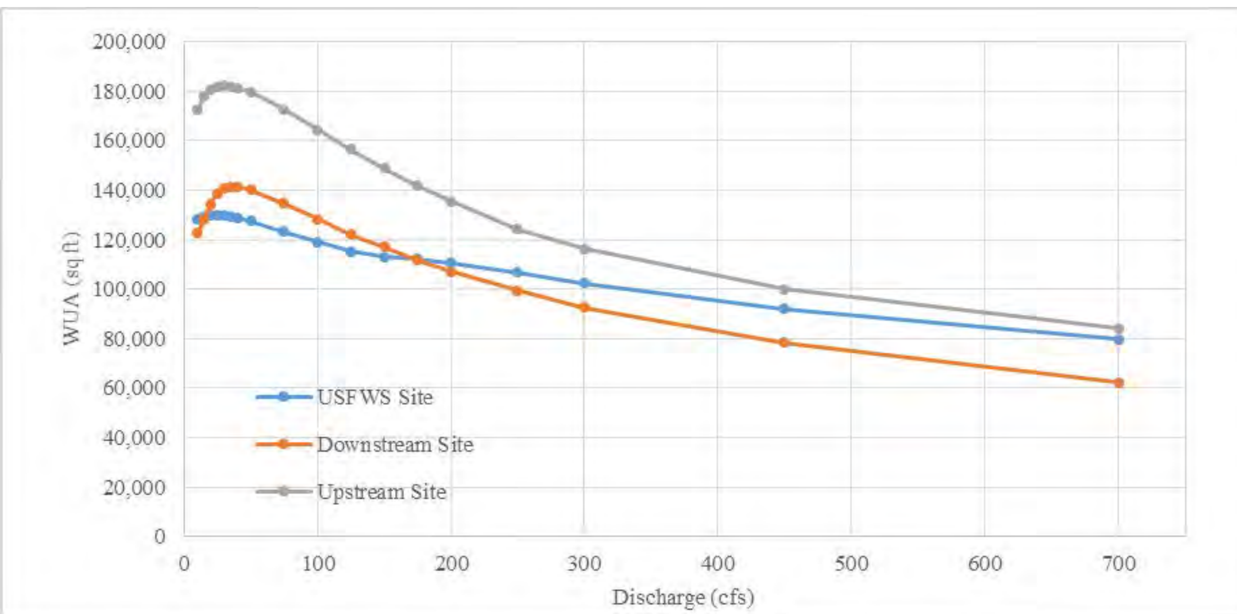

Figure 3.3.3-34. Hardhead juvenile WUA at SSWD and USFWS sites.

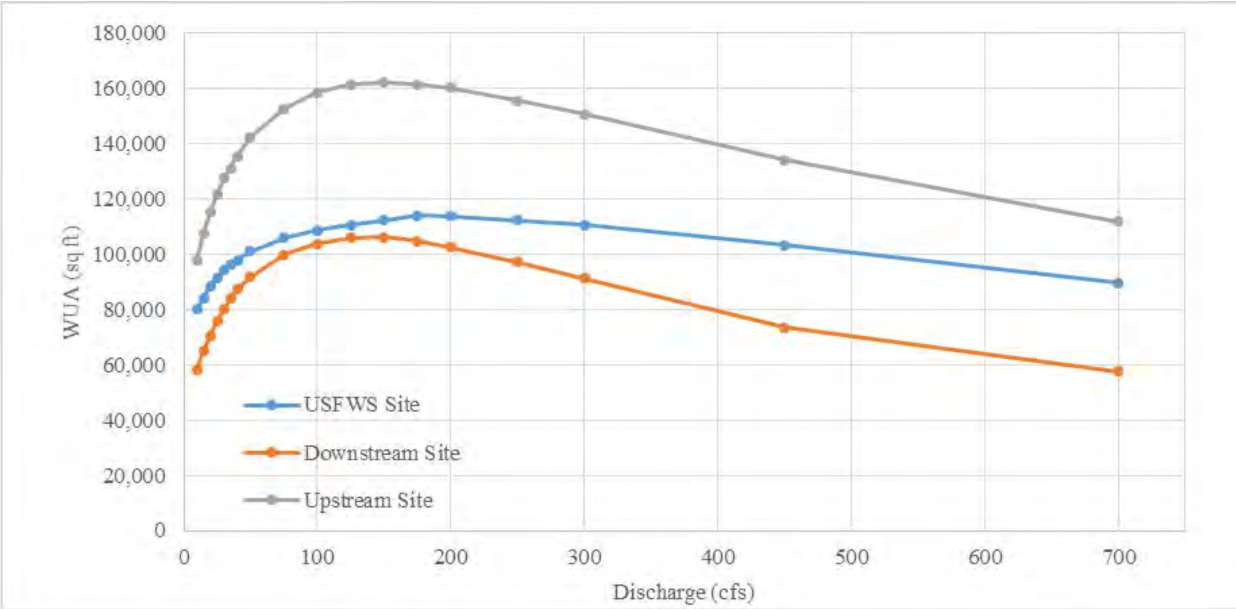

Figure 3.3.3-35. Hardhead adult WUA at SSWD and USFWS sites.

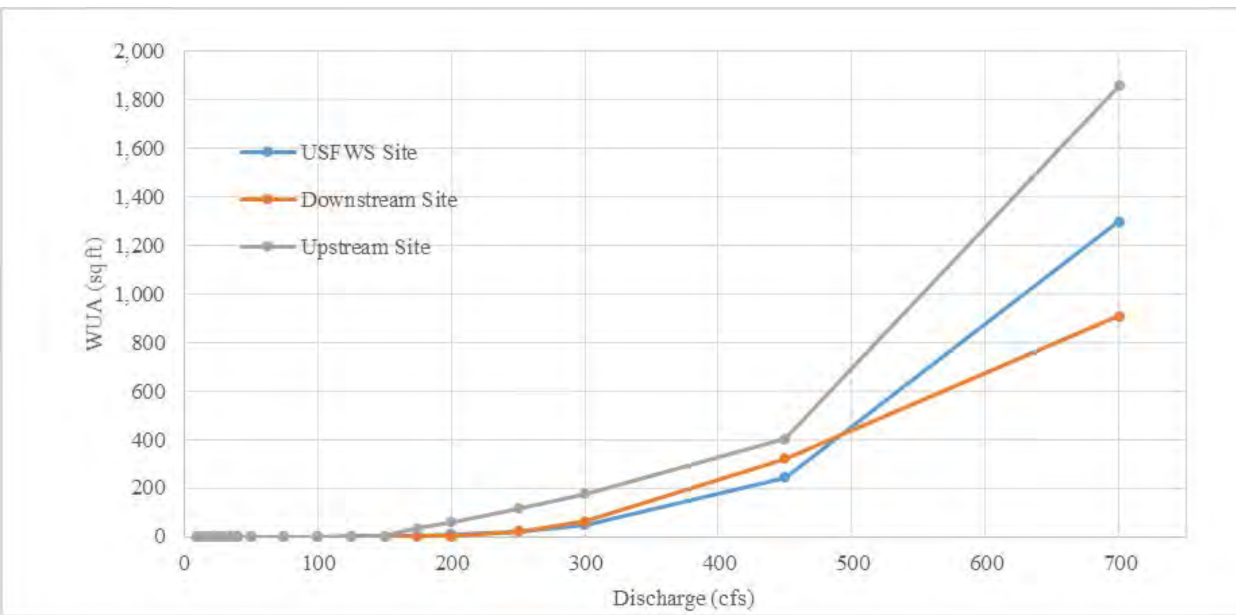

Figure 3.3.3-36. Sturgeon spawning WUA at SSWD and USFWS sites.

Habitat for Chinook Salmon Under Existing Conditions

The Instream Flow Study does not consider temperature as a parameter of suitability and assumes that water temperatures for each life stage of CV fall-run Chinook salmon ESU is adequate. However, this is not true at all times in the lower Bear River. The lower Bear River is a relatively small, valley floor tributary to the Feather River that is a rain-fed watershed and lacks any access to snowpack or water-on-snow freshet runoff. As a result, summer conditions, even pre-Project, would typically be represented by warm, low flows, more akin to a coastal stream than a coldwater Sierran stream. The system can respond rapidly to precipitation, but is highly influenced by ambient warming from late spring into early fall and from releases from upstream water projects. As a result, water temperature is currently a limiting factor to salmonids.

To examine water temperature constraints for CV fall-run Chinook salmon ESU, SSWD developed a water temperature model based on the 1975 to 2014 period of record. The development of this model is discussed in Section 3.3.2.1.2.3 of this Exhibit E. Using its Temp Model, Chinook salmon life-stage usage periodicities in Table 3.3.3-1 and EPA water temperature guidelines in Table 3.3.3-4. SSWD assessed under the No Action Alternative (i.e., Environmental Baseline [current conditions]) the suitability of water temperature in the lower Bear River for the various life stages of CV fall-run Chinook salmon ESU. The evaluation was done at four nodes in the lower Bear River: 1) RM 16.9 immediately downstream of non-Project diversion dam; 2) RM 11.5 at the Highway 65 bridge; 3) RM 6.8 at the Pleasant Grove Road bridge; and 4) RM 3.5 at the Highway 70 bridge. Suitable water temperatures for the lifestage are expressed in terms of the percent of days in each month that stream water temperatures meet EPA guidelines. To do this, SSWD calculated 7DADM water temperatures from the Base Case Temp Model output, which is mean daily water temperature. The results of this analysis by lifestage is presented in Table 3.3.3-30 and discussed below.

Table 3.3.3-30. Percent of days per month where the No Action Alternative (environmental baseline) stream water temperature at four locations in the lower Bear River is within the EPA guidelines for specific lifestages of CV fall-run Chinook salmon ESU. Temperatures are output from SSWD's Temp Model. For each lifestage, only months where utilization based on periodicity is expected are shown. Zero percent indicates that no days have suitable water temperatures and 100 percent indicates that all the days have suitable water temperatures.

Lower Bear River Location	Month											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
CHINOOK SALMON SPAWNING/INCUBATION/EMERGENCE (EPA GUIDELINE: LESS THAN 13° C 7DADM)												
Below the non-Project diversion dam	100%	99%	74%							0%	30%	99%
Highway 65	99%	81%	54%							0%	50%	99%
Pleasant Grove Bridge gage	98%	74%	47%							0%	48%	98%
Highway 70	94%	69%	39%							0%	49%	98%
CHINOOK SALMON CORE JUVENILE REARING (EPA GUIDELINE: LESS THAN 16° C 7DADM)												
Below the non-Project diversion dam	100%	100%	97%	93%	82%							100%
Highway 65	100%	98%	78%	63%	16%							100%
Pleasant Grove Bridge gage	100%	96%	74%	58%	8%							100%
Highway 70	100%	96%	72%	55%	5%							100%
CHINOOK SALMON MIGRATION (EPA GUIDELINE: LESS THAN 18° C 7DADM)												
Below the non-Project diversion dam							23%	0%	0%	14%	96%	100%
Highway 65							0%	0%	0%	31%	100%	100%
Pleasant Grove Bridge gage							0%	0%	0%	27%	99%	100%
Highway 70							0%	0%	0%	30%	99%	100%
Number of Days included in Each Month's Analysis (WYs 1976 through 2014)	1,209	1,102	1,209	1,170	1,209	1,170	1,209	1,209	1,170	1,203	1,170	1,209

Key: Blue cells are 100% suitable water temperatures based on EPA guideline; green cells are 80% to 99% suitable; yellow cells are 70% to 79% suitable; orange cells are 60% to 69% suitable; and red cells are less than 60% suitable.

<u>CV Fall-run Chinook Salmon ESU Immigration and Staging</u>

CV fall-run Chinook salmon ESU immigration and staging primarily occurs from July through December (Table 3.3.3-4), with minimal activity, if any, occurring July through September. Summer fish observations as part of 2018 Water Transfer Monitoring did not document CV fall-run Chinook salmon ESU adult presence in the lower Bear River. In addition, multiple years of Vaki monitoring on the Yuba River generally shows passage events beginning in small numbers in September and increasing by October. In 2015, adults on the Yuba River were not documented until October 12, 2015 (Yuba RMT 2015) and only began to arrive in moderate numbers in November.

Suitable CV fall-run Chinook salmon migration characteristics are not relatively complex to maintain. Primarily, adults need complete access to spawning grounds, without physical impairment due to obstacle or shallow water barrier. The lower Bear River maintains sufficient continuity for adult access to the spawning grounds and no instream barriers or impediments to passage were noted during any relicensing surveys completed (e.g. habitat mapping, redd mapping and fish sampling). Specific instream habitat models were not developed for this lifestage because of the general simplistic needs do not require advanced modeling to measure suitability.

The EPA provides a temperature guideline of 18°C 7DADM for migrating adult salmon to ensure that adults are not stressed and that potential eggs within females are not compromised due to excessively warm water. Returning adults may become stressed as their food stores deplete during their journey to their natal spawning grounds under excessively high water temperature. Adults generally manage for temperature by holding in cooler water, in the Sacramento or Feather rivers on their return until conditions begin to improve and then continuing upstream migration. Water temperature analyses in Table 3.3.3-30 shows that water temperatures from July through September are unsuitable, and even in October early returning adults may be exposed to unsuitable water temperatures for most of the time. Water temperatures are suitable in November and December. Wetter years expand the window of opportunity for returning adults, while drier years limit access due to temperature. These conditions are typical of any small watershed and would occur regardless of the Project.

<u>CV Fall-run Chinook Salmon ESU Spawning</u>

CV fall-run Chinook salmon ESU spawning can occur in the lower Bear River from October through January (Table 3.3.3-4). Spawning surveys found that significant activity appears to occur in January. SSWD's studies, as described above, show that the lower Bear River contains good quantities of Chinook salmon spawning substrate and the overall capacity for spawning does not appear to be limited by gravel based on general activity observed of adult spawners (i.e. opportunistic observation and carcass counts) and related spatial requirements. The EPA (2003) guidelines state that a cool 13°C 7DADM or less is desired for suitable temperature during spawning. The guideline is relatively cold, especially for fall water temperature in the lower Bear River that has not fully chilled due to seasonal ambient cooling. The low elevation of the Bear River and relatively smaller reservoir does not cool the water as quickly as other watersheds. As a result, as shown in Table 3.3.3-31, water temperatures are not suitable for spawning in October, marginal at best in November (i.e., 30% to 48% of the days suitable, most of which occurs in the wetter water years), and become suitable in December and January.

Temperature results appear to correlate with significant spawning activity observed in January during SSWD's redd surveys with moderate amounts or spawning in November and December.

During this period, the existing minimum flow requirement is 10 cfs, and SSWD and CFWID are not diverting water for irrigation at the non-Project diversion dam. At a flow of 10 cfs and based on the habitat-flow relationship in Figure 3.3.3-28 and water temperature, there would be no habitat available in October due to water temperature, and some habitat in November, but only about 30 to 50 percent of the time. The amount of habitat available for spawning in every year in December and January is 9.4 percent of the maximum WUA (Max WUA) of about 200 cfs at the Instream Flow Study Upstream Site, 8.4 percent of the Max WUA of about 300 cfs at the Downstream Site, and 17.3 percent of the Max WUA of about 300 cfs at the USFWS Site.

<u>CV Fall-run Chinook Salmon ESU Egg Incubation</u>

CV fall-run Chinook salmon ESU egg incubation immediately follows spawning and generally requires 40 to 60 days to complete (Moyle 2002). Since spawning in the lower Bear River mainly occurs from November through January, egg incubation can then extend through March, but can begin as early as October (Table 3.3.3-4). SSWD's studies, as described above, show that CV fall-run Chinook salmon ESU spawning substrate has good permeability for egg incubation and there are extensive quality gravel beds extending throughout the lower reach.

SSWD's relicensing Instream Flow Study does not include a specific egg incubation model, but is encompassed as part of the overall spawning curve. Assuming that salmon are able to successfully spawn in suitable habitat and that sufficient water stage is maintained for covering redds, then the overall conditions for egg incubation are physically met for velocity, depth, and substrate habitat modeling.

The EPA (2003) guideline similarly maintain that 13°C 7DADM is advised through spawning and egg incubation. This results in a similar scenario to spawning with unsuitable water temperatures in October, marginal at best in November (i.e., 30% to 48% of the days suitable, and these occur in the wetter years), suitable in December and January, with decreasing suitability in February and March (i.e., 39% to 74% of the days suitable) (Table 3.3.3-30). While the early window for egg incubation may be limited in some warmer, drier water years, it is anticipated that cooler, wetter years expand the opportunity for both spawning and incubation. The seasonal opportunity driven by precipitation and cooler weather is a strong factor that persisted prior to the Project and still influences the opportunistic salmonid production levels in the lower Bear River.

<u>CV Fall-run Chinook Salmon ESU Fry Rearing</u>

Young fish that have emerged from gravel incubation represent a fry lifestage. CV fall-run Chinook salmon ESU fry rearing may occur in December, but is more likely to occur from January through April (Table 3.3.3-4). SSWD's studies, as described above, show that the lower Bear River contains good structural habitat for fry rearing. Instream Flow Study modeling differentiates fry from juvenile fishes, because they are not strong swimmers and tend to occupy different habitat when compared to the more mature juvenile counterparts. The existing minimum flow requirement is 10 cfs, and SSWD and CFWID are not diverting water for irrigation at the non-Project diversion dam. At a flow of 10 cfs and based on the habitat-flow relationship in Figure 3.3.3-29, the existing minimum flow provides 100 percent of the maximum WUA at each of the Instream Flow Study Upstream and Downstream sites and at the USFWS Site. Therefore, habitat for fry rearing does not appear to be limited, based on depth, velocity and substrate.

The EPA (2003) guidelines do not recommend different prescriptions for fry or juvenile developmental stages and only officially identify juvenile rearing. Regardless, the EPA suggests that 16°C 7DADM is an appropriate guideline for rearing salmon of either fry or juvenile. Temperature conditions for fry are suitable from December through February, decline slightly in March, and, except for immediately below the non-Project diversion dam, are generally unsuitable in April and May (Table 3.3.3-30).

CV Fall-run Chinook Salmon ESU Juvenile Rearing

As fry mature, food prey items increase in size, swimming ability improves and the developmental stage transitions to juvenile. CV fall-run Chinook salmon ESU juvenile fish are more robust, can handle quicker water and access a greater range of habitat when compared to fry. Juvenile fish are most likely to be present from January through May (Table 3.3.3-4). The existing minimum flow requirement is 10 cfs, and SSWD and CFWID are not diverting water for irrigation at the non-Project diversion dam. At a flow of 10 cfs and based on the habitat-flow relationship in Figure 3.3.3-30, the existing minimum flow provides 84 to 99 percent of the maximum WUA at each of the relicensing Instream Flow Study Upstream and Downstream sites and at the USFWS Site. Therefore, habitat for juvenile rearing does not appear to be limited, based on depth, velocity and substrate.

As discussed for fry rearing, the EPA suggests that 16°C 7DADM is an appropriate guideline for rearing salmonids (fry or juvenile developmental stages). Temperature conditions for rearing juveniles are excellent from December through February, and only begin to decline in April and May (Table 3.3.3-30). While water may warm in these later months, some studies have shown slightly warmer conditions may improve growth for rearing juvenile fish and may not pose as strong of an impact as once contemplated. Maximum growth of juvenile fall-run Chinook salmon has been reported to occur in Nimbus Hatchery spring-run Chinook salmon at 18.8°C (Cech and Myrick 1999). Regardless, suitable conditions persist for multiple months and the window for extended rearing likely persists in wetter water years, which would be anticipated under unimpaired conditions prior to the Project as well.

CV Fall-run Chinook Salmon ESU Smoltification

Smoltification is the process of a juvenile freshwater anadromous fish moving into saltwater. The process is a general physiological change that begins in freshwater and requires suitable water temperature to occur. Habitat requirements for CV fall-run Chinook salmon ESU fry or juvenile fishes as discussed above address what is needed during rearing, but water temperature during smoltification is suggested to be 14°C 7DADM by EPA guidelines. Smoltification may occur between Late December and May (Table 3.3.3-4), which generally remain cool during the earlier months of this time period. During mid-spring and early summer months, temperature warms and would exceed the EPA guideline.

Habitat for Hardhead Under Existing Conditions

Hardhead Juvenile

Juvenile hardhead habitat is predicted throughout each site excluding swift riffle sections. The most suitable habitat occurs in slow sections and along the margins of pools away from the thalweg, as well as in discrete locations off the main channel. Hardhead juvenile WUA was highest at the Upstream Site for all discharge simulations, followed by the Downstream Site and the USFWS Site, with some variation on either end of the simulation range (Figure 3.3.3-34). Max WUA occurs at 25 cfs for the USFWS Site, 40 cfs for the Downstream Site, and 30 cfs for the Upstream Site; however, any one of these flows provides more than 99 percent of Max WUA at each site.

Hardhead Adult

The models identified adult hardhead habitat throughout each site excluding swift riffle sections. Adult hardhead suitability is similar to juvenile suitability except for preferring deeper habitat and slightly faster velocities. The most suitable habitat occurred in slow, deeper sections of pools away from the thalweg, as well as in discrete locations off the main channel. Hardhead adult WUA was highest at the Upstream Site for all discharge simulations, followed by the USFWS Site and then the Downstream Site (Figure 3.3.3-35). Max WUA occurs at 175 cfs for the USFWS Site, and 150 cfs for the Upstream and Downstream sites. Simulation flows between 40 cfs and 300 cfs produced at least 80 percent of Max WUA at all sites.

Habitat for Sturgeon Under Existing Conditions

Sturgeon spawning habitat was limited to a few locations within each site at the highest flows simulated. Suitable habitat was predicted in deep pools with sufficiently high velocity through the thalweg. For simulations less than 125 cfs, no suitable spawning habitat was identified. For simulations from 125 to 200 cfs suitable habitat remains limited enough that it is likely does not provide any spawning benefit. Suitable spawning habitat increases throughout each simulation at all sites, peaking at the highest modeled flow of 700 cfs. (Figure 3.3.3-36.)

SSWD's Relicensing Benthic Macroinvertebrates Study

Only one source of information was found regarding benthic macroinvertebrates downstream of the project Area. In 2011 and 2013, SWRCB staff conducted studies in the lower Bear River as part of the SWAMP Statewide Perennial Streams Assessment. One of the studies was conducted about 0.3-mi upstream of the Pleasant Grove Bridge (RM 7.2) and the other about 0.5-mi upstream of the Highway 70 Bridge (RM 4.0; SWRCB 2011, SWRCB 2013). While the data provided did not include any benthic macroinvertebrate (BMI) metric calculations, the 14 orders and 24 families identified during sampling suggest a diverse assemblage of benthic macroinvertebrates. However, only seven of the 24 families (25%) were from Ephemeroptera, Plecoptera, and Trichoptera (EPT) taxa which suggest a warm water, altered environment (Table 3.3.3-31).

Table 3.3.3-31. Orders and families of aquatic macroinvertebrates that were found at two locations in the lower Bear River (downstream of the Project).

Order	**Amphipoda (scuds)**	**Arhynchobdellida (leeches)**	**Hydroida (hydra)**	**Coleoptera (aquatic beetles)**	**Plecoptera (stoneflies)**	**Hoplonemertea (worms)**
Family	Gammaridae	Erpobdellidae	Hydridae	Elmidae	Perlodidae	Tetrastemmatidae
Order	**Trombidiformes (mites)**	**Veneroida (clams)**	**Basommatophora (snails)**	**Ephemeroptera (mayflies)**	**Trichoptera (caddisflies)**	**Diptera (true flies)**
Family	Sperchontidae	Corbiculidae	Lymnaeidae	Baetidae	Leptoceridae	Chironomidae
	Hygrobatidae	Sphaeriidae	Planorbidae	Leptohyphidae	Hydropsychidae	Simuliidae
	--	--	Ancylidae	Caenidae	Philopotamidae	--
Order	**Hemiptera (true bugs)**	**Odonata (damsel and dragonflies)**	--	--	--	--
Family	Naucoridae	Libellulidae	--	--	--	--
	--	Coenagrionidae	--	--	--	--

Source: SWRCB 2011 and SWRCB 2013.

In 2017, SSWD conducted BMI surveys for Study 3.4. Surveys were conducted at two representative sites on the Bear River between the non-Project diversion dam and the Feather River confluence. Sampling methods conformed to the standard reach wide benthos (RWB) methods for documenting and describing BMI assemblages and physical habitat described by the SWRCB's SWAMP protocol (Ode et al. 2016). Measurements on water chemistry and physical habitat where collected in conjunction with BMI samples.

The sample sites differed in habitat, substrate composition, and transect characteristics (Table 3.3.3-32). The upstream site was dominated by pools, and the downstream site was comprised of pool, run, and riffle habitats. Moving downstream, dominant substrate size shifted from larger to smaller size classes. The shift in substrate composition is likely a function of the more sediment deposition occurring in the reach and geomorphic processes.

Table 3.3.3-32. Water quality and habitat characteristics collected from SSWD's 2017 study at the Bear River downstream of Camp Far West Reservoir.

Category	Metric	Bear River Upstream of Pleasant Grove Bridge	Bear River Downstream of Highway 70 Bridge
Water Quality	Water Temperature (°C)	25.4	25.9
	Dissolved Oxygen (mg/l)	8.6	10.1
	Specific Conductivity (μS/cm)	89	155.7
	pH	7.6	7.78
Site Characteristics	Reach Length (m)	250	150
	Flow (cfs)	15.2	36.4
	Habitat Composition (% of Site)		
	Pool	66	35
	Glide	12	0
	Riffle	19	40
	Run	4	25
	Dominant Thalweg Substrate Composition (% of site)		
	Bedrock	0	0
	Boulder	0	0
	Cobble	10	0
	Gravel, Course	71	35
	Gravel, Fine	15	20
	Sand	0	20
	Fines	0	24

Table 3.3.3-32. (continued)

Category	Metric	Bear River Upstream of Pleasant Grove Bridge	Bear River Downstream of Highway 70 Bridge
Transect Characteristics	Average Sample Plot Depth (cm)	52.5	63.2
	Average Wetted Width (m)	13.5	9.7
	Average Bankful Width (m)	34	16.1
	Average Bankful Height (m)	1.7	1.2
	Riparian Canopy Cover (%)	23	70

Key: µS = microsiemens cm = centimeters °C = Celsius cfs = cubic feet per second
% = percent µm -= micrometers mg/l = milligrams/liter m = meter

BMI samples were collected at the "11" main transects for each site on the Bear River. BMI samples were processed by Ecoanalysts, a qualified taxonomy laboratory that complies with requirements outlined in the SWAMP protocol. Ecoanalysts calculated the California Stream Condition Index (CSCI) scores using BMI data (Table 3.3.3-33). CSCI is California's new assessment tool that translates BMI data into a numerical measurement of stream health. CSCI scores indicate if a stream's health is altered and to what degree as well as reflects ecological structure and the degree of variation of the observed to expected outcome (Rehn et al. 2015). Scores are calculated using two indices, a multi-metric index (MMI) and observed-to-expected (O/E) index. MMI scores reflect ecological structure and function and O/E scores measure taxonomic completeness (Rehn et al. 2015).

The O/E index compares the observed versus expected BMI taxa and measures the biological condition of a site. The MMI index combines several BMI metrics into a single measurement of biological condition (Rehn et al. 2015). The mean CSCI score of reference sites is 1. CSCI scores greater than 1 indicate more complex ecological functioning and taxonomic richness than predicted. As a stream's CSCI score approaches 0, it represents a stream's increased variance from reference conditions and a degradation of the stream's biological conditions (Rehn et al 2015).

An estimated 20,264 organisms were collected from the two sample sites. A randomly sorted subset of 1,381 invertebrates was used to derive BMI metrics. Eight common BMI metrics were calculated for each site and compared to the CSCI predicted value (Table 3.3.3-33). The BMI community upstream of Pleasant Grove was dominated by seed shrimp (Ostrocoda) which made up 94 percent of the sample. The BMI community downstream of Highway 70 was dominated by thee orders: midges (Diptera); Caddisflies (Trichoptera); and mayflies (Ephemeroptera).

The site upstream of Pleasant Grove scored the lowest of the two sites. The CSCI score fell into the "very likely altered" status. It was below the expect value for all eight BMI metrics. The second site, downstream of highway 70 had the highest score of 0.70, indicating a "likely altered" state. The site downstream of highway seventy was below the predicted value for all metrics except percent Coleoptera (beetle family).

The BMI communities at both sites were dominated by tolerant species and did not contain intolerant species. Intolerant species refers to macroinvertebrates that are highly susceptible to stream impairment. Shredder taxa were absent from BMI samples. The term Shredder refers to one of the BMI functional feeding groups known for shredding coarse particulate organic matter.

Shredders are found in slower moving water in cold streams where leaf material accumulates (Harrington and Born 1999). Having a high number of shredder taxa can be a good indicator for riparian cover. Both BMI sites scored below the predicted value for taxonomic richness, percent EPT, and percent clinger taxa. EPT percent is an important indicator of stream health because of EPT's sensitivity to disturbance and pollution (Harrington and Born 1999). Variability in site BMI metrics is likely related to differences in habitat complexity. The low species richness is likely related to extremely high flows from the past season.

Table 3.3.3-33. BMI metrics from samples collected from SSWD's 2017 study at the Bear River downstream of Camp Far West Reservoir.

BMI Metrics	Bear River Upstream of Pleasant Grove	Bear River Downstream of Highway 70
ABUNDANCE		
MMI Score	0.49	0.69
CSCI Score	0.47	0.70
Status	Very Likely Altered	Likely Altered
RICHNESS		
Taxonomic Richness	13.55	23.05
Taxonomic Richness Predicted	34.05	33.71
Percent EPT	34	32
Percent EPT predicted	43	44
Percent Coleoptera Taxa	7	13
Percent Coleoptera Taxa Predicted	13	13
INTOLERANCE		
Intolerant Percent	0	0
Intolerant Percent Predicted	15	15
FEEDING		
Percent Clinger Taxa	33	43
Percent Clinger Taxa Predicted	54	50
Shredder Taxa	0	0
Shredder Taxa Predicted	1.8	1.8

Key: MMI = multimetric index CSCI= California Stream Condition Index EPT = Ephemeroptera, Plecoptera, Trichoptera

3.3.3.2 Environmental Effects

This section discusses the potential environmental effects of SSWD's proposed Project, as described in Section 2.2 of this Exhibit E. As part of the Project relicensing, SSWD proposes a Pool Raise, modifications of existing recreation facilities, and modification of the existing Project Boundary. SSWD proposes one measure that will effect aquatic resources, WR1, Implement Minimum Streamflows, which will continue current flow requirements. In addition, SSWD assumes its release through December 2035 of up to 4,400 ac-ft of water from July through September (maximum of 37 cfs) in dry and critically dry water years to meet SSWD's Bay-Delta Water Quality Control Plan objectives and consistent with SSWD's water rights will continue. The release is in addition to the minimum flows requirements in the FERC license. Refer to Section 2.1.5.2.3 regarding this requirement. The section below is divided into the following areas: 1) effects of construction-related activities; 2) effects of continued Project O&M.

3.3.3.3.1 Effects of Construction-Related Activities

This section provides a summary of the effects of the construction-related activities associated with the Pool Raise on aquatic resources in the Project Area.

Effects of Construction on Fish and BMI

There will be no change to instream flows in the lower Bear River and, therefore, no effect on aquatic habitats, fish, or BMI as a result of construction related to the Pool Raise. During construction, including relocation of recreation facilities, SSWD will follow all appropriate permit conditions related to water quality and erosion to prevent impacts to aquatic species and habitats in Camp Far West Reservoir.

Effects of Construction on FYLF and WPT

Construction would have no effect on FYLF and WPT. No FYLF or WPT have been documented within or adjacent to the work area, nor is there any appropriate habitat in the area of the proposed work.

Effects of Construction on AIS

Construction will have no effect on AIS, in that the work will not increase the likelihood of these species being introduced to the Project or spreading them outside or to new sites on the Project. The work will be done in the dry, using appropriate equipment, which will be cleaned prior to being brought onto the Project. All recreation construction will be done in existing NSRA and SSRA, so no new sites will be opened for AIS invasion. Further, SSWD will comply with all mitigation measures required under various permits, including those that may relate to preventing the introduction and spread of AIS.

3.3.3.3.2 Effects of Proposed Project Operations and Maintenance

Under SSWD's proposed Project, water quantity and quality could change, as compared to the No Action Alternative. This section discusses effects of SSWD's proposed Project on: 1) fish and BMI resources in Camp Far West Reservoir; 2) fish and BMI resources downstream of the Project; 3) FYLF; 4) WPT; and 5) AIS.

Effects on Fish and AIS in Camp Far West Reservoir

Fish in Camp Far West Reservoir would be affected by the Pool Raise. The Pool Raise would create additional storage capacity in Camp Far West Reservoir and, as a result, would create additional shoreline habitat, which would potentially benefit fish within the Project. The additional storage provided by the Pool Raise would result in a small increase in the quantity of coldwater stored in the reservoir (Table 3.3.2-21 in the Water Resources section), which may provide additional habitat for fish. The additional water surface created by the Pool Raise may also create additional spawning habitat for fish who utilize the margins of the reservoir (i.e., black bass species).

The Pool Raise would have no effect on AIS in Camp Far West Reservoir.

Effects on Fish in the Lower Bear River

The Proposed Project would have a beneficial effect on fish in the lower Bear River. As described above, under existing conditions the fish assemblage in the lower Bear River is dominated by introduced, warm-water species (e.g. bass and panfish) and some native species with broad temperature tolerances (e.g., Sacramento pikeminnow and Sacramento sucker), with seasonal utilization by CV fall-run Chinook salmon ESU. Given that CV fall-run Chinook salmon ESU is the species in the lower Bear River that is most sensitive to flow and temperature, the discussion below focuses on this species.

With regards to flow, SSWD's proposed streamflows would continue to provide 100 percent of Max WUA for CV fall-run Chinook salmon ESU fry rearing at all three sites modeled as part of SSWD's Instream Flow Study, and between 84 and 99 percent Max WUA for CV fall-run Chinook salmon ESU juvenile rearing. In addition, rerunning the relicensing Water Temp Models and analysis for suitable water temperatures shows a slight benefit in water temperature for CV fall-run Chinook salmon ESU juvenile rearing below the non-Project diversion dam. Given that existing conditions provide good habitat diversity and structure (e.g., substrate and LWM) and the proposed Project would have no effect on that, CV fall-run Chinook salmon ESU fry and juvenile rearing are expected to continue to be good in the lower Bear River under the proposed Project.

However, while under the existing condition, adequate and good quality CV fall-run Chinook salmon ESU spawning substrate occurs, exiting minimum streamflows provide marginal habitat for this life stage based depth, velocity and velocity (i.e., less than 20% Max WUA, depending on the site).

To assess providing at least 80 percent of the Max WUA for each CV fall-run Chinook salmon ESU lifestage, SSWD utilized the WUA predictions produced by the relicensing Instream Flow Study model to determine monthly flows that would provide at least 80 percent of maximum WUA (80% Max WUA) for each lifestage of CV fall-run Chinook salmon ESU. To do this, SSWD integrated the Yuba River CV fall-run Chinook salmon ESU periodicities with the EPA water temperature guidelines to determine, month by month, which lifestage expected to be present has the lowest temperature guideline. Except for July through September, for each month, the life-stage with the lowest temperature guideline was selected as the priority lifestage for that month, and the instream flow that provided at least 80% Max WUA for the priority lifestage at each of the three modeled sites. From June through September, existing minimum instream flow requirement of 10 cfs was used because WUA does not apply to CV fall-run Chinook salmon ESU adult migration in those months. Table 3.3.3-34 shows the resulting monthly minimum streamflows.

Table 3.3.3-34. Yuba CV fall-run Chinook salmon ESU periodicity table with corresponding EPA guidance temperatures (degrees Celsius). Green cells indicate the most sensitive lifestage activities based on EPA water temperature guidelines (<°C 7DADM). Flows corresponding to 80% Max WUA for the priority lifestage are presented in the bottom row.

Life Stage	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Adult Immigration & Staging	--	--	--	--	--	--	18	18	18	18	18	18
Spawning	13	13	--	--	--	--	--	--	--	13	13	13
Embryo Incubation	13	13	13	--	--	--	--	--	--	13	13	13
Fry Rearing	16	16	16	16	--	--	--	--	--	--	--	-- 16
Juvenile Rearing	-- 16	16	16	16	16	--	--	--	--	--	--	--
Juvenile Downstream Movement	18	18	18	18	18	--	--	--		--	--	-- 18
80% Max WUA Flow (cfs)	95	95	95	10	10	10[1]	10[1]	10[1]	10[1]	95	95	95

[1] Since WUA does not apply to adult migration, so from June through September the existing minimum instream flow requirement of 10 cfs was used for this analysis.

The WUA-based flow schedule has mixed effects on CV fall-run Chinook salmon ESU habitat in the lower Bear River. There are moderate decreases in stream temperature in most reaches of the lower Bear River in February and March, which are beneficial to all lifestages of CV fall-run Chinook salmon ESU. However, from April through November, the WUA-based flow schedule generally produces increased stream temperatures throughout the lower Bear River, which are detrimental to all life-stages of CV fall-run Chinook salmon ESU. Of particular concern are the increased temperatures in October and November under this scenario, when CV fall-run Chinook salmon adults are entering the river and beginning to spawn. While there are periods of increased physical modeled habitat, these modeled areas are not usable if temperature is a limiting factor. A balanced approach that does not create extremes, improves or maintains temperature, and sustains a sufficient amount of habitat is a more prudent approach that is not achieved under the 80% Max WUA flow schedule.

Table 3.3.3-35. Percent of days per month where, under the considered scenario (Pool Raise with 80% Max WUA flow schedule), stream temperature at four locations in the lower Bear River is less than EPA temperature guidelines for specific life stages of CV fall-run Chinook salmon. Temperatures are output from the Water Temp Models and are expressed as the 7DADM in degrees Celsius. For each lifestage, only months where utilization based on periodicity is expected are shown. Zero percent indicates that no days have suitable water temperatures and 100 percent indicates that all the days have suitable water temperatures.

Lower Bear River Location	Month											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
CHINOOK SALMON SPAWNING/INCUBATION/EMERGENCE (EPA GUIDELINE: LESS THAN 13° C 7DADM)												
Below the non-Project diversion dam	100%	99%	90%							0%	14%	93%
Highway 65	100%	93%	60%							0%	24%	97%
Pleasant Grove Bridge gage	99%	88%	51%							0%	27%	98%
Highway 70	96%	79%	40%							0%	30%	97%
CHINOOK SALMON CORE JUVENILE REARING (EPA GUIDELINE: LESS THAN 16° C 7DADM)												
Below the non-Project diversion dam	100%	100%	97%	84%	74%							100%
Highway 65	100%	100%	90%	61%	19%							100%
Pleasant Grove Bridge gage	100%	99%	82%	56%	9%							100%
Highway 70	100%	99%	76%	53%	5%							100%
CHINOOK SALMON MIGRATION (LESS THAN 18° C 7DADM)												
Below the non-Project diversion dam							33%	8%	3%	12%	83%	100%
Highway 65							0%	0%	0%	15%	94%	100%
Pleasant Grove Bridge gage							0%	0%	0%	16%	95%	100%
Highway 70							0%	0%	0%	17%	96%	100%
Number of Days included in Each Month's Analysis (WYs 1976 through 2014)	1,209	1,102	1,209	1,170	1,209	1,170	1,209	1,209	1,170	1,203	1,170	1,209
Minimum Flows (cfs) at which Water Temp Model was Run	95	95	95	10	10	10	10	10	10	95	95	95

Key: Blue cells are 100% suitable water temperatures based on EPA guideline; green cells are 80% to 99% suitable; yellow cells are 70% to 79% suitable; orange cells are 60% to 69% suitable; and red cells are less than 60% suitable.

Table 3.3.3-36. Net change in suitable water temperature days between the 80% Max WUA (Pool Raise with 80% Max WUA flow schedule) and SSWD's proposed Project (Pool Raise and SSWD's Proposed Flow Schedule) in percent of days per month where stream temperature at four locations in the lower Bear River is less than EPA temperature guidelines for specific life stages of CV fall-run Chinook salmon ESU. Positive values indicate a benefit from the proposed Project to the given life-stage at the given location.

Lower Bear River Location	Month											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
CHINOOK SALMON SPAWNING/INCUBATION/EMERGENCE (EPA GUIDELINE: LESS THAN 13° C 7DADM)												
Below the non-Project diversion dam	0%	0%	10%							0%	-16%	-6%
Highway 65	0%	13%	8%							0%	-26%	-2%
Pleasant Grove Bridge gage	1%	13%	4%							0%	-22%	-1%
Highway 70	2%	11%	1%							0%	-19%	-1%
CHINOOK SALMON CORE JUVENILE REARING (EPA GUIDELINE: LESS THAN 16° C 7DADM)												
Below the non-Project diversion dam	0%	0%	-1%	-11%	-17%							0%
Highway 65	0%	2%	13%	-2%	-1%							0%
Pleasant Grove Bridge gage	0%	2%	8%	-3%	-1%							0%
Highway 70	0%	3%	5%	-3%	-1%							0%
CHINOOK SALMON MIGRATION (EPA GUIDELINE: LESS THAN 18° C 7DADM)												
Below the non-Project diversion dam							-39%	6%	3%	-2%	-13%	0%
Highway 65							0%	0%	0%	-15%	-6%	0%
Pleasant Grove Bridge gage							0%	0%	0%	-13%	-4%	0%
Highway 70							0%	0%	0%	-13%	-3%	0%
Number of Days included in Each Month's Analysis (WYs 1976 through 2014)	1,209	1,102	1,209	1,170	1,209	1,170	1,209	1,209	1,170	1,203	1,170	1,209
Minimum Flows (cfs) at which Water Temp Model was Run	95	95	95	10	10	10	10	10	10	95	95	95

Key: Green shaded cells indicate more suitable water temperature conditions for that CV fall-run Chinook salmon ESU life stage; red shaded cells indicate less suitable water temperature conditions.

In terms of Project O&M, the 80% Max WUA flow schedule creates impacts to water supply deliveries, power generation, and overall reservoir operation. The 80% Max WUA flow schedule requires an annual release to the river of nearly 38,000 ac-ft, an increase of approximately 28,000 ac-ft from existing conditions. The additional water released to the river reduces the amount of water available for water supply delivery, but also requires an increase in Camp Far West Reservoir's carryover target (4,000 ac-ft in the environmental baseline to 19,000 ac-ft in the 80% Max WUA flow schedule) in an attempt to prevent the reservoir from reaching deadpool. The combination of the additional flow and higher carryover target reduces deliveries to SSWD in all years, as seen in Figure 3.3.3-37, resulting in an annual average reduction of 10,000 ac-ft of water supply delivery to CFWID and SSWD (a 10% reduction). Despite the changes to the carryover target, the reservoir still reaches deadpool in 6 of 39 years (15% of the years modeled), as opposed to only 1 year in existing conditions. Power generation increases marginally in some years due to the additional flow being released from the reservoir, as shown in Figure 3.3.3-38. However, the 80% Max WUA flow schedule usually results in lower reservoir elevations, which leads to an annual average decrease in power generation of 865 MWh (a 4% decrease).

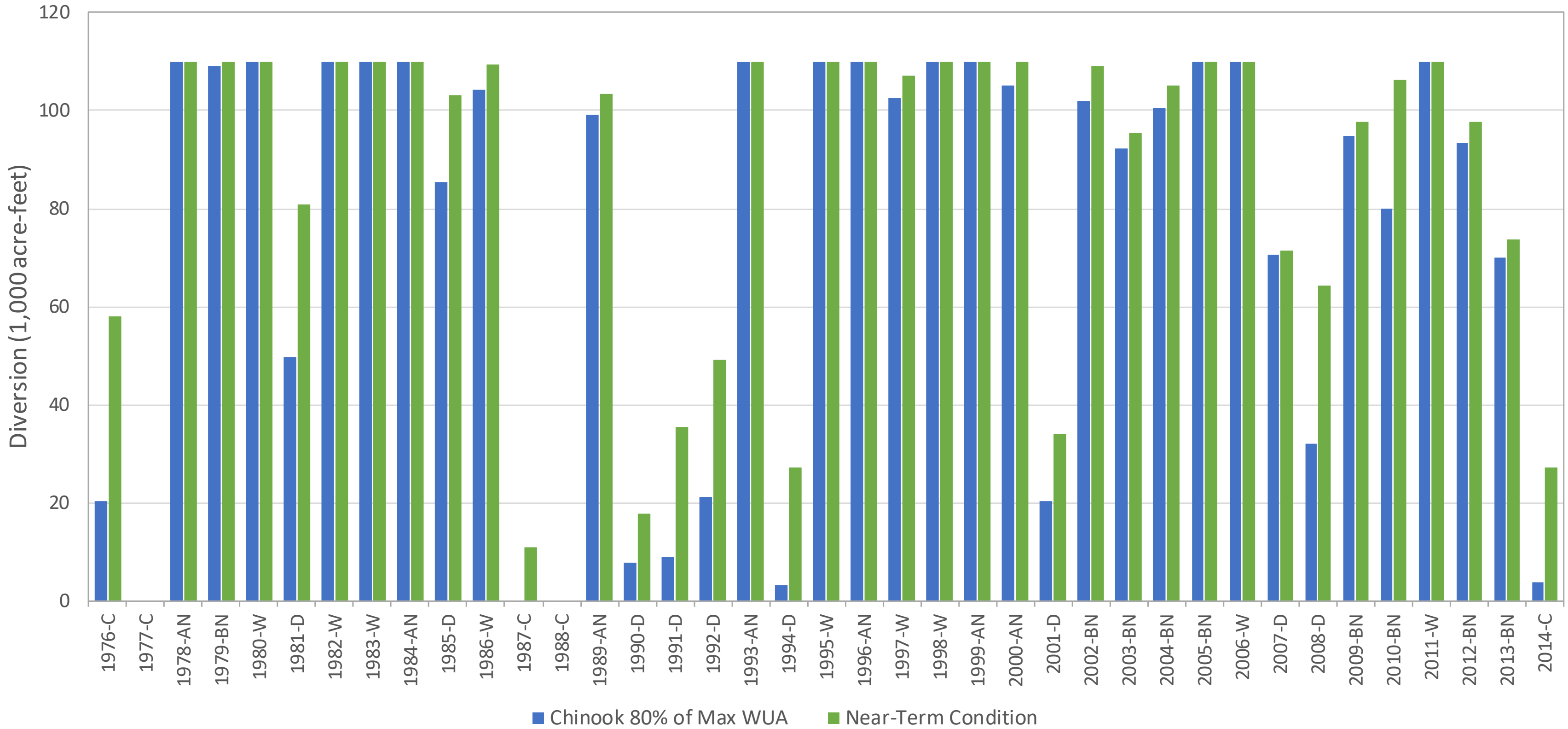

Figure 3.3.3-37. Comparison of SSWD Main Canal diversions under the 80% Max WUA scenario (Pool Raise with 80% WUA flow schedule) and SSWD's proposed Project.

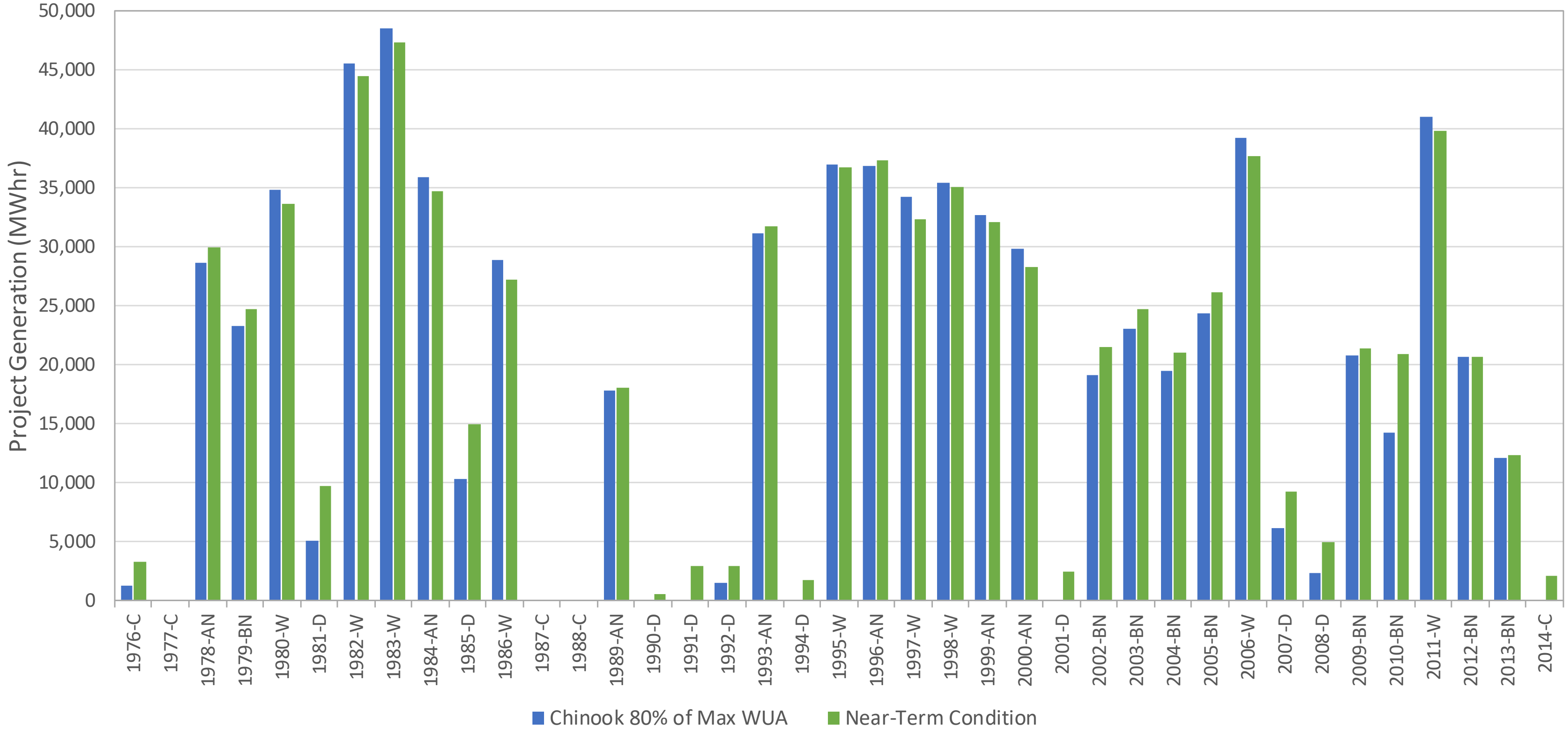

Figure 3.3.3-38. Comparison of annual power generation at the Camp Far West Powerhouse under the 80% Max WUA scenario (Pool Raise with 80% WUA flow schedule) and SSWD's proposed Project.

The 80% Max WUA flow schedule results in excessive variability between improved and reduced habitat, increased water temperature, and an overall impact to water storage, water deliveries and Project generation. Based on the identified impacts, SSWD does not consider the scenario of Pool Raise with 80% Max WUA flow schedule a prudent or beneficial alternative to SSWD's proposed Project.

Direct insight into the thermal responsiveness of the Bear River during elevated flows in July and August was observed during a water transfer in 2018. Discharge increased from 12 cfs to approximately 125 cfs and was maintained from July 2 to August 28. At the start of the water transfer discharge ramp-up, temperature was 27.5°C at RM 3.5. Temperature reduced to 22.9°C by July 4 as higher discharge moved through the system, but then steadily warmed to 26.2°C by July 19, even though discharge was maintained at 125 cfs. The relatively small coldwater pool available in Project reservoir storage provided only minimal relief at flows 10 times the baseflow. Ambient conditions rapidly began to warm elevated discharges and nullified any thermal cooling benefit. The small storage capacity, low elevation, and warm ambient summer conditions exceed the Project's ability to provide any meaningful extended thermal offset for coldwater fishes in late spring through fall months.

Effects on FYLF

SSWD's proposed Project would have no effect on FYLF. The Project is located at the western edge of the range for this species, and well below an elevation of 600 ft, where FYLF normally occur (Sycamore Associates 2013).

Effects on WPT

The proposed Project would have a beneficial effect on WPT. While the Pool Raise may affect potential habitat for this species, this would likely result in an increase to aquatic habitat for WPT within the reservoir. However, this elevation raise would also result in the conversion of 470 linear ft of riverine habitat in the Bear River and 295 linear ft of habitat in Rock Creek for WPT into lacustrine habitat. Both of these habitats are utilized by this species and this increase in water surface elevation should have minimal effect on WPT.

Effects on AIS

The proposed Project would have no effect on AIS. Recreation at Camp Far West Reservoir, which is the activity most likely to introduce and spread AIS, will continue as it does now. American bullfrog is already present in the Project, at the two sewage ponds near the Project, and generally throughout the region. The proposed Project would not cause the further spread of American bullfrog.

3.3.3.3 Cumulative Effects

3.3.3.3.1 Fish

The cumulative effects resulting from past, present, and reasonably foreseeable future actions, including the proposed Project, have the potential to affect fisheries resources in the lower Bear

River. These activities include timber harvest, livestock grazing, mining, and operation of upstream and downstream water projects.

While timber harvest and grazing rates are likely to decline in the future, the effects of past impacts from these activities are likely negative to anadromous salmonids and other native fishes in the lower Bear River and come in the form of altered regimes for flows and sediment delivery, increased stream temperatures, and reduced availability of large woody material. The water projects on the Bear River further these effects by blocking sediment and large woody material from traveling downstream and altering flow and temperature regimes.

Similarly, mining on the scale that occurred in the mid-1800s has ceased, but those activities significantly altered the geology and soils in the Bear River watershed. These activities moved massive amounts of sediments, some of which were deposited in the lower Bear River channel. The effect of that deposition on fishes is mixed, since these gravels were deposited prior to the construction of the water projects and continue to be available to fish in the lower Bear River (e.g., spawning habitat for anadromous fish), despite reduced sediment transport caused by the various water projects, including Camp Far West. Mining activities also introduced mercury and other harmful metals into the Bear River. Camp Far West and the other reservoirs provide an opportunity for these elements to settle and in the case of mercury be bioaccumulated in fish.

The construction and ongoing operation of the various water projects on the Bear River, all of which went into operation prior to the Project, represent the most significant past and present actions in the Project area, and the operators of those projects are predicting increased demand for water in the foreseeable future. The upstream projects affect inflow into the Project, and the non-Project diversion dam immediately downstream of Camp Far West Dam affects the Project's water releases to the lower Bear River. The resulting hydrograph in the lower Bear River is impaired and can be unpredictable. Such a hydrograph likely has negative effects to anadromous salmonids and other native fishes through reduced streamflows (including large run-off flows in spring), which may negatively impact available spawning and rearing habitats and alter stream temperatures.

Another cumulative effect on native Bear River fish is the introduction and persistence of non-native fish species. These species have been introduced by resource agencies, the public, or conveyance from upstream projects. Camp Far West Reservoir provides good habitat for non-native fish (especially black bass species) which compete with native species and could be transported downstream during spill events. Similarly, the Sacramento River basin has also been stocked with non-native fish which are now present in the Bear River.

The net effect of the cumulative effects to anadromous salmonids and other native fishes in the lower Bear River is largely negative and likely realized in lower productivity and survival rates resulting from reductions in suitable habitats, altered magnitude and timing of stream flows, and increased stream temperatures.

3.3.3.3.2 FYLF

As described above, the Project is located at the western edge of the range for this species, and well below an elevation of 600 ft, where FYLF normally occur (Sycamore Associates 2013).

3.3.3.3.3 WPT

WPT is significantly affected by loss and degradation of existing habitats – ponds, shallow lakes, and low gradients streams – to urban, agricultural, and water development. Historical over collection for food and the pet trade was likely a major factor in the early decline of the species. Introduction of non-native competing species, particularly other species of turtles and predators; the proliferation of native predators, such as raccoons, in areas of human development; and road mortality also have significant impacts. Although the Project provides habitat for WPT in the Project reservoir, deep water reservoirs may represent low quality habitat, with negligible benefit to the species. As a source of predatory fish into tributaries, the Project may contribute to cumulative effects on WPT.

In the lower Bear River, historical mining has altered instream and floodplain wetland habitats for WPT; this activity is not associated with the Project, which has no cumulative effect.

3.3.3.4 Unavoidable Adverse Effects

The proposed Project will continue to capture sediment, truncate high flows, and alter flow and water temperature in the lower Bear River, which may affect fish (and habitat) downstream of the Project. These effects are considered at best beneficial (e.g., slightly cooler water temperatures from the proposed Project) and at worst long-term, minor impacts that are cumulative in nature when considering the entire Bear River watershed. Instream flow and water temperature modeling shows that simply releasing more flow to provide additional physical habitat will not improve water temperature and therefore not make conditions better overall for threatened or endangered fish species.

The Project will continue to have no other effect on FYLF and WPT than periodically inundating a portion of the Bear River and Rock Creek with slack water as Camp Far West Reservoir is filled. It is unlikely that FYLF or WPT utilize these habitats since these fluctuations happen in most years.

3.3.3.5 List of Attachments

Attachment 3.3.3A Final rating curves for the Upstream and Downstream sites

Attachment 3.3.3B Final HSC and a description of the HSC selection procedure

Attachment 3.3.3C Fall-Run Chinook and Steelhead Map Sets

Attachment 3.3.3A

Final Rating Curves for Hydraulic Simulation Modeling of the Upstream and Downstream Sites

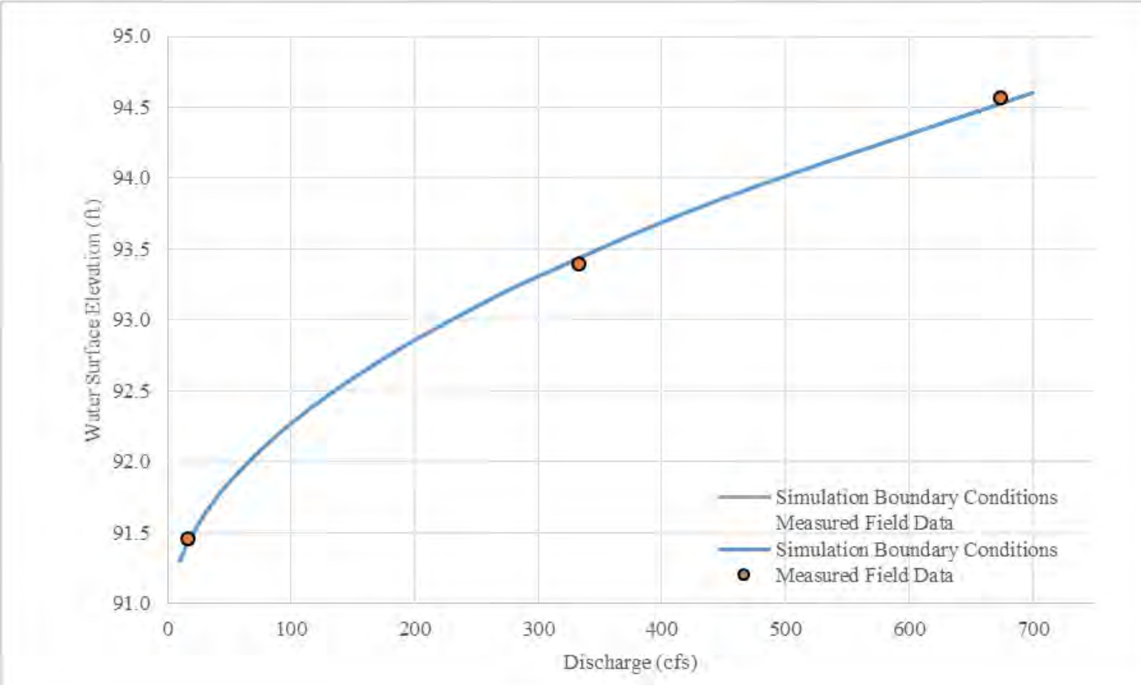

Figure 3.3.3A-1. Final rating curve for boundary conditions at the Upstream Site.

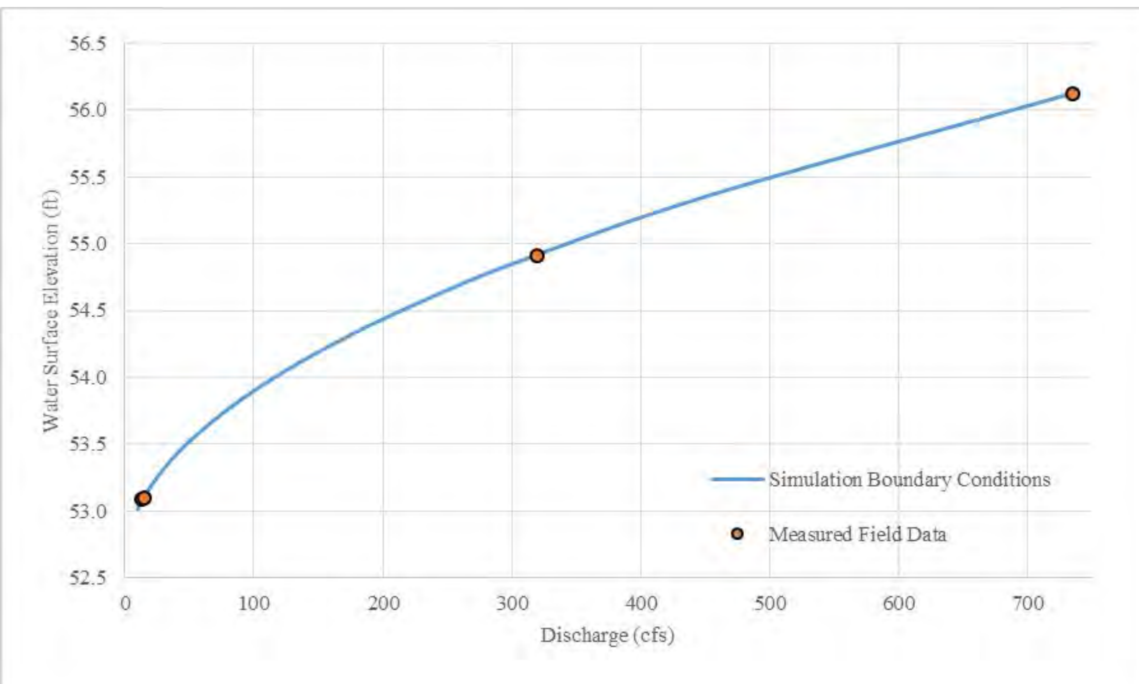

Figure 3.3.3A-2. Final rating curve for boundary conditions at the Downstream Site.

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Attachment 3.3.3B
Habitat Suitability Criteria

Summary of Habitat Suitability Criteria (HSC) for Target Fish Species and Life Stages on the Lower Bear River

The procedures employed for selecting Habitat Suitability Criteria (HSC) for use in assessing instream habitat in the Bear River, California are described below.

HSC were selected through a collaborative process involving a variety of instream flow specialists, as well as the California Department of Fish and Wildlife (CDFW), U.S. fish & Wildlife Service (FWS), and other relicensing participants. Two collaboration meetings were held, the first on July 20, 2018, with a follow-up meeting on August 20, 2018.

Prior to the HSC meeting, a list of proposed target species and life-stages were discussed with the following selections:

Species	**Life-stage**	**Variables***
Chinook Salmon	Spawning	Depth, MC Velocity, Substrate
(fall run)	Fry	Depth, MC Velocity, Cover
	Juvenile	Depth, MC Velocity, Cover
Steelhead	Spawning	Depth, MC Velocity, Substrate
	Fry	Depth, MC Velocity, Cover
	Juvenile	Depth, MC Velocity, Cover
Hardhead	Juvenile	Depth, MC Velocity
	Adult	Depth, MC Velocity
Sturgeon	Spawning	Depth, MC Velocity, Substrate
(white or green)		

*MC Velocity = Mean Column Velocity

This list was presented and agreed upon by the meeting participants. Candidate HSC curves representing each of these species and life-stages were developed prior to the meeting, then presented and discussed until a final HSC curve was approved by everyone in attendance. The list of candidate HSC was developed from a master list of HSC data, which for salmon and steelhead were filtered to a subset of HSC developed from California streams and rivers and applied in previous instream flow studies. The HSC dataset for Chinook salmon, being very large, was further filtered to represent HSC from medium-sized streams similar to the Bear River (e.g., HSC from large rivers such as the Sacramento River, Klamath River, etc. were dropped from consideration). Candidate HSC for steelhead were drawn from all California studies, but emphasis was focused on data from medium-sized rivers. In general, the consensus-selected HSC for these two species relied heavily on HSC from Clear Creek and the lower Yuba River relicensing studies, as well as Big Sur HSC for steelhead fry and juvenile rearing.

Due to the paucity of HSC data for sturgeon spawning (green or white), all available HSC datasets were presented for discussion; however the consensus HSC for use in the Bear River relied on HSC developed and selected for use on the lower Yuba River. Hardhead HSC previously vetted and utilized in the Yuba-Bear Drum-Spaulding instream flow study were presented and selected to represent that species in the Bear River.

Specific notes RE selection of individual HSC for each species and life-stage are presented below. Please refer to the tables at the end of this document for the final HSC curve points.

Chinook Salmon

Spawning. Ten candidate HSC datasets were presented to represent spawning by Chinook Salmon, in addition to site-specific data collected at 73 salmon redds in the Bear River study area. Following discussion of the site-specific data and comparison of candidate HSC curves, a consensus HSC curve for spawning velocity was selected that utilized the Clear Creek fall Chinook curve from 0.9 fps to 1.83 fps, then followed the lower Yuba HSC curve to 5.32 fps (see figures). The consensus HSC for spawning depth likewise followed the Clear Creek fall Chinook HSC from 0.4-1.1 ft, then descended to 5 ft based on consensus and discussion regarding the site-specific characteristics of the Bear River study area. HSC representing spawning substrate for Chinook utilized consensus for gravel less than one inch in diameter, then followed the Clear Creek HSC for substrates dominated by gravels 1-3 inches to gravels ranging from 3-5 inches in diameter.

Fry Rearing. Seven candidate HSC datasets were presented to represent rearing by Chinook salmon. The consensus HSC for mean column velocity for Chinook fry was based on the FWS Yuba River HSC, which was largely adopted for the lower Yuba instream flow study, except the consensus HSC was truncated at 1.8 fps. The consensus HSC for fry depth bracketed the FWS Yuba fry curve from 0.0 to 1.5 ft, but then descended proximal to the lower Yuba curve to 4.0 ft. HSC for fry cover suitability was based on the Clear Creek fall Chinook HSC, except for consensus-based decisions for aquatic vegetation, which was rare in the Bear River.

Juvenile Rearing. The FWS Yuba HSC for juvenile Chinook velocity suitability, subsequently adopted for use in the lower Yuba instream flow study (with slight modifications), was likewise selected for use in the Bear River. In contrast to the FWS and Lower Yuba curves, the Bear consensus curve dropped to zero suitability at 3.0 fps. For juvenile depth, the Bear River participants selected a new curve that utilized components of several existing HSC, including the Battle Creek, Stanislaus River, and lower Yuba curves. Use of instream cover by juvenile Chinook was based on the Clear Creek fall Chinook curve, except suitability was downgraded for aquatic vegetation, as for fry.

Steelhead

Spawning. Eight HSC curves for steelhead spawning were presented, along with site-specific redd data previously collected in the lower Yuba River. Following discussion the Clear Creek HSC for spawning velocity was selected to represent the Bear River. The final Bear HSC for spawning depth was also largely based on the Clear Creek HSC from depths of 0.3 to 2.5 ft, but then the curve dropped along the lower Yuba redd data to an intermediate value at 4 ft, then extended to 10 ft. The maximum depth was based in part on the maximum spawning depths observed in Clear Creek. Spawning substrate HSC for steelhead followed the Clear Creek HSC for substrate sizes up to 1-2 inches, then followed the lower Yuba HSC for larger substrates.

Fry Rearing. Seven HSC datasets were presented as candidate curves for steelhead rearing. The consensus HSC from fry velocity suitability was a curve drawn intermediate to the HSC from Clear Creek and the Big Sur River. The fry depth curve was drawn by consensus to bracket both the Clear Creek and the Big Sur River HSC. Instream cover HSC for steelhead fry was largely based on the Clear Creek HSC, with some adjustments for suitability of cobble and boulder substrates based on Big Sur data, and adjustments to aquatic vegetation suitability based on lower Yuba HSC.

Juvenile Rearing. Consensus HSC representing velocity suitability for juvenile steelhead bracketed the Big Sur HSC, except for velocities less than 0.75 fps which were intermediate to HSC from the Big Sur River and Clear Creek. The final HSC for juvenile depth suitability likewise bracketed the Big Sur HSC, with somewhat higher suitability for depths over 3 ft and maximum depth of 6 ft due to higher values represented by the Clear Creek HSC. As noted for steelhead fry, the cover HSC for juvenile steelhead followed the Clear Creek HSC except for cobble/boulder substrate which was adjusted based on HSC data from the Big Sur River.

Sturgeon

Spawning. As noted above, the HSC selected to represent spawning by green or white sturgeon was taken directly from the HSC selected for use in the lower Yuba River instream flow study.

Hardhead

Juvenile and Adult Rearing. As noted above, the HSC selected to represent juvenile and adult rearing by hardhead were taken directly from the HSC selected for use in the Yuba-Bear Drum-Spaulding instream flow study.

Table 3.3.3B-1. Fall-run Chinook salmon spawning habitat suitability criteria.

Velocity (fps)	Suitability	Depth (ft)	Suitability	Substrate (in. diameter)	Suitability
0.09	0	0.4	0	<0.1	0
0.1	0.06	0.5	0.39	0.1-1	0
0.15	0.08	0.6	0.59	1-2	0.5
0.22	0.1	0.7	0.76	1-3	1
0.29	0.12	0.8	0.88	2-3	0.8
0.36	0.14	0.9	0.95	2-4	0.6
0.43	0.17	1	0.99	3-4	0.3
0.5	0.21	1.1	1	3-5	0
0.57	0.24	1.5	1	4-5	0
0.64	0.29	3	0.2	4-6	0
0.71	0.33	5	0	6-8	0
0.78	0.38	--	--	8-10	0

Table 3.3.3B-1. (continued)

Velocity (fps)	Suitability	Depth (ft)	Suitability	Substrate (in. diameter)	Suitability
0.85	0.43	--	--	8-12	0
0.92	0.48	--	--	>12	0
0.95	0.5	--	--	--	--
0.99	0.53	--	--	--	--
1.06	0.59	--	--	--	--
1.13	0.64	--	--	--	--
1.2	0.7	--	--	--	--
1.27	0.75	--	--	--	--
1.34	0.8	--	--	--	--
1.41	0.84	--	--	--	--
1.48	0.88	--	--	--	--
1.55	0.92	--	--	--	--
1.62	0.95	--	--	--	--
1.69	0.97	--	--	--	--
1.76	0.99	--	--	--	--
1.83	1	--	--	--	--
2.95	1	--	--	--	--
3.25	0.5	--	--	--	--
5.32	0	--	--	--	--

Table 3.3.3B-2. Fall-run Chinook salmon fry rearing habitat suitability criteria.

Velocity (fps)	Suitability	Depth (ft)	Suitability	Cover Code	Cover Description	Suitability
0	1	0	0	0.1	none	0.33
0.1	0.99	0.2	0.85	1	cobble	0.33
0.2	0.95	0.4	1	2	boulder	0.33
0.3	0.89	1.5	1	3	fine woody veg (<1")	1
0.4	0.81	3	0.25	3.7	3+ovh	1
0.6	0.65	4	0	4	branches	1
0.7	0.56	--	--	4.7	4+ovh	1
0.8	0.49	--	--	5	log (>1' diam)	1
0.9	0.42	--	--	5.7	5+ovh	1
1.1	0.3	--	--	7	ovh (>2' abv sub)	0.33
1.3	0.22	--	--	8	ucb	1
1.8	0	--	--	9	aq veg	0.2
--	--	--	--	9.7	9+ovh	0.2
--	--	--	--	10	rip-rap	0.33

Table 3.3.3B-3 Fall-run Chinook salmon juvenile rearing habitat suitability criteria.

Velocity (fps)	Suitability	Depth (ft)	Suitability	Cover Code	Cover Description	Suitability
0	1	0.2	0	0.1	none	0.33
0.1	1	1.25	1	1	cobble	1
0.2	0.99	1.5	1	2	boulder	0.33
0.3	0.98	2.1	1	3	fine woody veg (<1")	0.33
0.4	0.97	3	0.4	3.7	3+ovh	1
0.5	0.96	7	0	4	branches	1
0.6	0.94	--	--	4.7	4+ovh	1
0.7	0.92	--	--	5	log (>1' diam)	1
0.8	0.89	--	--	5.7	5+ovh	1
0.9	0.87	--	--	7	ovh (>2' abv sub)	0.33
1	0.84	--	--	8	ucb	1
1.1	0.81	--	--	9	aq veg	0.24
1.2	0.78	--	--	9.7	9+ovh	0.24
1.3	0.74	--	--	10	rip-rap	0.33
1.4	0.71	--	--	--	--	--
1.5	0.67	--	--	--	--	--
1.6	0.63	--	--	--	--	--
1.7	0.6	--	--	--	--	--
1.8	0.56	--	--	--	--	--
1.9	0.52	--	--	--	--	--
2	0.48	--	--	--	--	--
2.1	0.45	--	--	--	--	--
2.2	0.41	--	--	--	--	--
3	0	--	--	--	--	--

Table 3.3.3B-4. Steelhead spawning habitat suitability criteria.

Velocity (fps)	Suitability	Depth (ft)	Suitability	Substrate (in. diameter)	Suitability
0.6	0	0.3	0	0.1	0
0.61	0.08	1	1	1	0.38
0.7	0.14	2.5	1	1-2	1
0.8	0.25	4	0.3	1-3	0.85
0.9	0.38	10	0	2-4	0.28
1	0.53	--	--	3-5	0.16
1.1	0.66	--	--	4-6	0.05

Table 3.3.3B-4. (continued)

Velocity (fps)	Suitability	Depth (ft)	Suitability	Substrate (in. diameter)	Suitability
1.2	0.78	--	--	6-8	0
1.3	0.87	--	--	8-10	0
1.4	0.94	--	--	8-12	0
1.5	0.98	--	--	>12	0
1.6	1	--	--	--	--
1.7	1	--	--	--	--
1.8	0.99	--	--	--	--
1.9	0.97	--	--	--	--
2	0.95	--	--	--	--
2.1	0.93	--	--	--	--
2.2	0.9	--	--	--	--
2.3	0.87	--	--	--	--
2.4	0.85	--	--	--	--
2.5	0.82	--	--	--	--
2.6	0.8	--	--	--	--
2.7	0.78	--	--	--	--
2.8	0.76	--	--	--	--
2.9	0.73	--	--	--	--
3	0.7	--	--	--	--
3.1	0.66	--	--	--	--
3.2	0.61	--	--	--	--
3.3	0.56	--	--	--	--
3.4	0.49	--	--	--	--
3.5	0.41	--	--	--	--
3.6	0.33	--	--	--	--
3.7	0.25	--	--	--	--
3.8	0.17	--	--	--	--
3.89	0.11	--	--	--	--
3.9	0	--	--	--	--

Table 3.3.3B-5. Steelhead fry rearing habitat suitability criteria.

Velocity (fps)	Suitability	Depth (ft)	Suitability	Cover Code	Cover Description	Suitability
0	1	0	0	0.1	none	0.33
0.1	1	0.1	1	1	cobble	0.75
0.25	1	0.75	1	2	boulder	0.33
1	0.2	2	0.2	3	fine woody veg (<1")	0.66
3.6	0	4	0	3.7	3+ovh	1
--	--	--	--	4	branches	0.66
--	--	--	--	4.7	4+ovh	1
--	--	--	--	5	log (>1' diam)	1

Table 3.3.3B-5. (continued)

Velocity (fps)	Suitability	Depth (ft)	Suitability	Cover Code	Cover Description	Suitability
--	--	--	--	5.7	5+ovh	1
--	--	--	--	7	ovh (>2' abv sub)	0.66
--	--	--	--	8	ucb	1
--	--	--	--	9	aq veg	0.5
--	--	--	--	9.7	5+ovh	0.5
--	--	--	--	10	rip-rap	0.33

Table 3.3.3B-6. Steelhead juvenile rearing habitat suitability criteria.

Velocity (fps)	Suitability	Depth (ft)	Suitability	Cover Code	Cover Description	Suitability
0	0.7	0	0	0.1	none	0.31
0.5	1	1	1	1	cobble	0.75
1.5	1	2	1	2	boulder	0.6
3.5	0.1	4	0.2	3	fine woody veg (<1")	0.4
5.6	0	6	0	3.7	3+ovh	1
--	--	--	--	4	branches	1
--	--	--	--	4.7	4+ovh	1
--	--	--	--	5	log (>1' diam)	1
--	--	--	--	5.7	5+ovh	1
--	--	--	--	7	ovh (>2' abv sub)	1
--	--	--	--	8	ucb	1
--	--	--	--	9	aq veg	0.4
--	--	--	--	9.7	5+ovh	0.4
--	--	--	--	10	rip-rap	0.4

Table 3.3.3B-7. Hardhead juvenile habitat suitability criteria.

Velocity (fps)	Suitability	Depth (ft)	Suitability
0	1	0.5	0
0.25	1	0.67	1
1.75	0.25	3.67	1
2.6	0	8.71	0.1
--	--	18	0.1

Table 3.3.3B-8. Hardhead adult habitat suitability criteria.

Velocity (fps)	Suitability	Depth (ft)	Suitability
0	0.82	0.66	0
0.2	1	2.62	1
0.9	1	18	1
2.13	0.22	--	--
3.5	0	--	--

Table 3.3.3B-9. Sturgeon spawning habitat suitability criteria.

Velocity (fps)	Suitability	Depth (ft)	Suitability	Substrate Category	Suitability
1.6	0	5	0	snags	0
3.6	1	10	1	organics	0
10	1	100	1	hard clay	0
15	0	--	--	silt/fine clay	0
--	--	--	--	sand	0.1
--	--	--	--	gravel	1
--	--	--	--	cobble	1
--	--	--	--	boulder	0.75
--	--	--	--	bedrock	0.4

Attachment 3.3.3C
Weighted Usable Area Map Sets

Maps Summarizing the Location and Quality of Fall-Run Chinook Salmon and Steelhead Habitat at the Upstream and Downstream Sites Modeled by SSWD

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Lower Bear River - Instream Flow Study

SSWD HDR

Fall-Run Chinook Salmon

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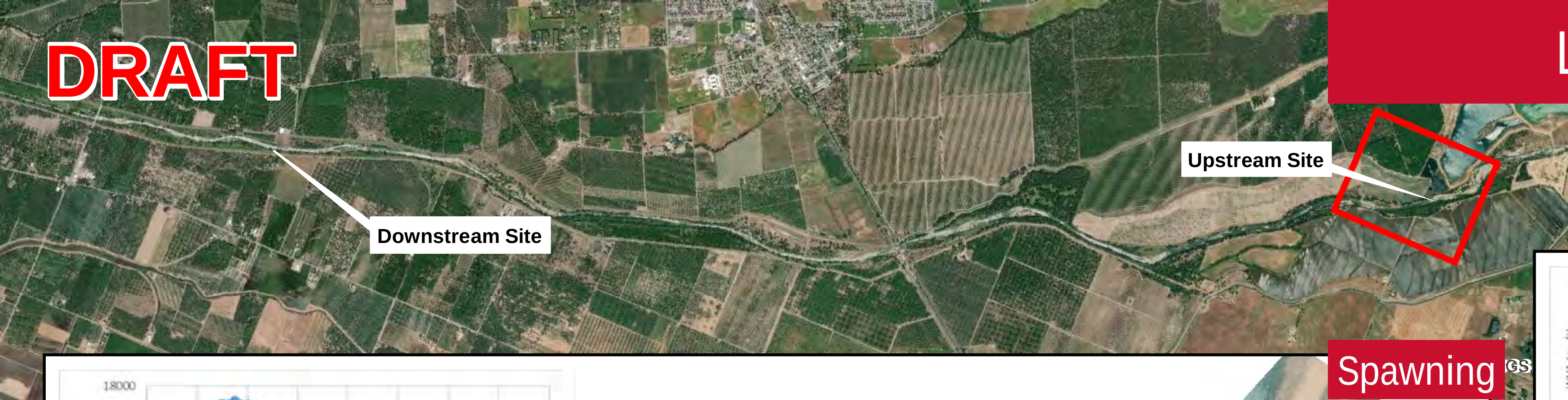

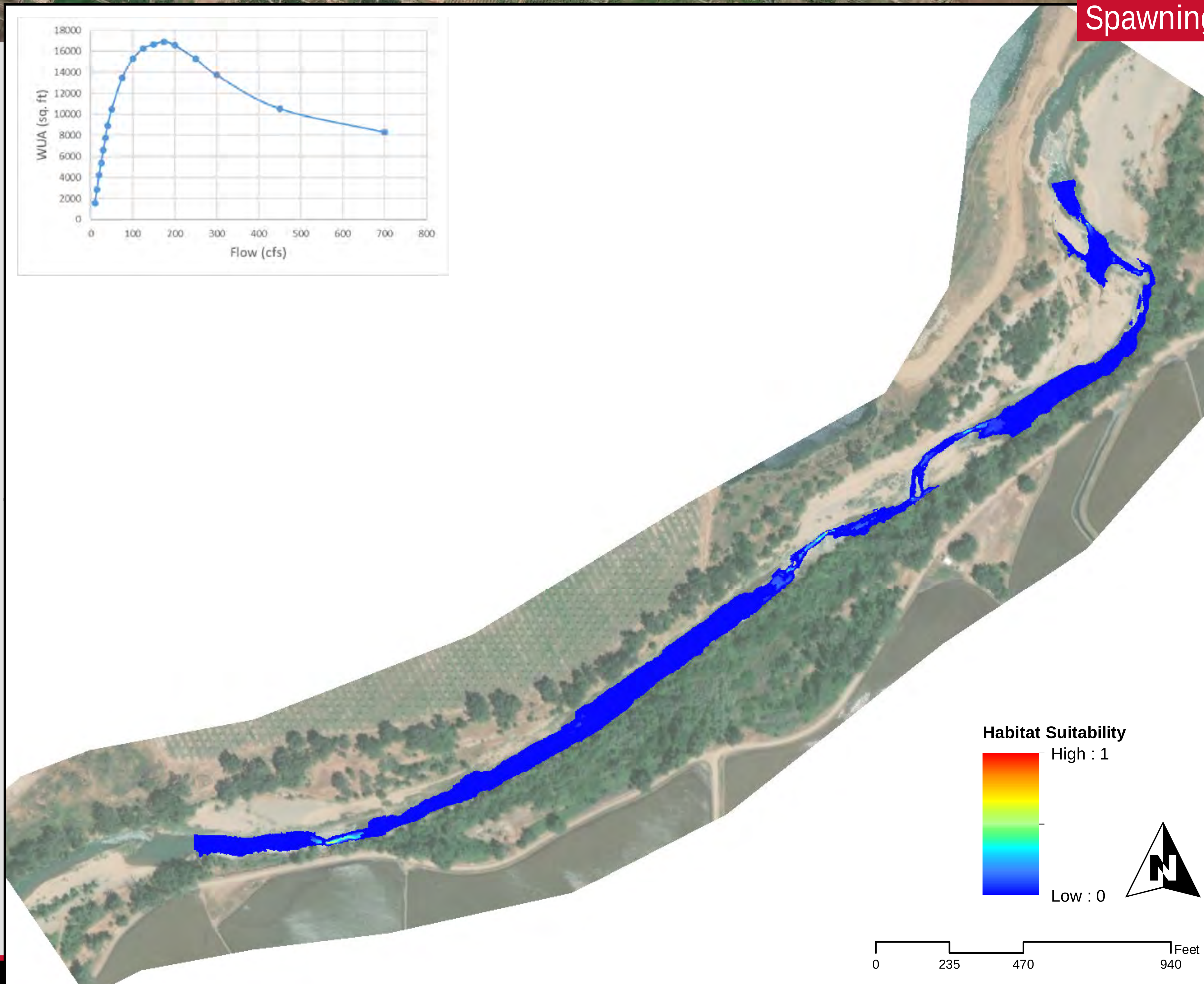

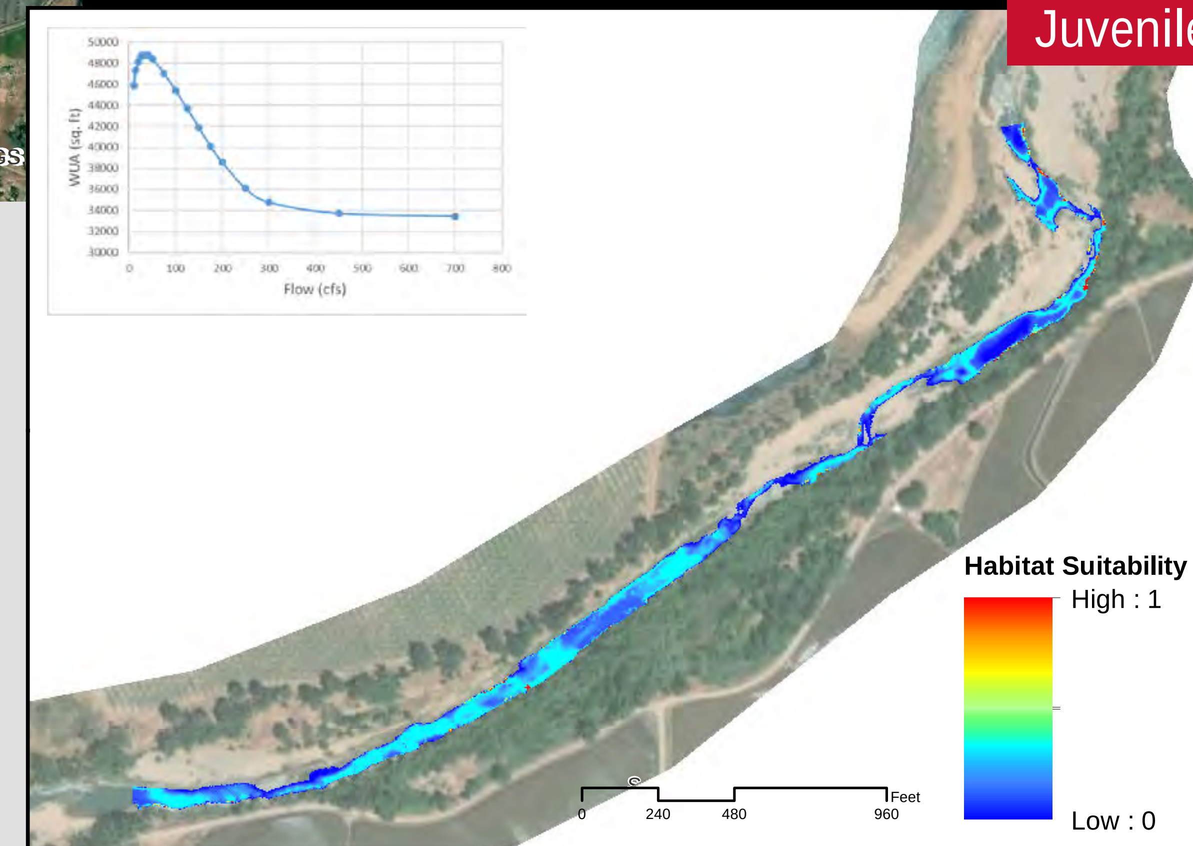

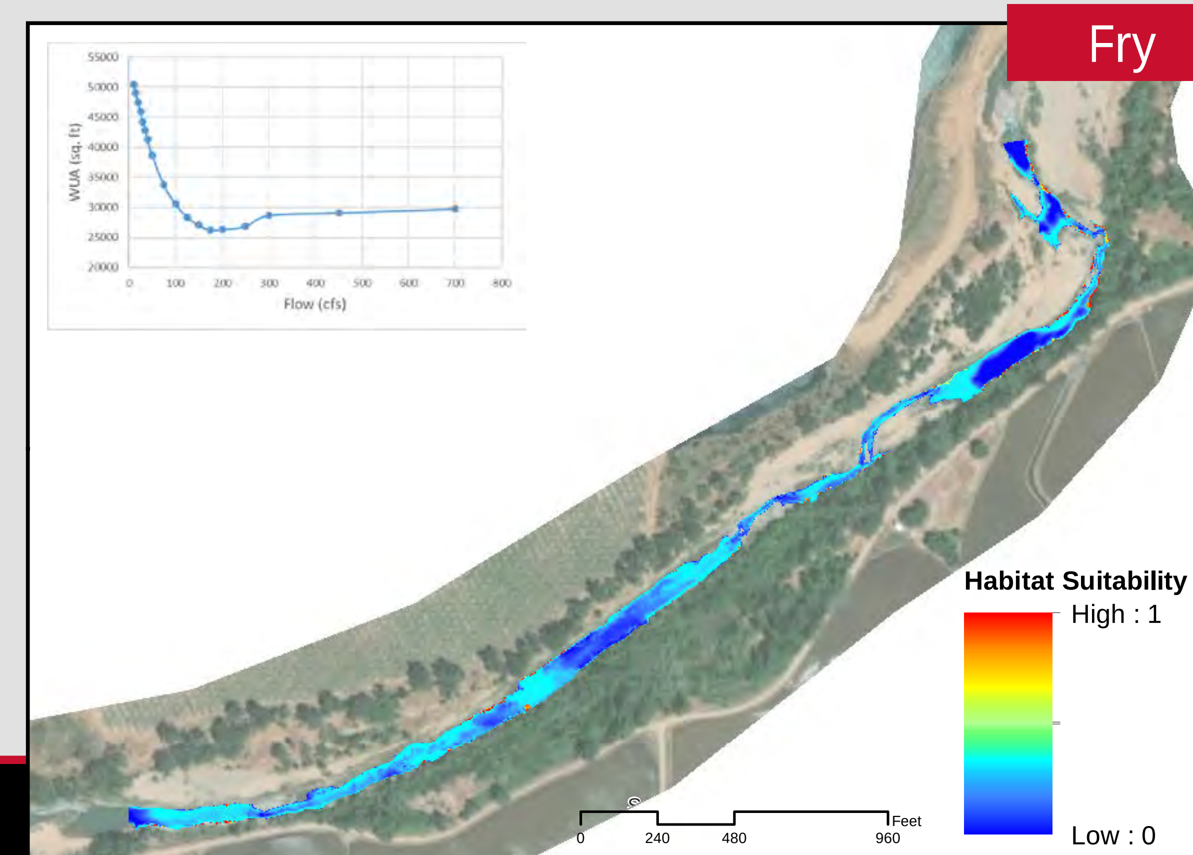

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Lower Bear River - Instream Flow Study

Fall-Run Chinook Salmon

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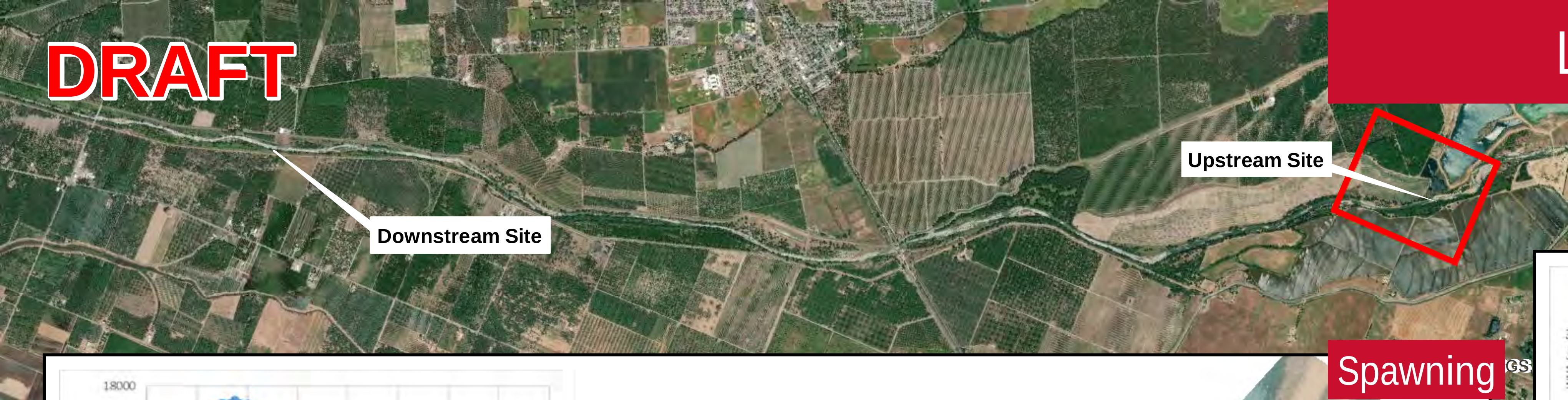

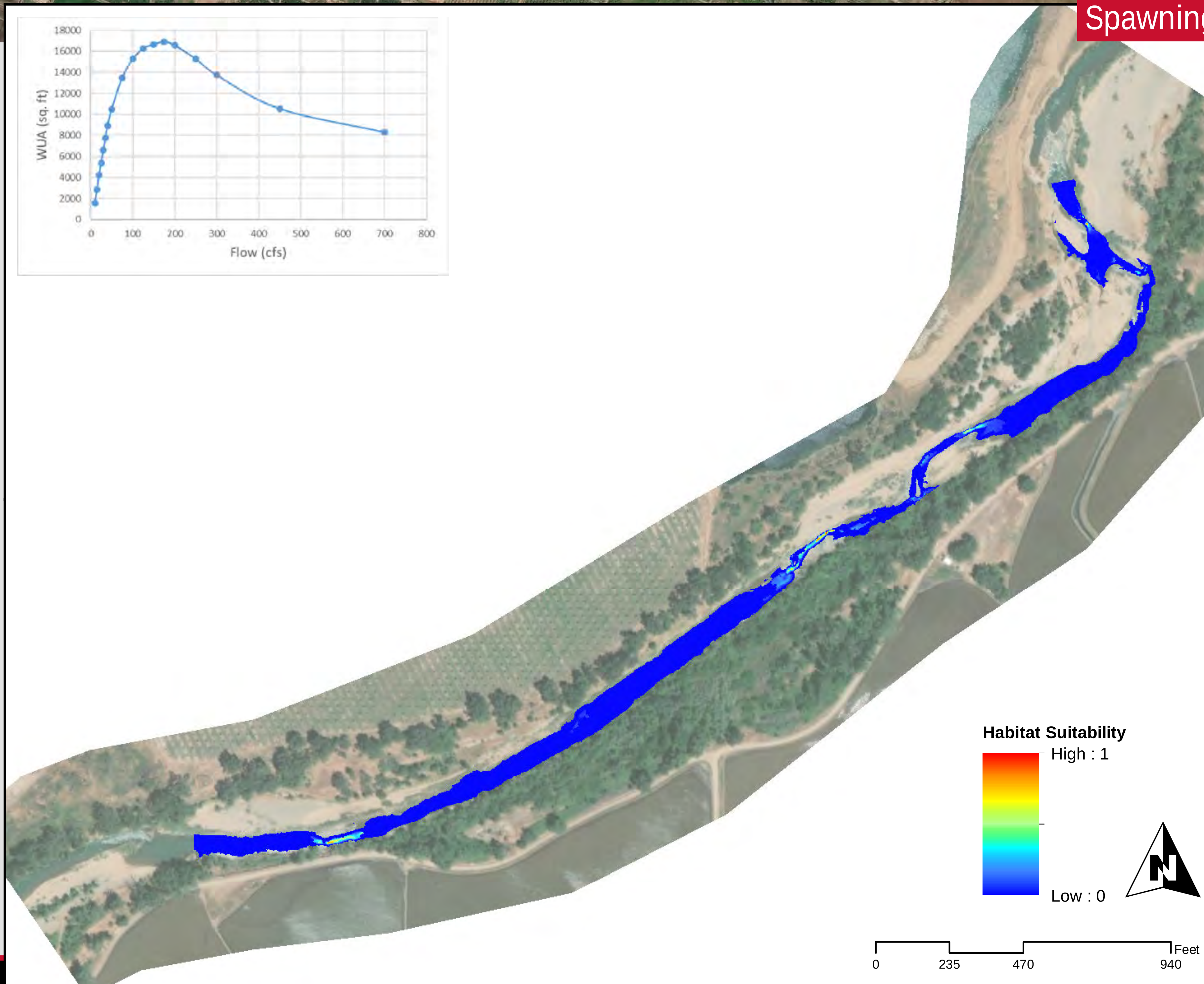

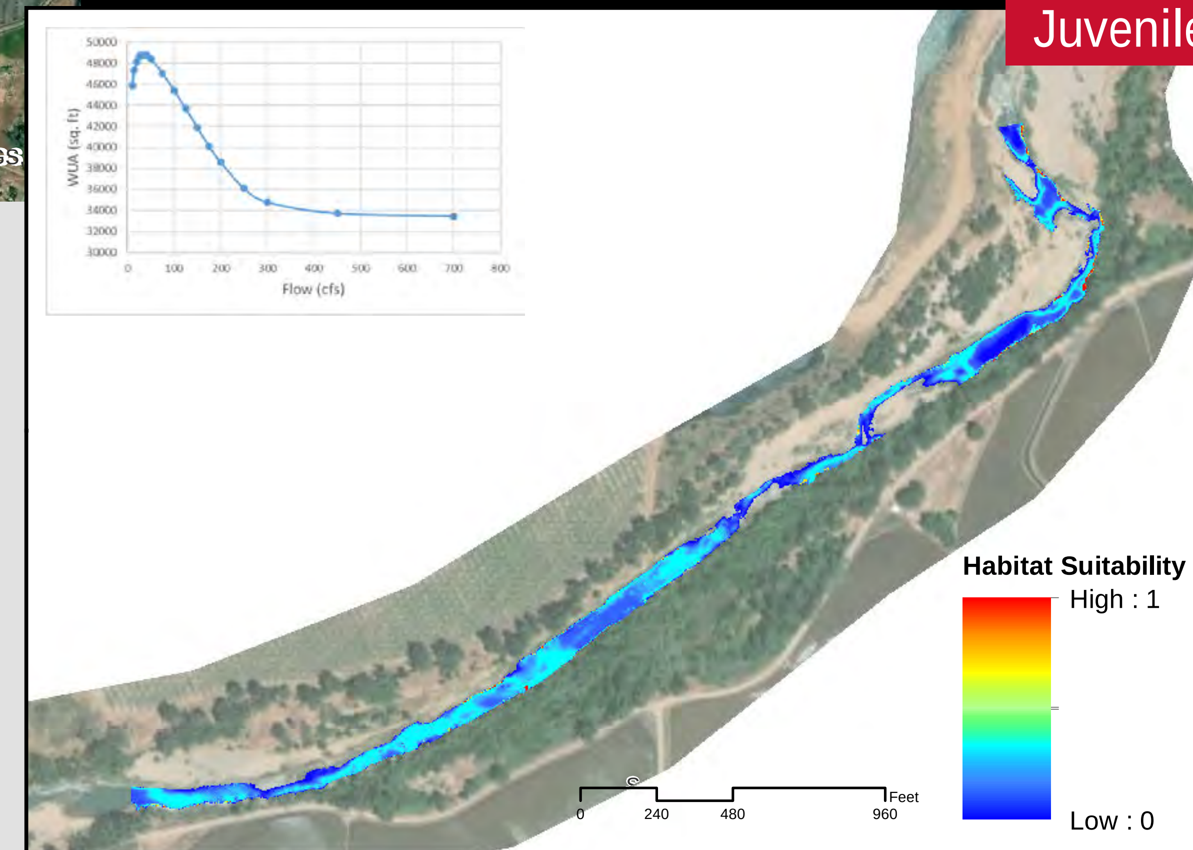

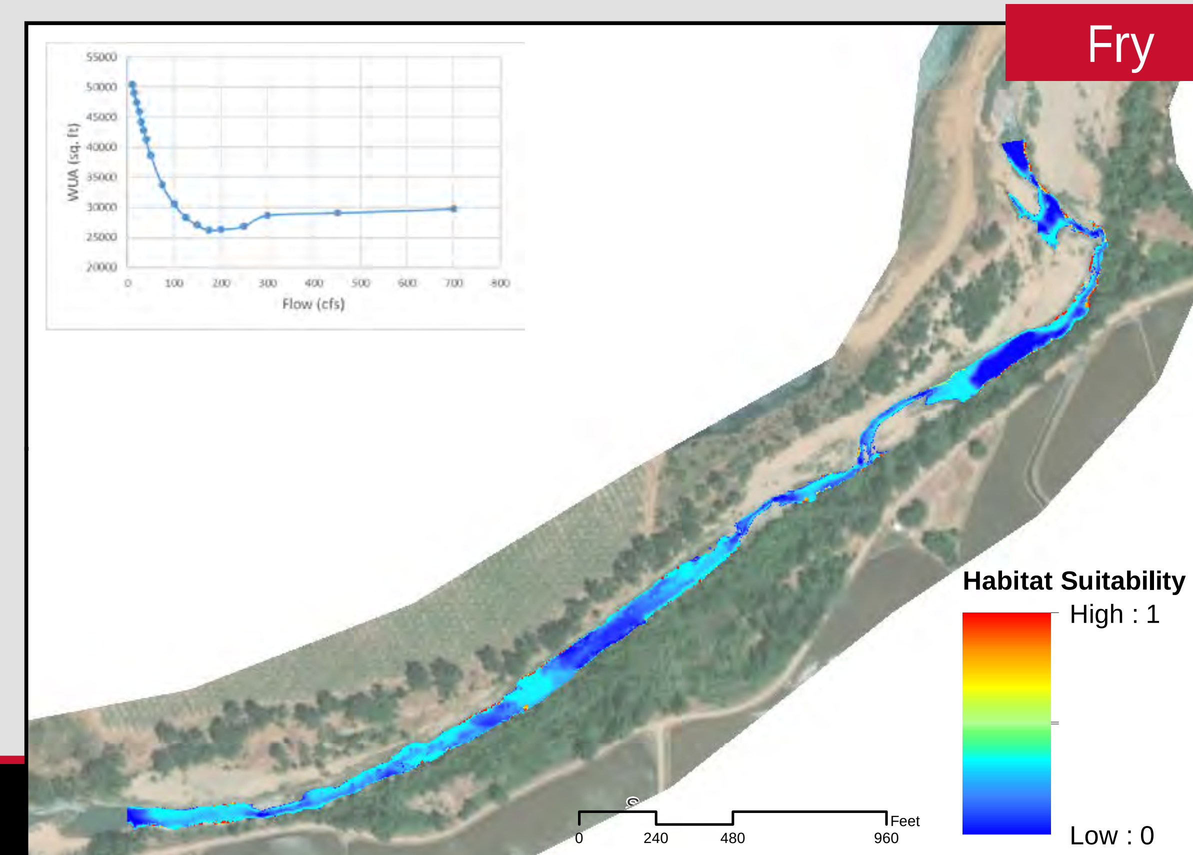

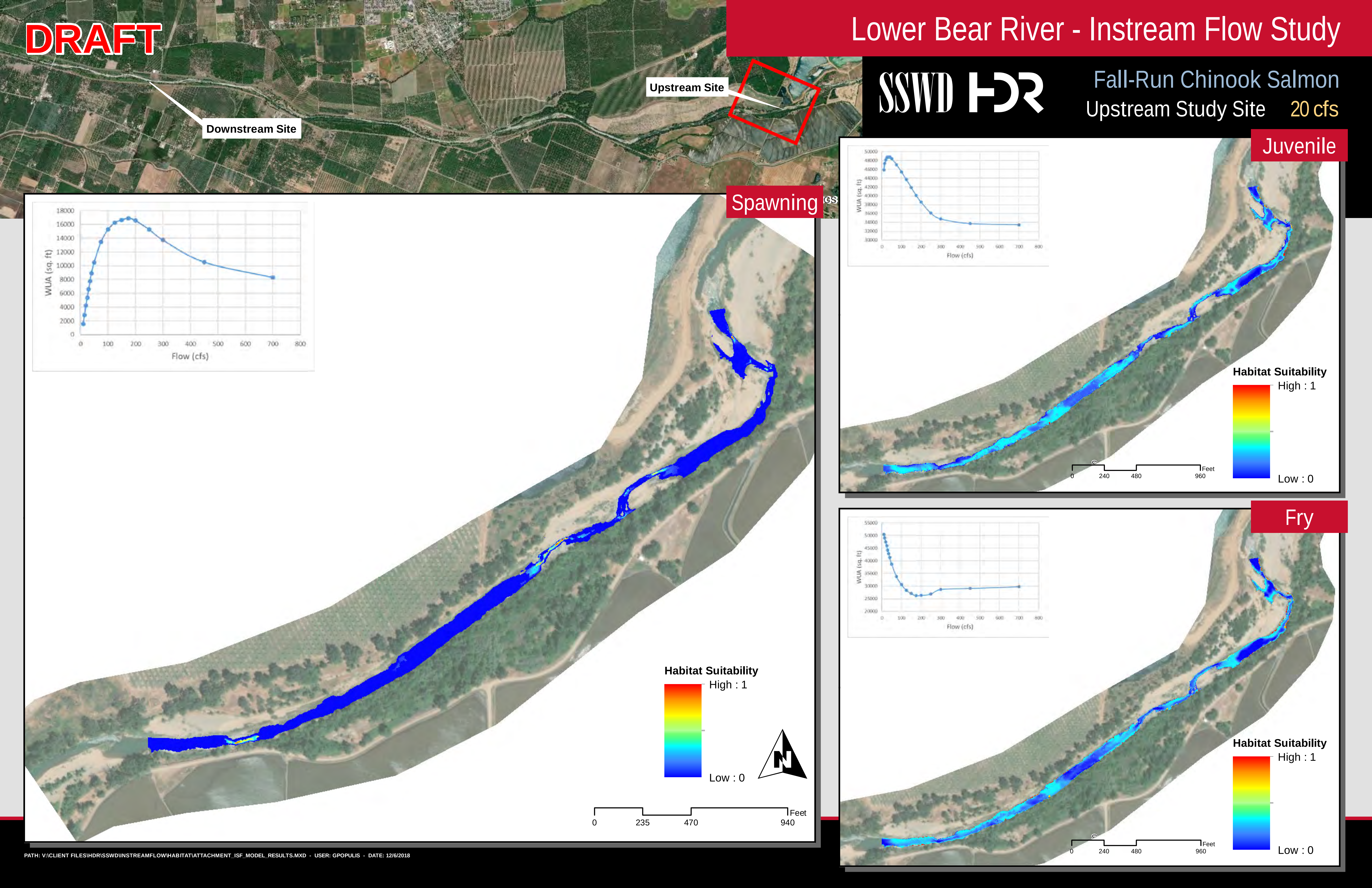
DRAFT
Lower Bear River - Instream Flow Study
SSWD
HDR
Fall-Run Chinook Salmon
Upstream Study Site
20 cfs
Upstream Site
Downstream Site
Spawning
WUA (sq. ft)
Flow (cfs)
Habitat Suitability
High : 1
Low : 0
0
235
470
940
Feet
Juvenile
WUA (sq. ft)
Flow (cfs)
Habitat Suitability
High : 1
Low : 0
0
240
480
960
Feet
Fry
WUA (sq. ft)
Flow (cfs)
Habitat Suitability
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0
240
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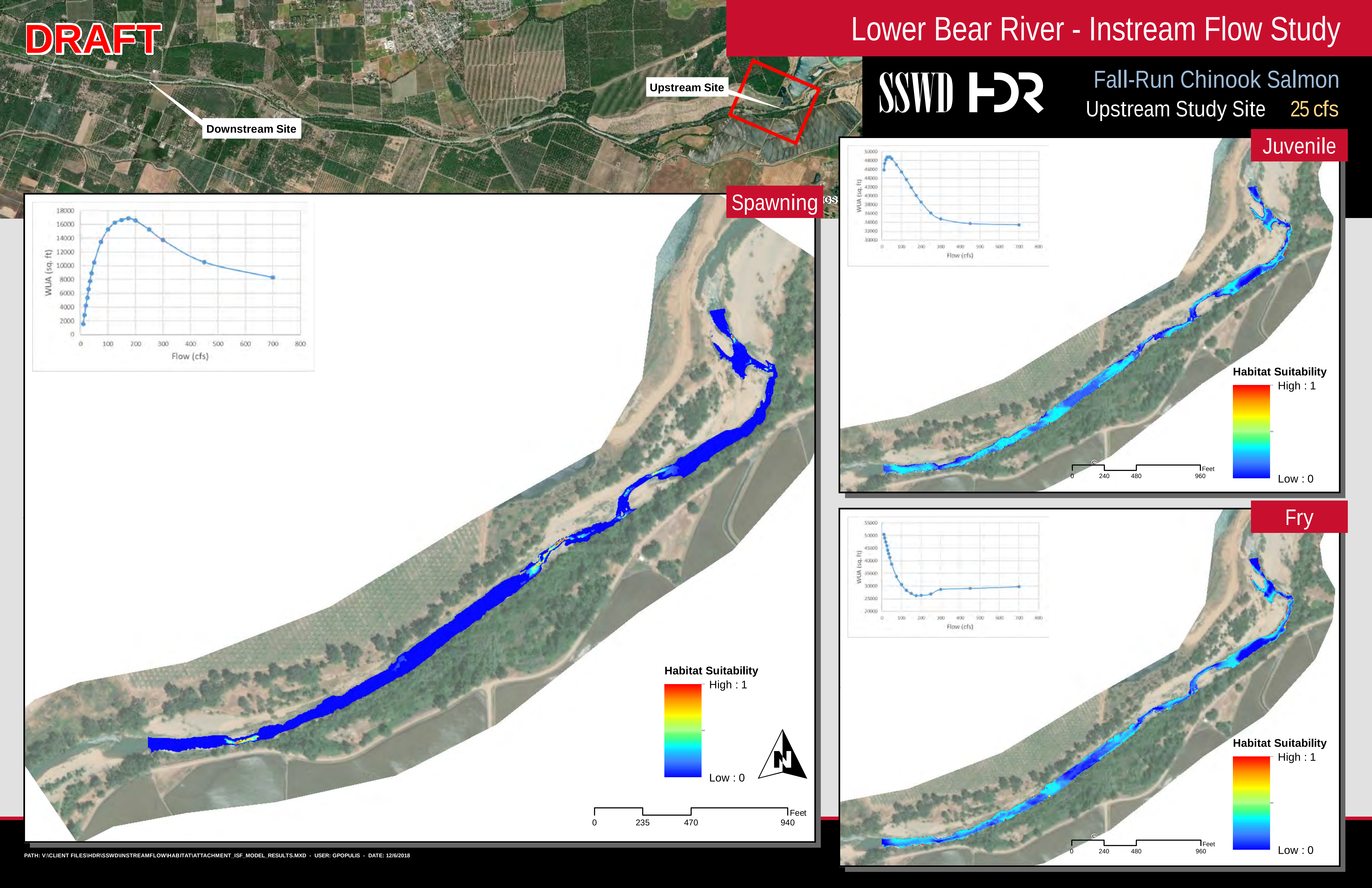
DRAFT
Lower Bear River - Instream Flow Study
SSWD
HDR
Fall-Run Chinook Salmon
Upstream Study Site
25 cfs
Upstream Site
Downstream Site
Spawning
WUA (sq. ft)
Flow (cfs)
Habitat Suitability
High : 1
Low : 0
N
0
235
470
940
Feet
Juvenile
Habitat Suitability
High : 1
Low : 0
0
240
480
960
Feet
Fry
Habitat Suitability
High : 1
Low : 0
0
240
480
960
Feet
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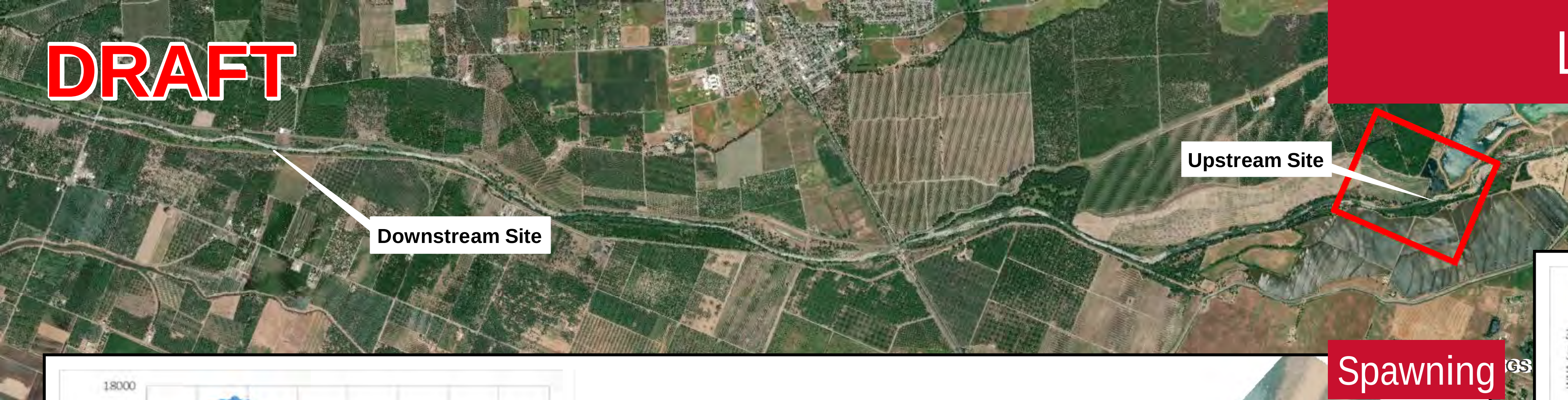
Lower Bear River - Instream Flow Study

SSWD HDR

Fall-Run Chinook Salmon

Upstream Study Site 30 cfs



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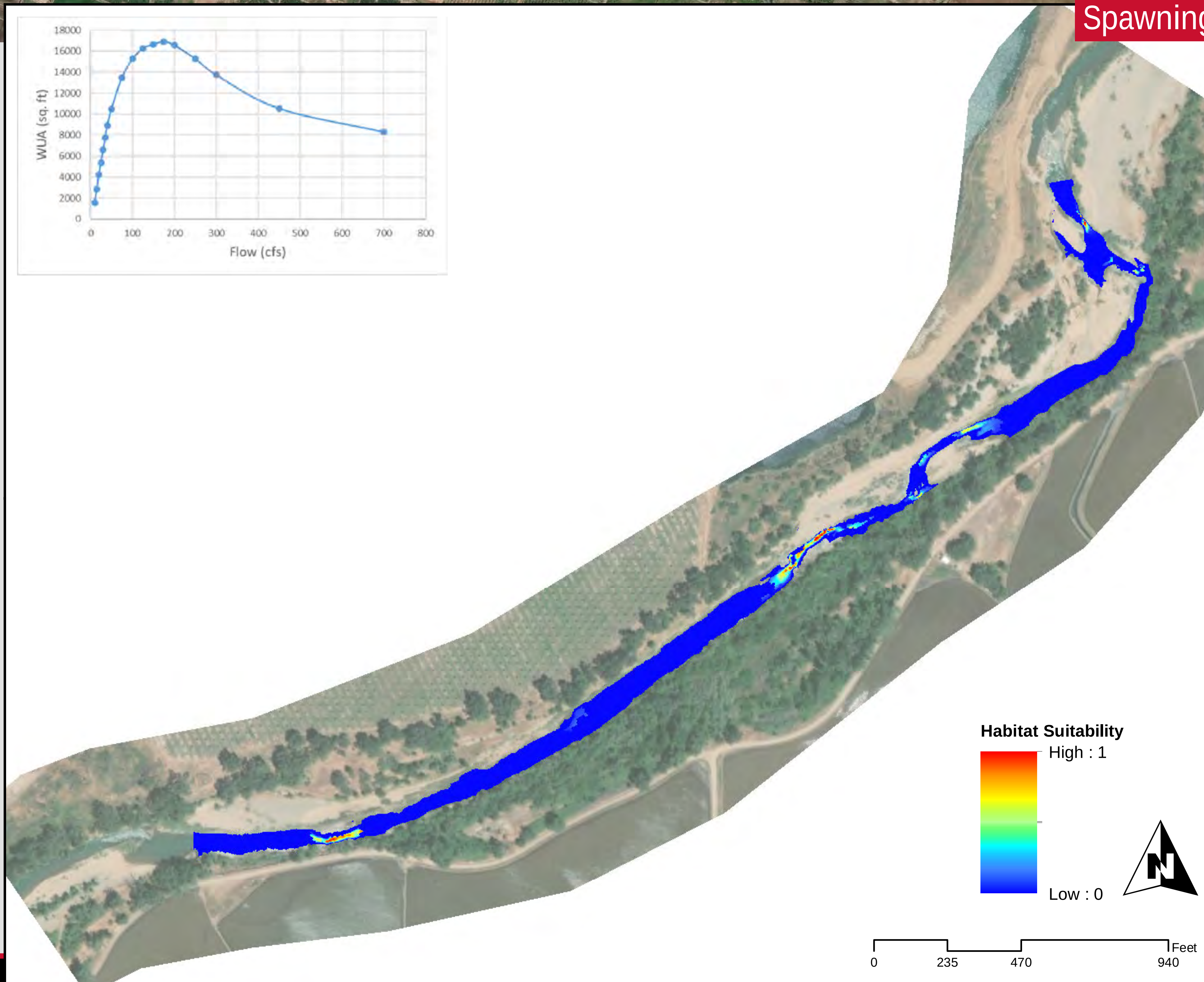

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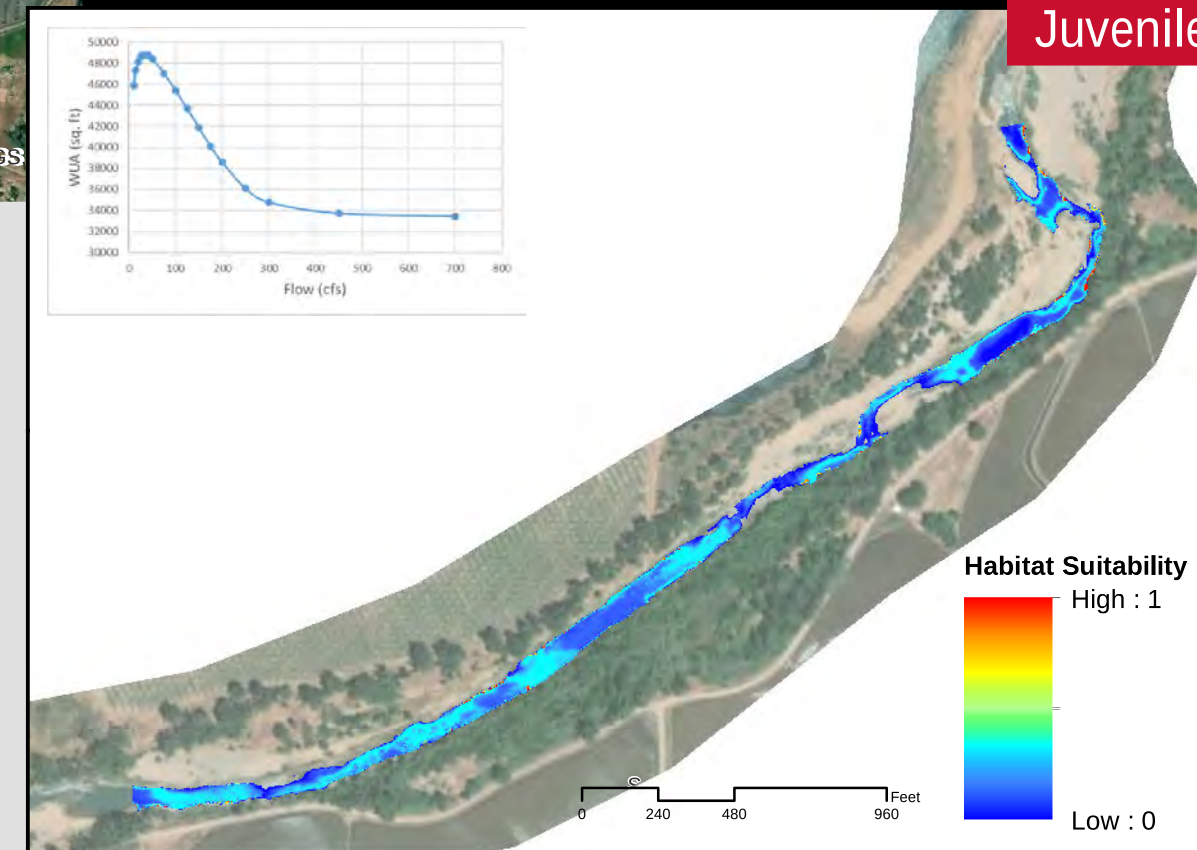

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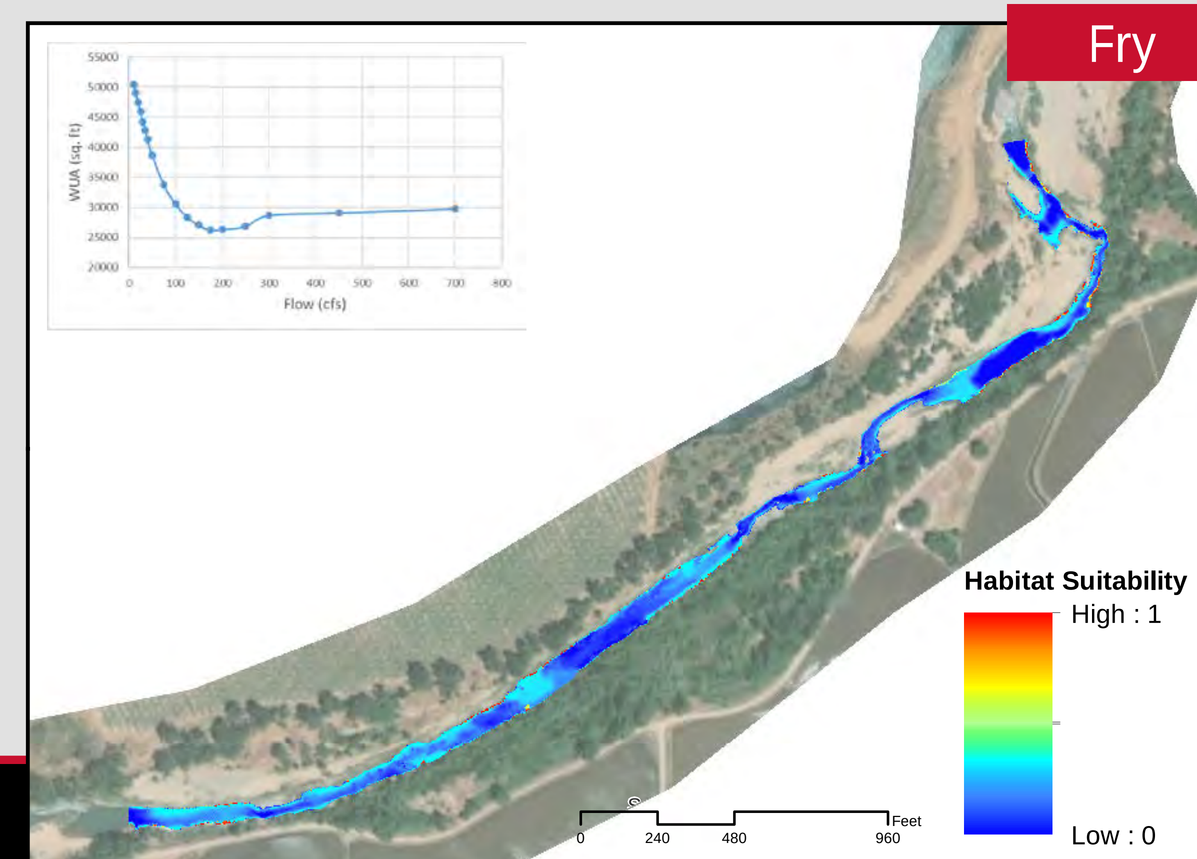


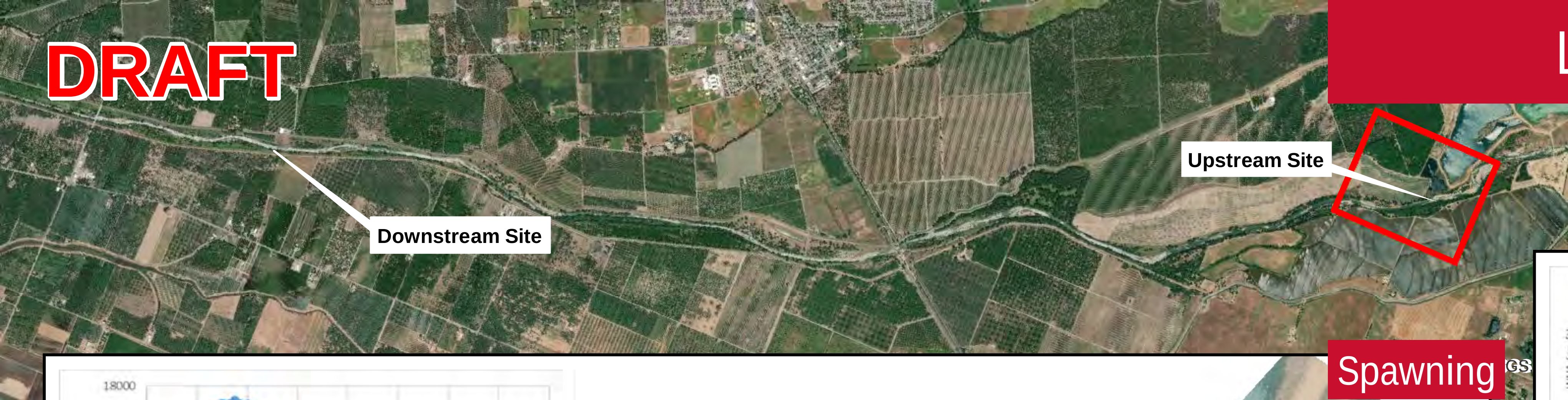
Lower Bear River - Instream Flow Study

SSWD HDR

Fall-Run Chinook Salmon

Upstream Study Site 35 cfs

DRAFT



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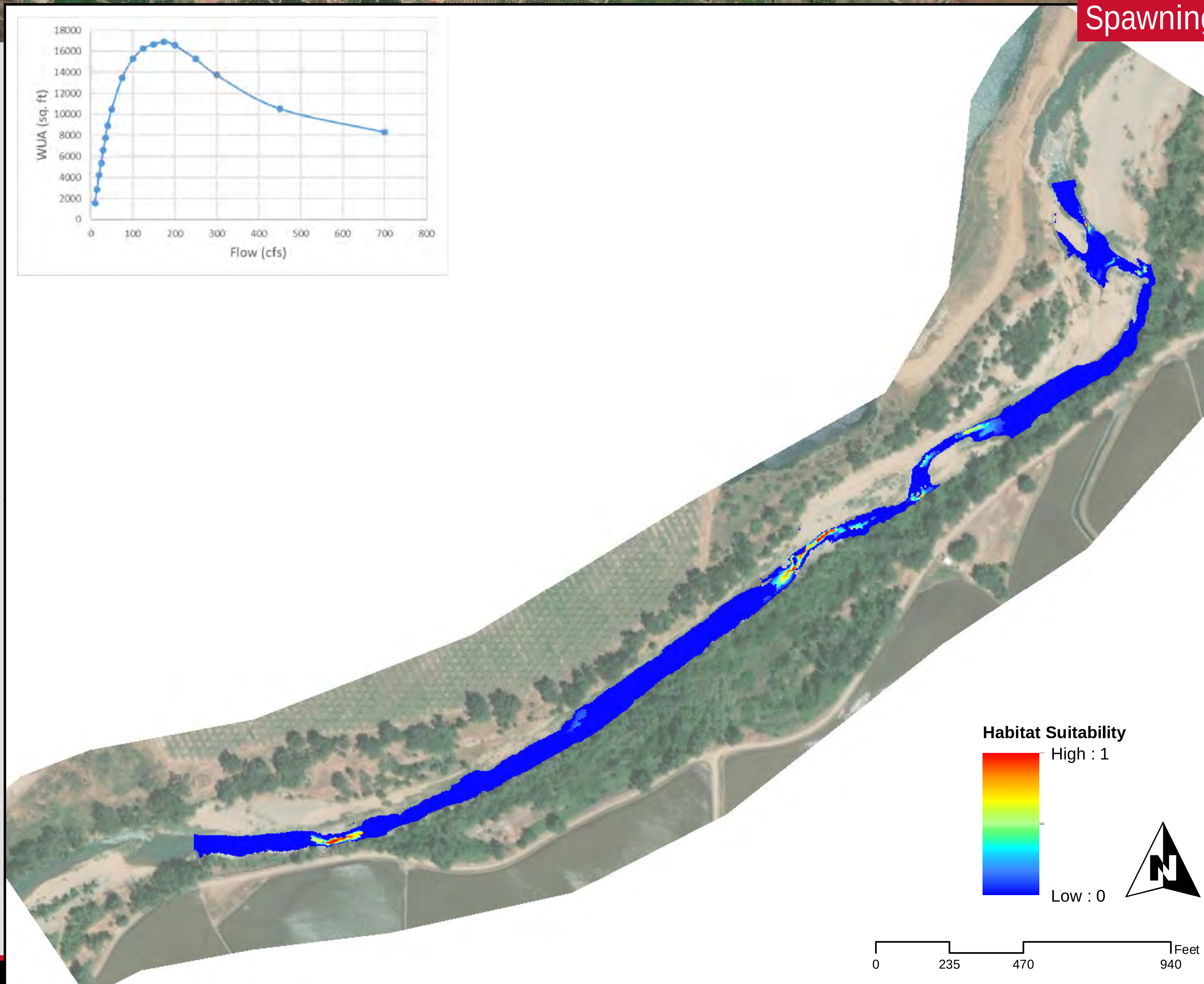

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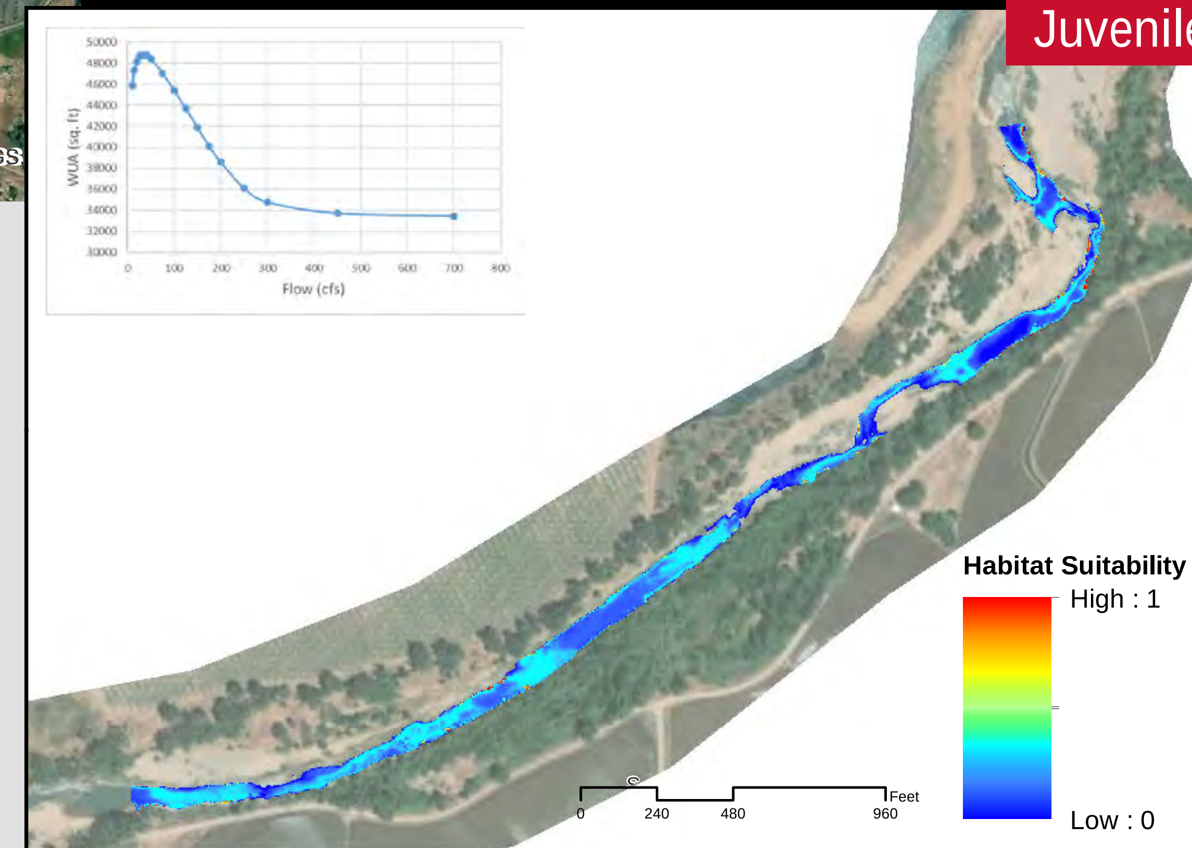

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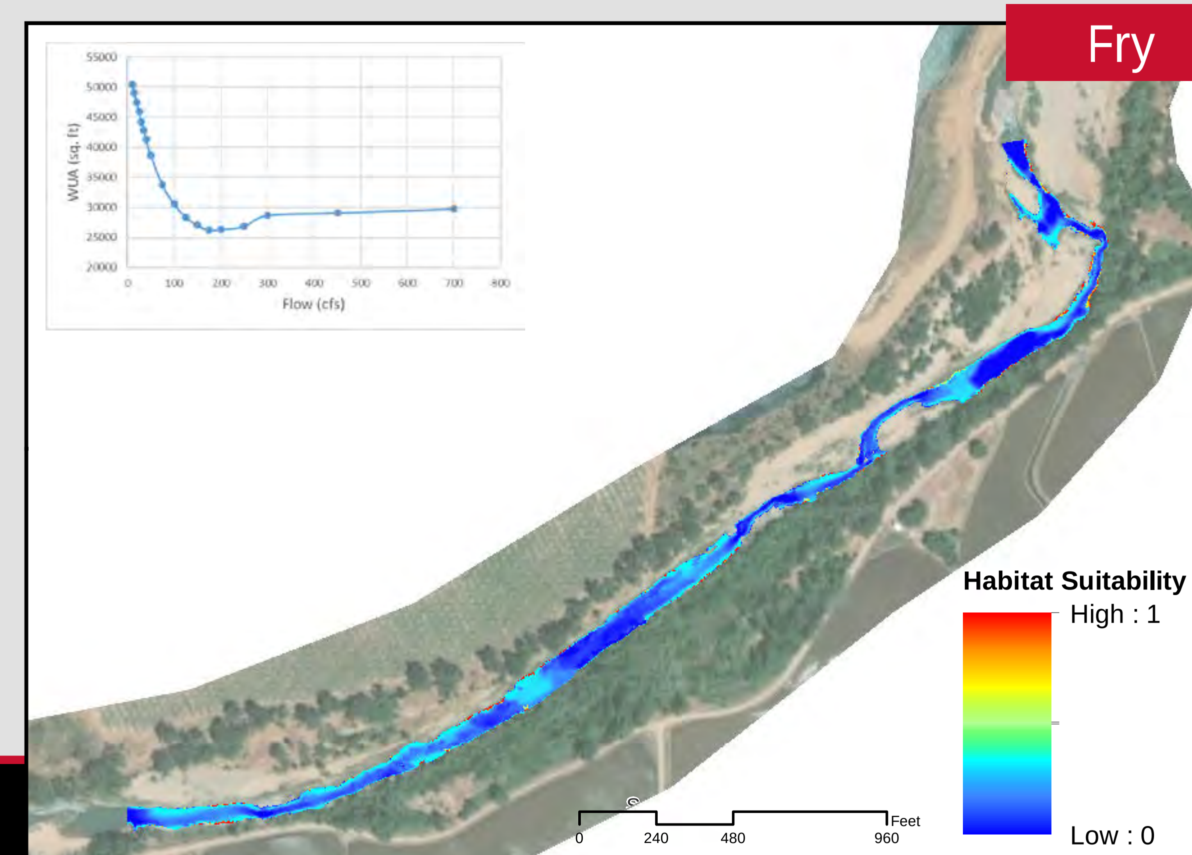

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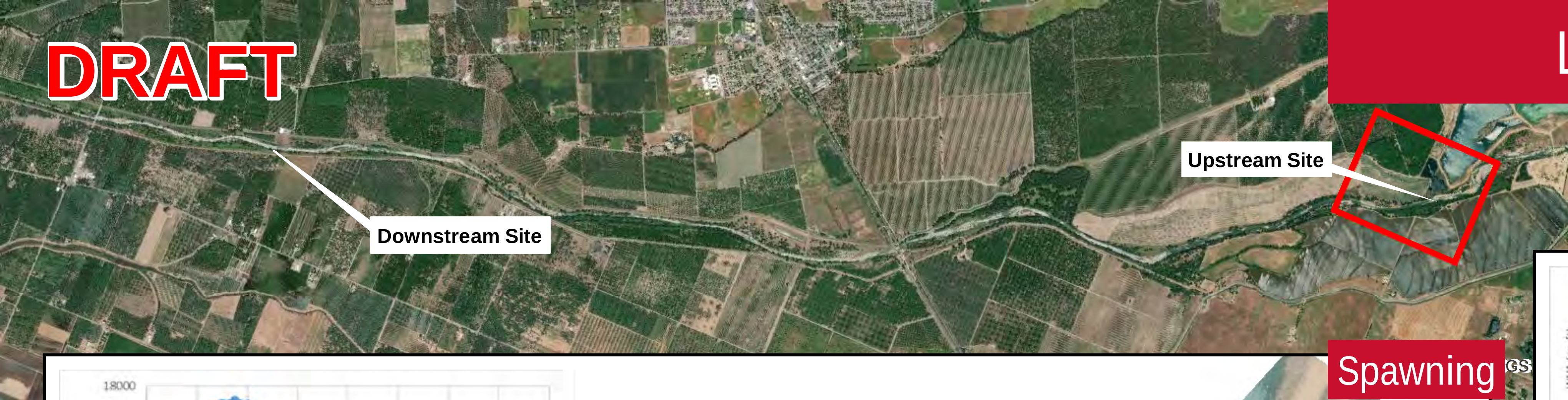
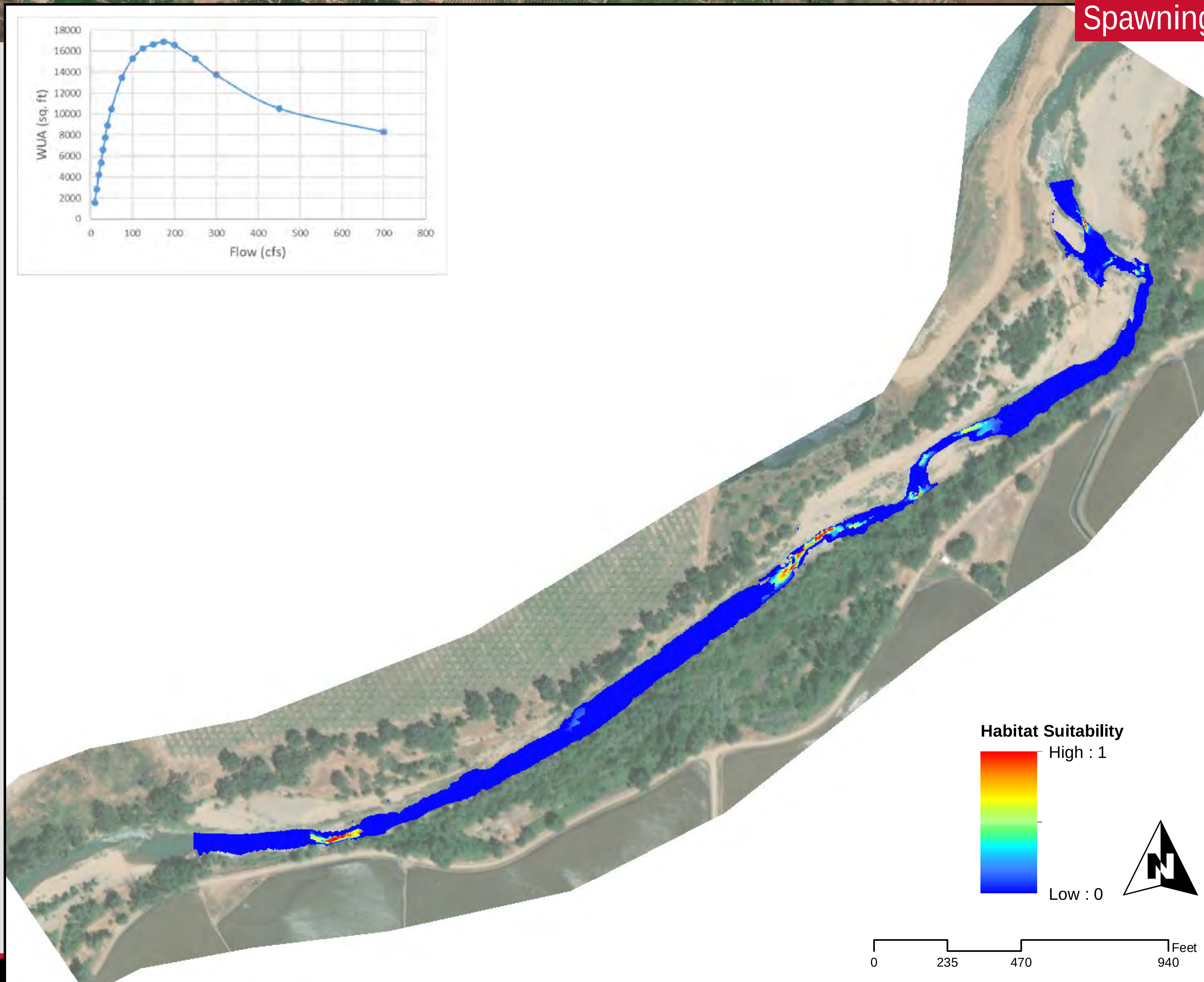
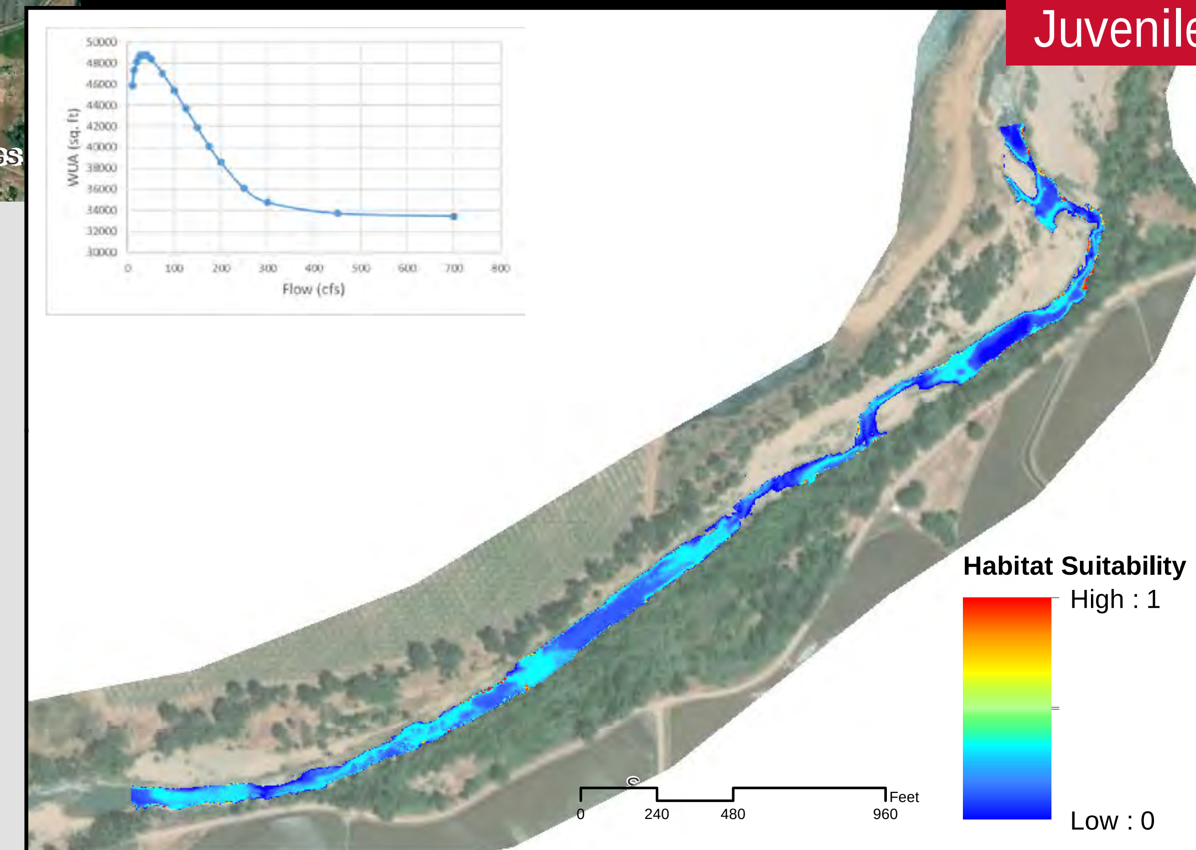
Lower Bear River - Instream Flow Study

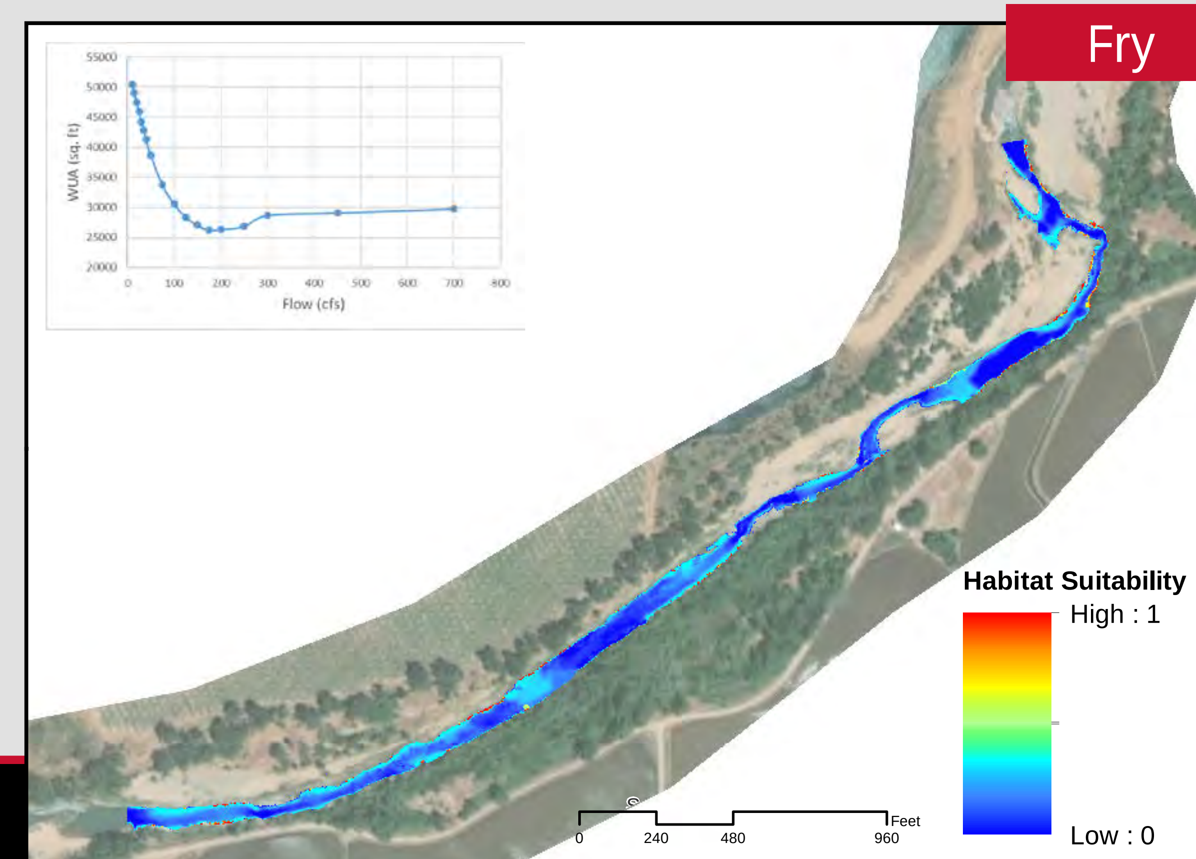
Fall-Run Chinook Salmon

Upstream Study Site 40 cfs





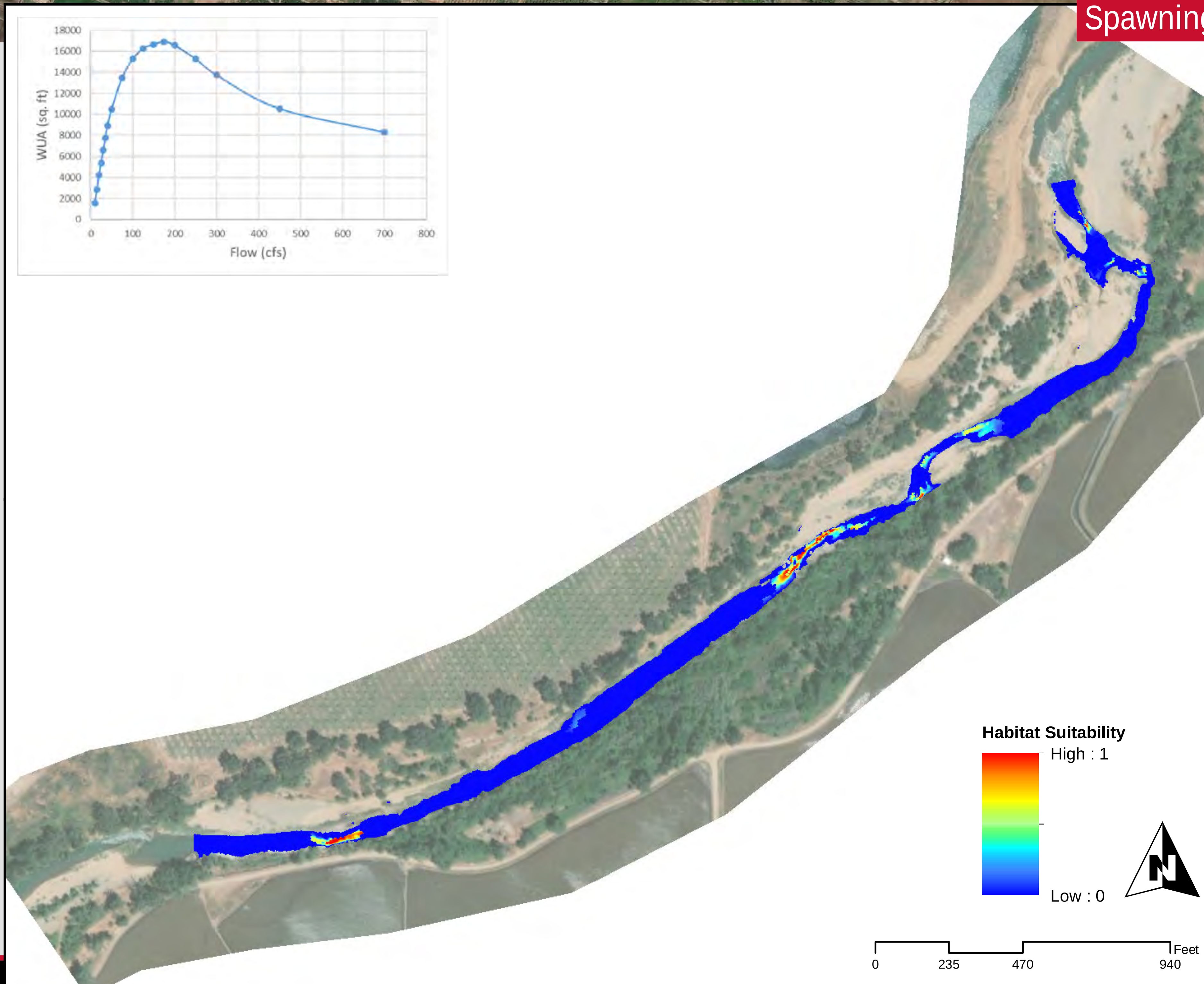


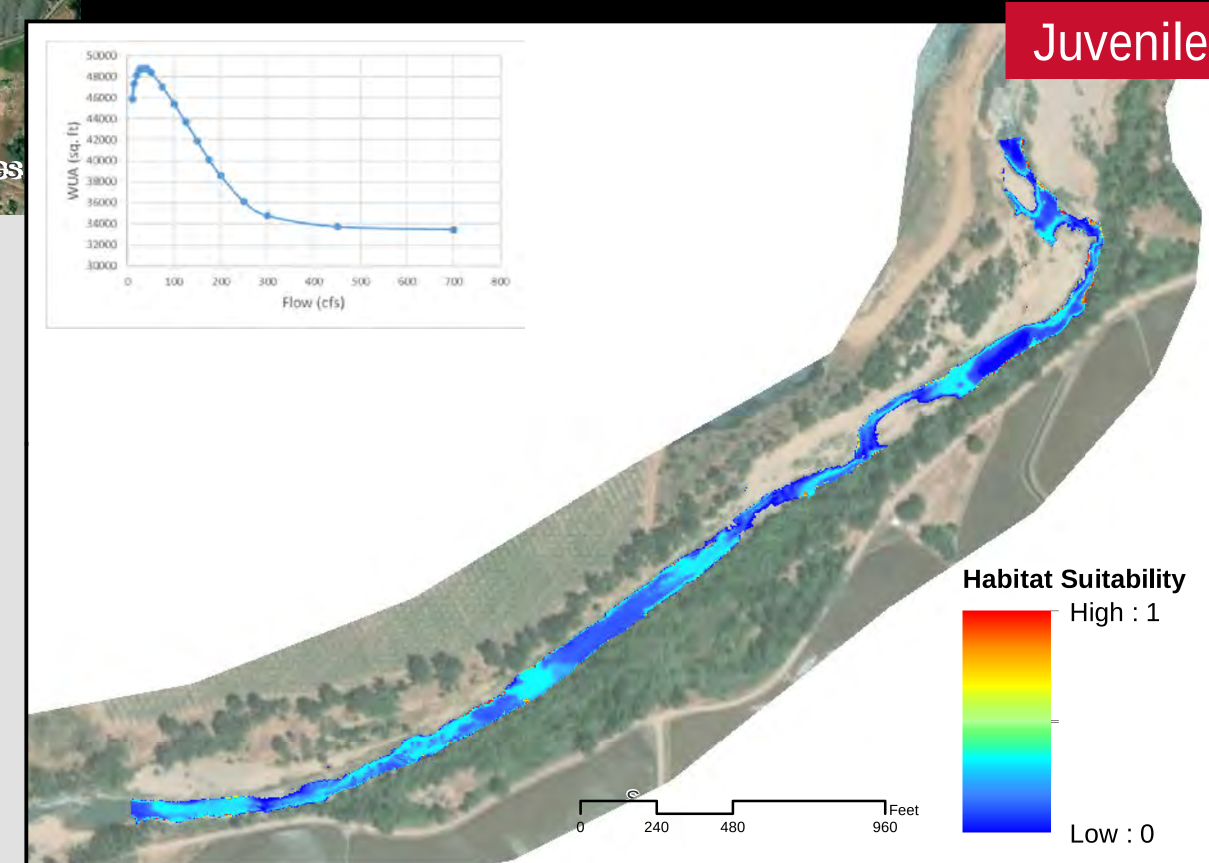


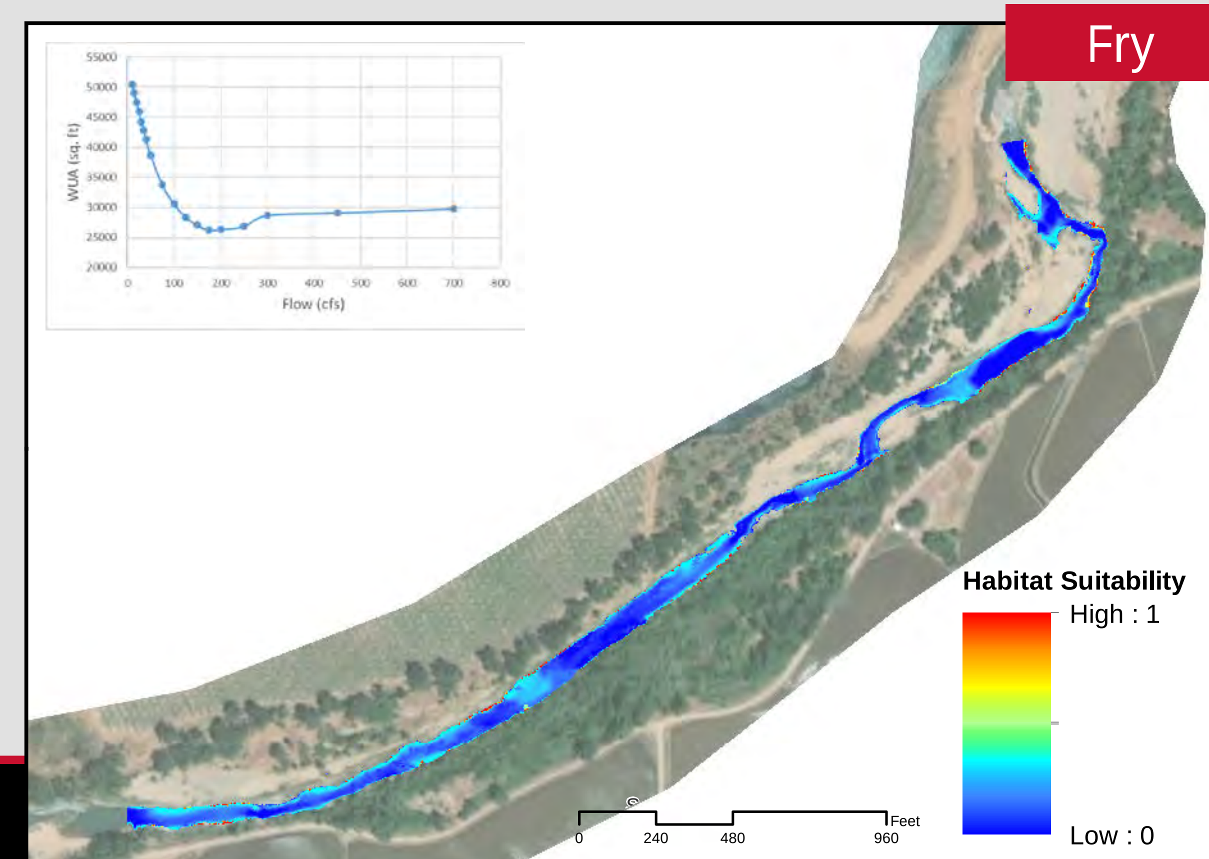
Lower Bear River - Instream Flow Study

Fall-Run Chinook Salmon

Upstream Study Site 50 cfs







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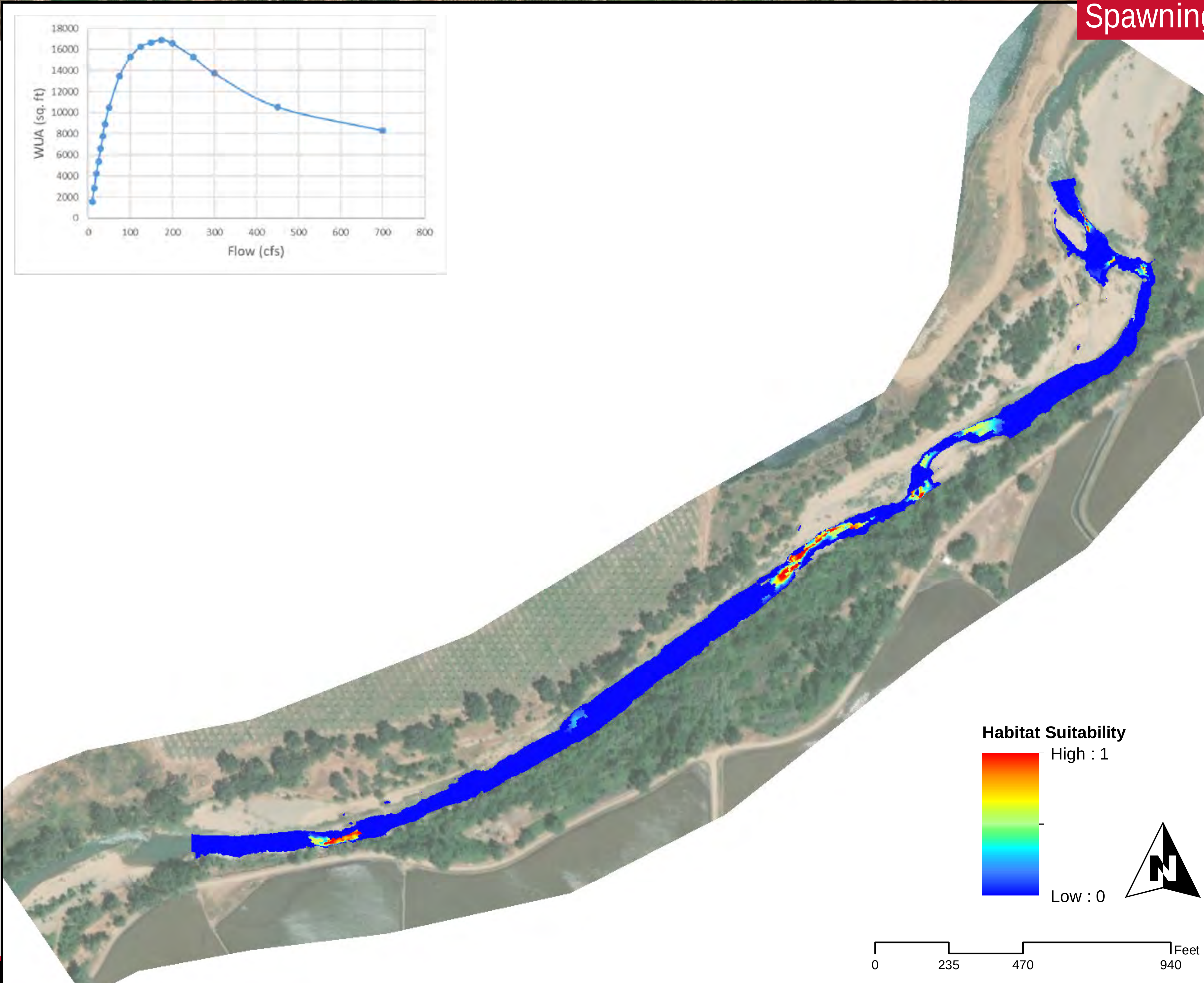
Lower Bear River - Instream Flow Study

SSWD HDR

Fall-Run Chinook Salmon

Upstream Study Site 75 cfs

Spawning



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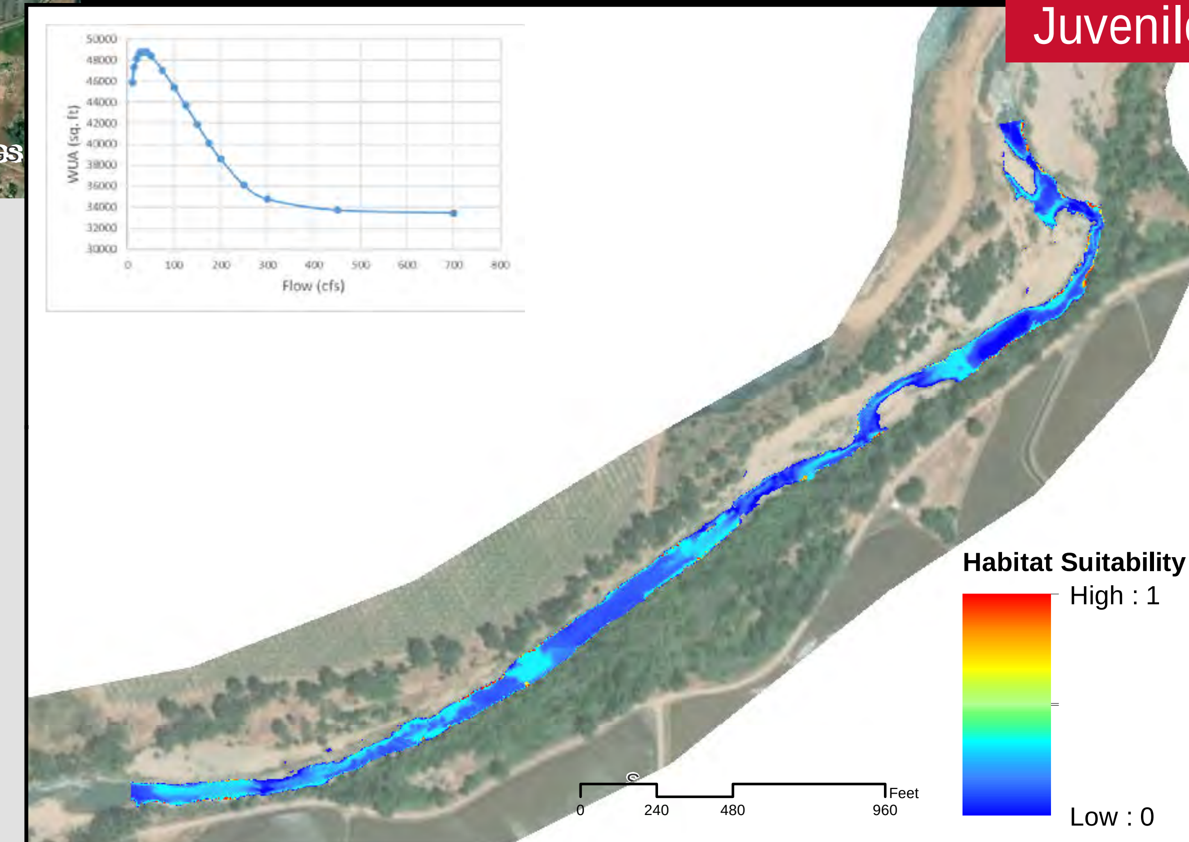

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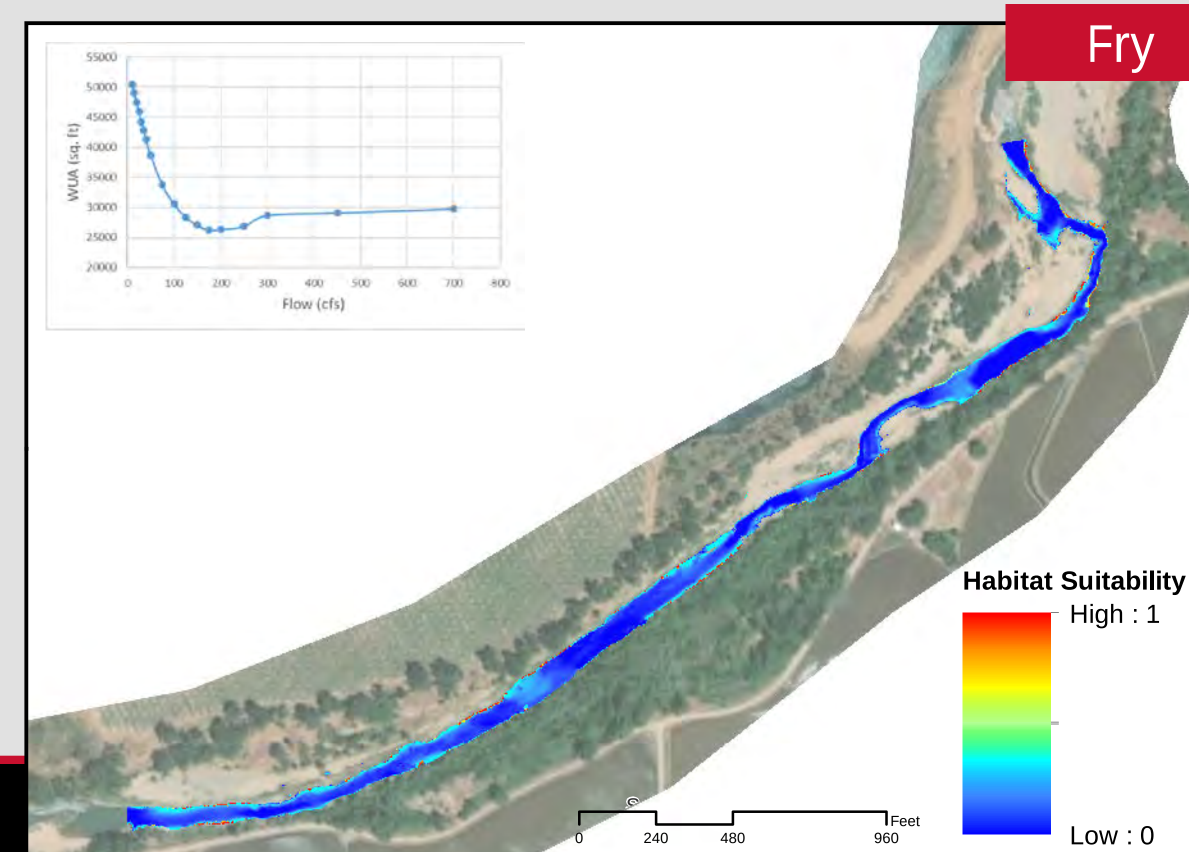

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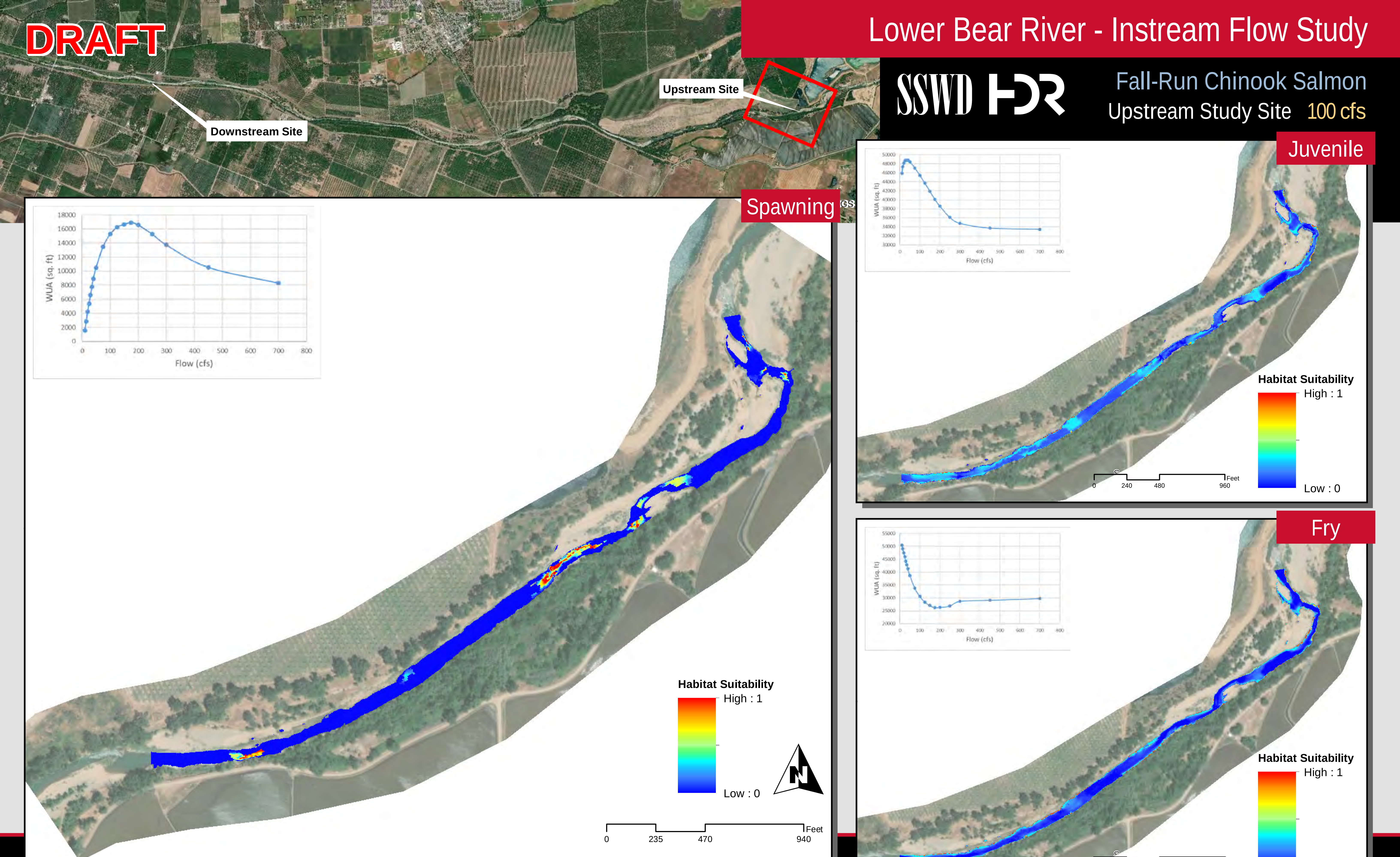

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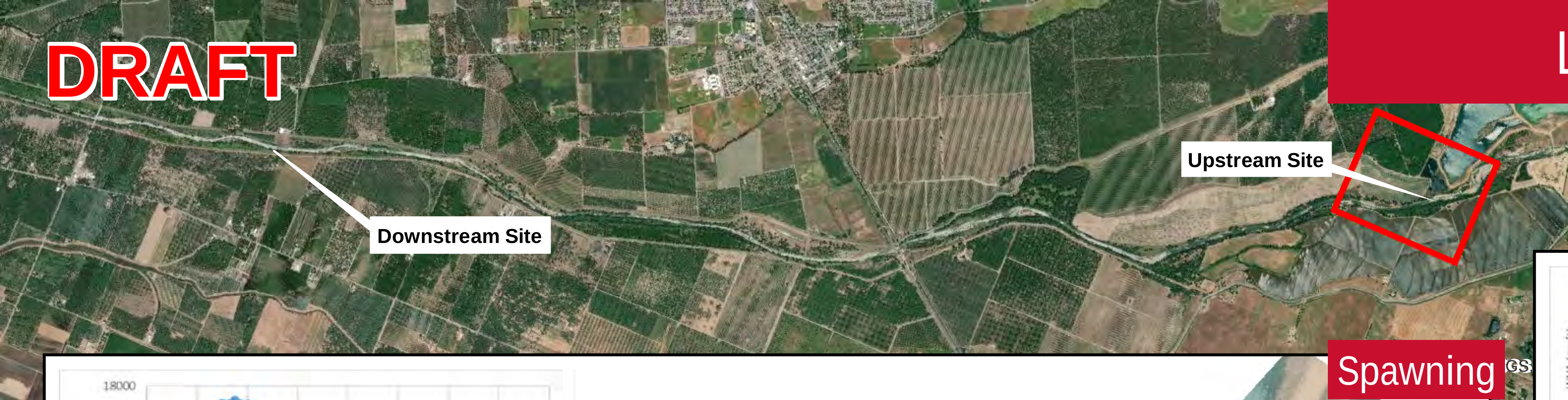
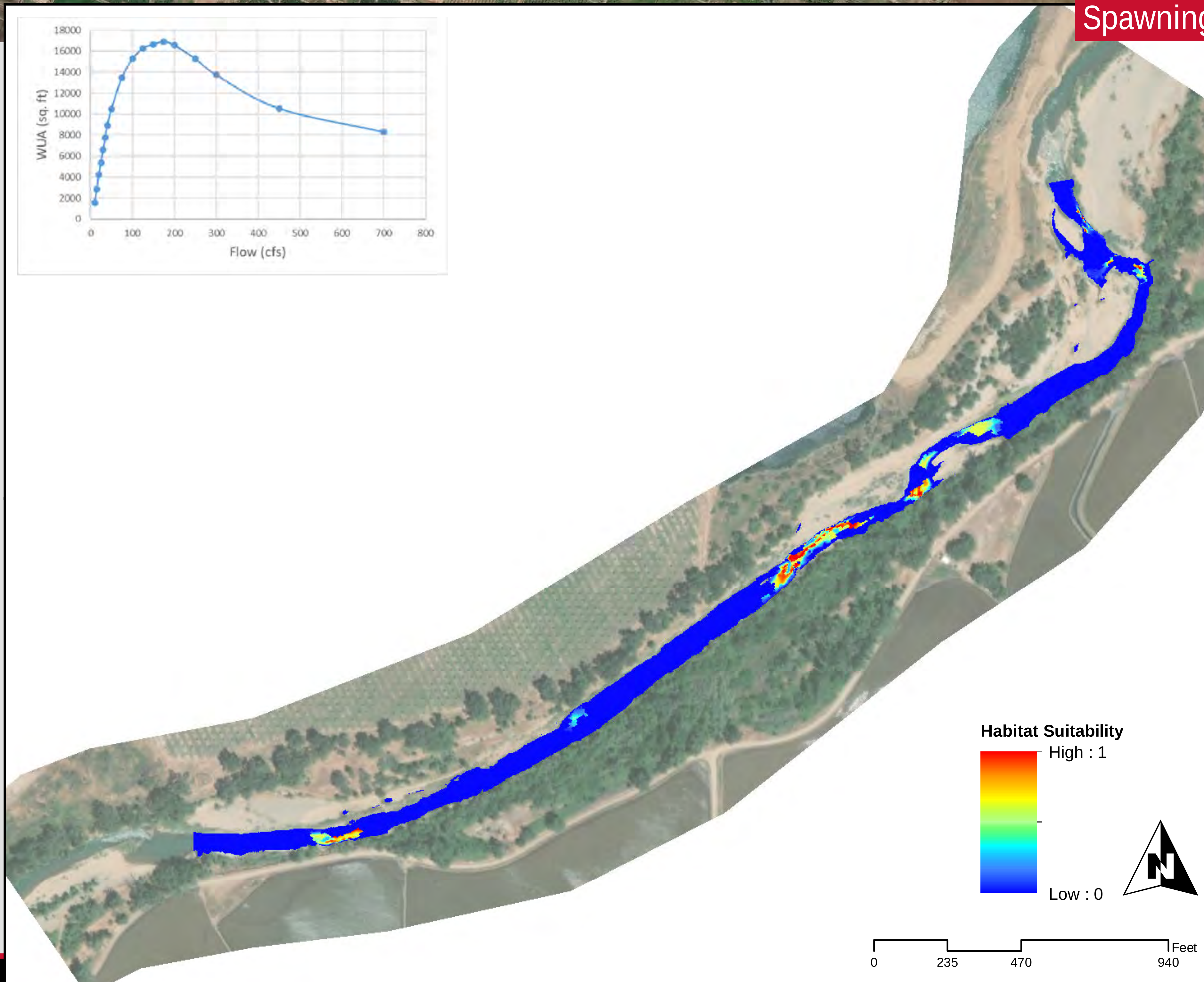
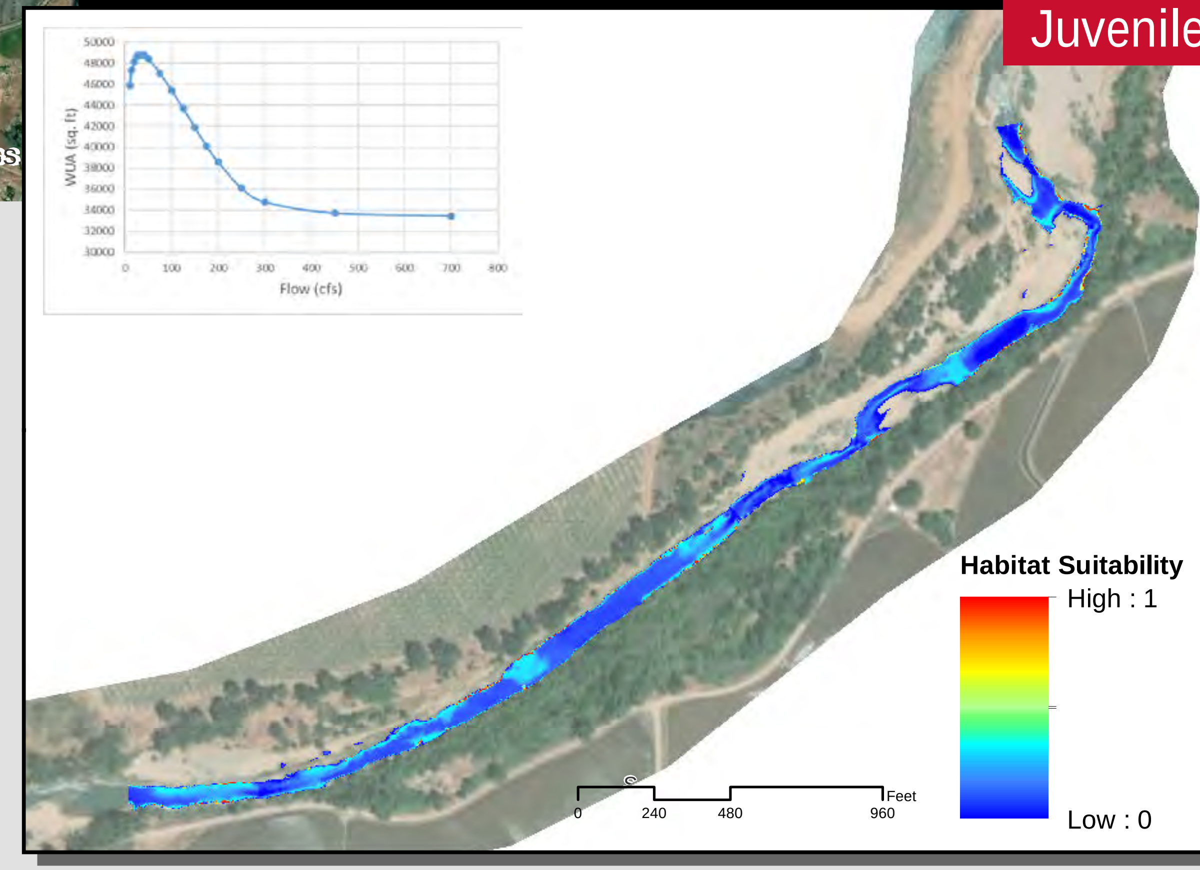
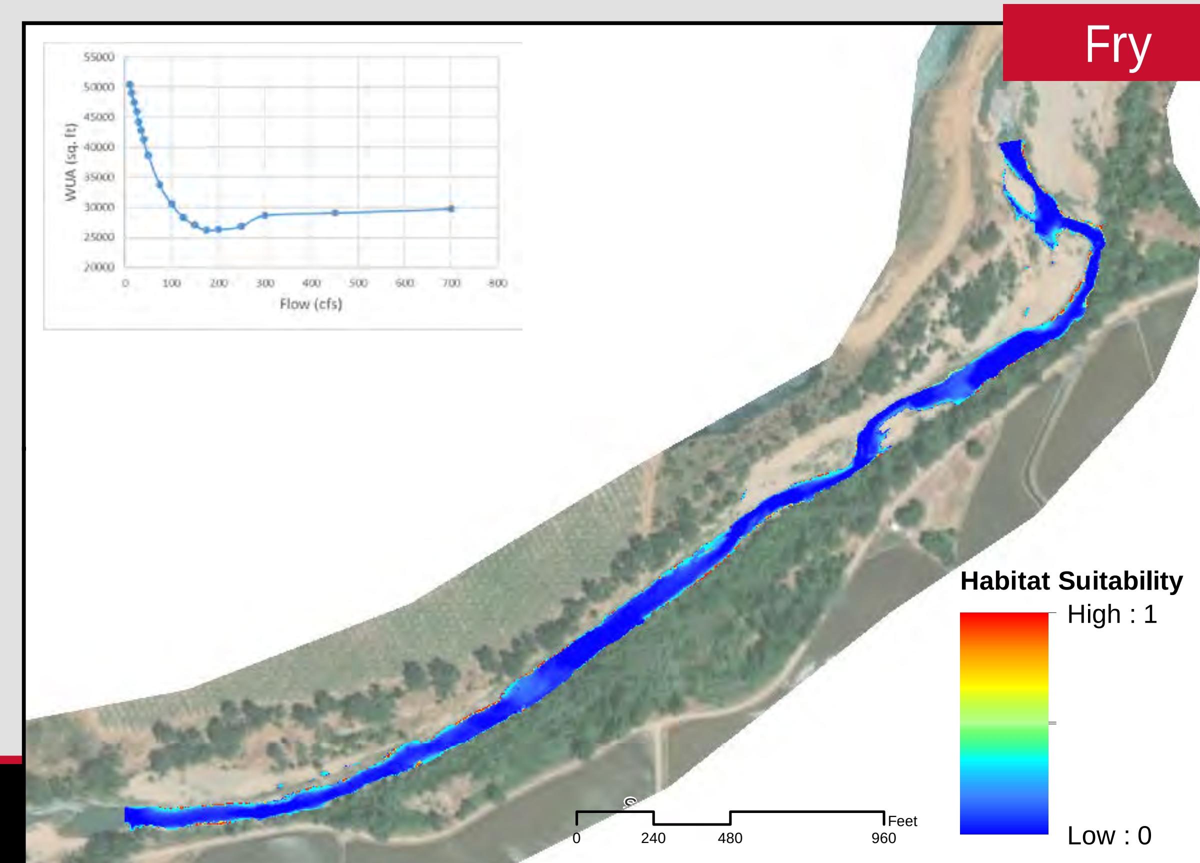
Lower Bear River - Instream Flow Study

Fall-Run Chinook Salmon
Upstream Study Site 125 cfs









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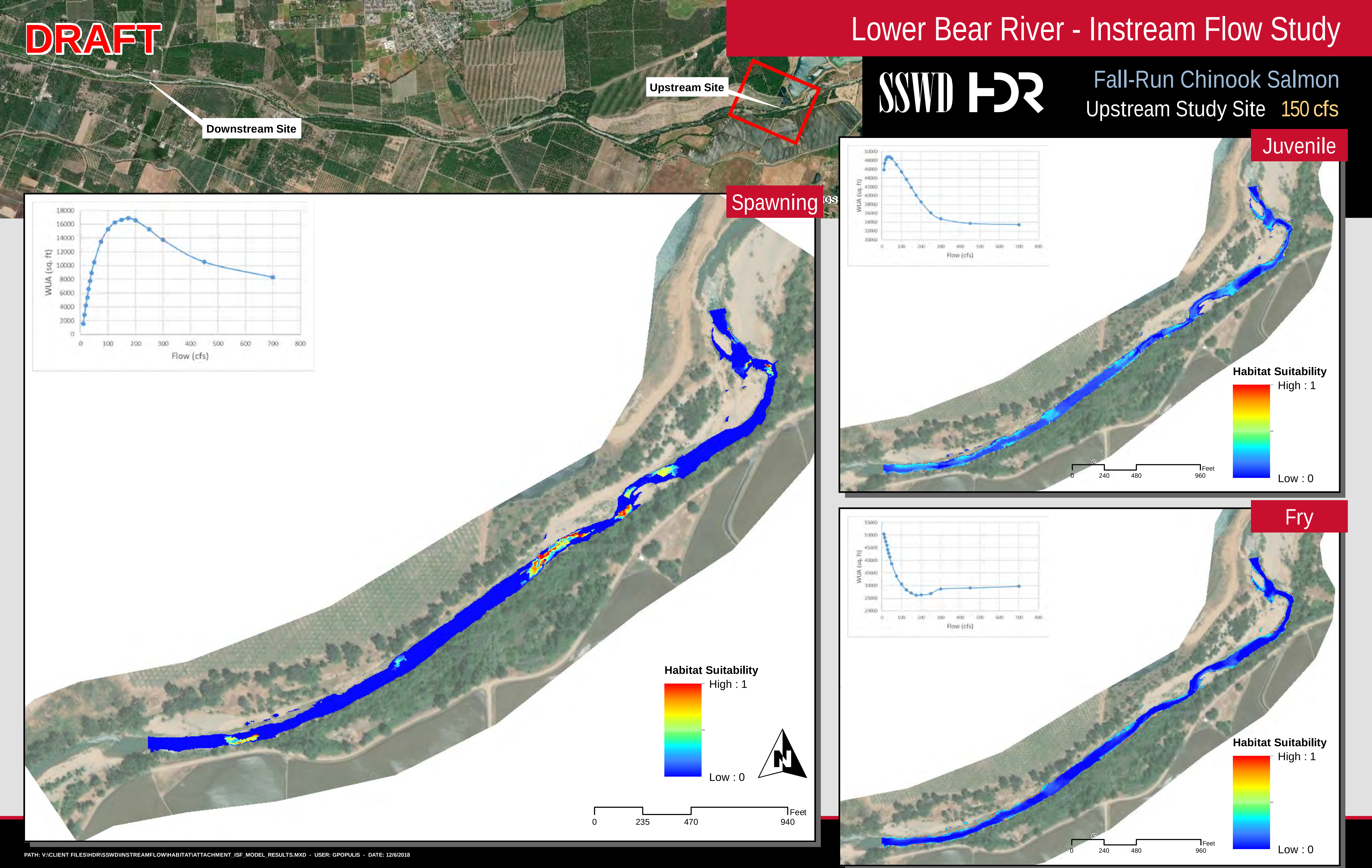

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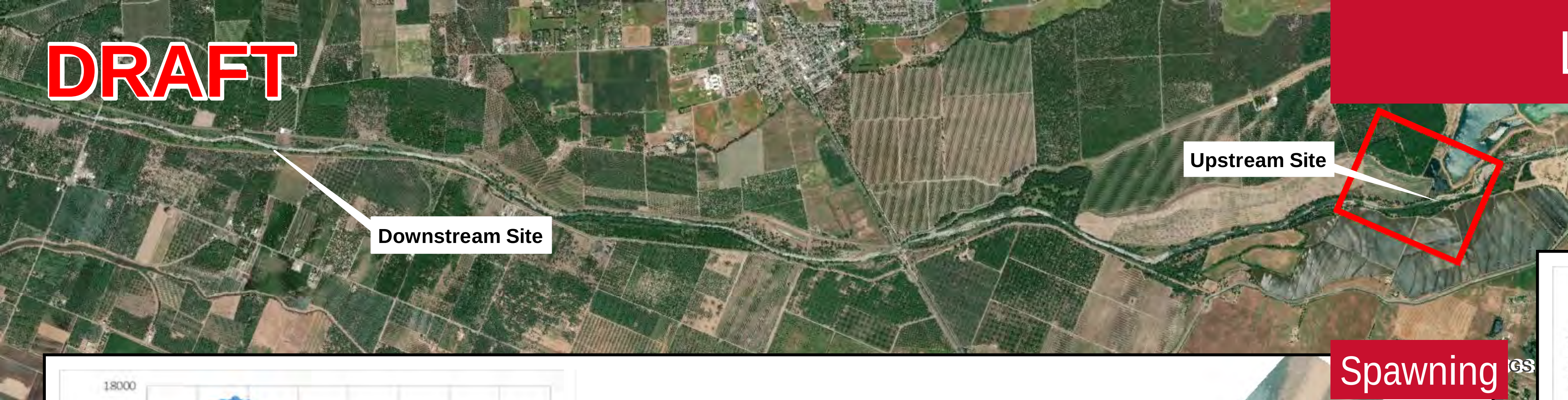
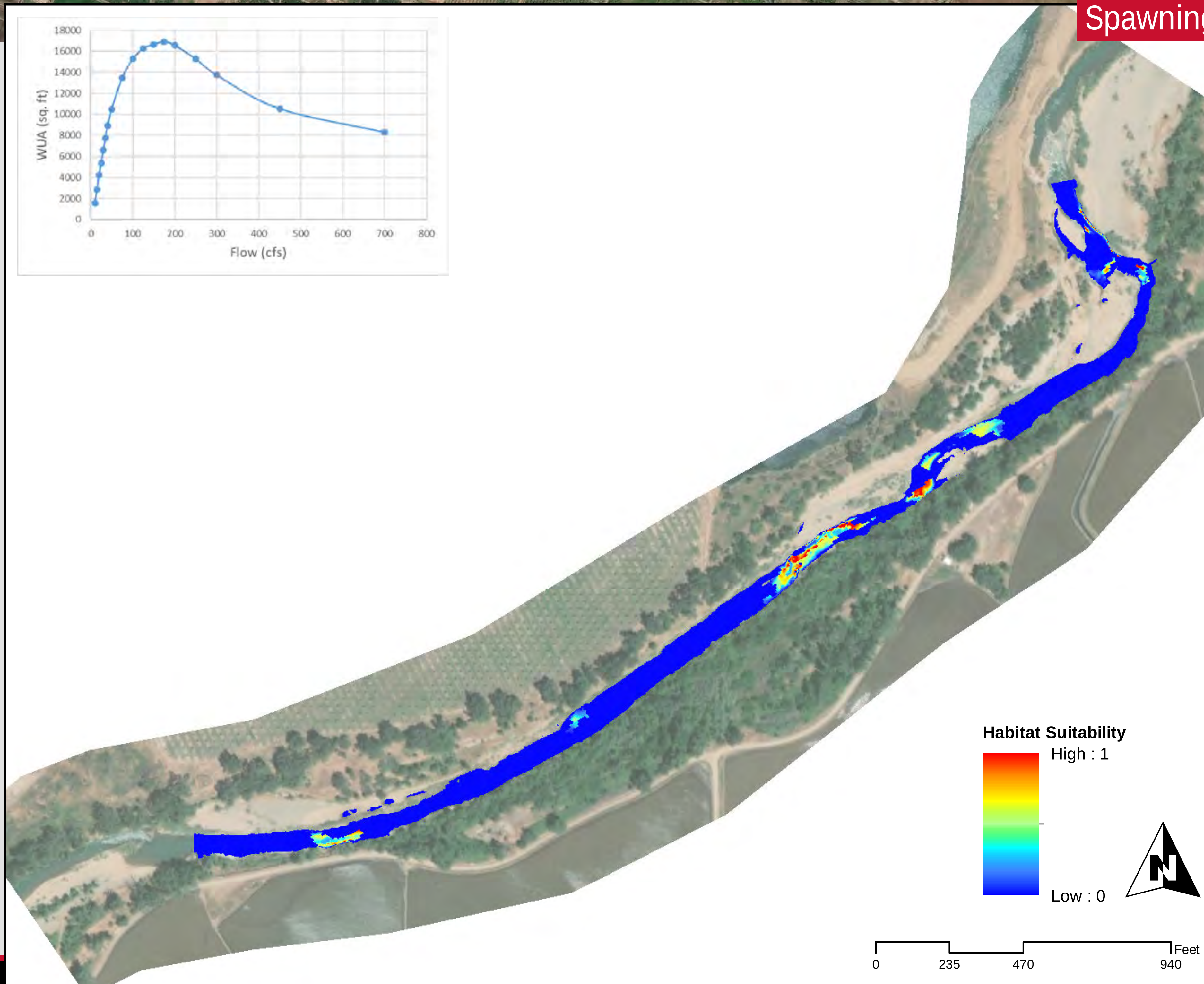
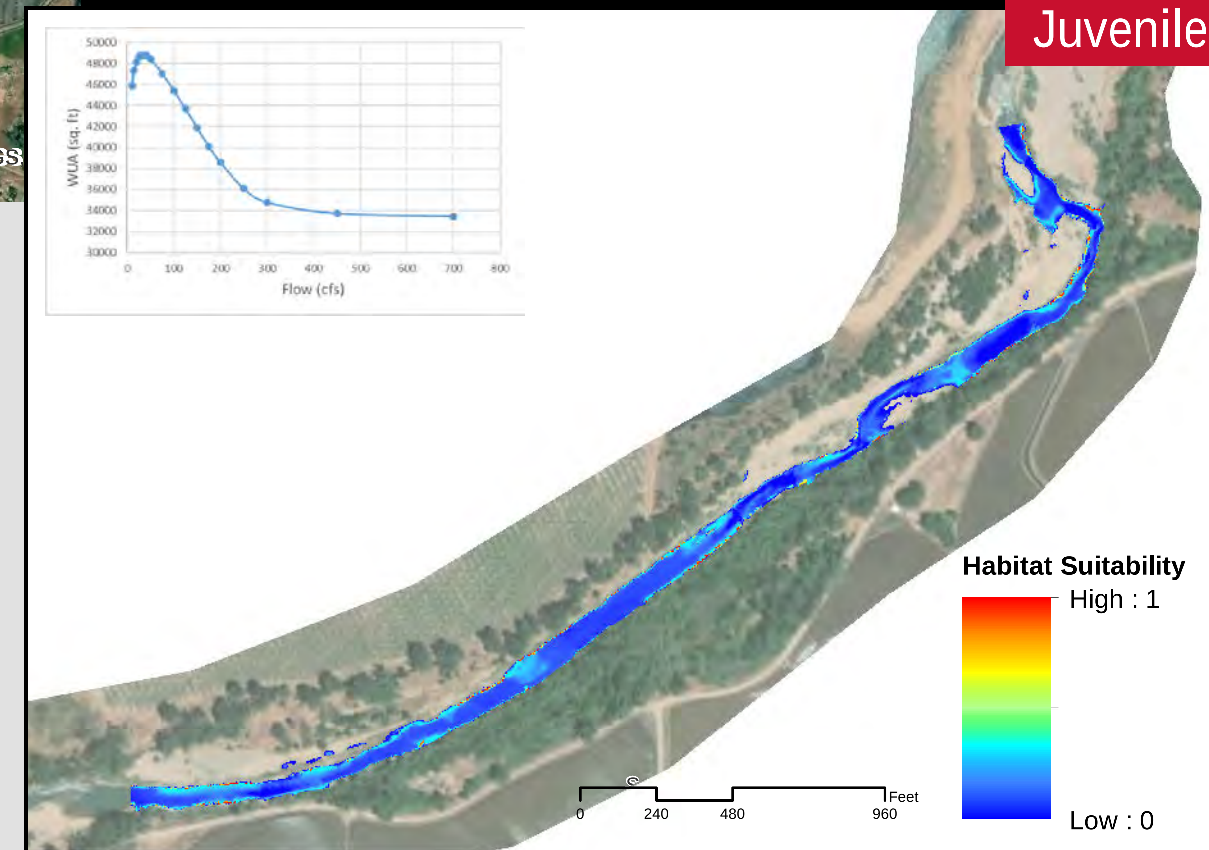
Lower Bear River - Instream Flow Study

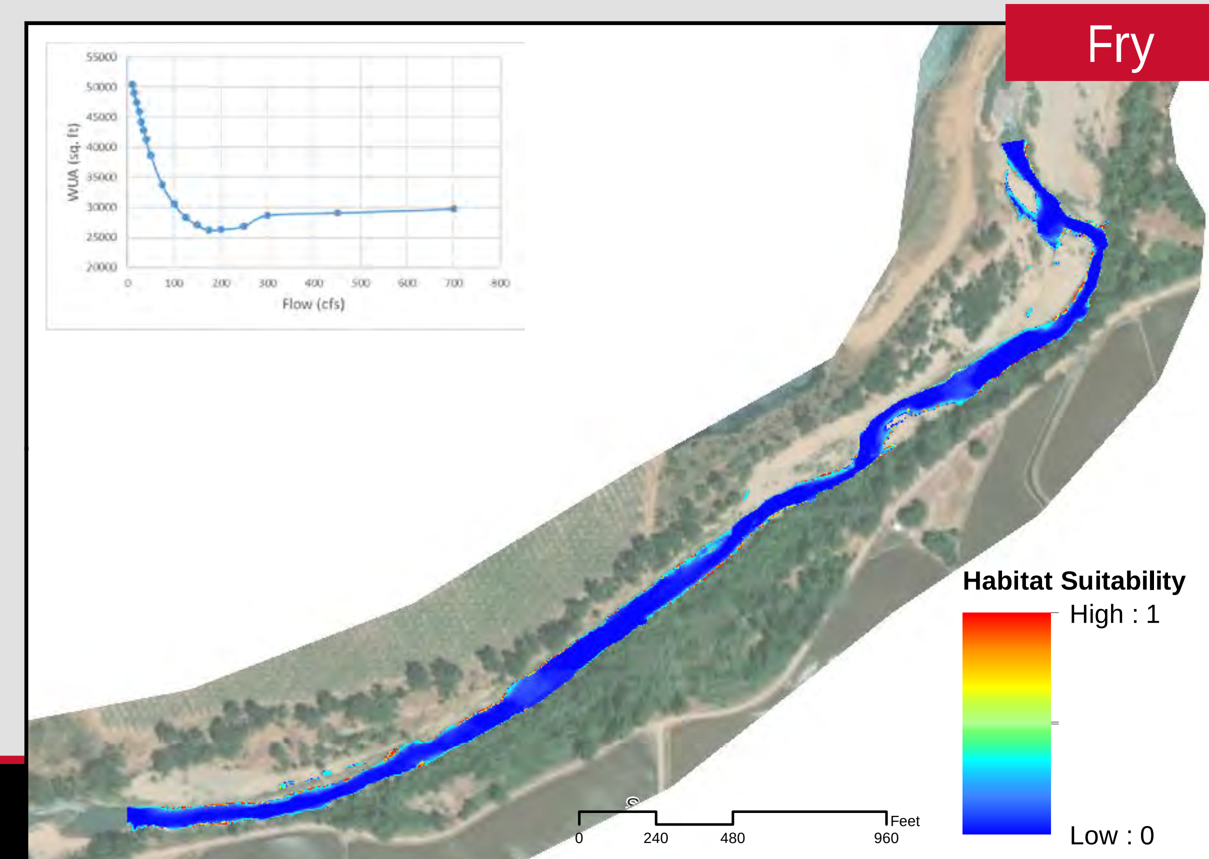
SSWD HDR

Fall-Run Chinook Salmon
Upstream Study Site 175 cfs









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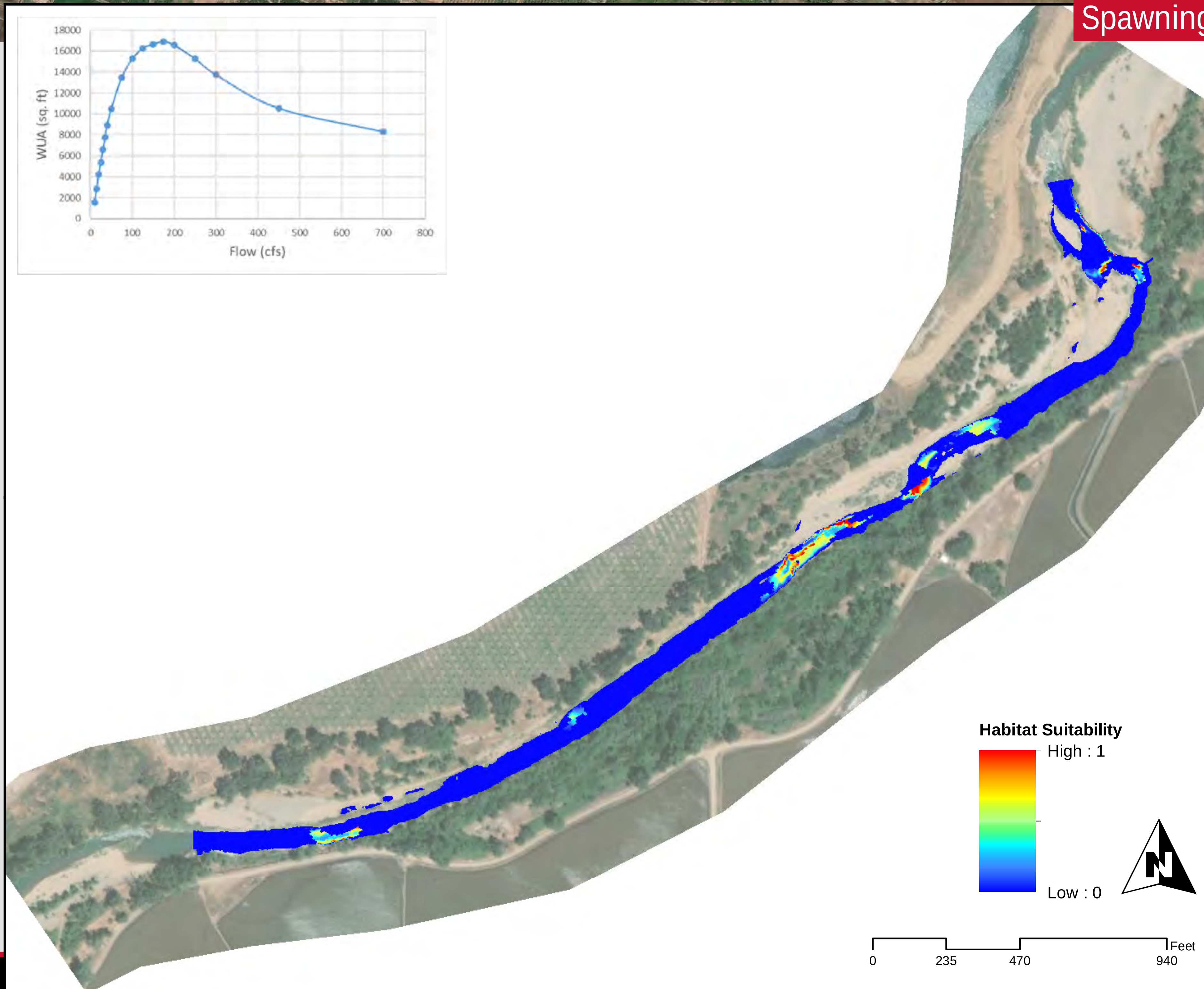
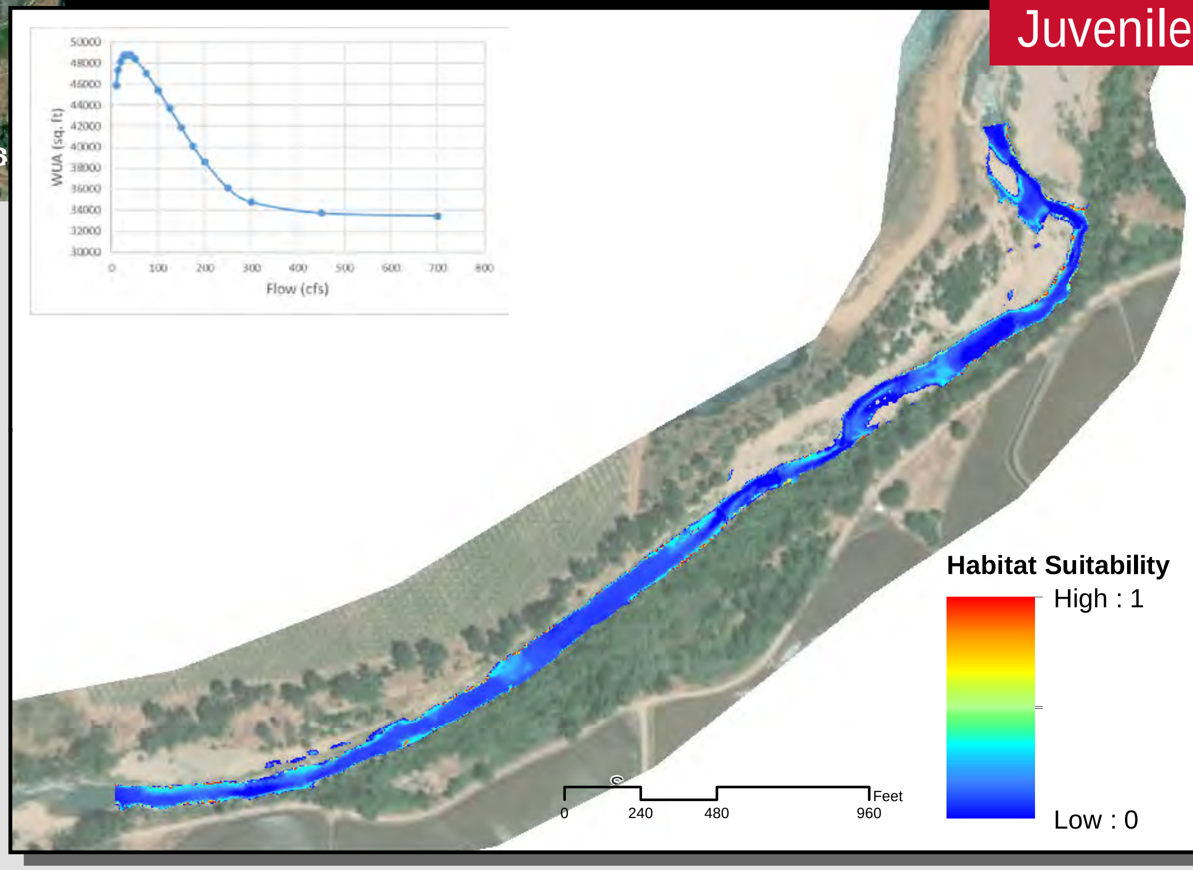
Lower Bear River - Instream Flow Study

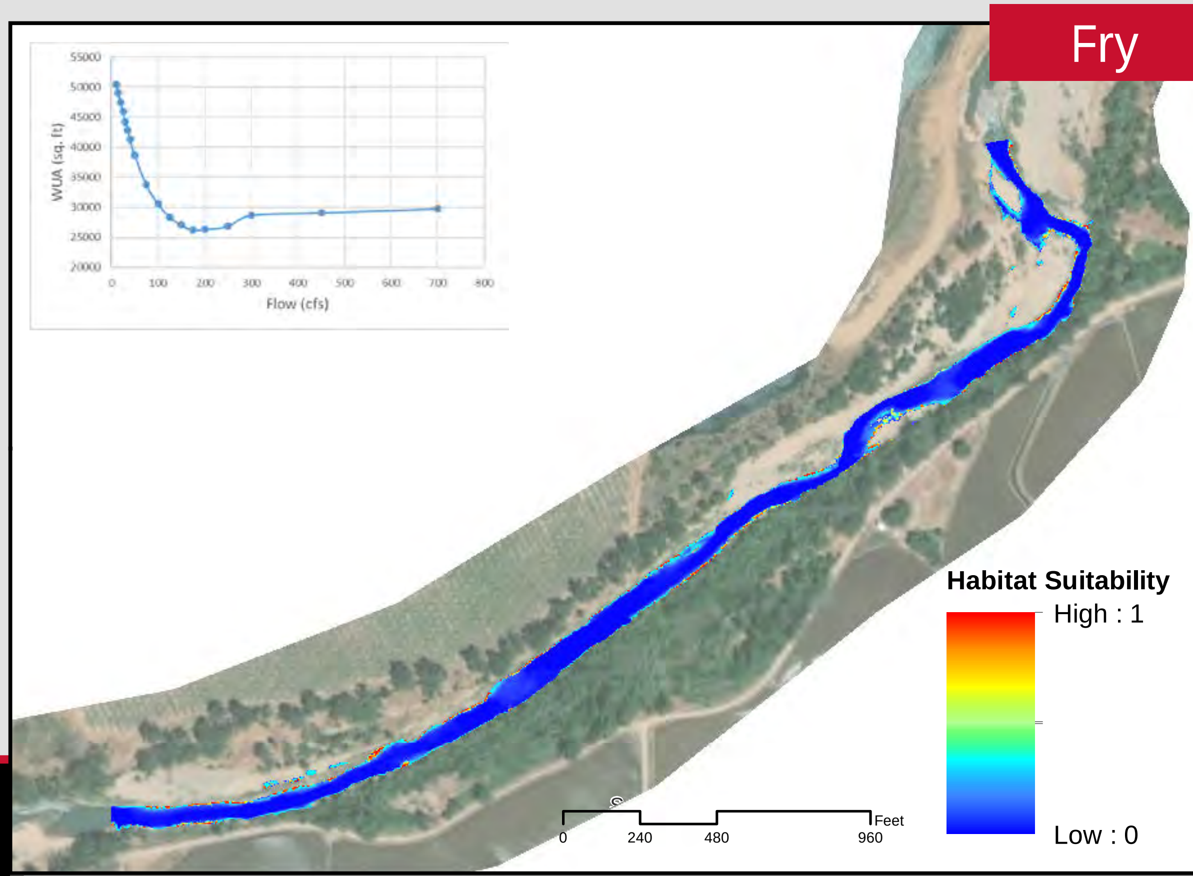
SSWD HDR

Fall-Run Chinook Salmon

Upstream Study Site 200 cfs







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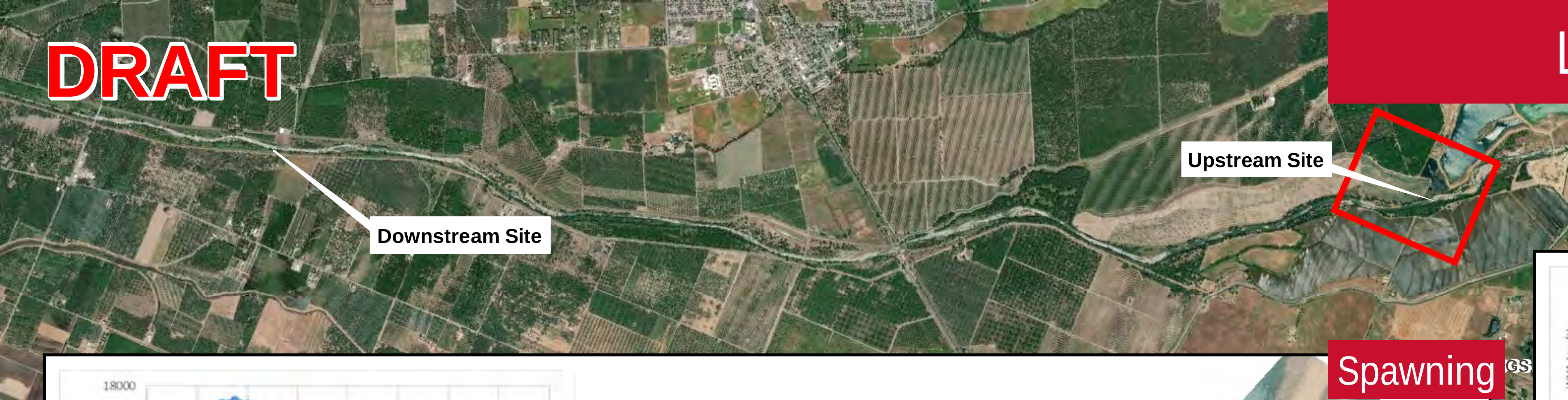
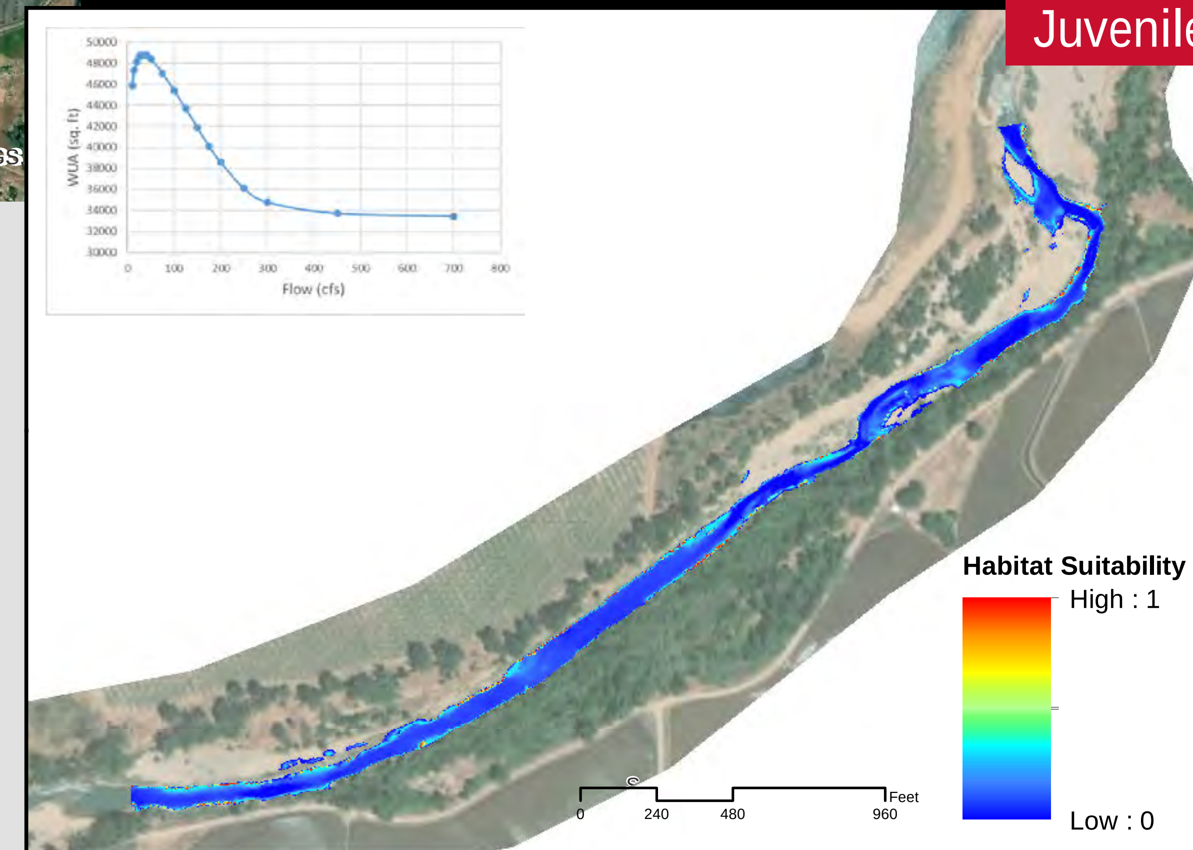
Lower Bear River - Instream Flow Study

Fall-Run Chinook Salmon
Upstream Study Site 250 cfs



Spawning

Juvenile



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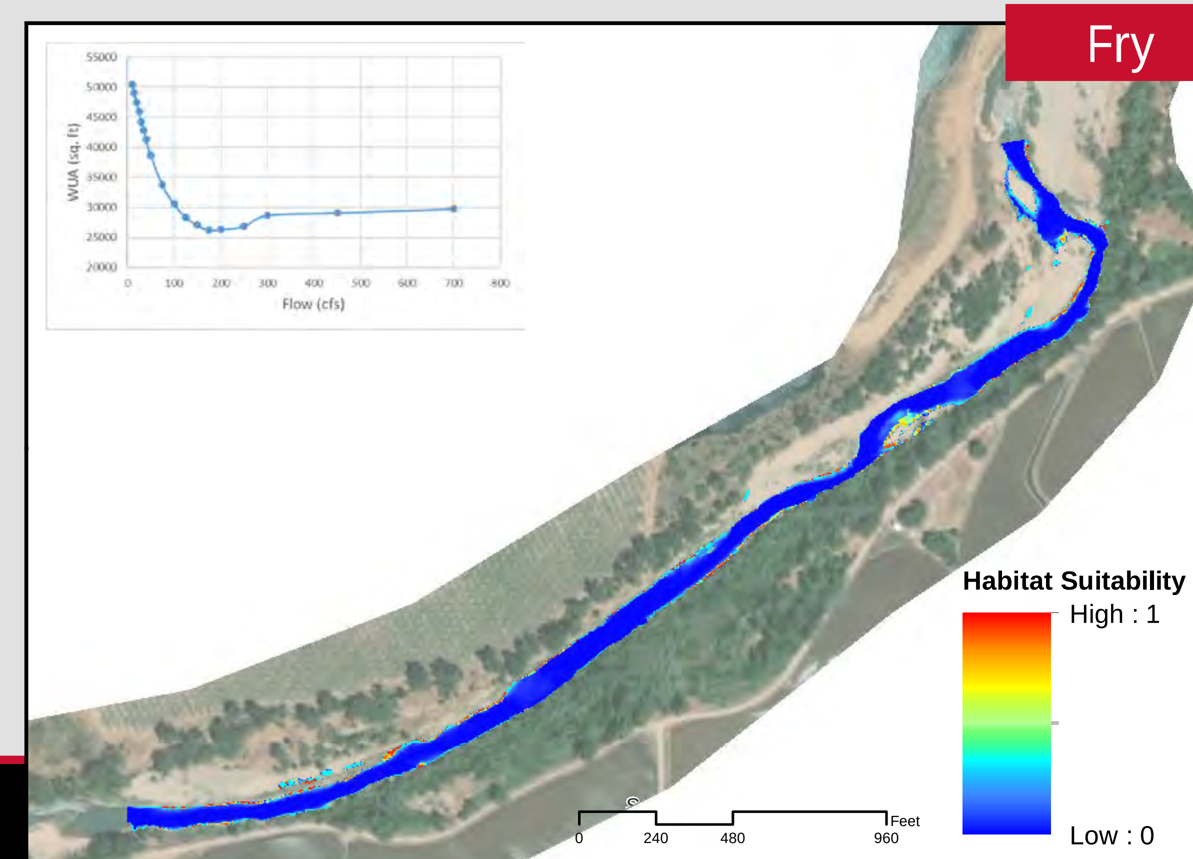
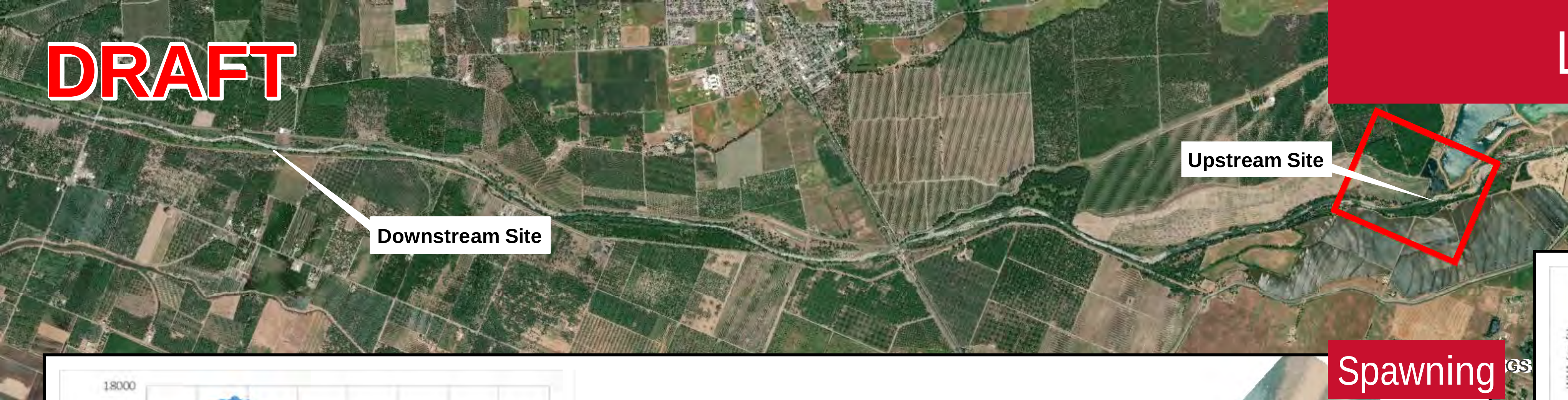


Lower Bear River - Instream Flow Study

SSWD HDR

Fall-Run Chinook Salmon

Upstream Study Site 300 cfs



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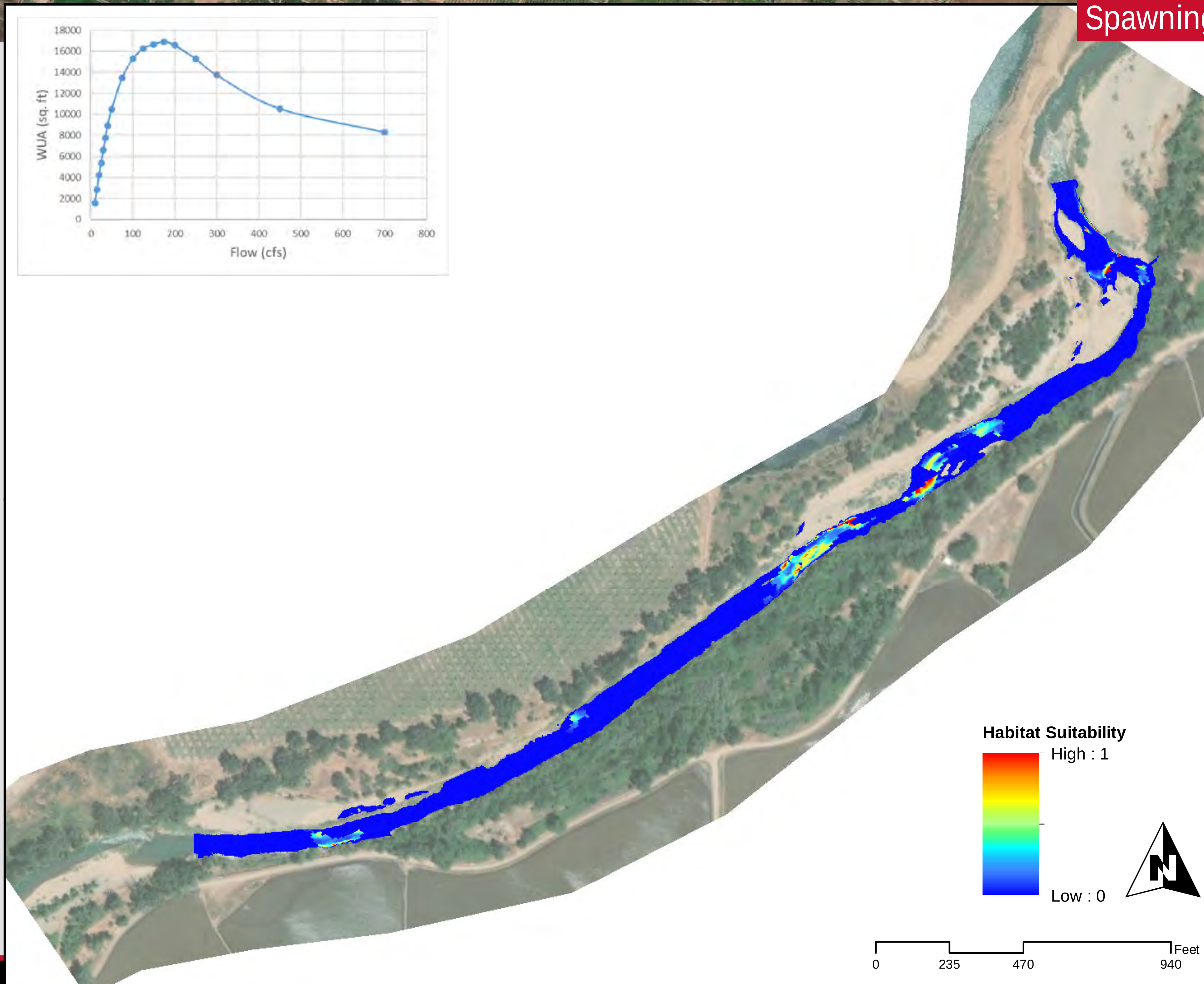

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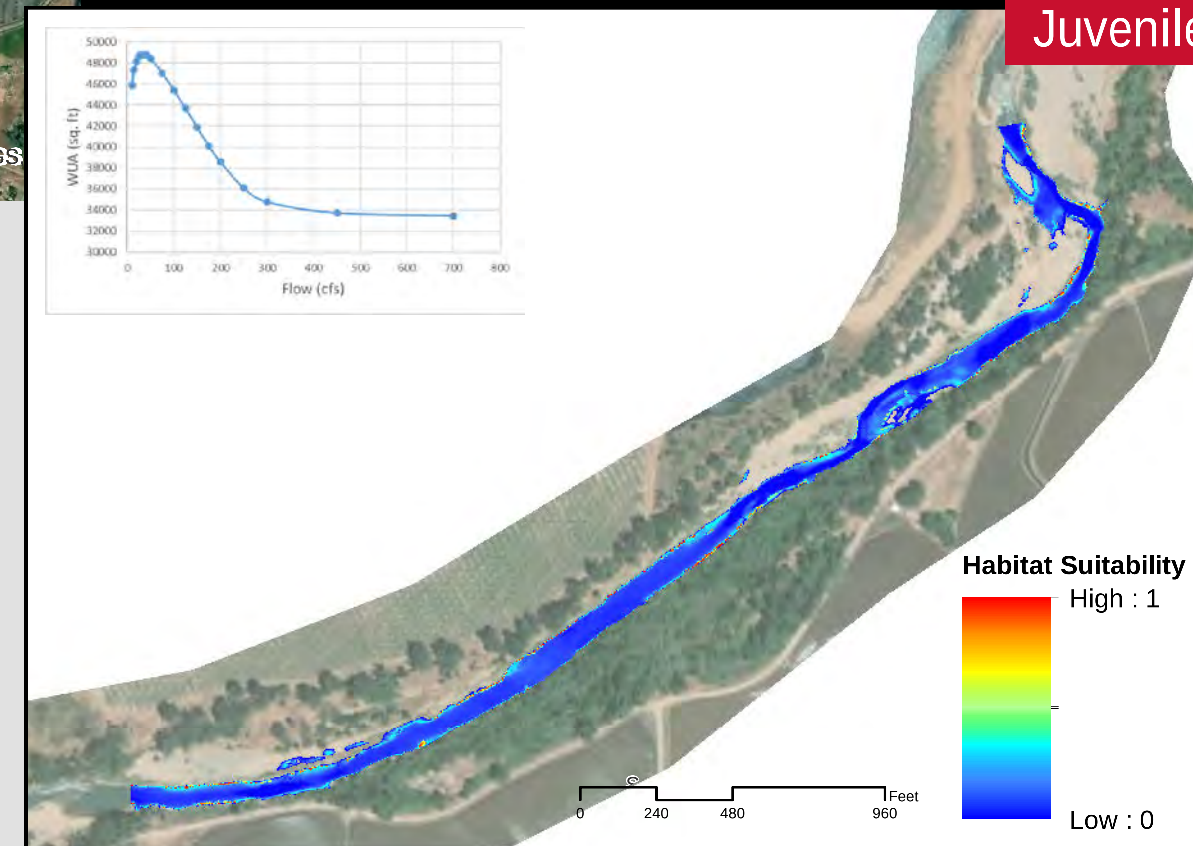

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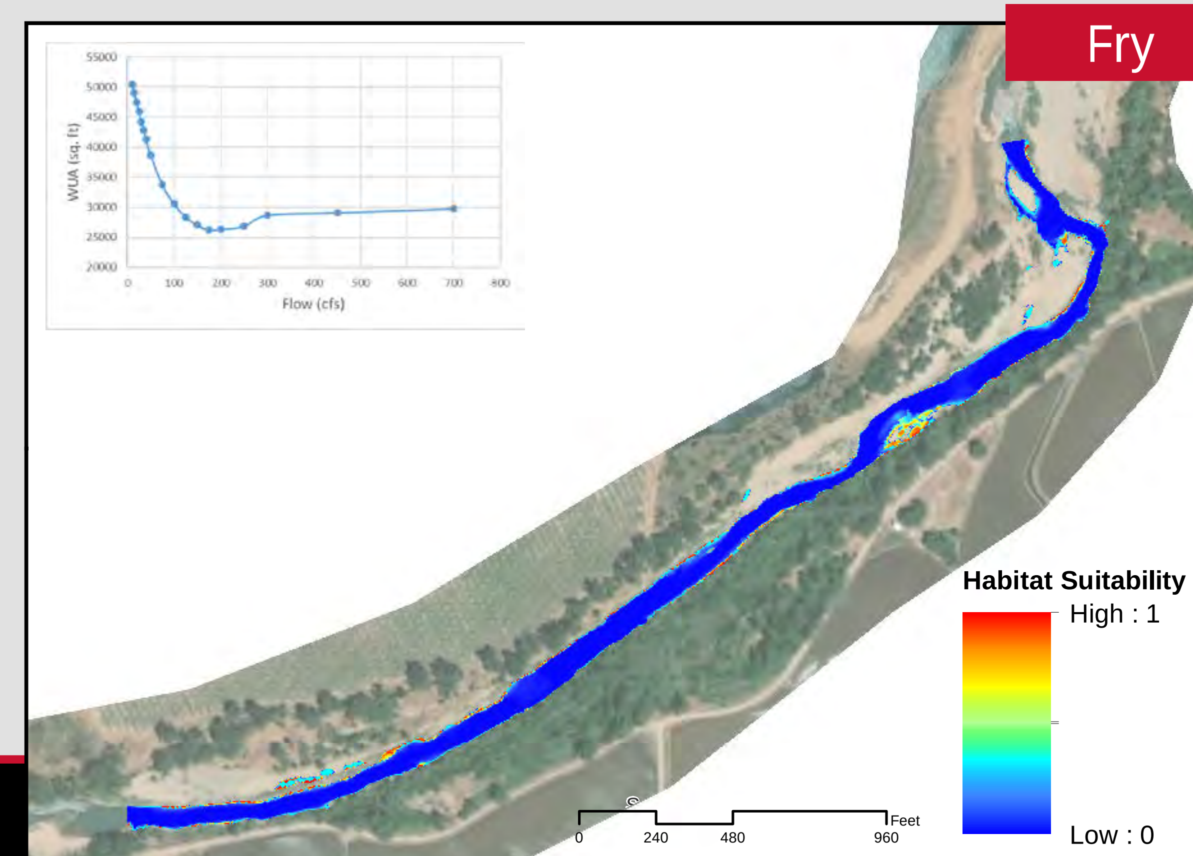
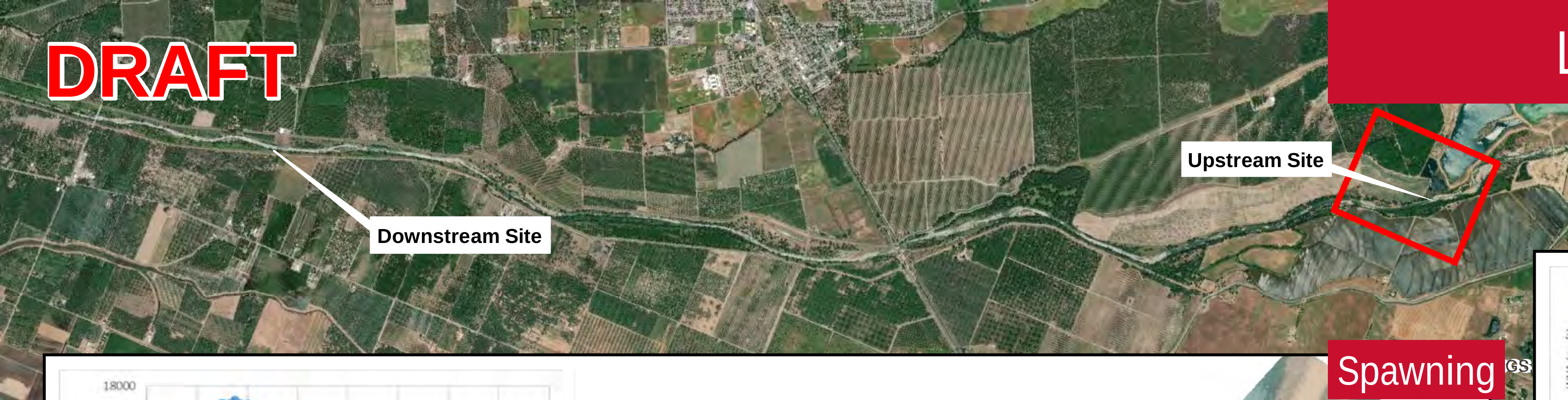


Lower Bear River - Instream Flow Study

DRAFT

Fall-Run Chinook Salmon

Upstream Study Site 450 cfs



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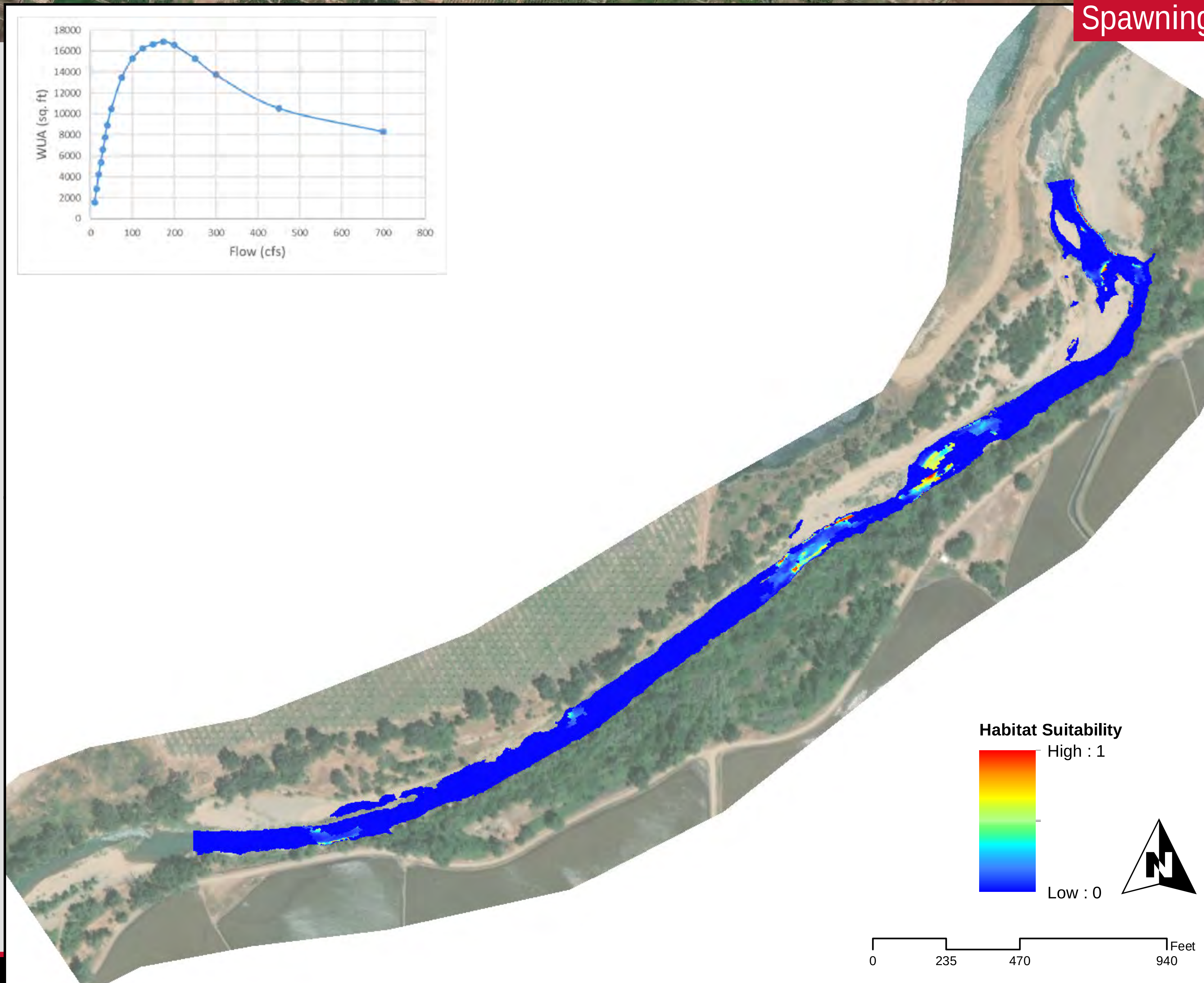

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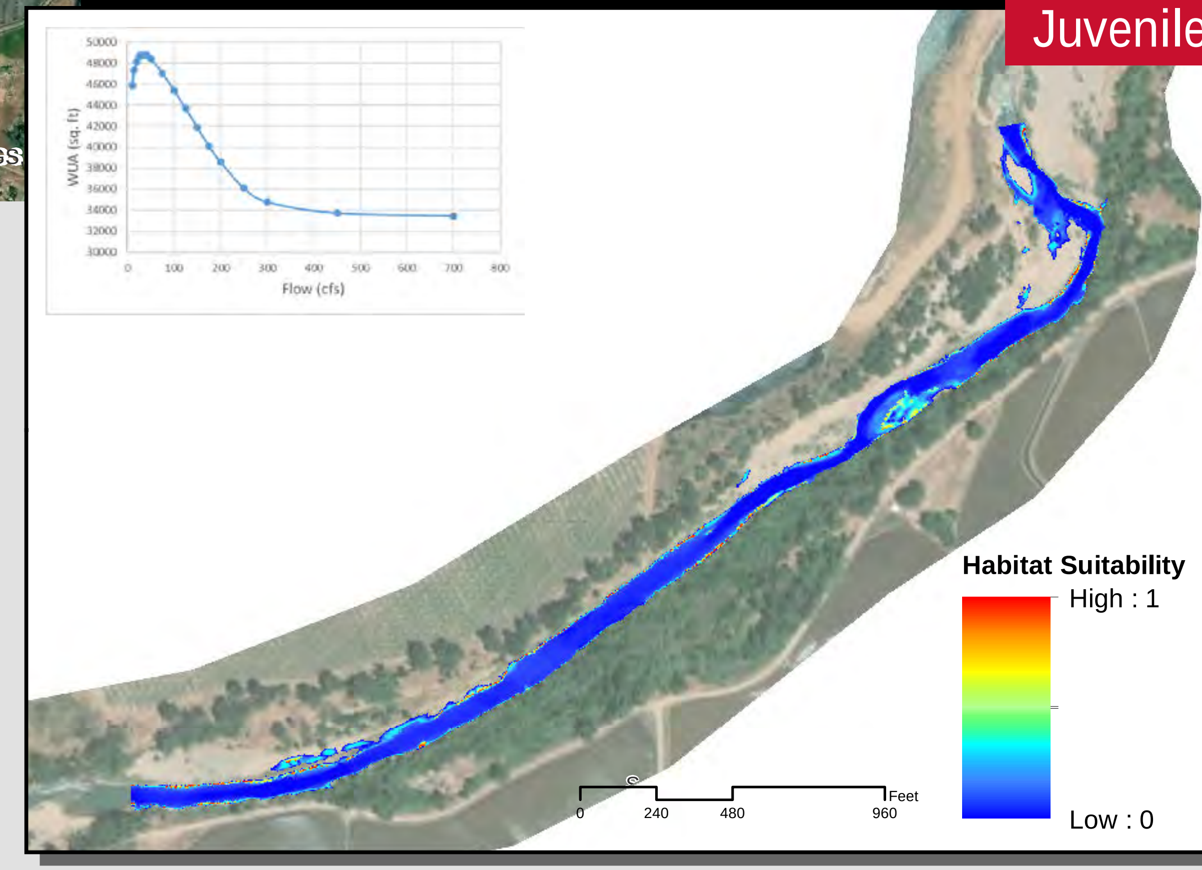

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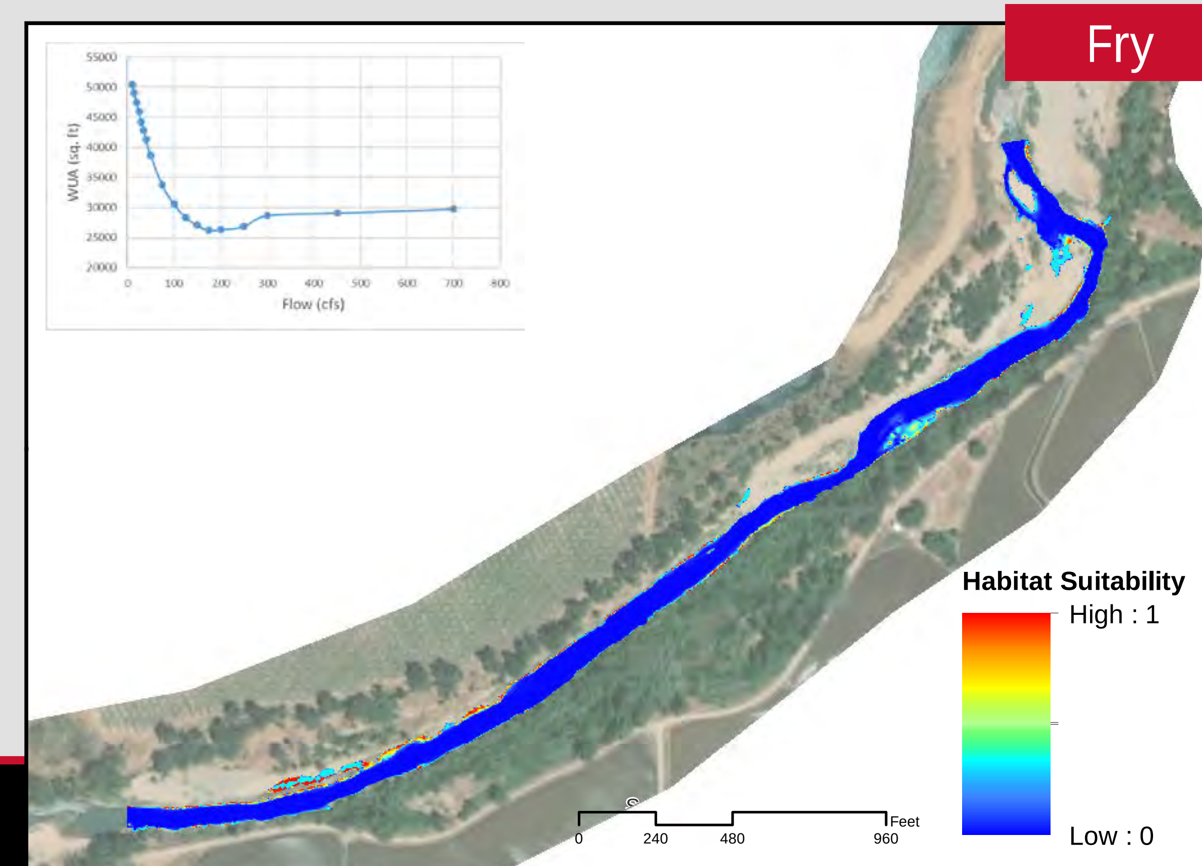

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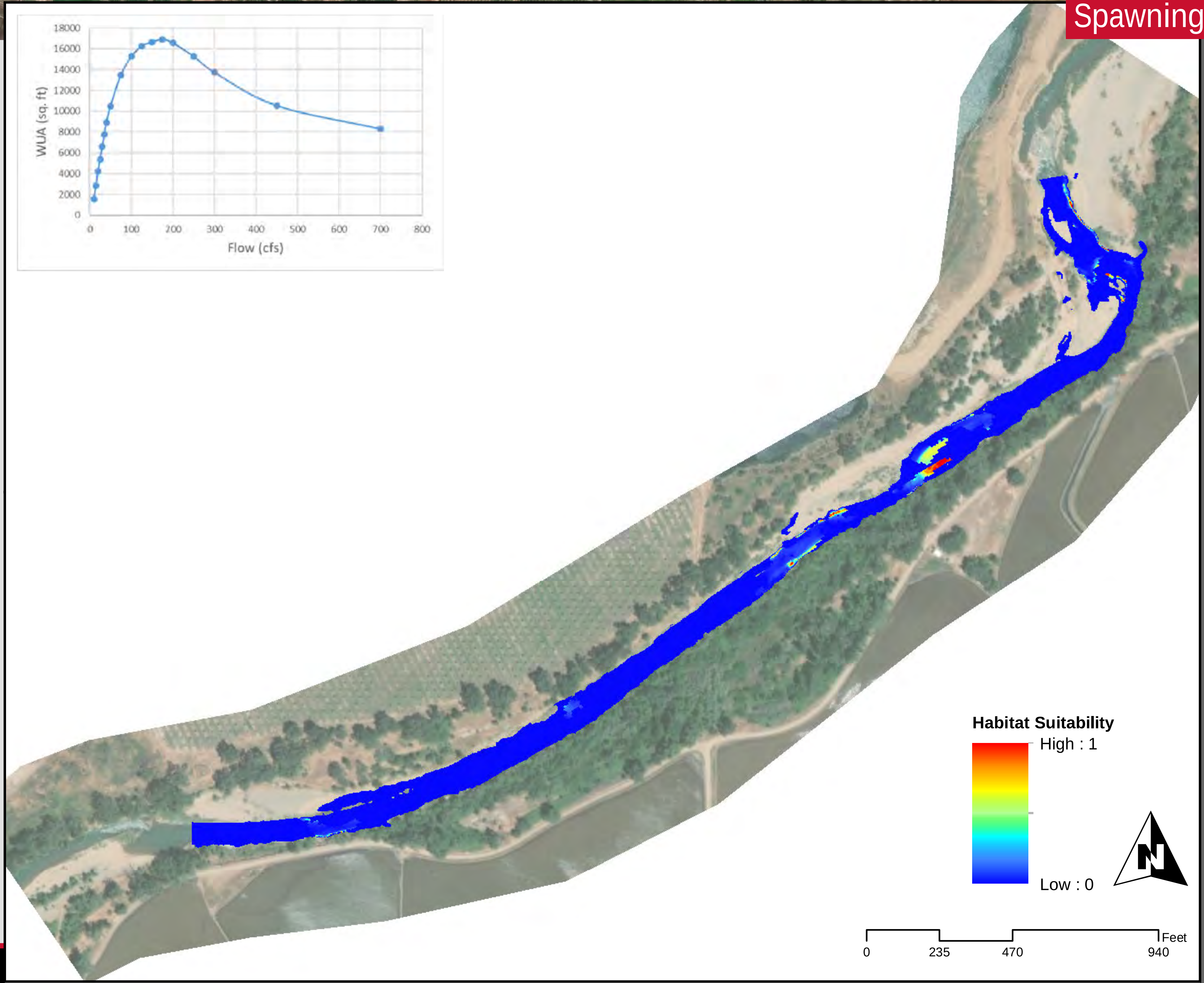
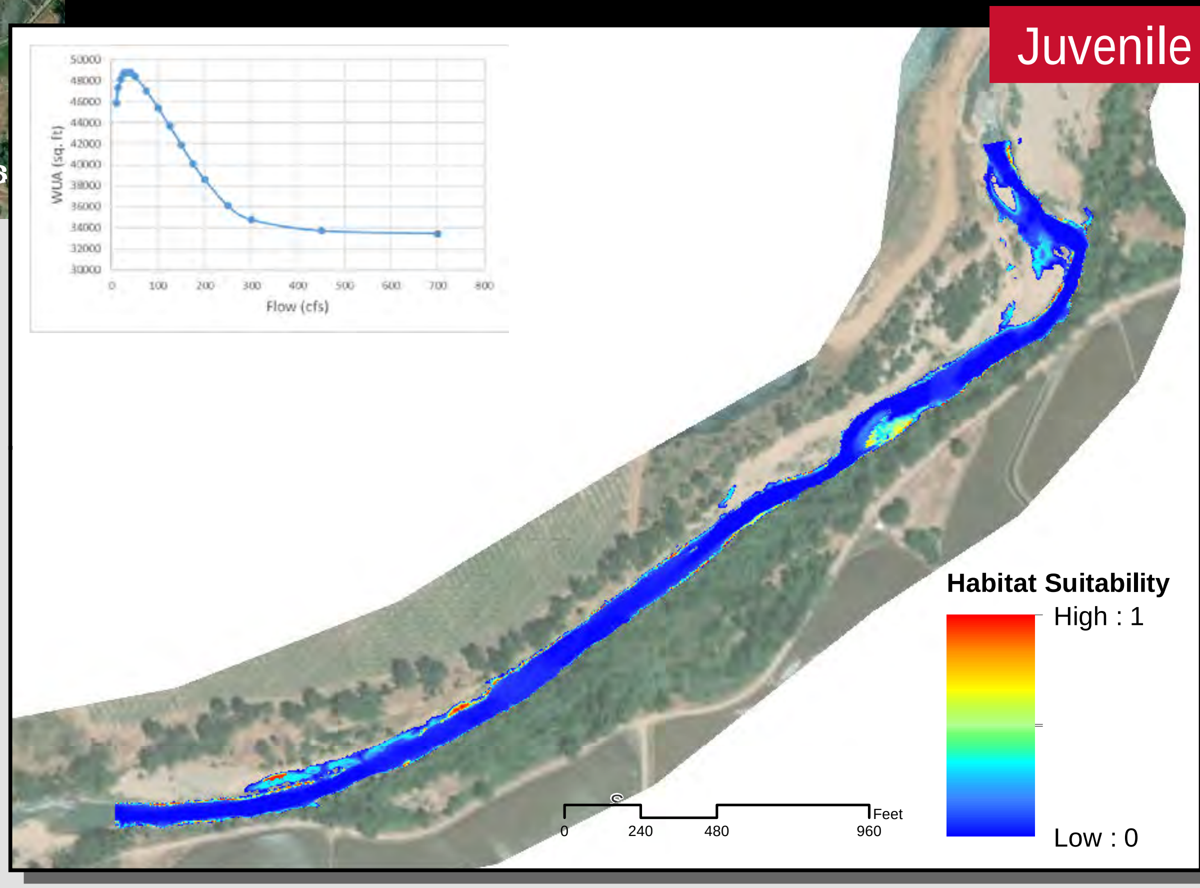
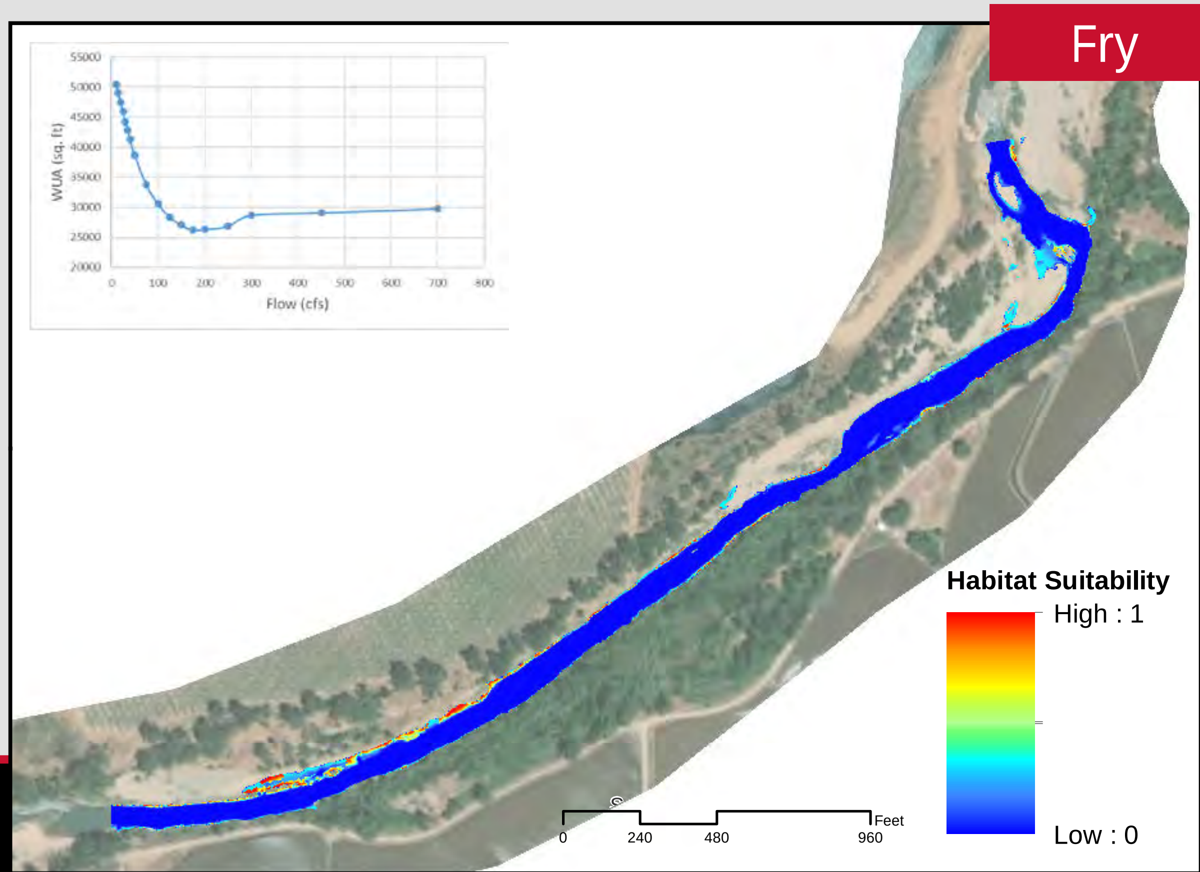
Lower Bear River - Instream Flow Study

Fall-Run Chinook Salmon

Upstream Study Site 700 cfs







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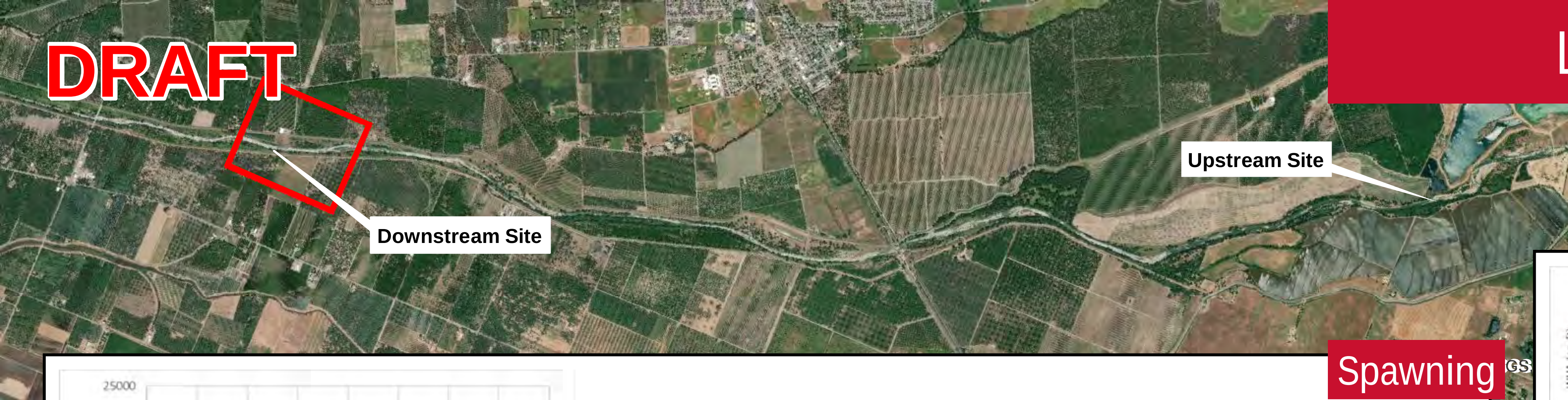
Lower Bear River - Instream Flow Study

Fall-Run Chinook Salmon
Downstream Study Site 10 cfs



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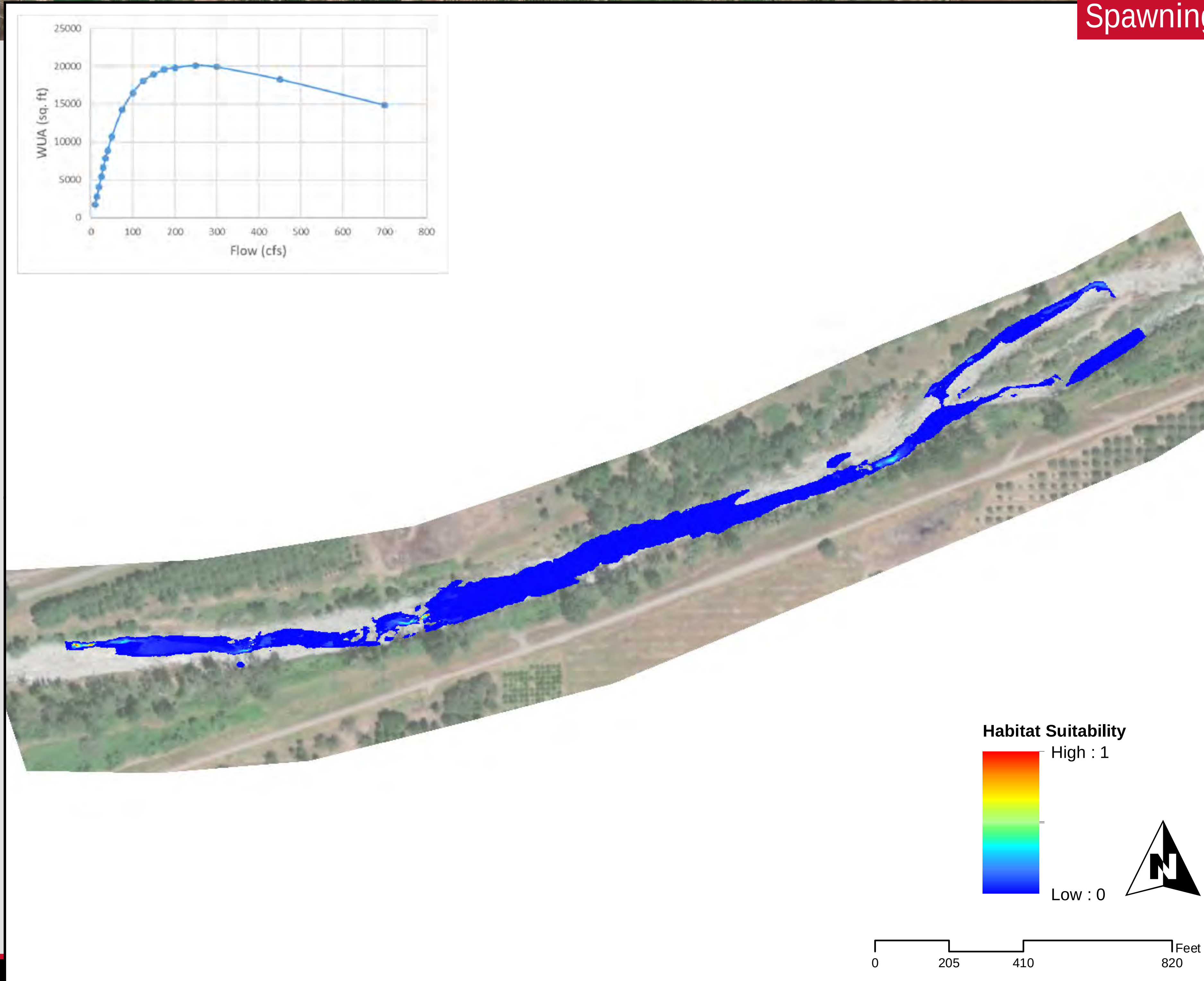

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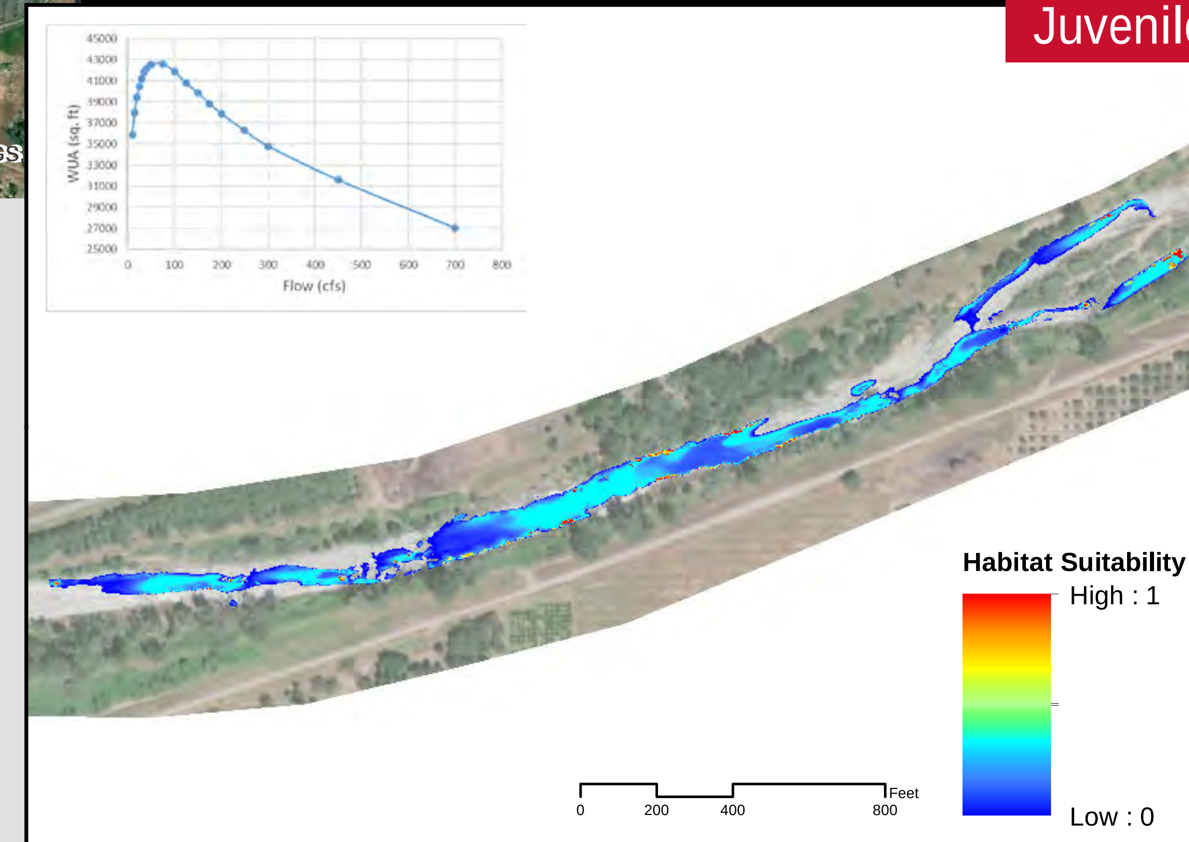

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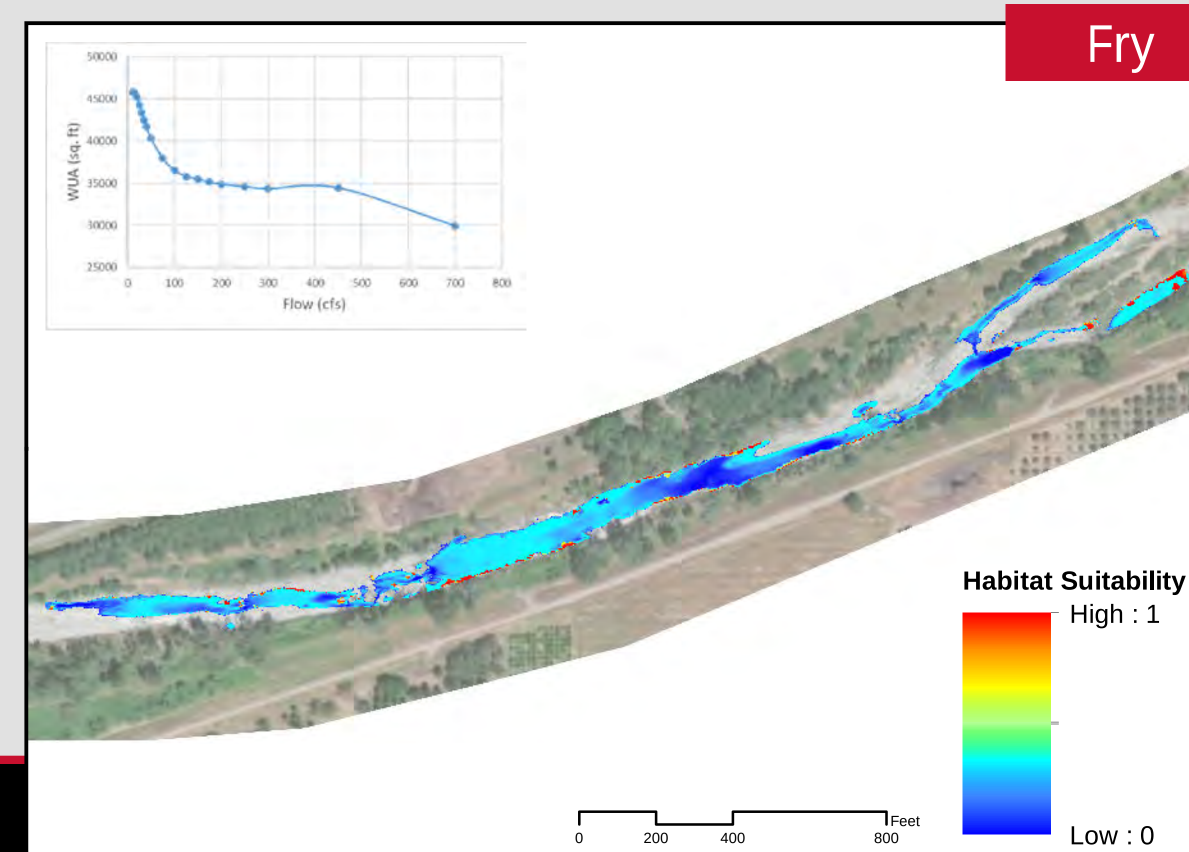
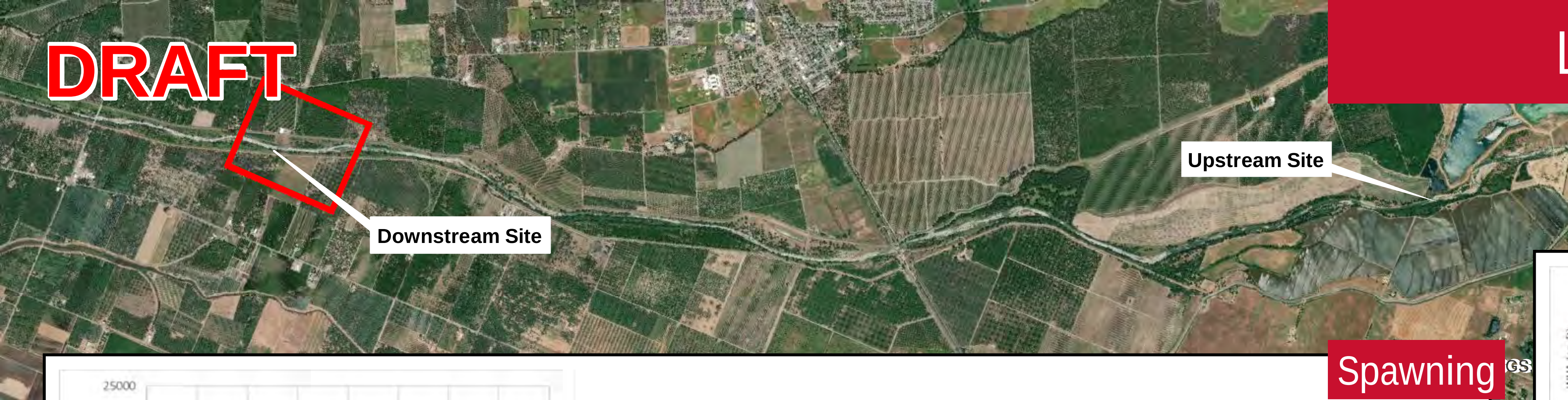


Lower Bear River - Instream Flow Study

Fall-Run Chinook Salmon

Downstream Study Site 15 cfs



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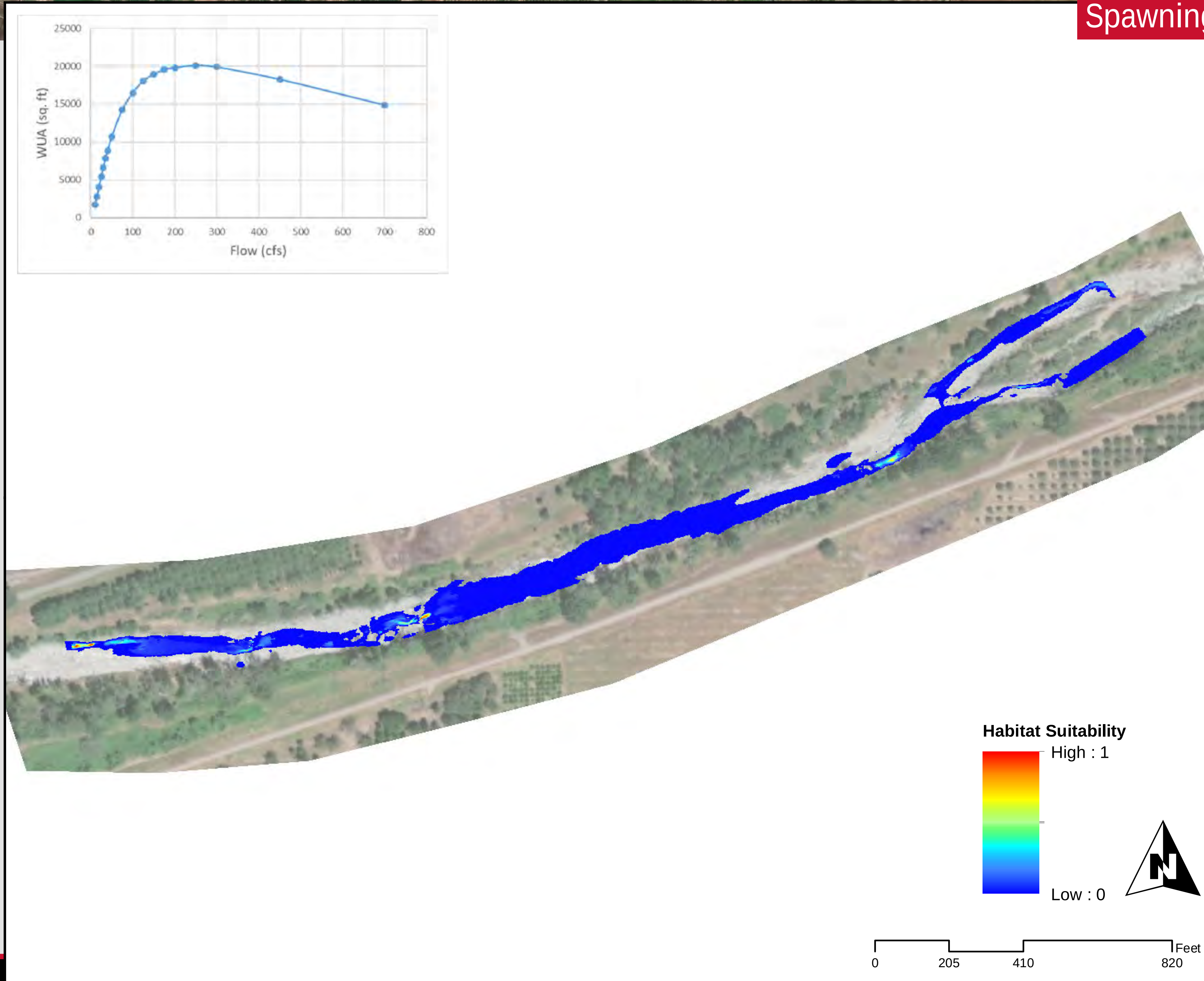

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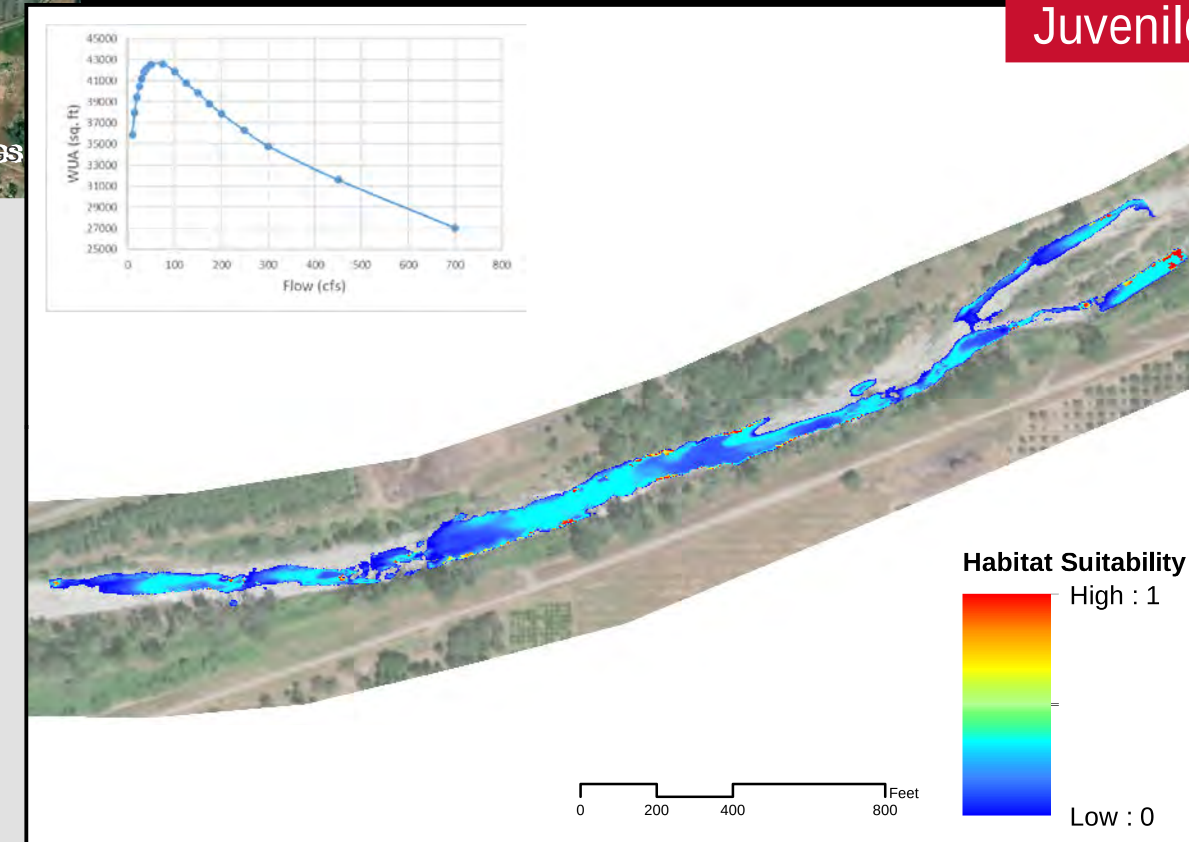

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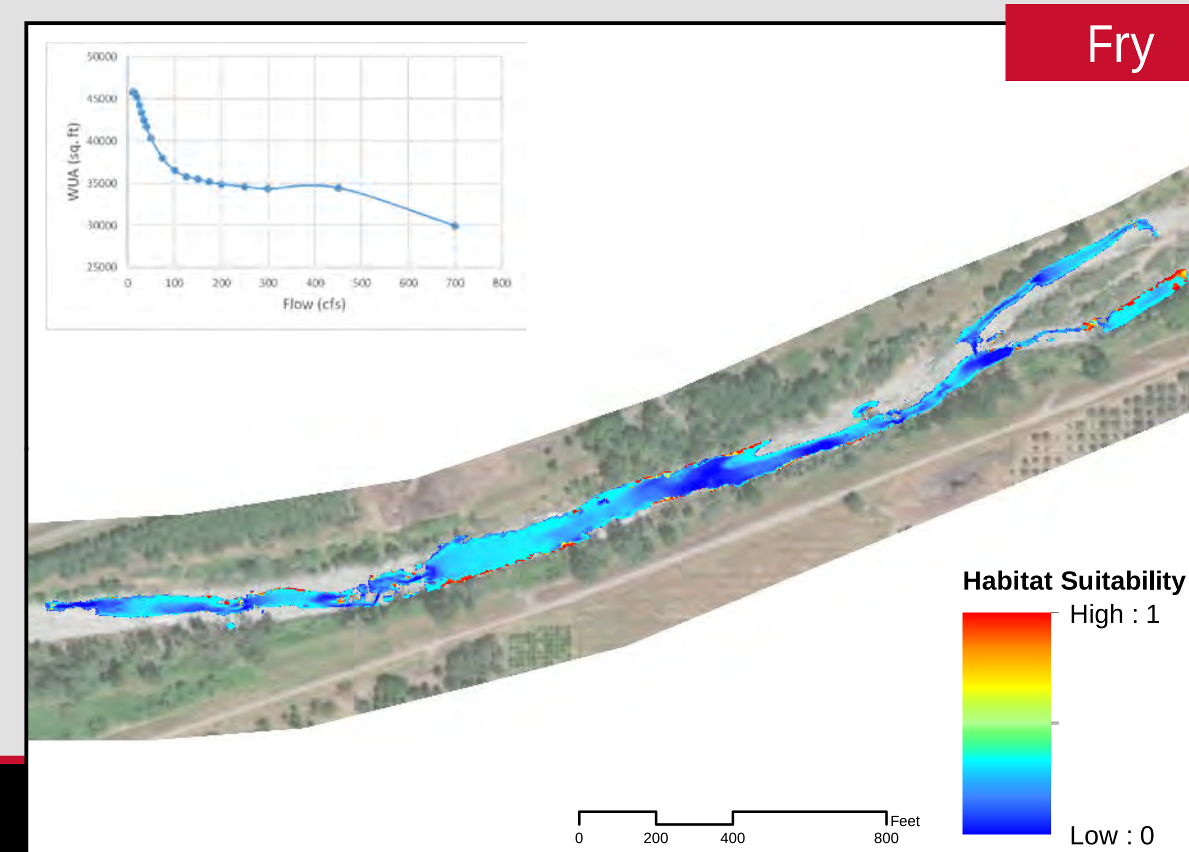


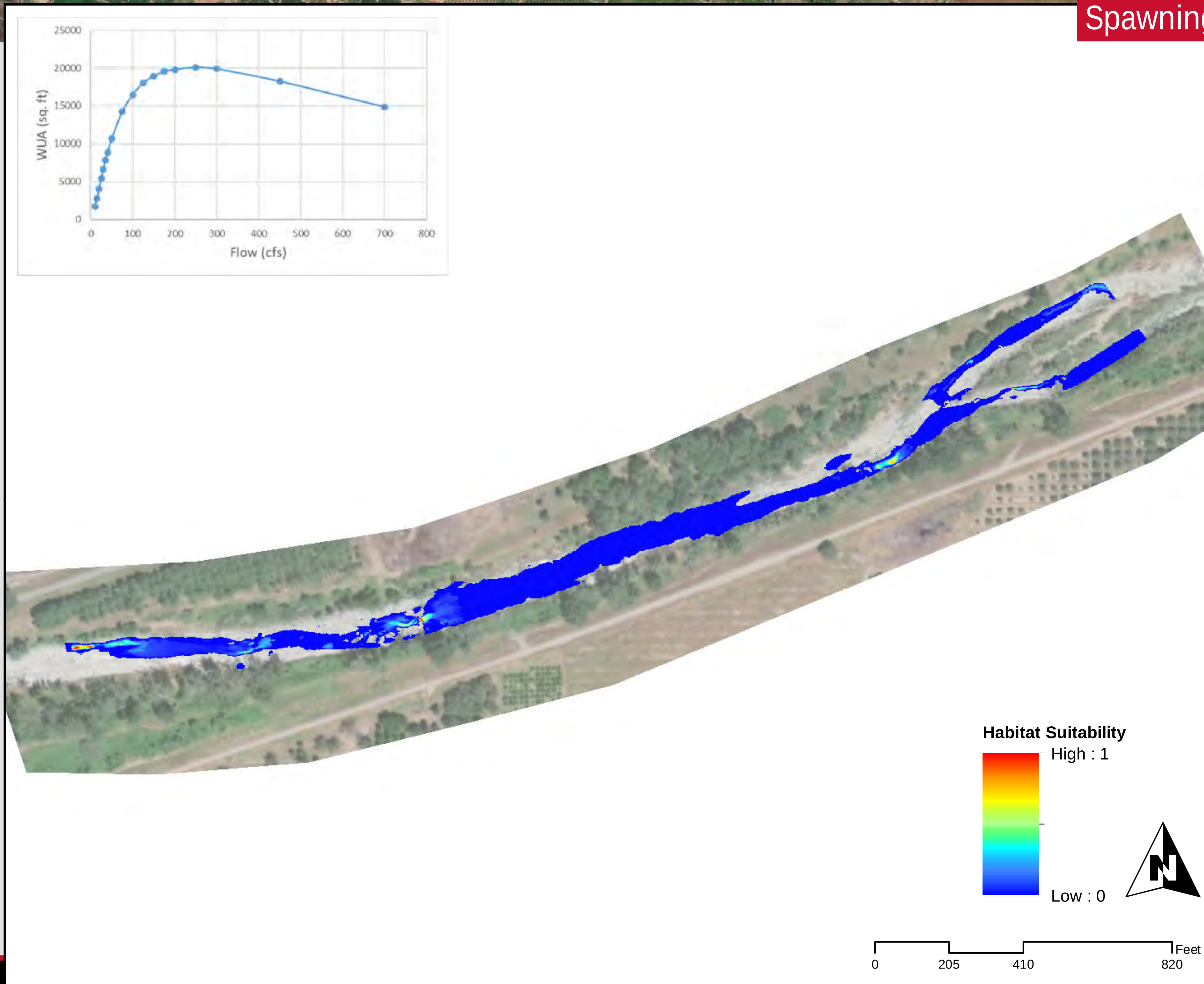
Lower Bear River - Instream Flow Study

SSWD HDR

Fall-Run Chinook Salmon

Downstream Study Site 20 cfs

Spawning



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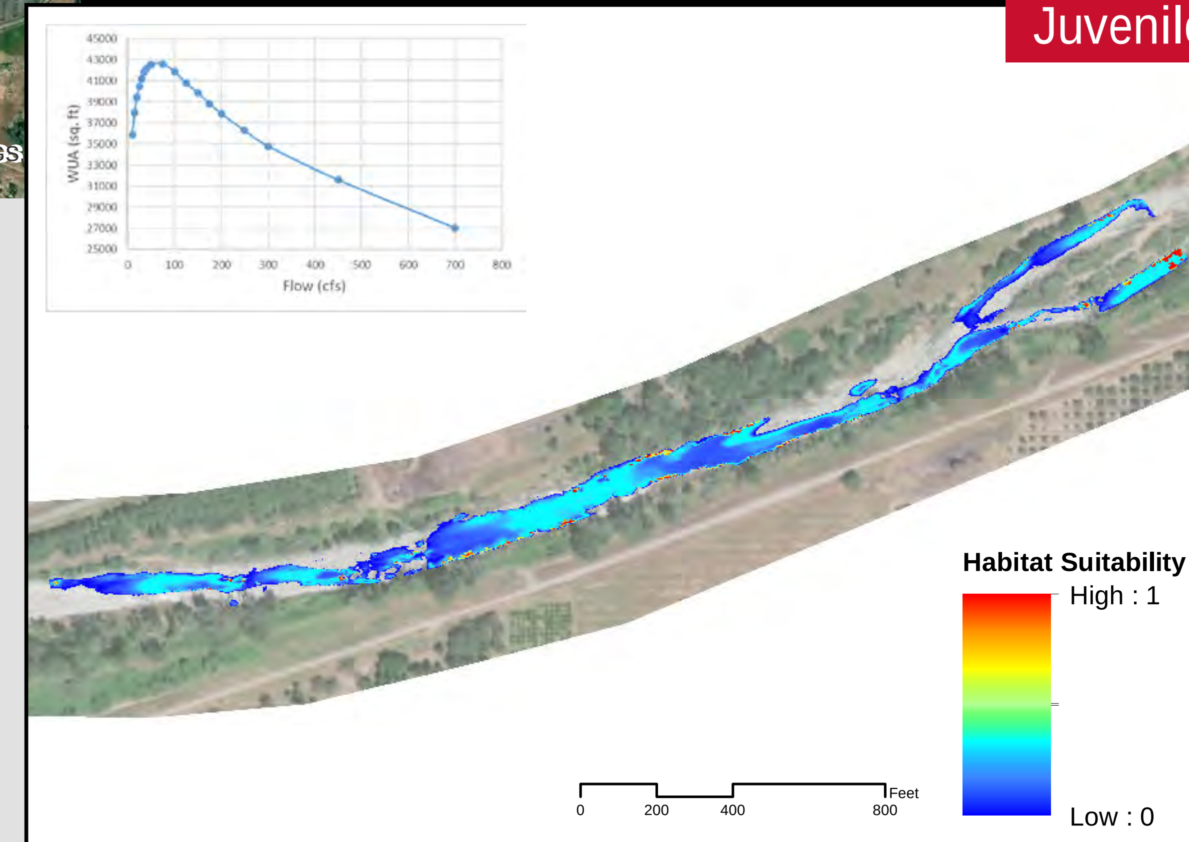

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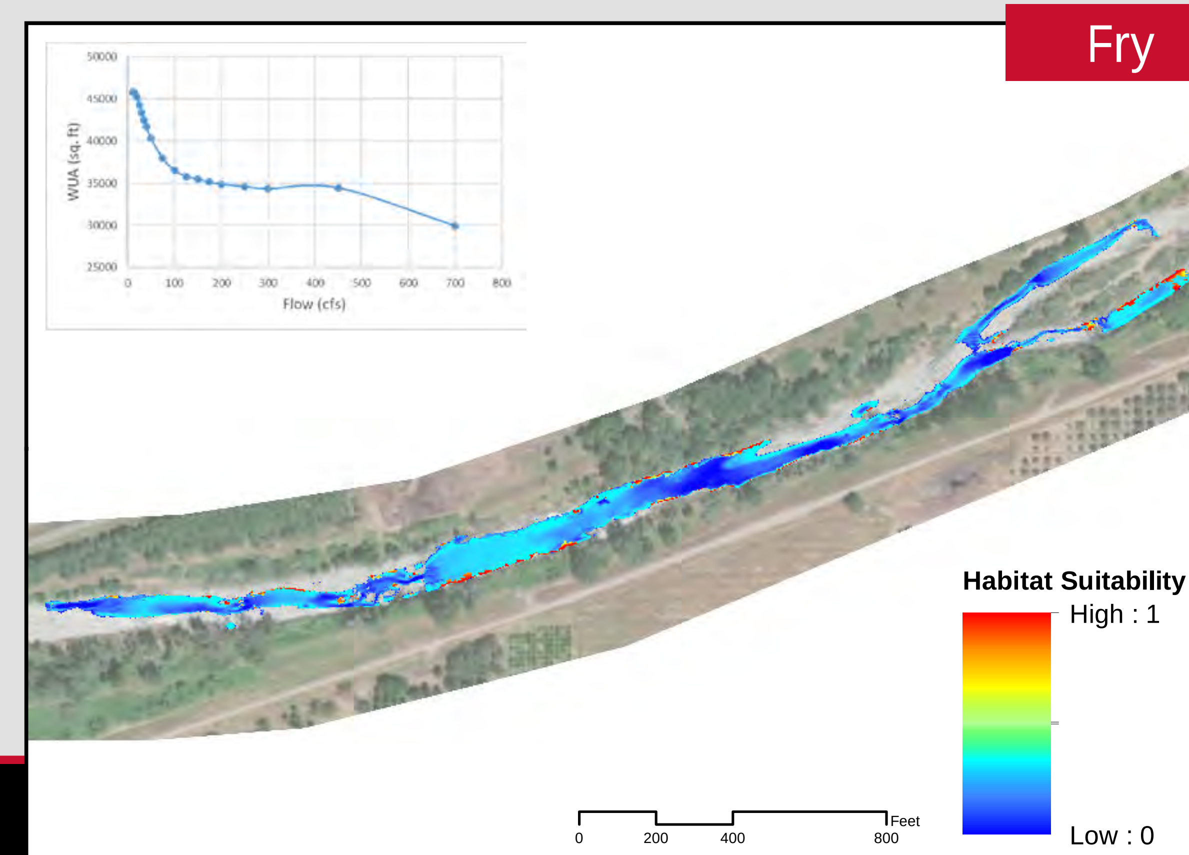
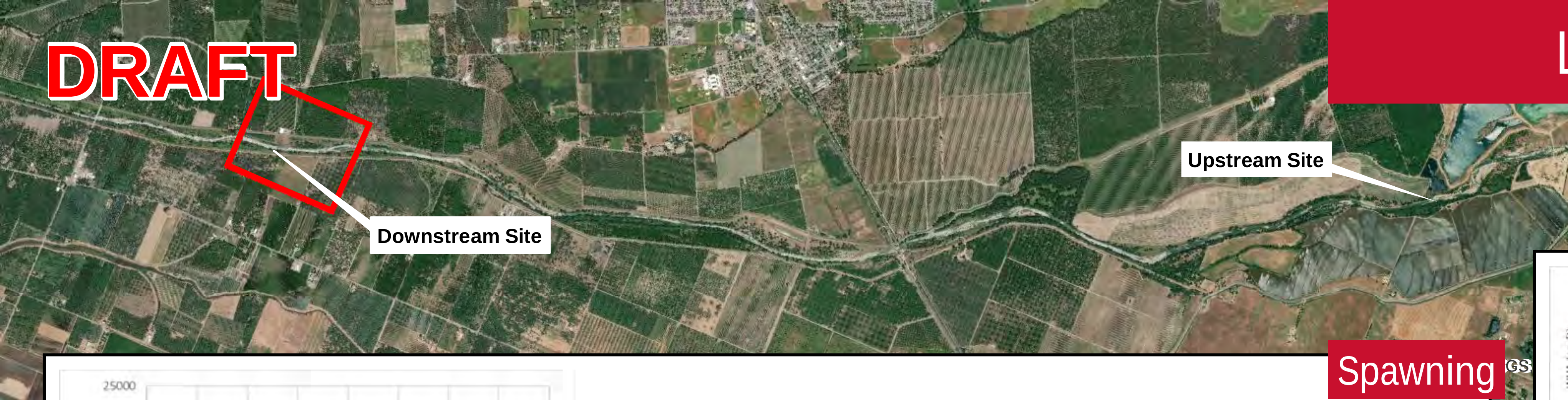
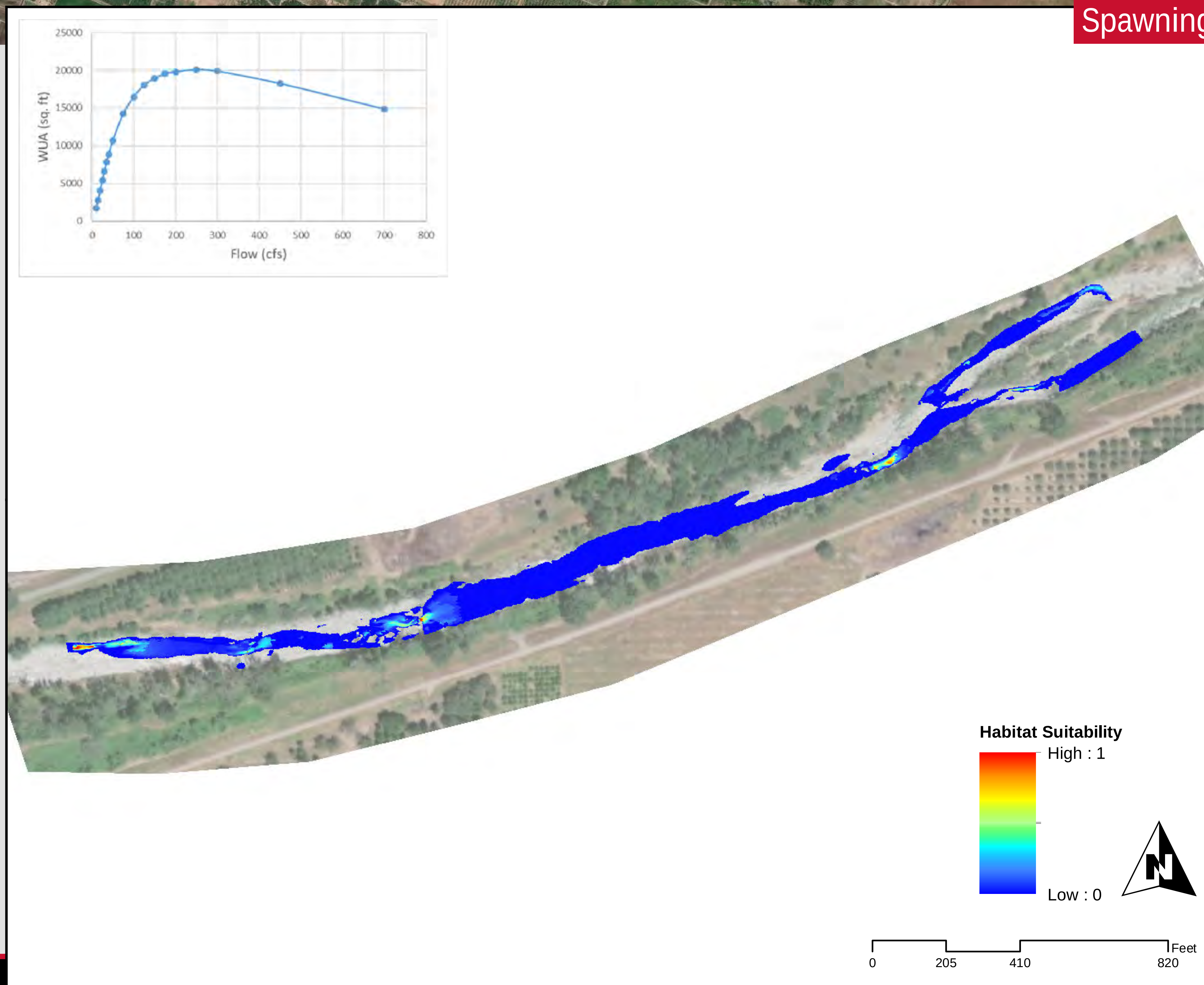


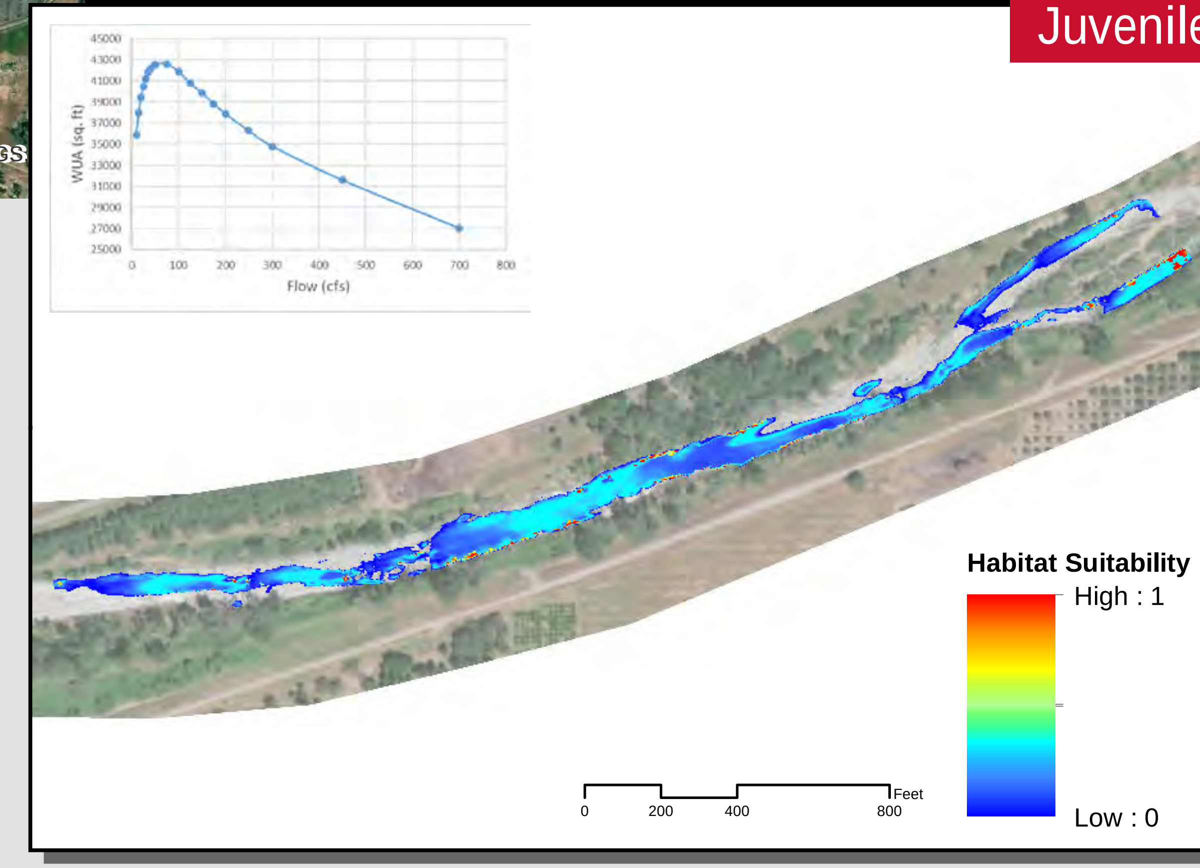
Lower Bear River - Instream Flow Study

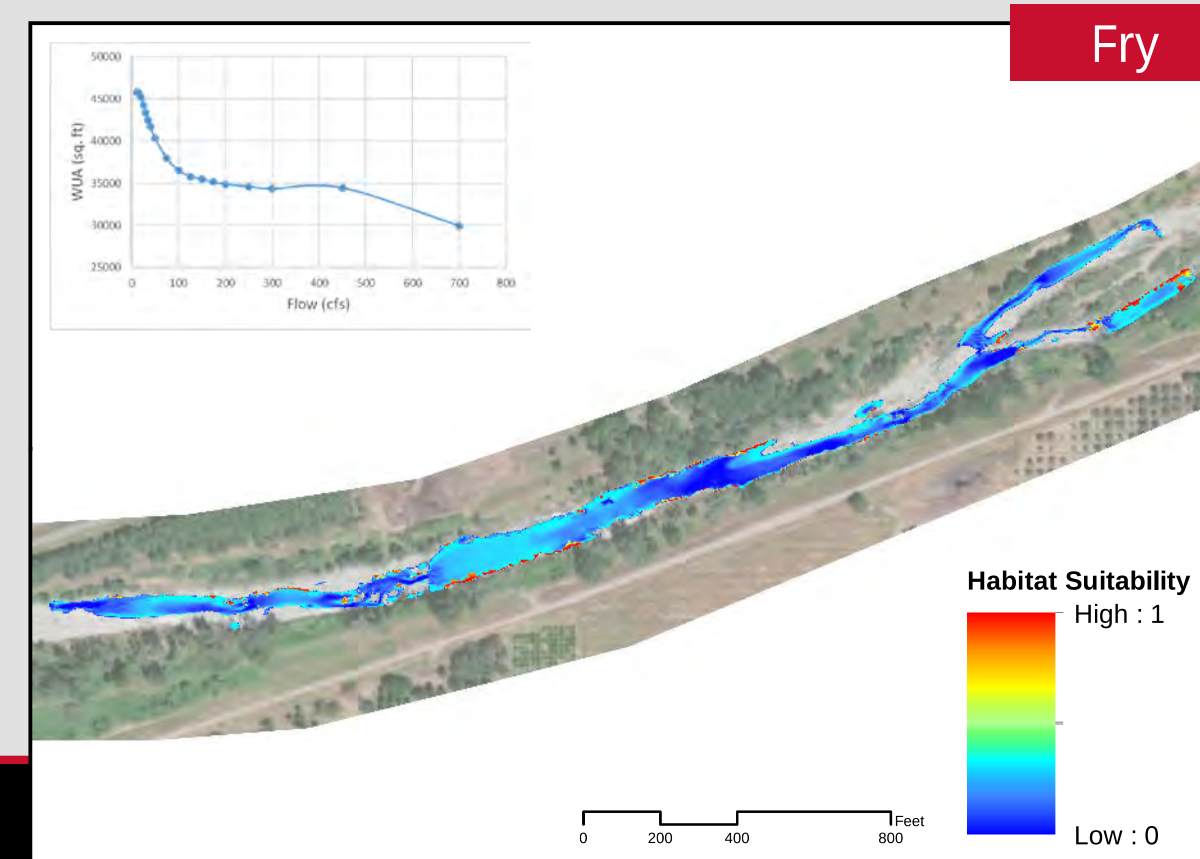
Fall-Run Chinook Salmon

Downstream Study Site 25 cfs





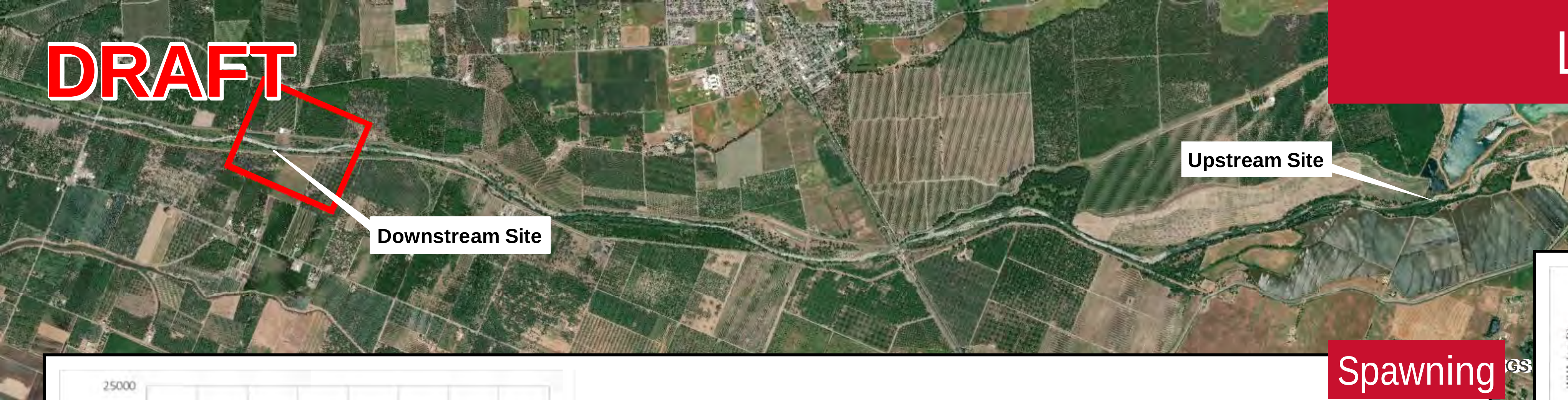




Lower Bear River - Instream Flow Study

SSWD HDR

Fall-Run Chinook Salmon
Downstream Study Site 30 cfs



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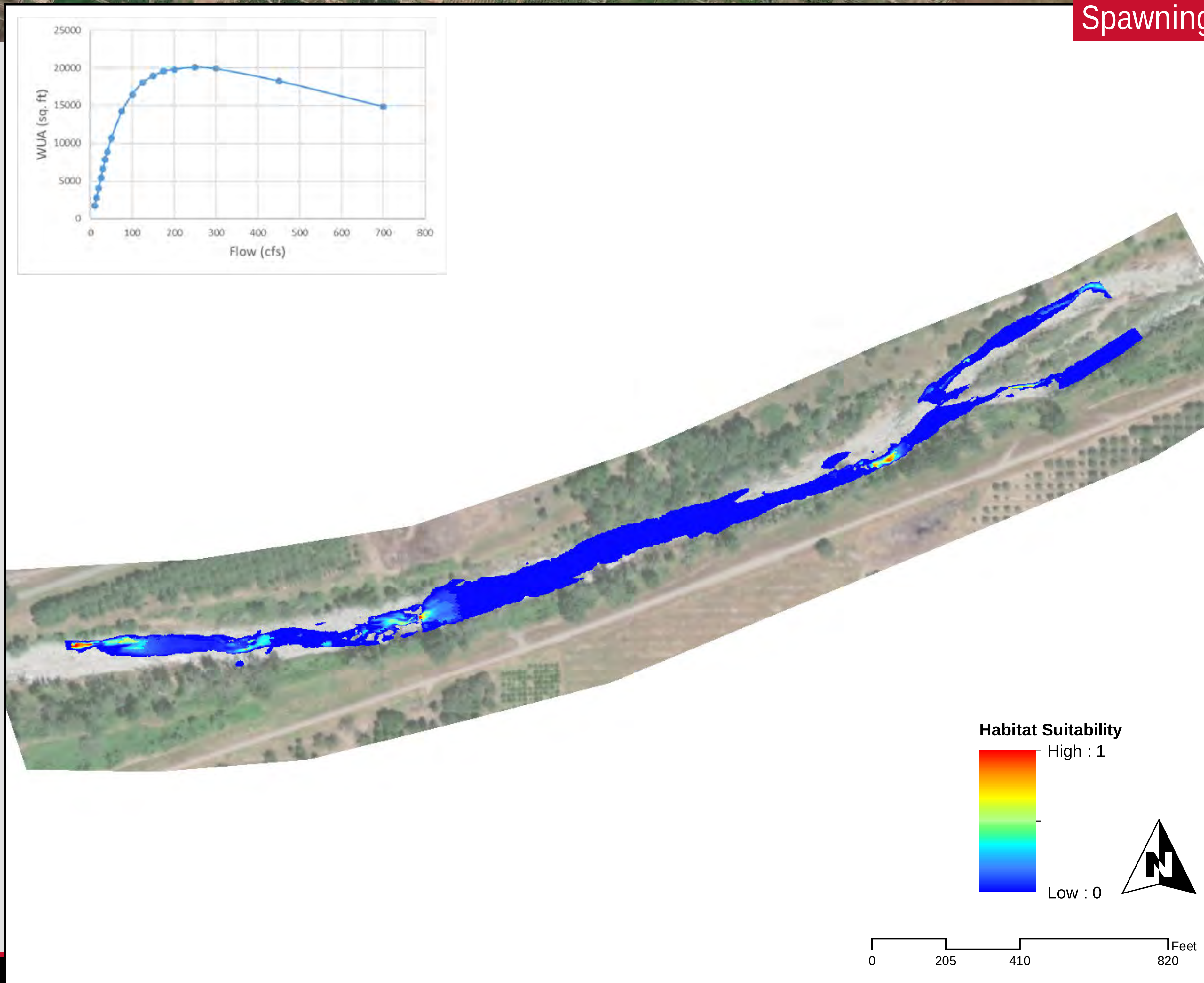

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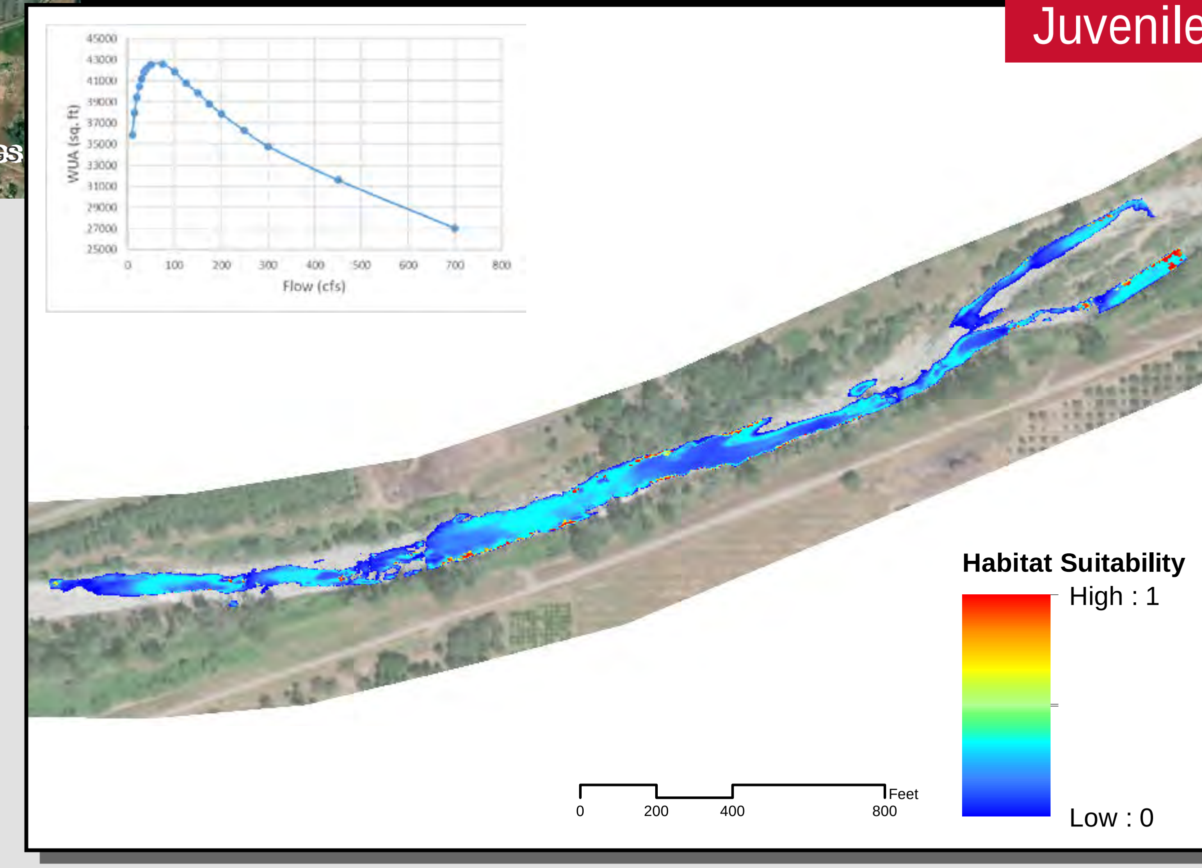

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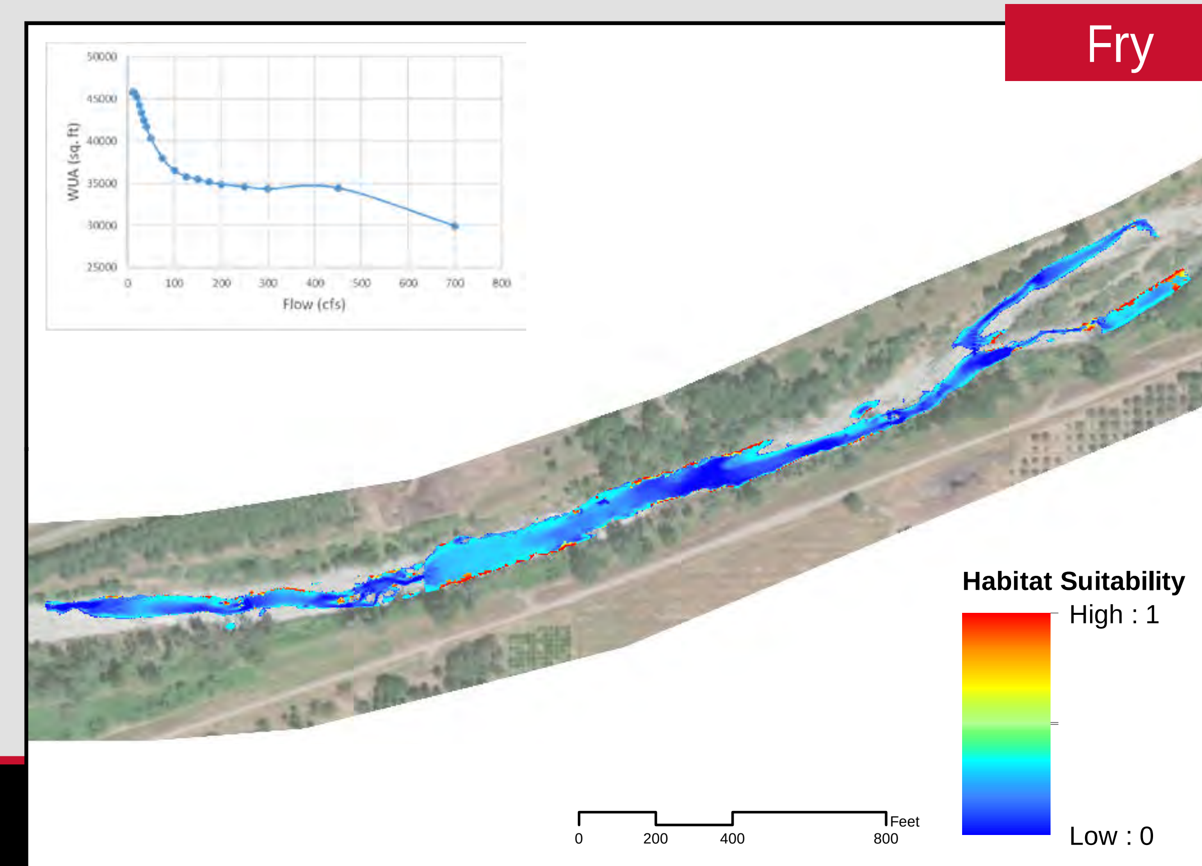
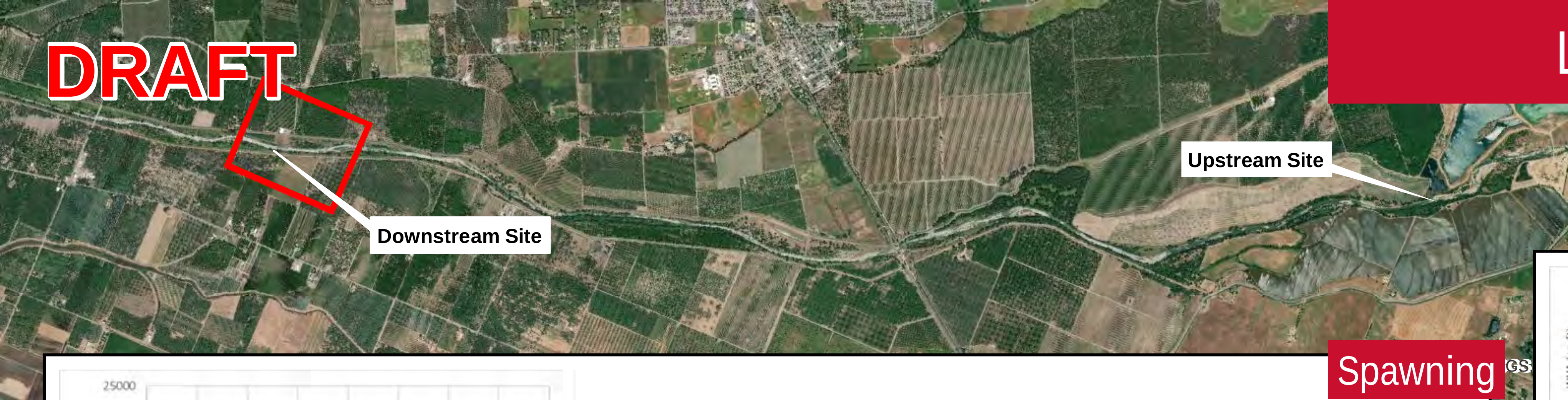


Lower Bear River - Instream Flow Study

Fall-Run Chinook Salmon
Downstream Study Site 35 cfs



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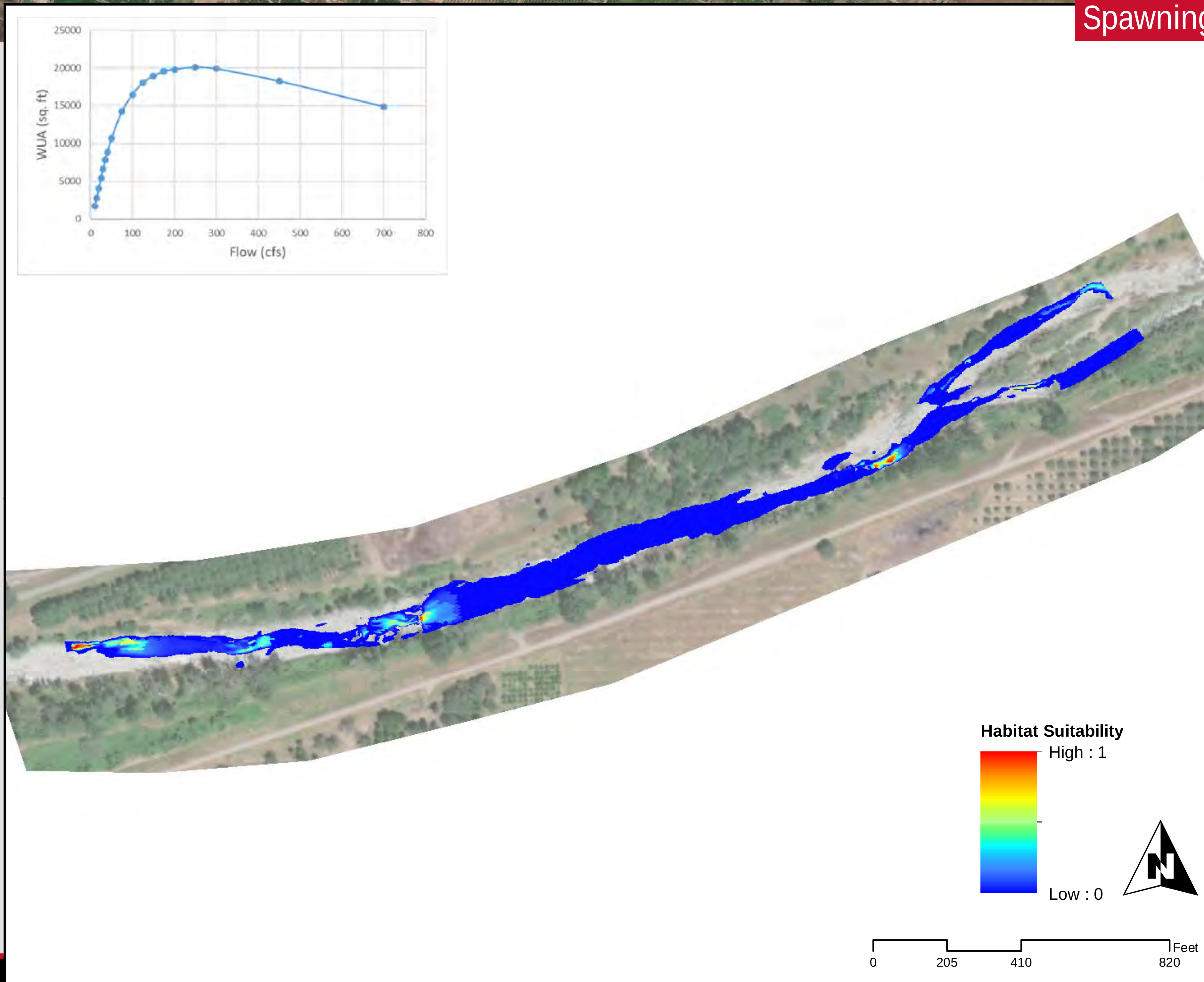
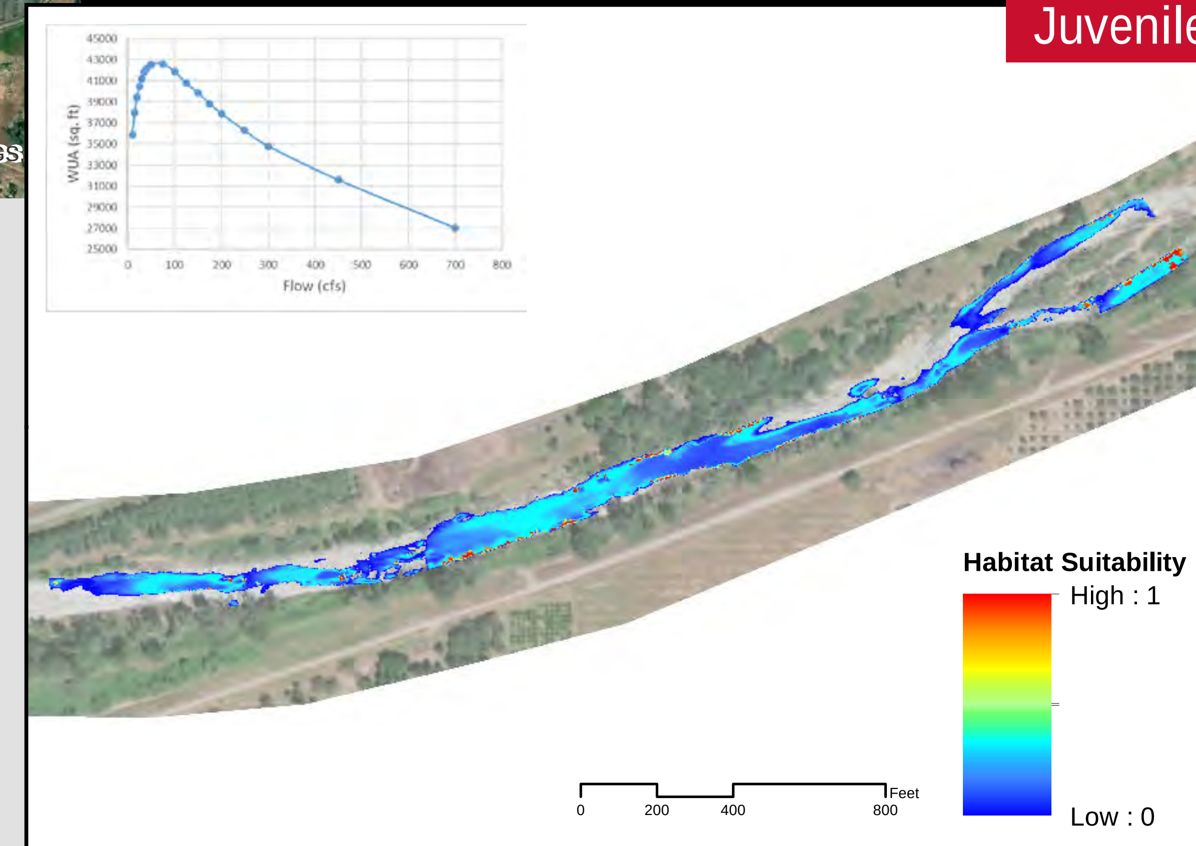


Juvenile



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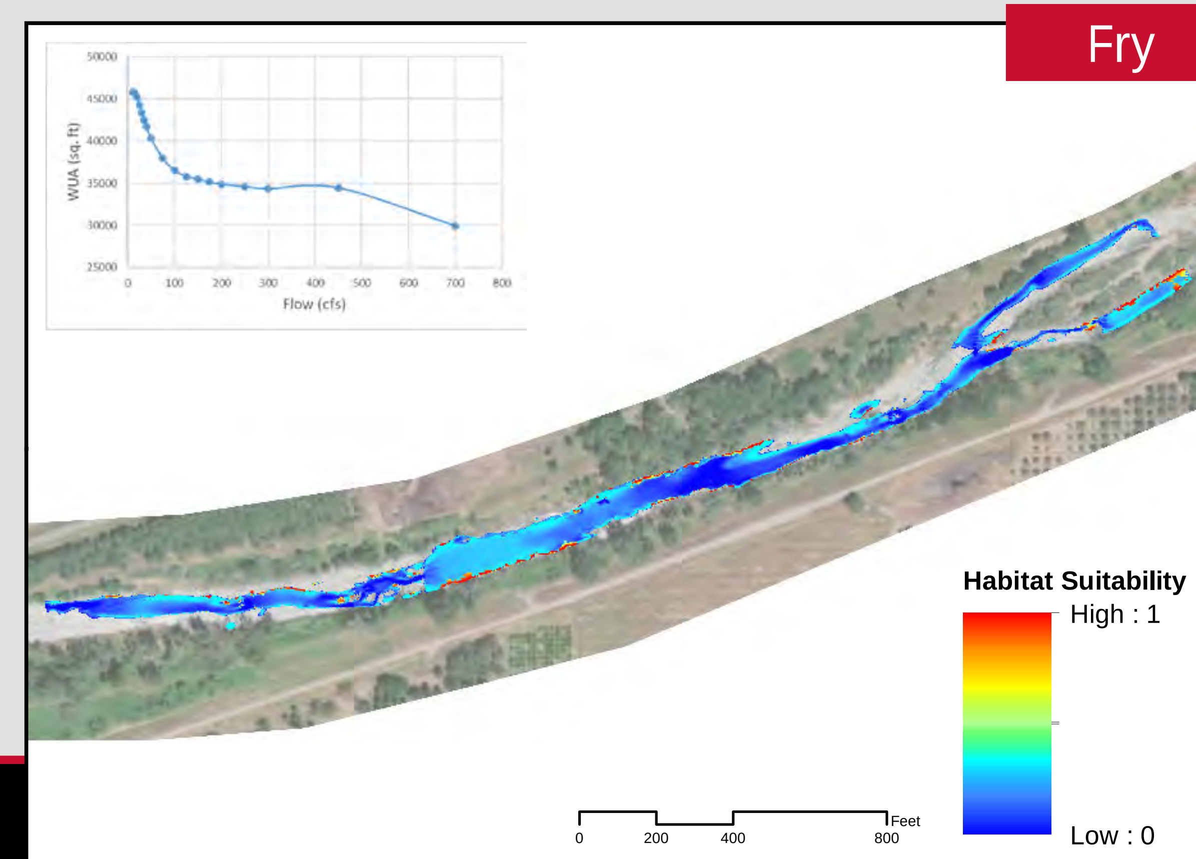
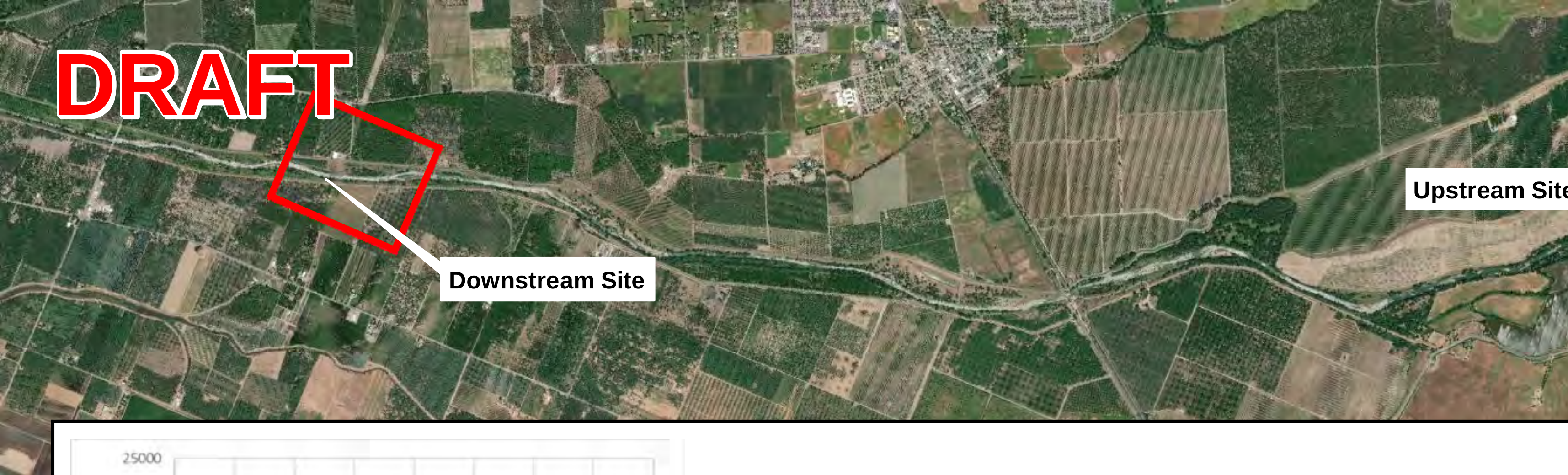


Lower Bear River - Instream Flow Study

SSWD HDR

Fall-Run Chinook Salmon

Downstream Study Site 40 cfs



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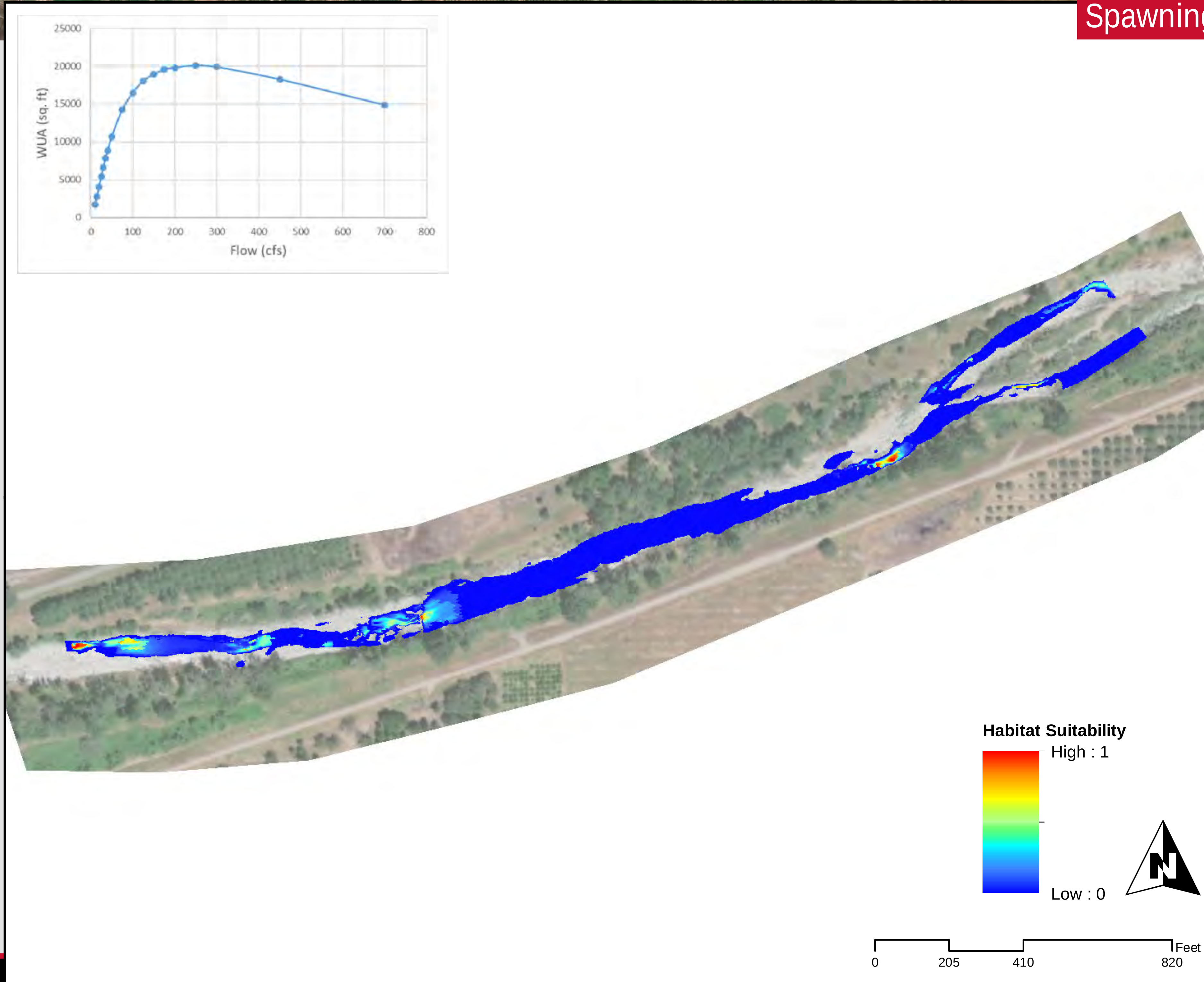

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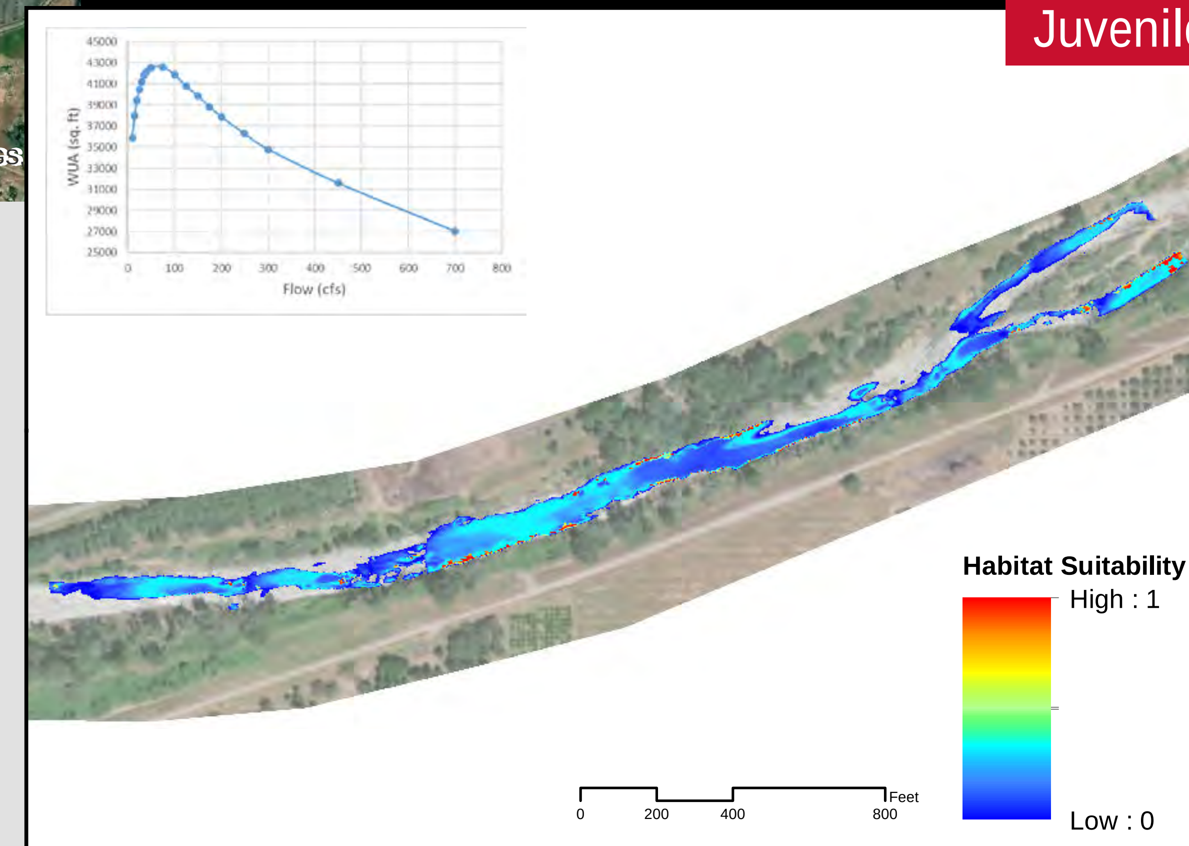

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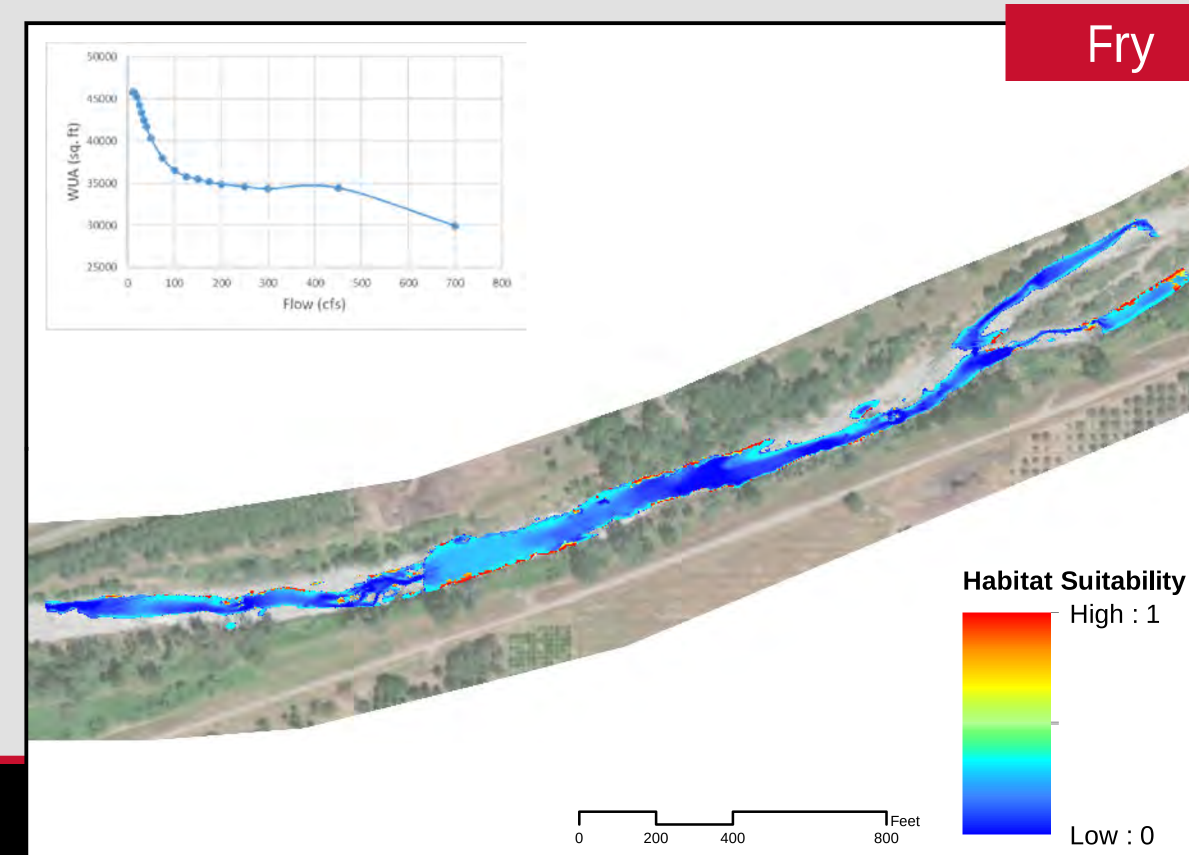

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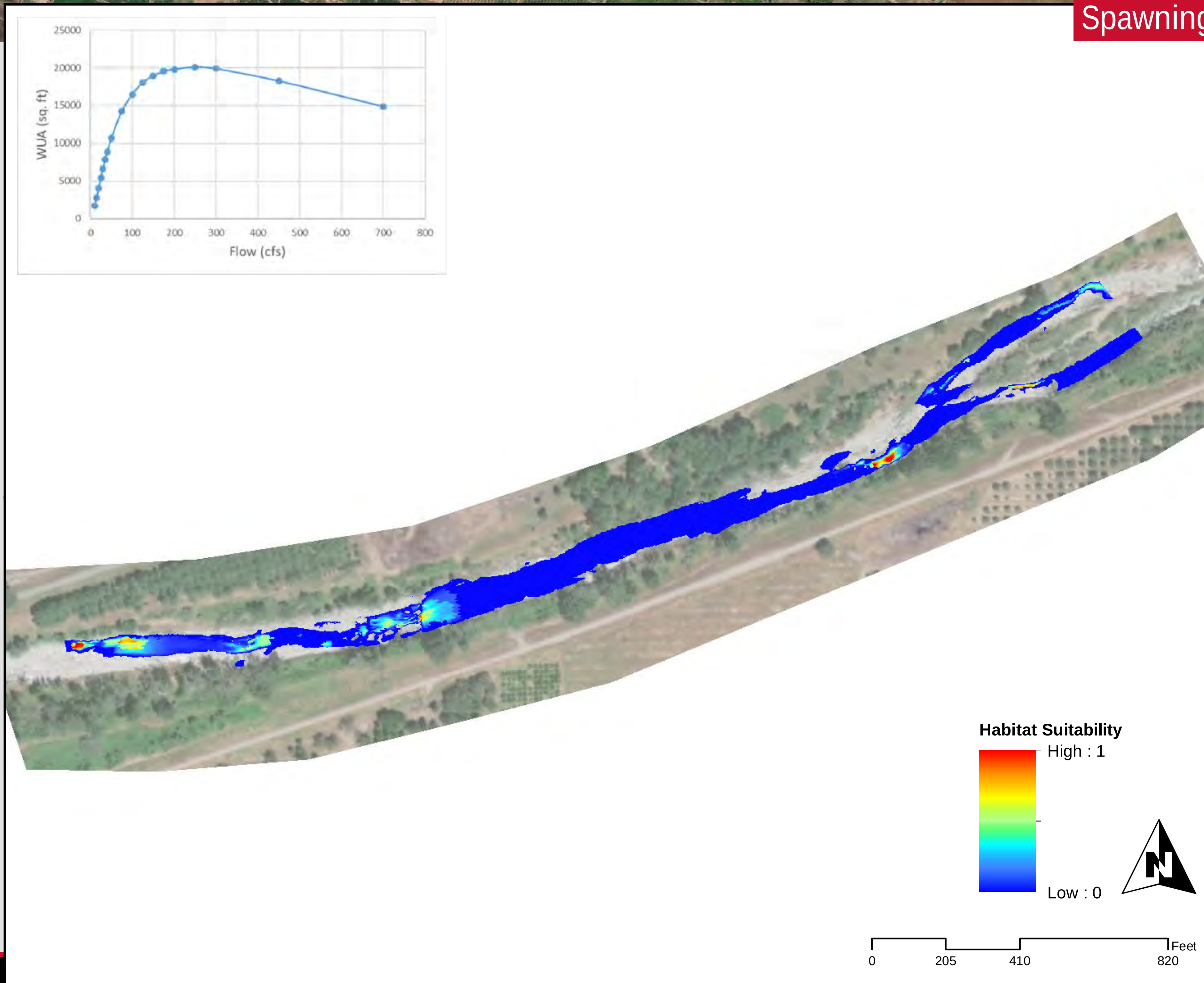
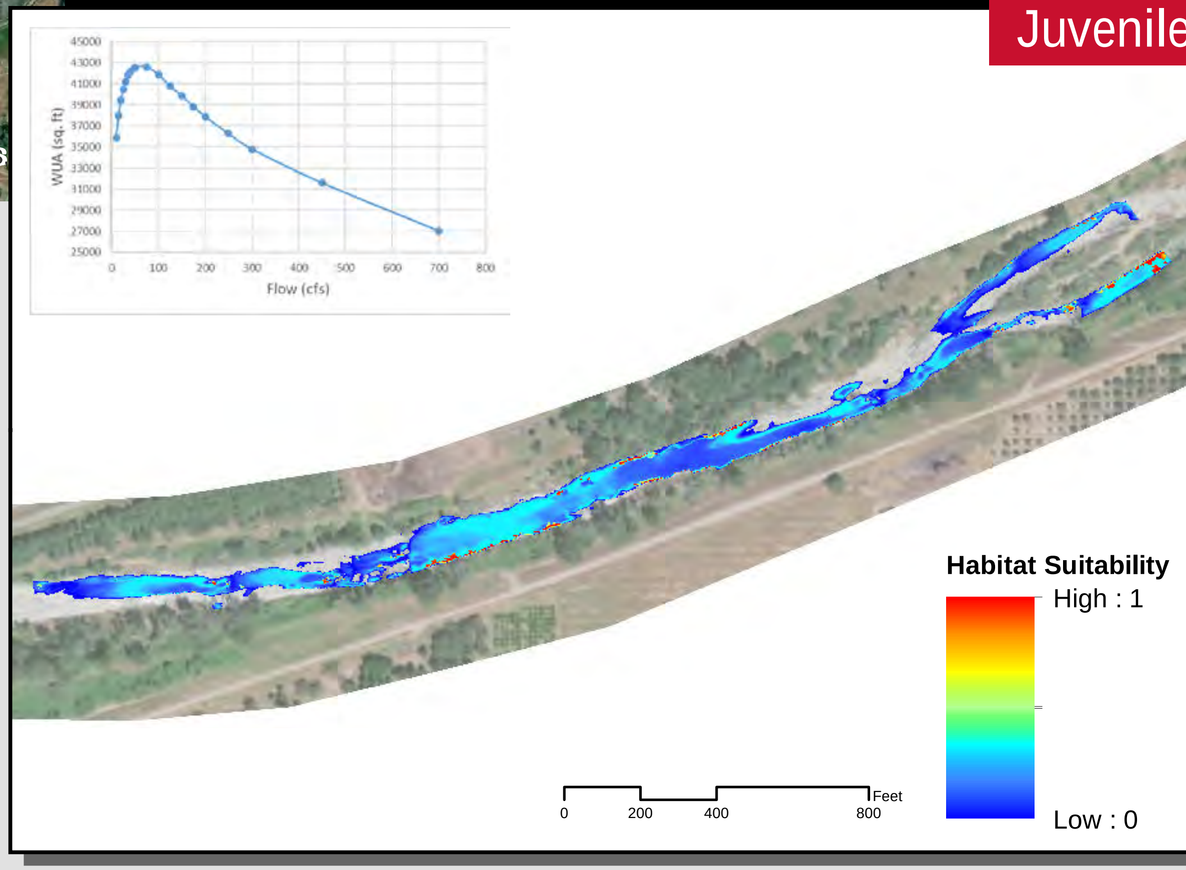
Lower Bear River - Instream Flow Study

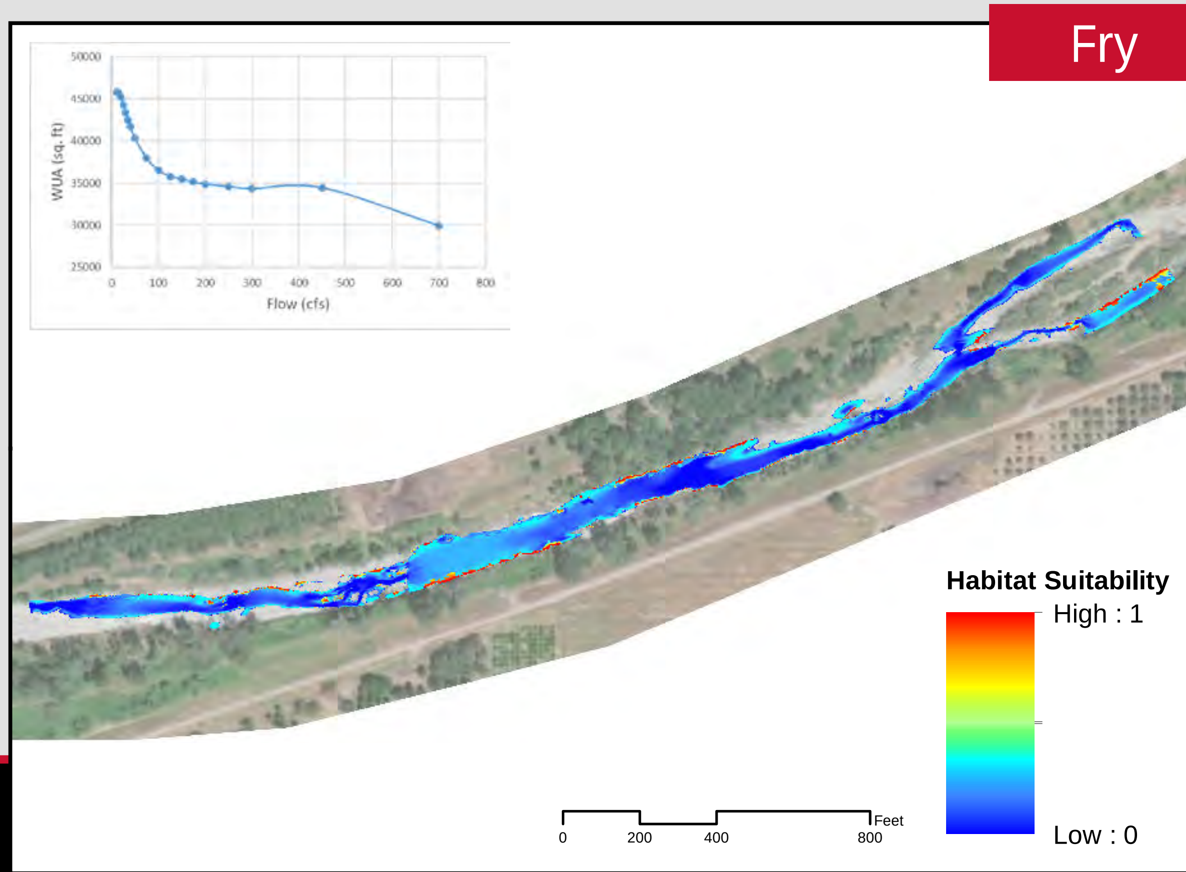
SSWD HDR

Fall-Run Chinook Salmon

Downstream Study Site 50 cfs







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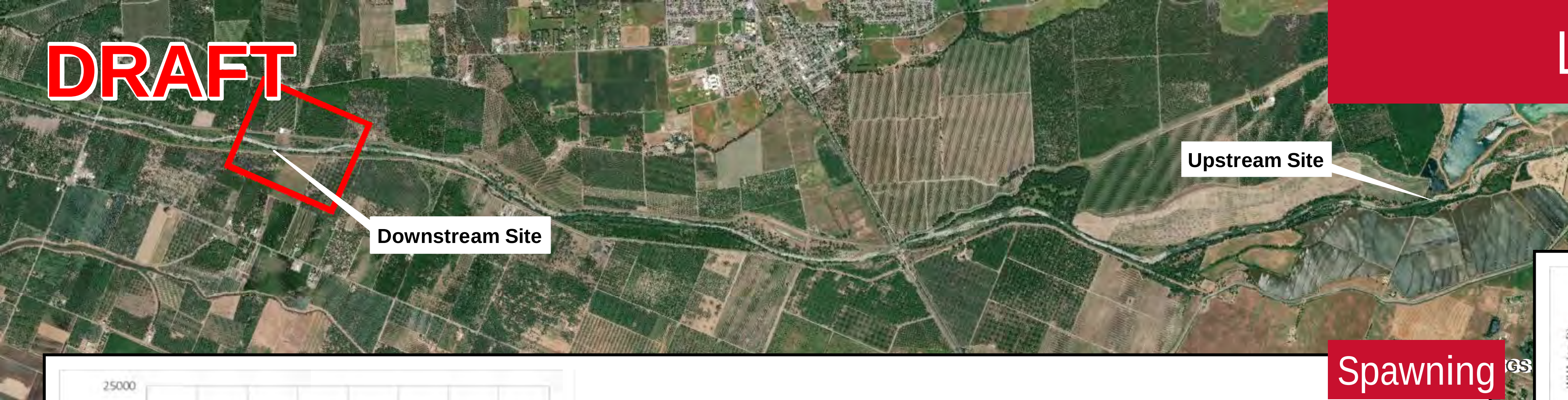
Lower Bear River - Instream Flow Study

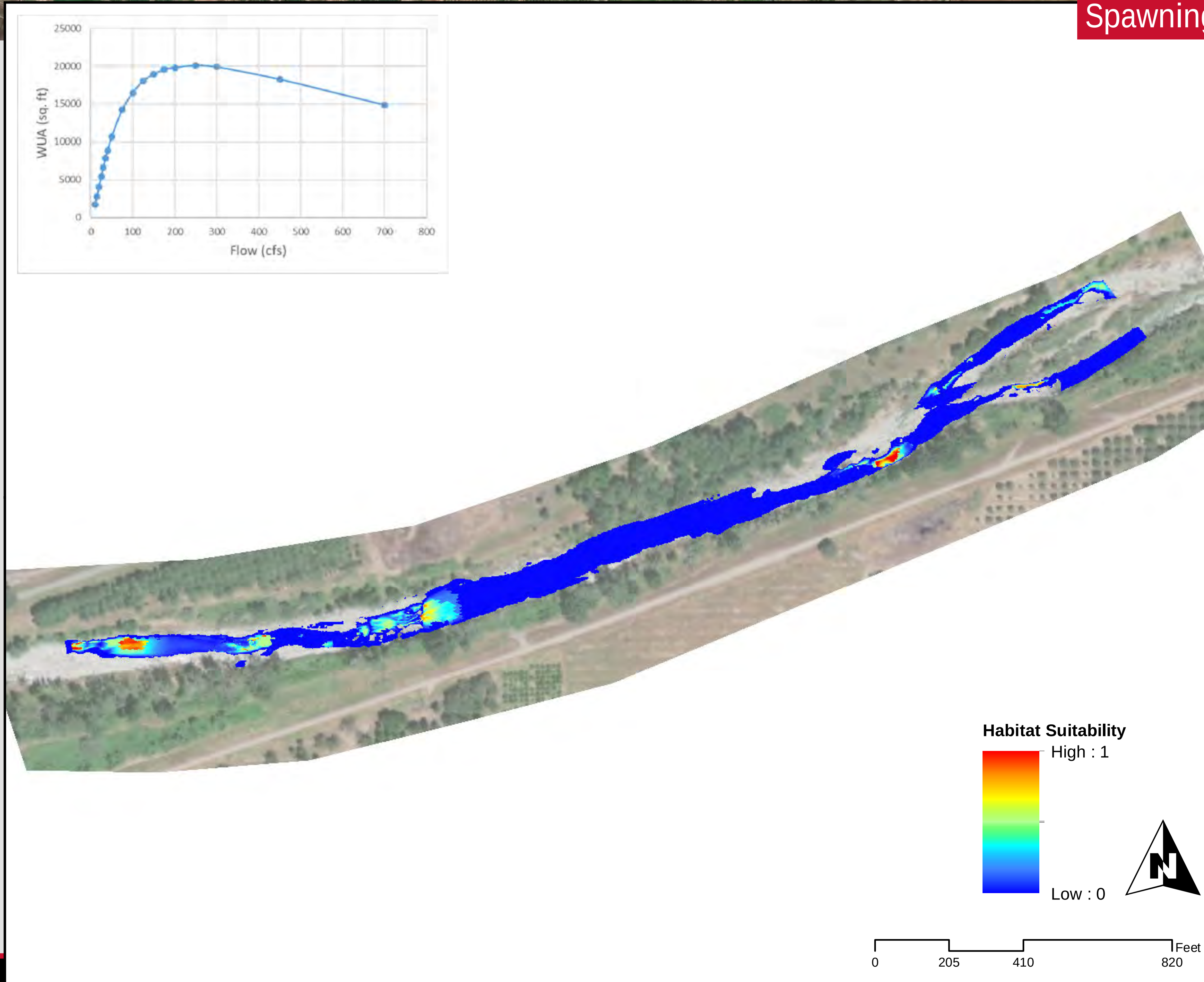
SSWD HDR

Fall-Run Chinook Salmon

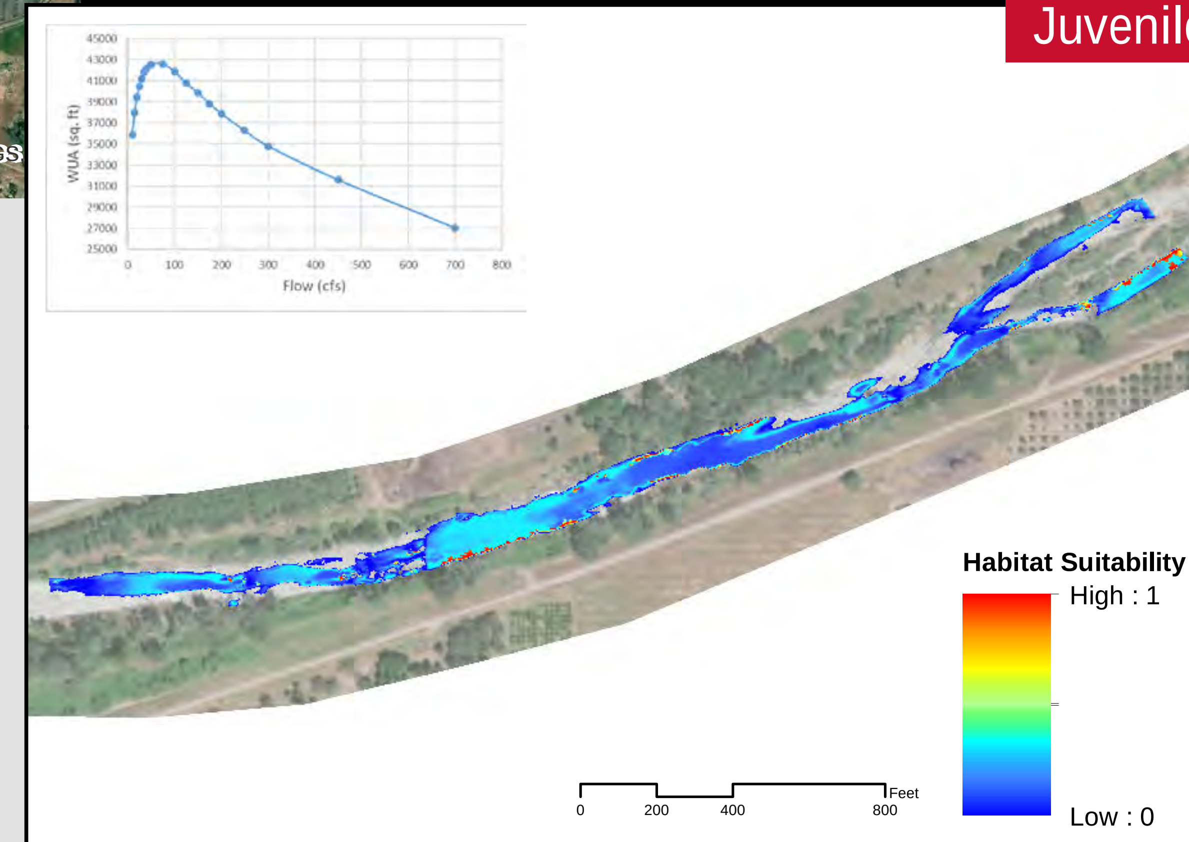
Downstream Study Site 75 cfs



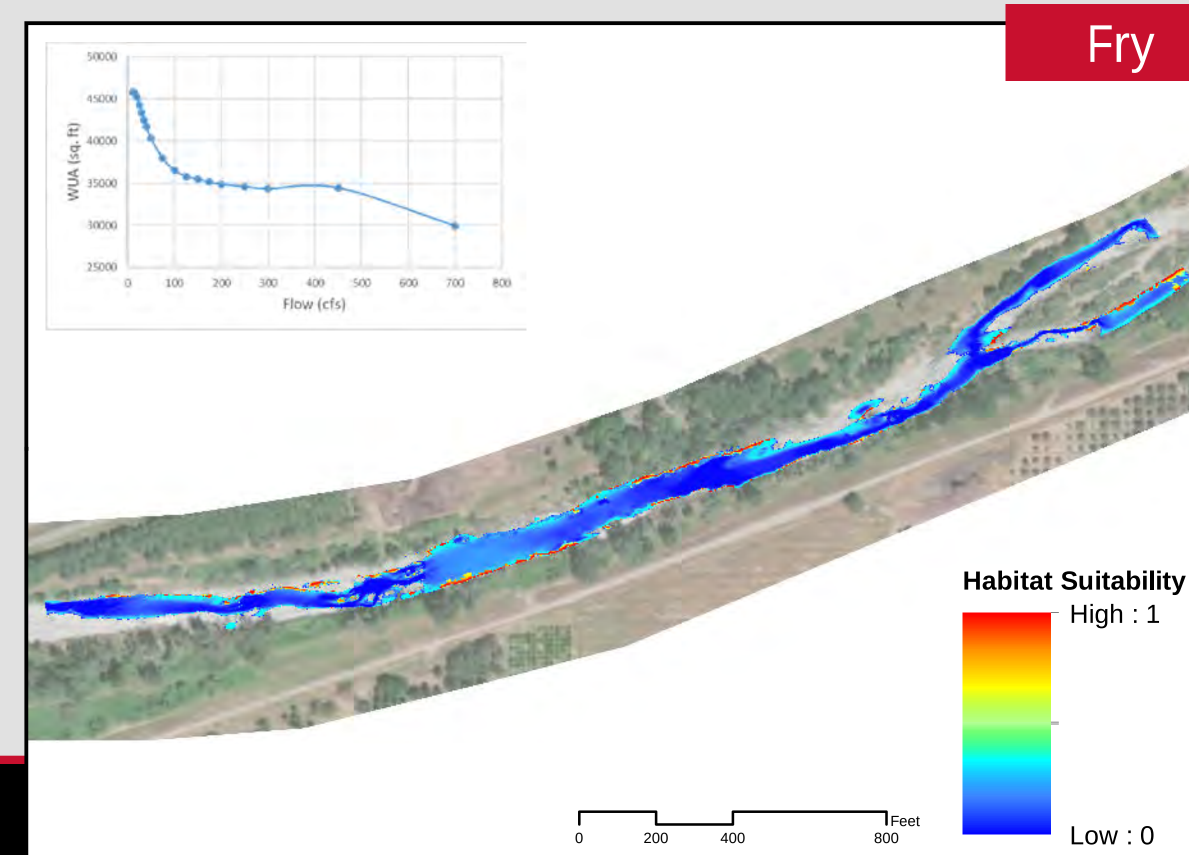
Spawning



Juvenile



Fry



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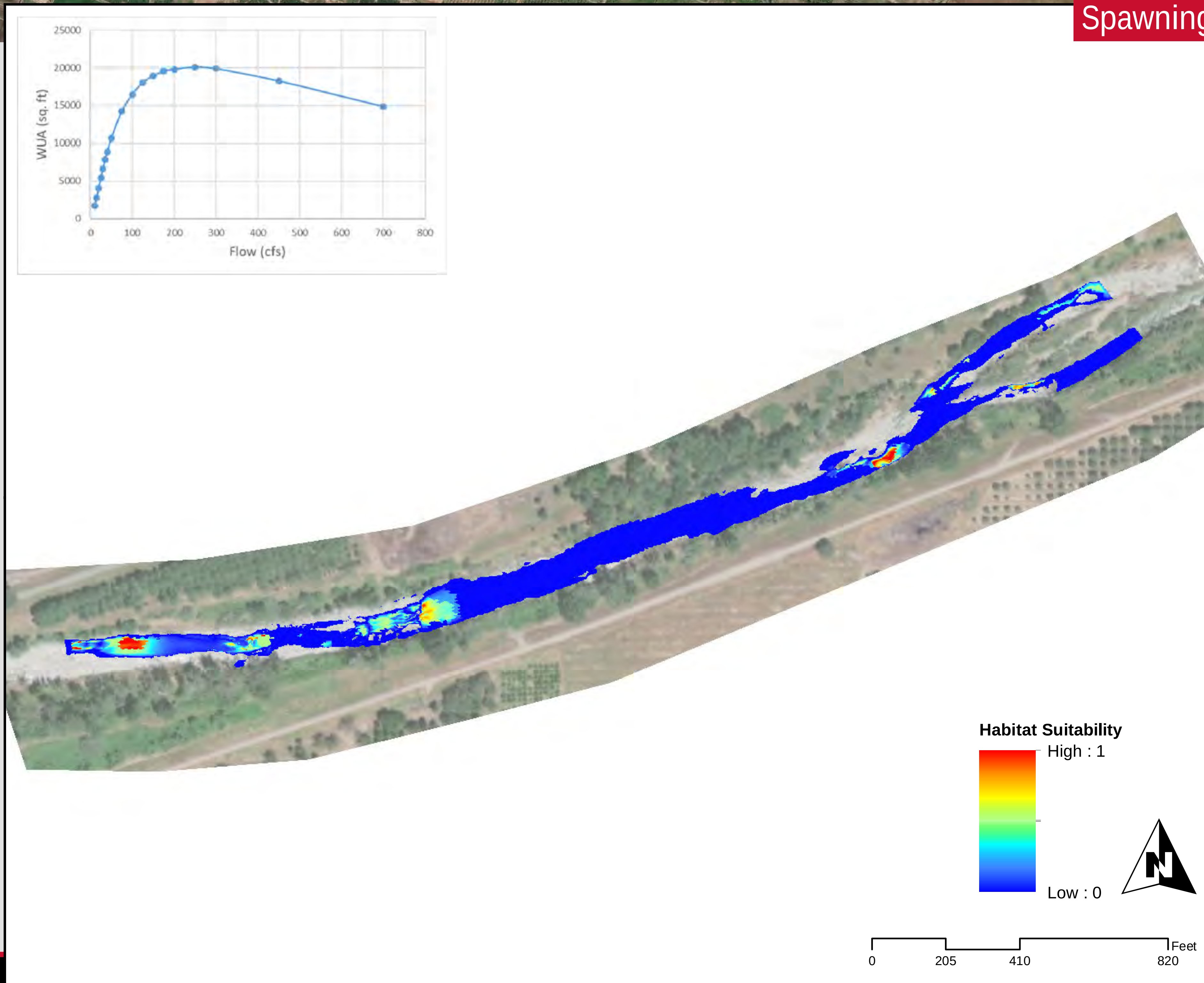
Lower Bear River - Instream Flow Study

Fall-Run Chinook Salmon

Downstream Study Site 100 cfs

Spawning



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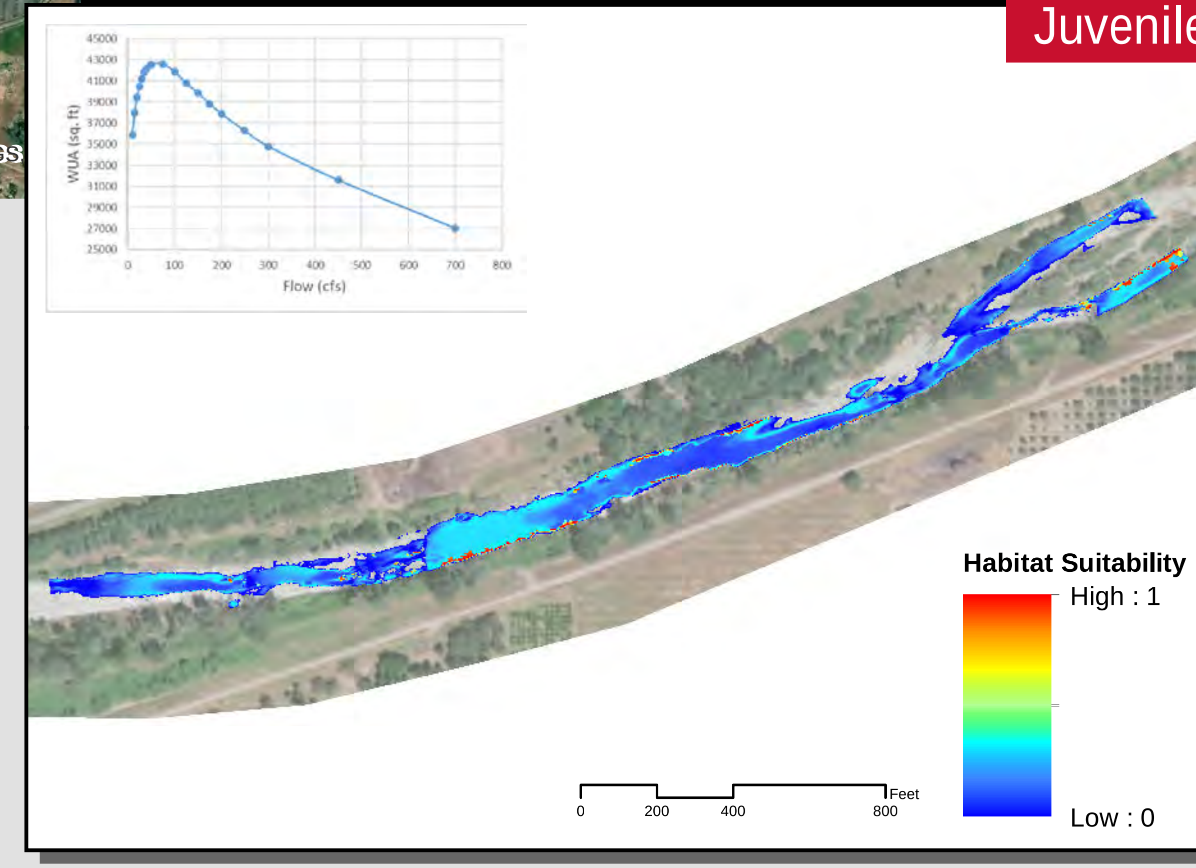

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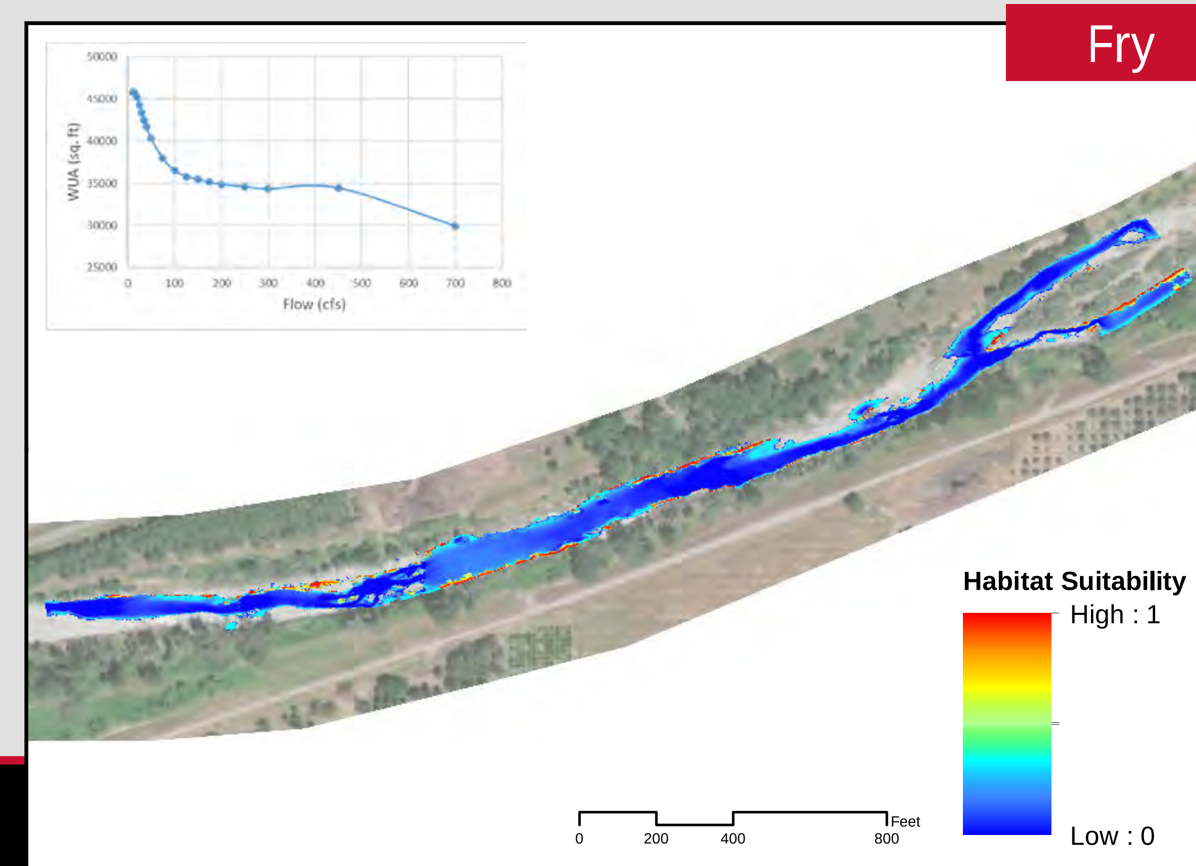
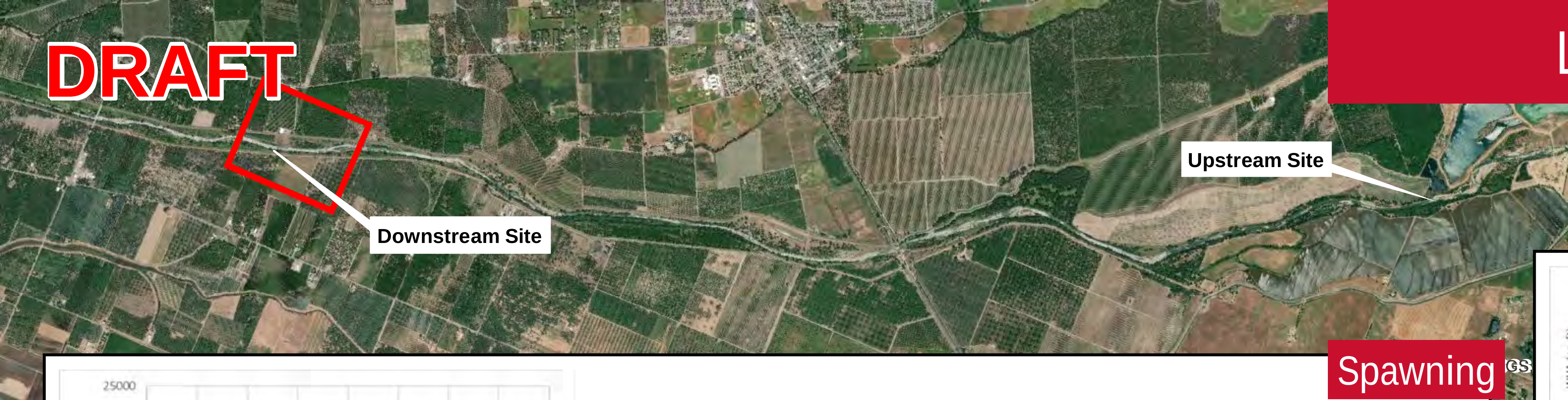


Lower Bear River - Instream Flow Study

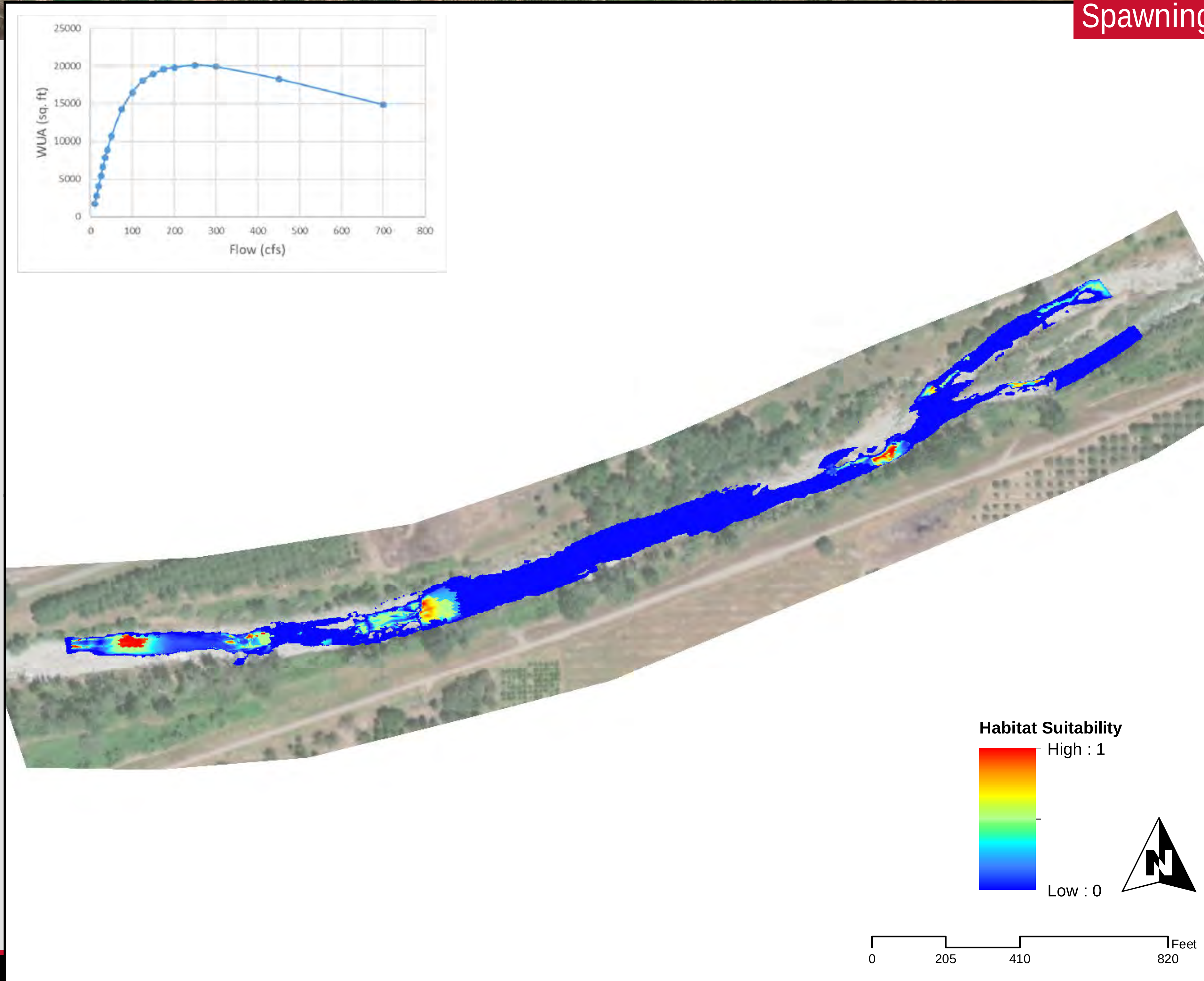
SSWD HDR

Fall-Run Chinook Salmon

Downstream Study Site 125 cfs



Spawning



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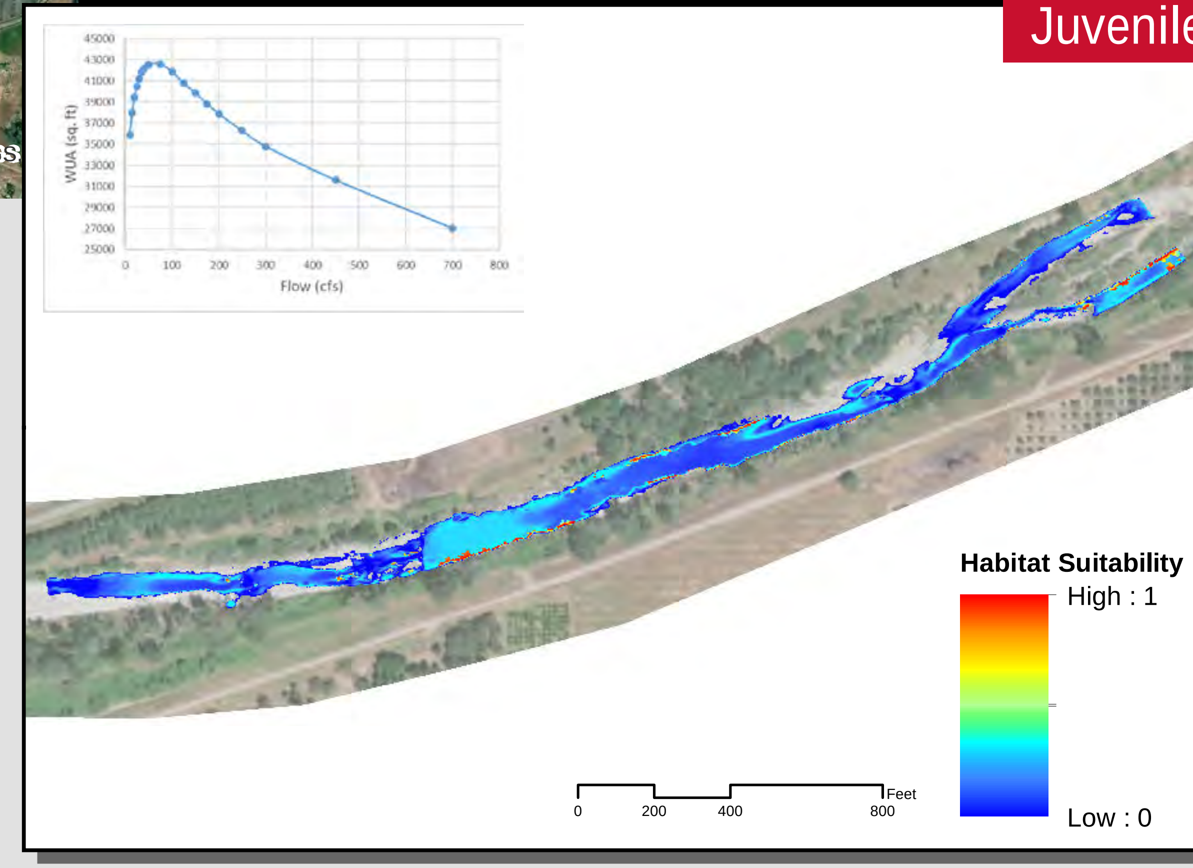

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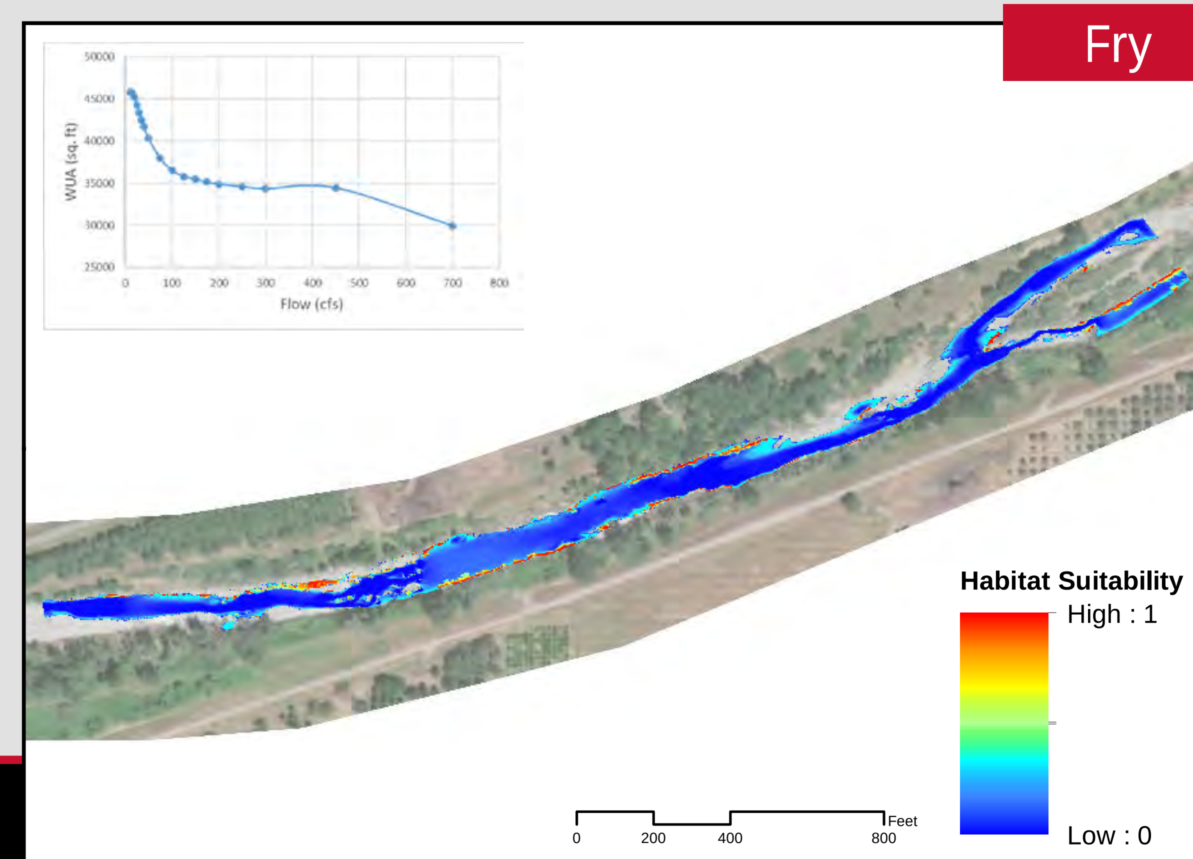

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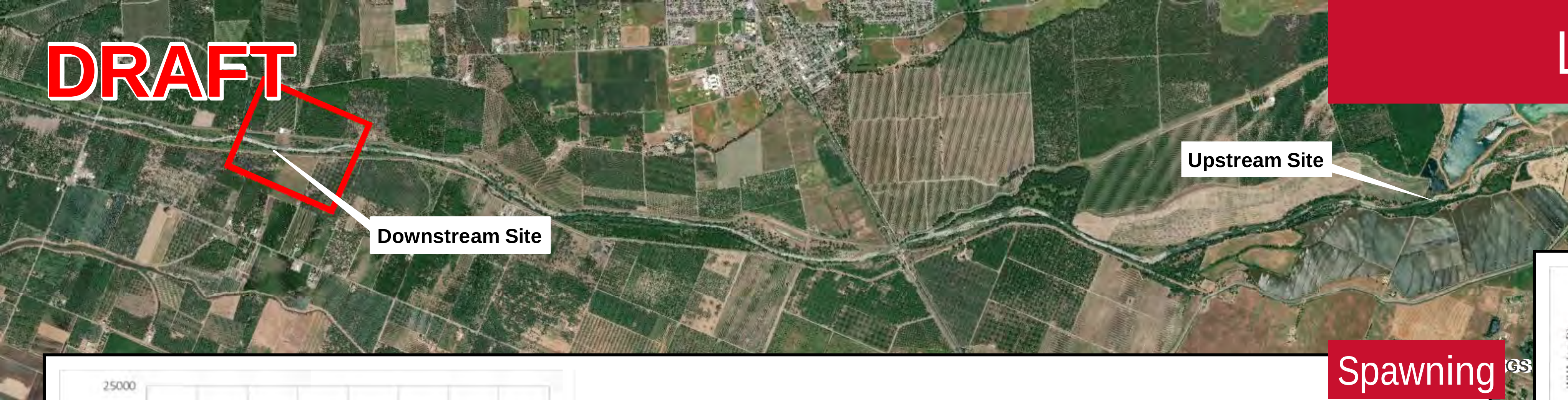
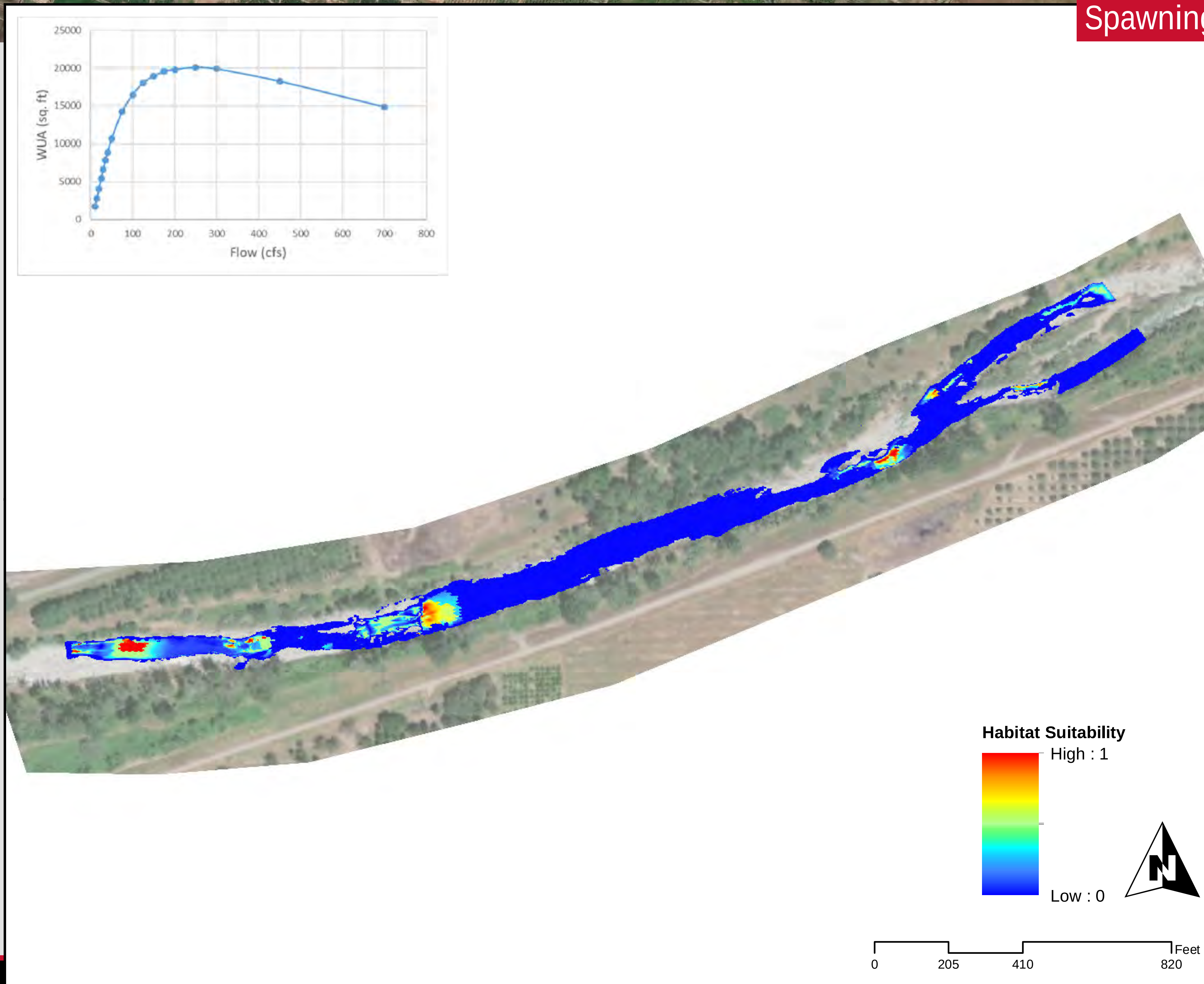


Lower Bear River - Instream Flow Study

Fall-Run Chinook Salmon

Downstream Study Site 150 cfs

Spawning



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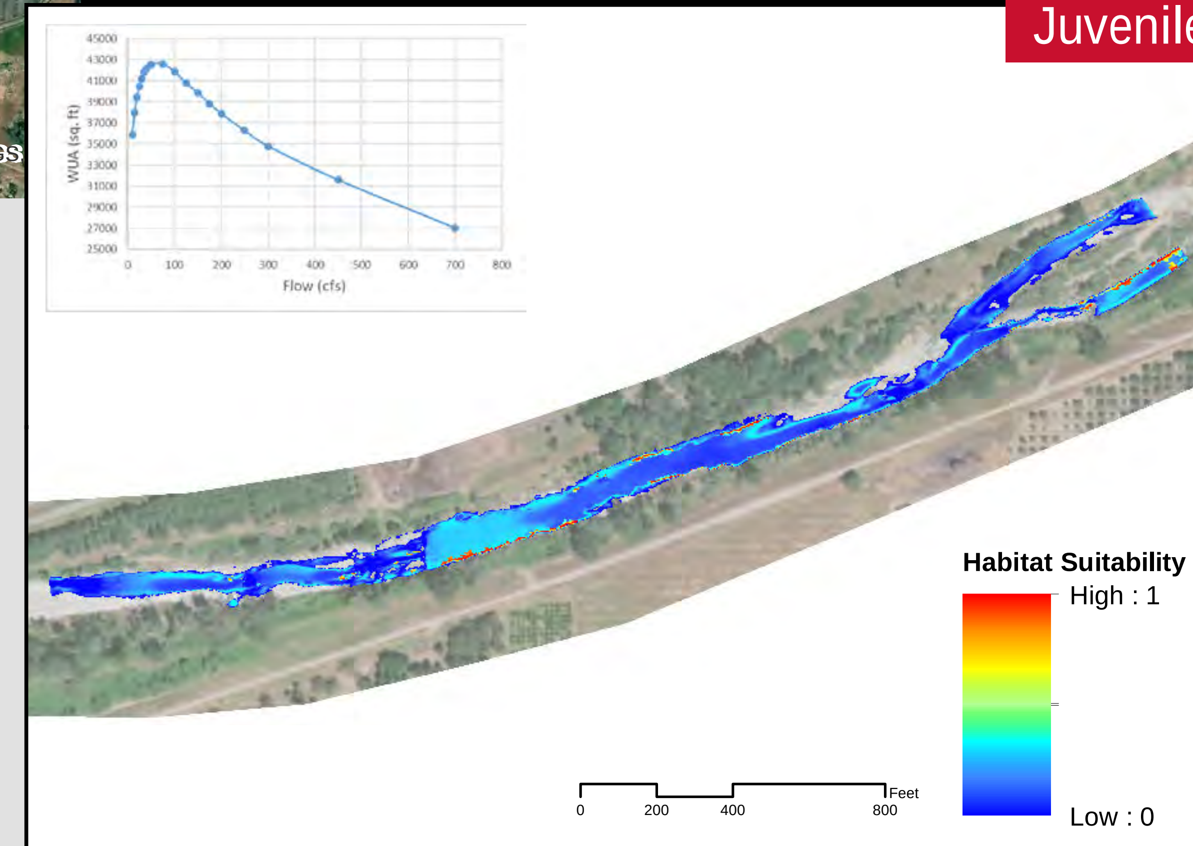

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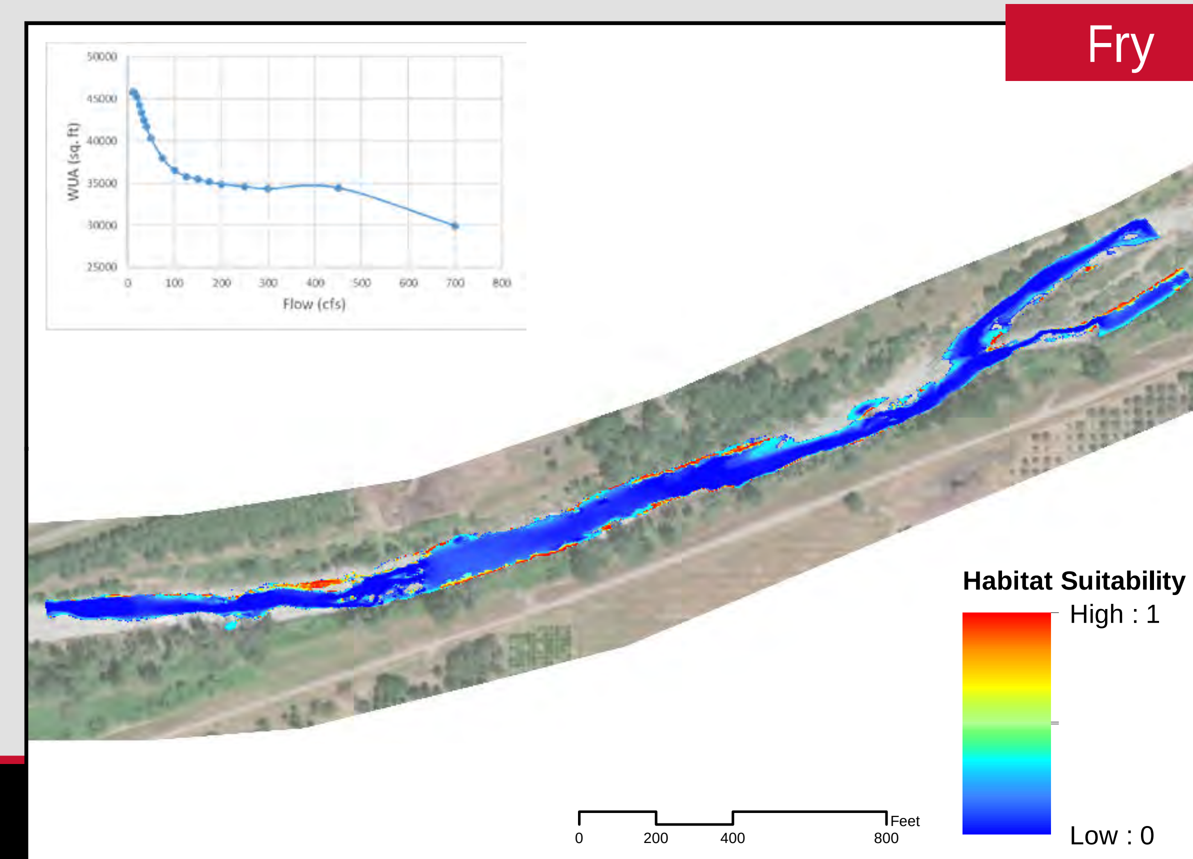
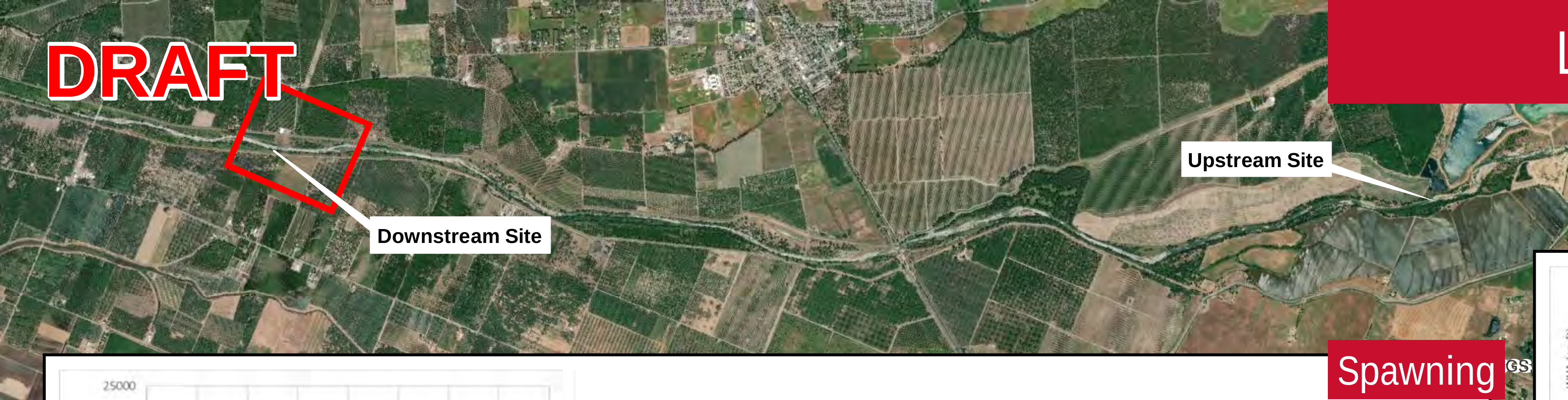


Lower Bear River - Instream Flow Study

SSWD HDR

Fall-Run Chinook Salmon

Downstream Study Site 175 cfs



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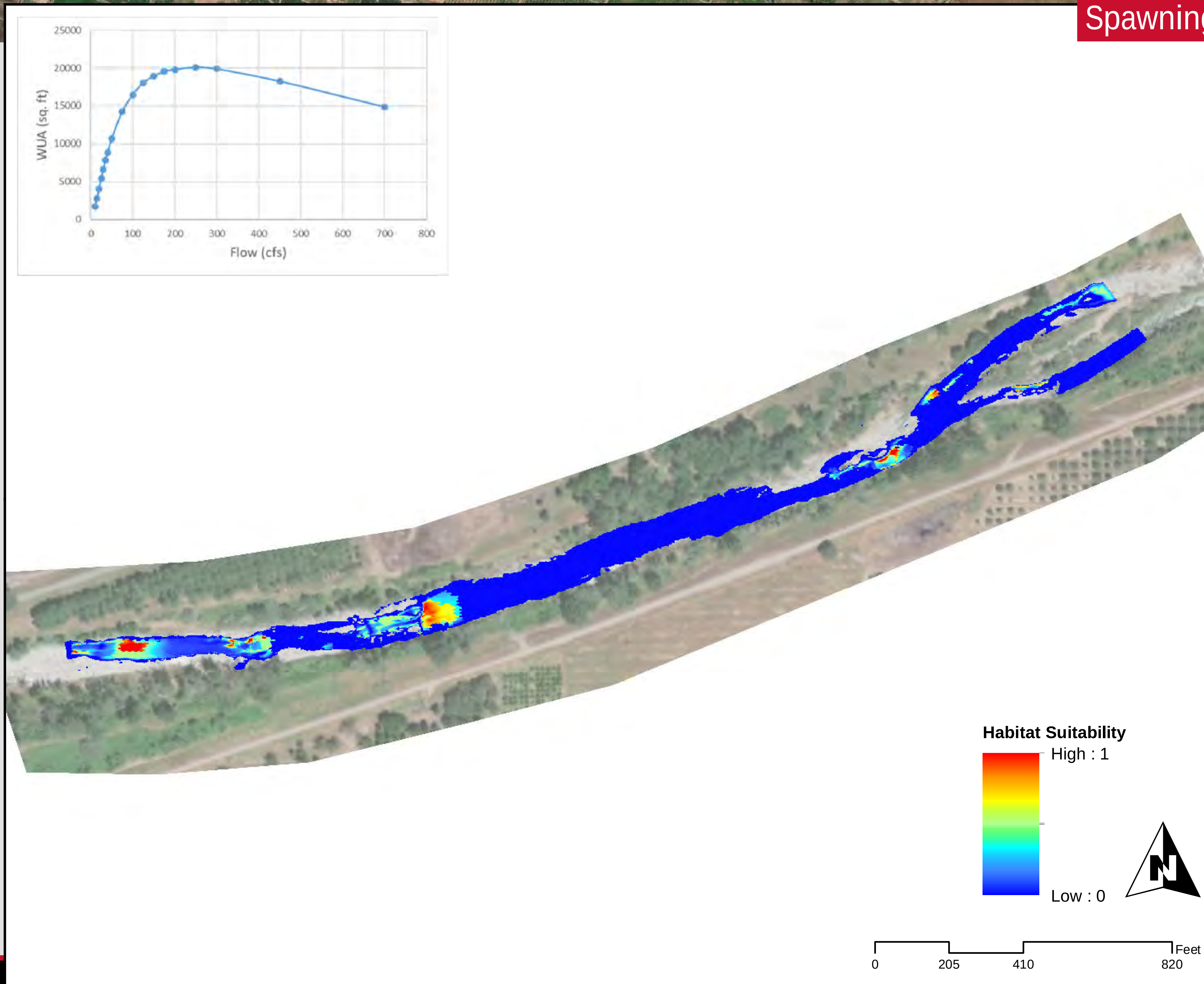
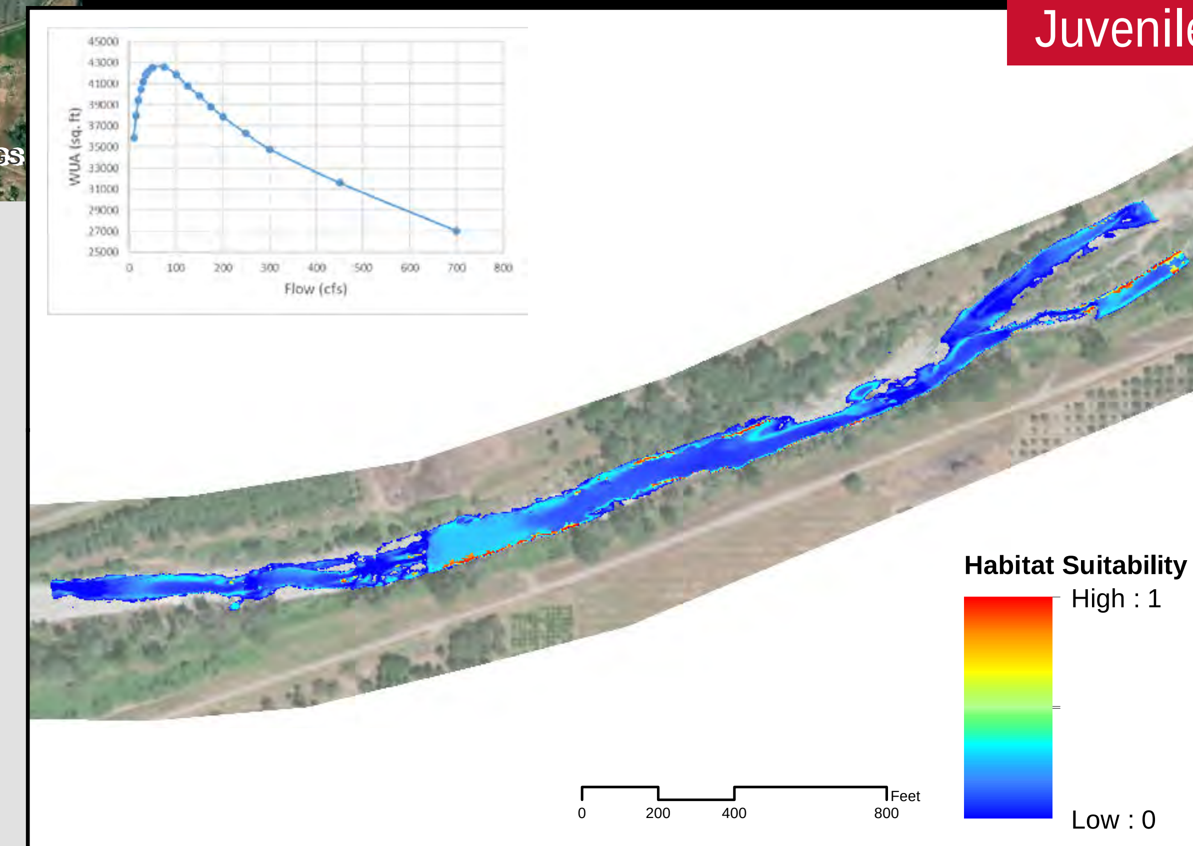
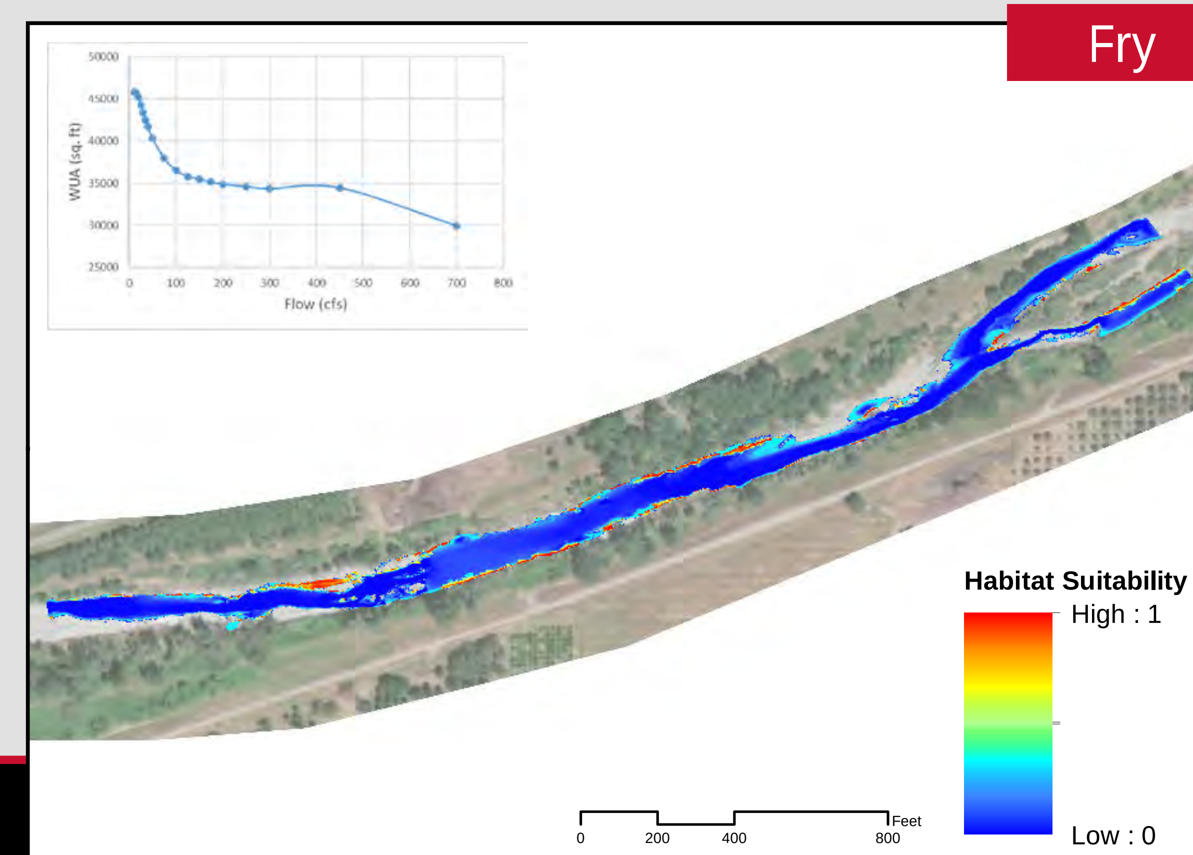


Juvenile



Fry

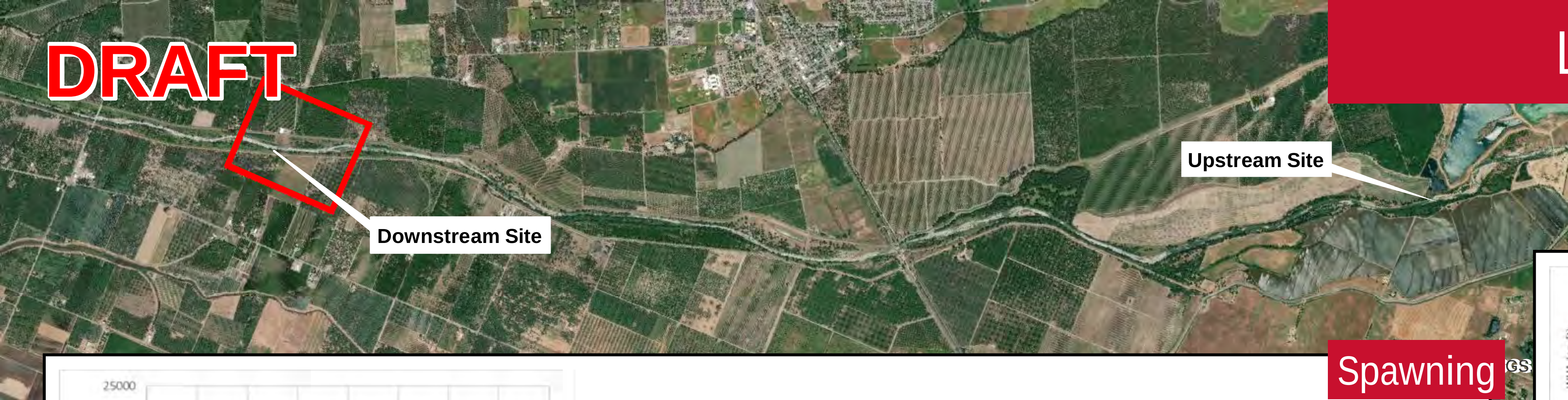


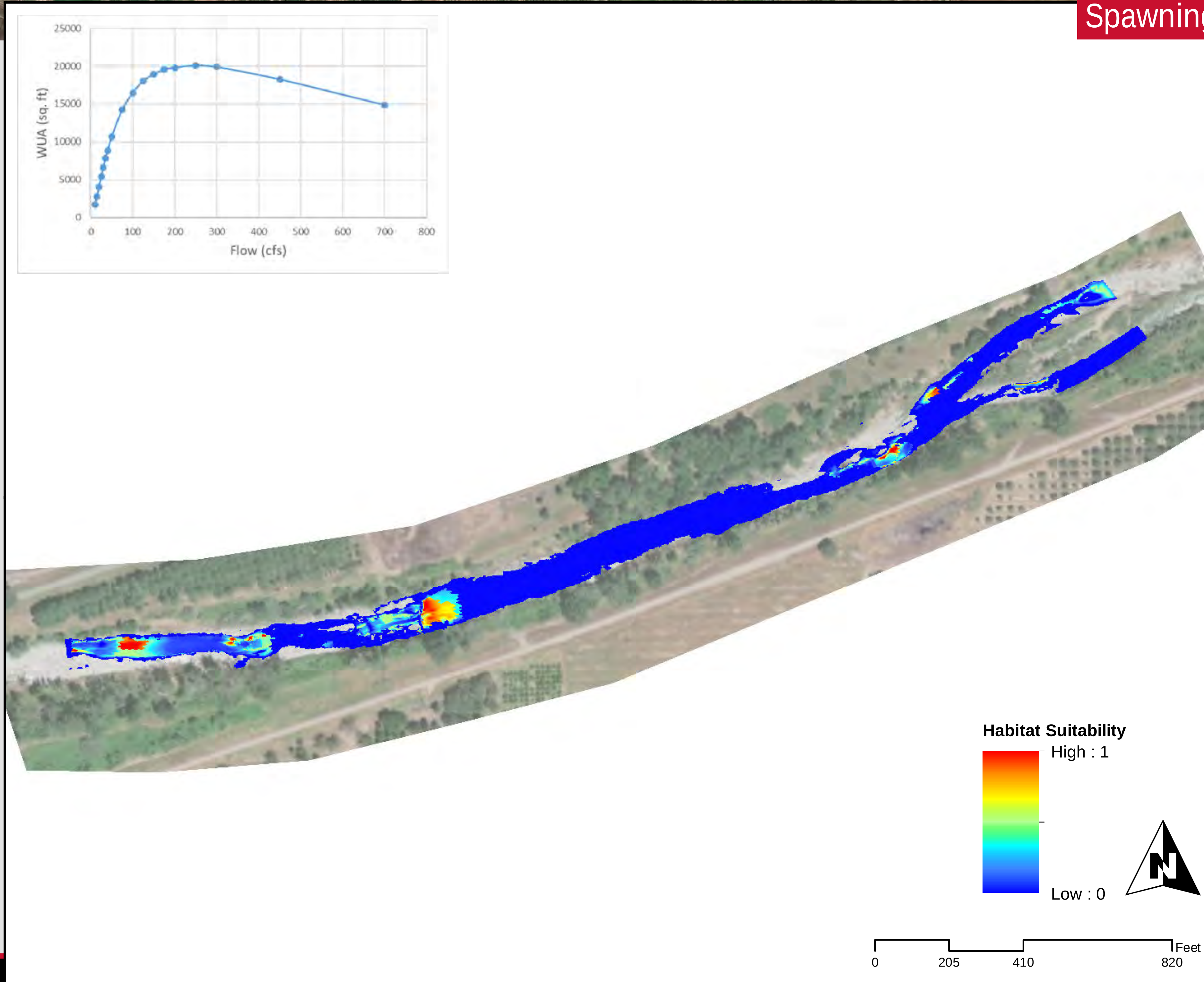
Lower Bear River - Instream Flow Study

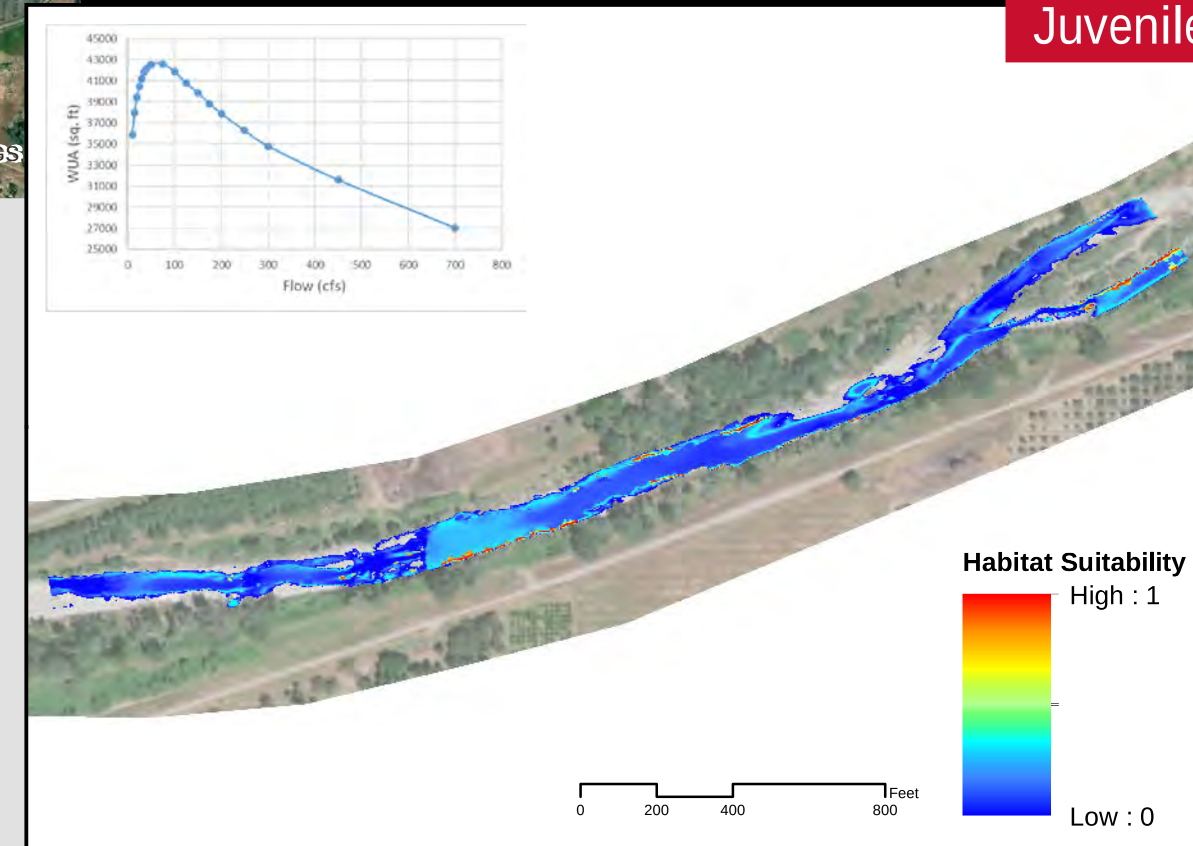
SSWD HDR

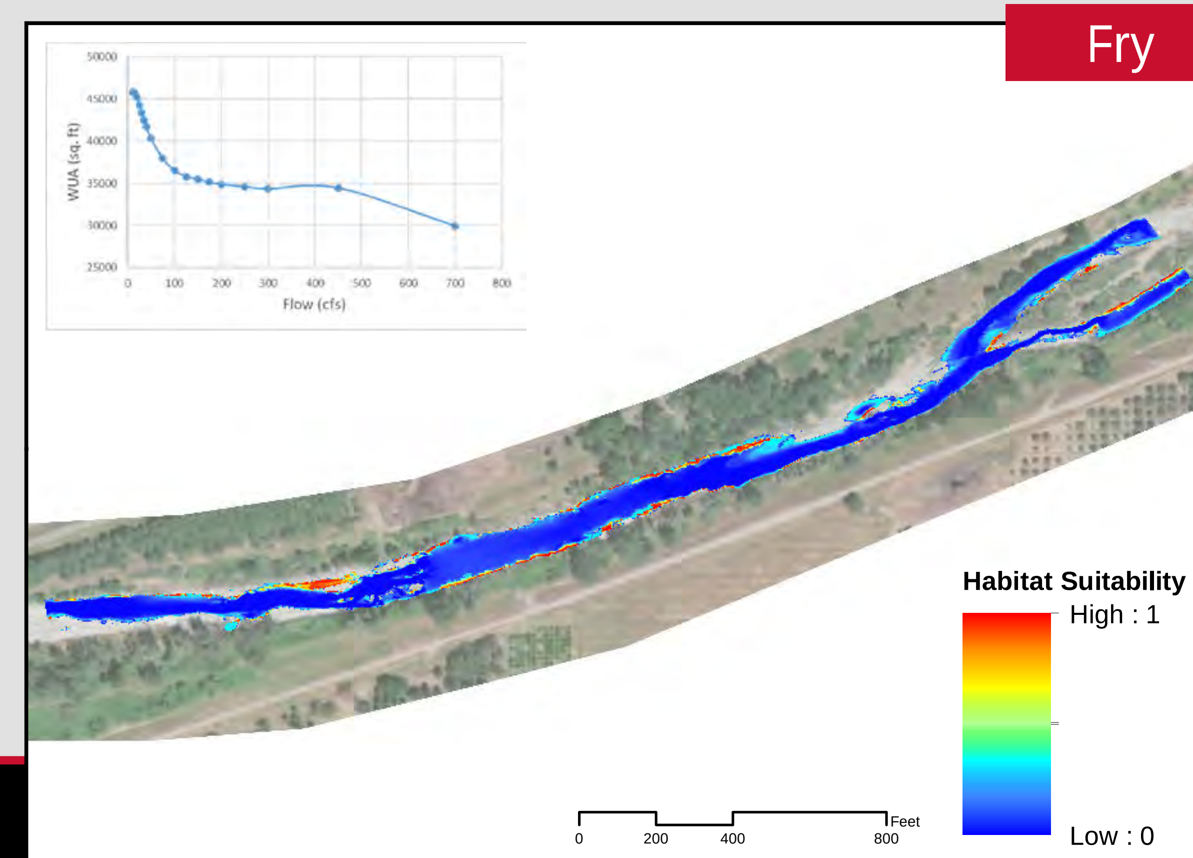
Fall-Run Chinook Salmon

Downstream Study Site 200 cfs







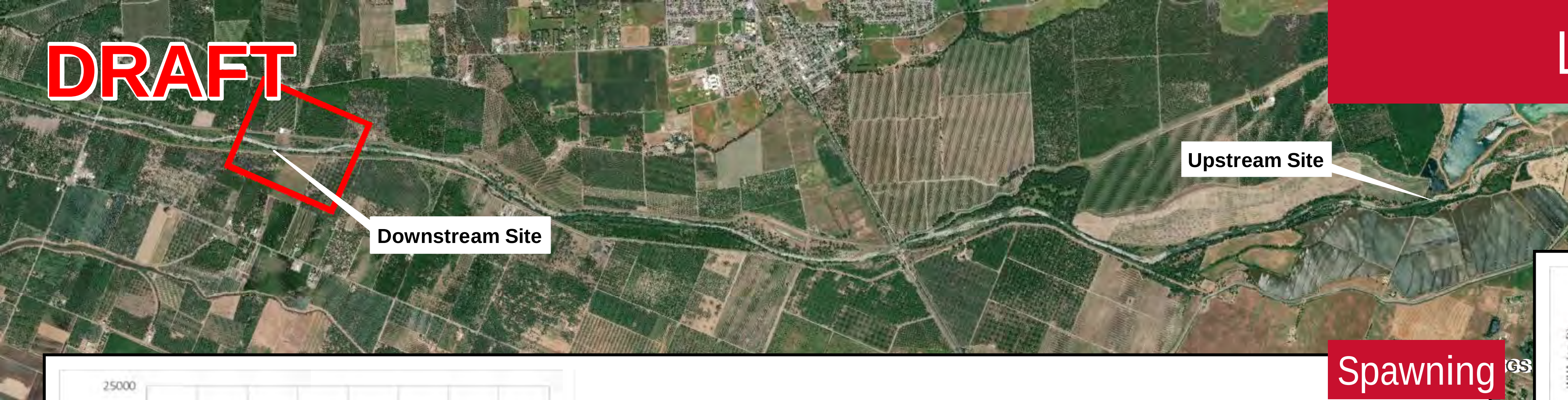


PATH: V:\CLIENT FILES\HDR\SSWD\INSTREAMFLOW\HABITAT\ATTACHMENT_ISF_MODEL_RESULTS.MXD - USER: GPOPULIS - DATE: 12/6/2018

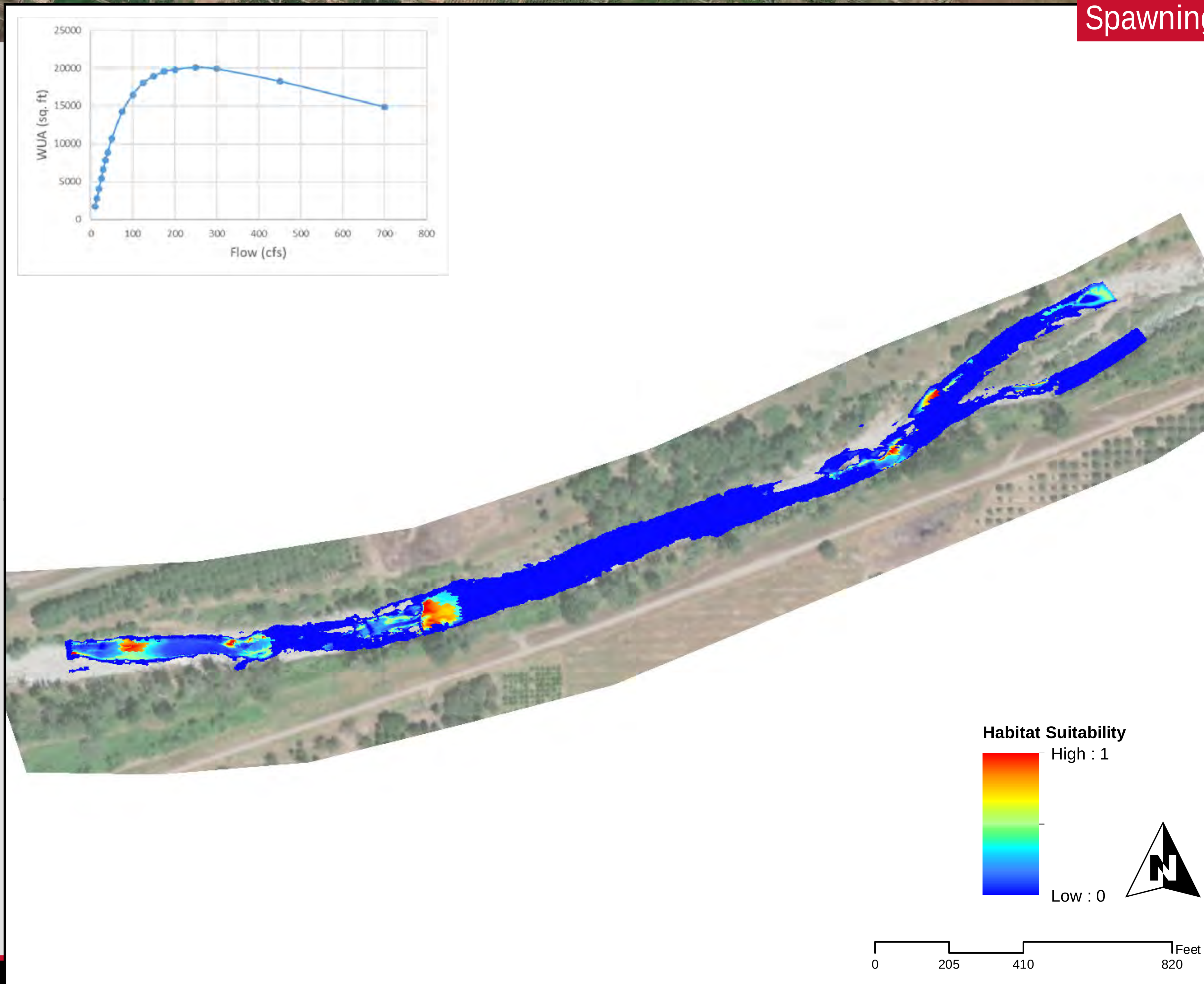
Lower Bear River - Instream Flow Study

Fall-Run Chinook Salmon

Downstream Study Site 250 cfs



Spawning



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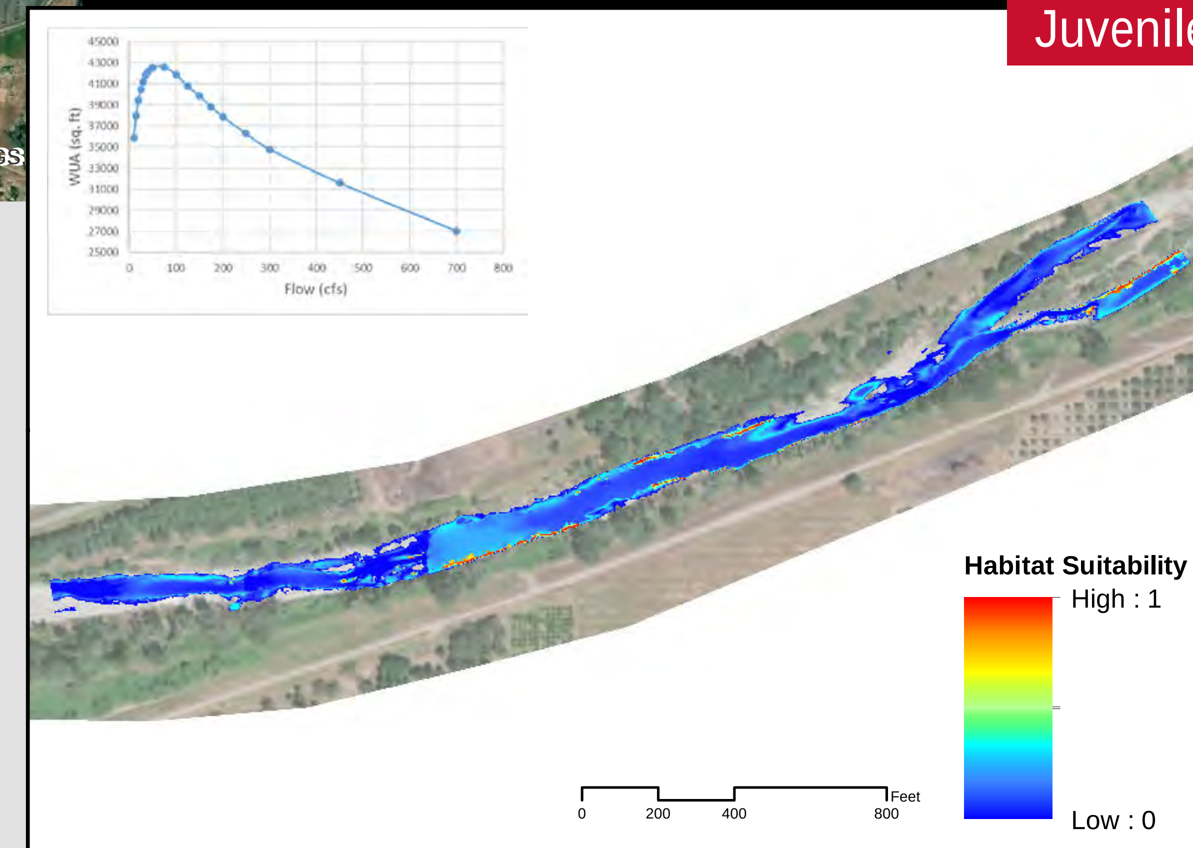

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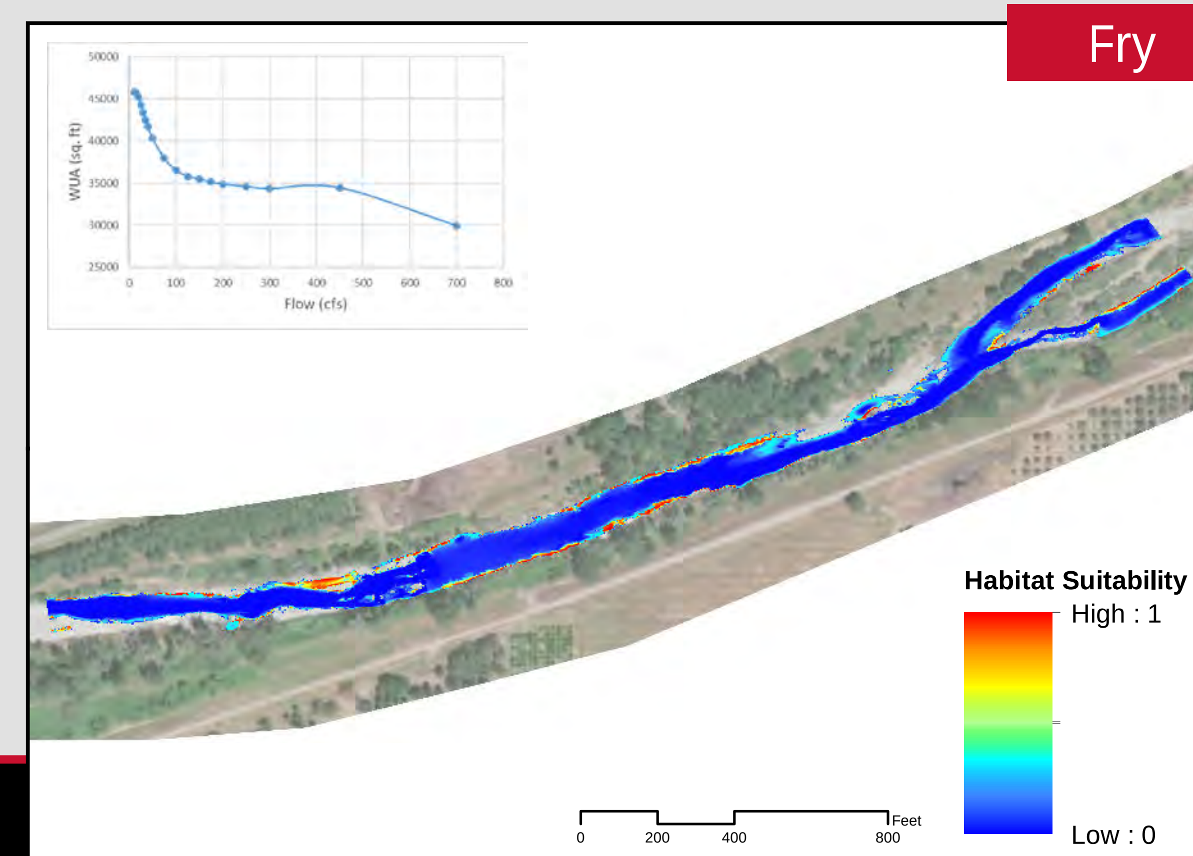
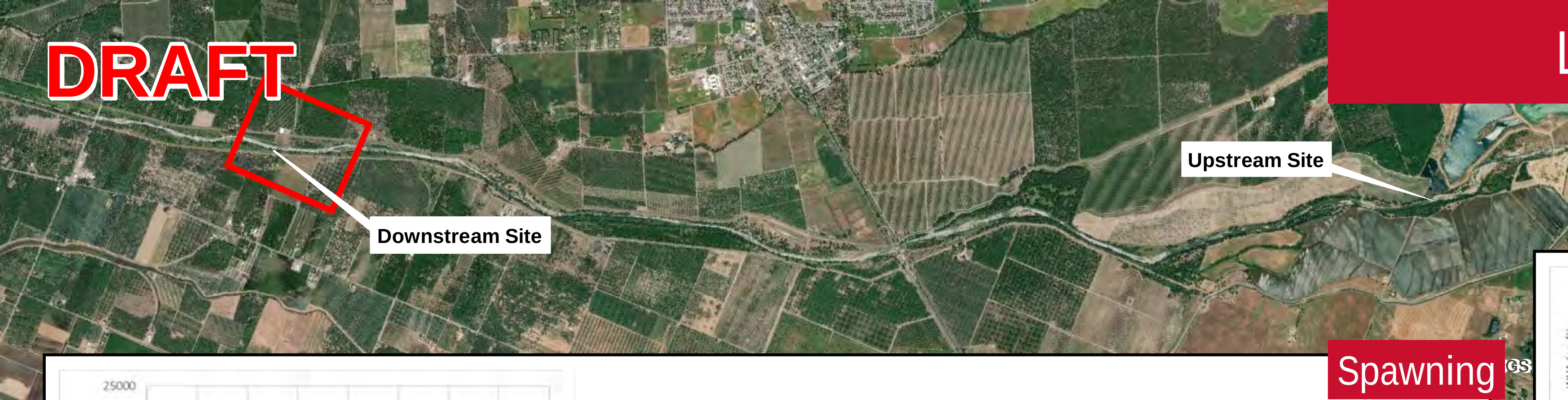


Lower Bear River - Instream Flow Study

SSWD HDR

Fall-Run Chinook Salmon

Downstream Study Site 300 cfs



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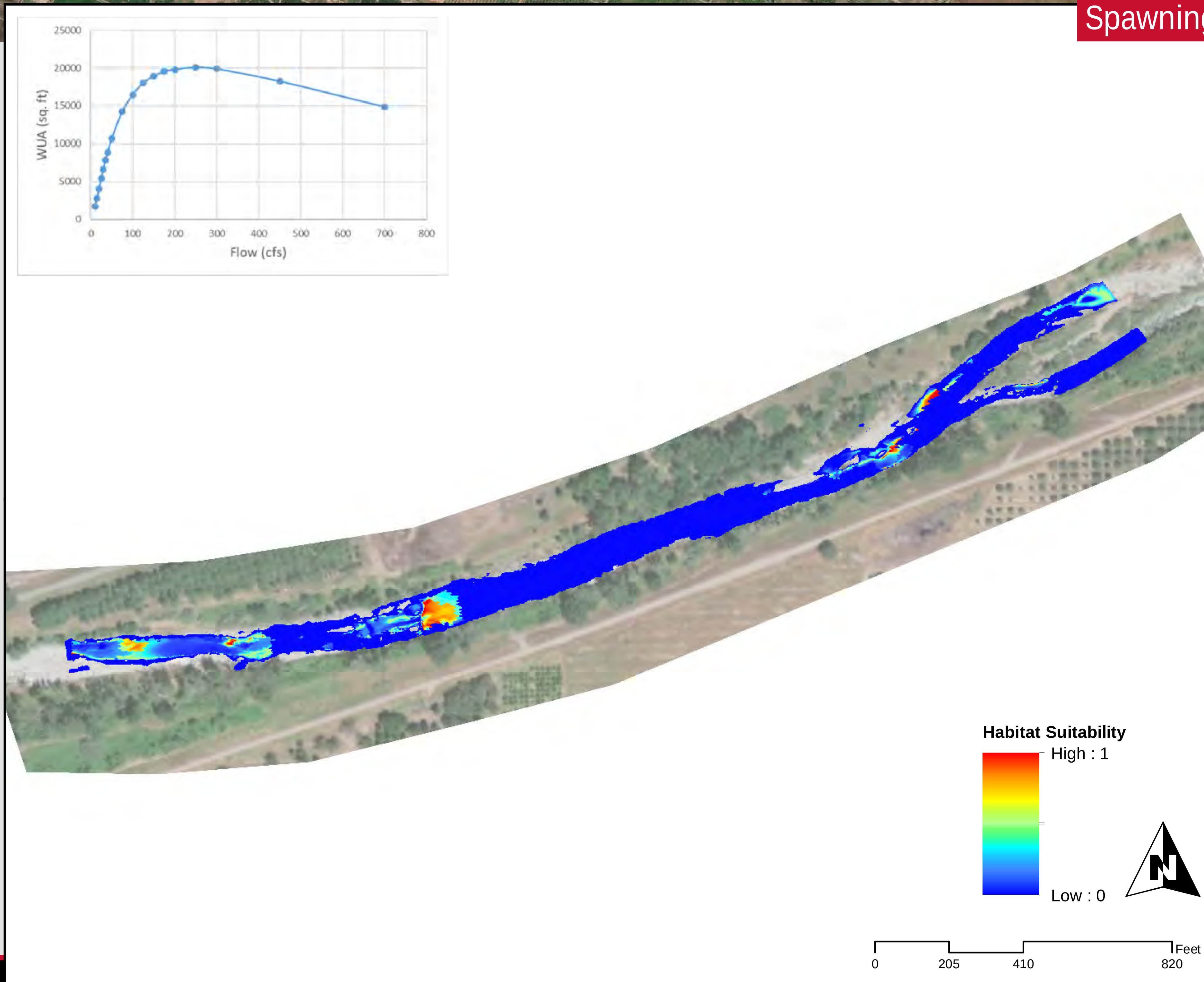

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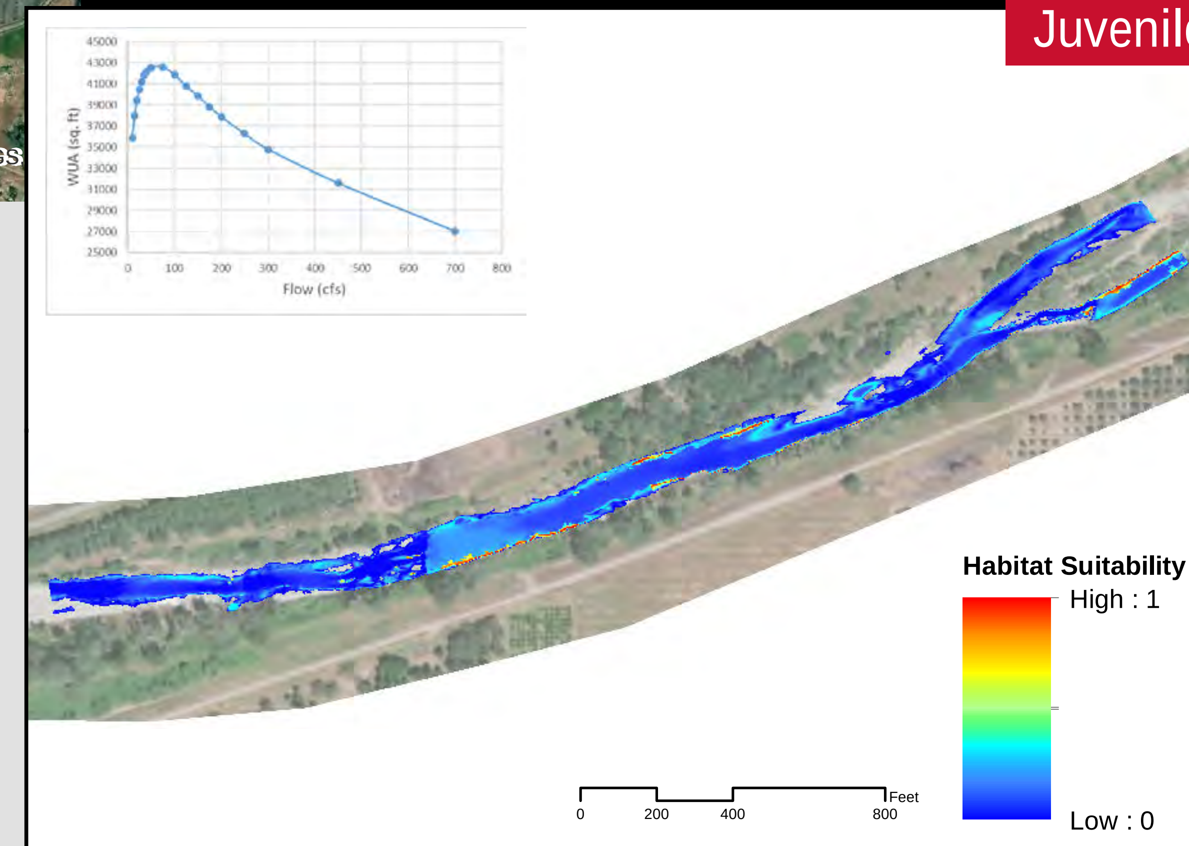

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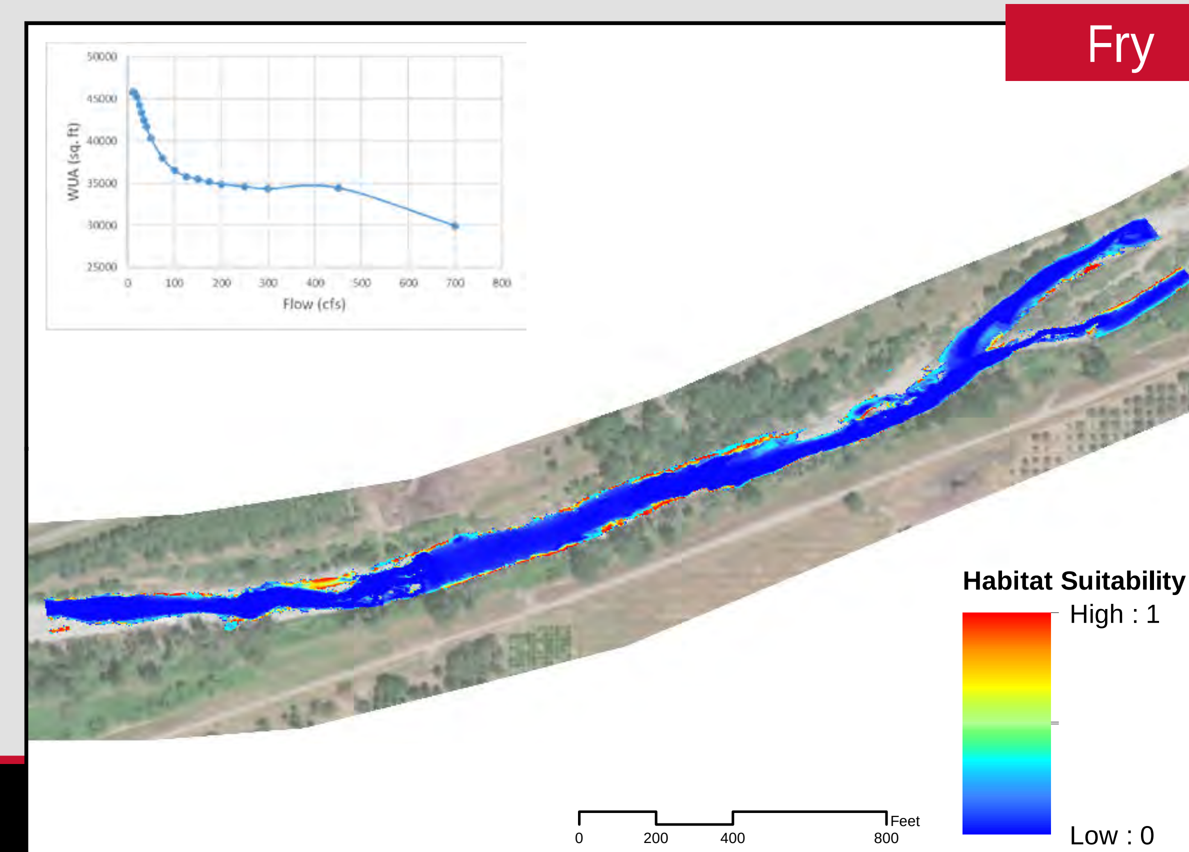
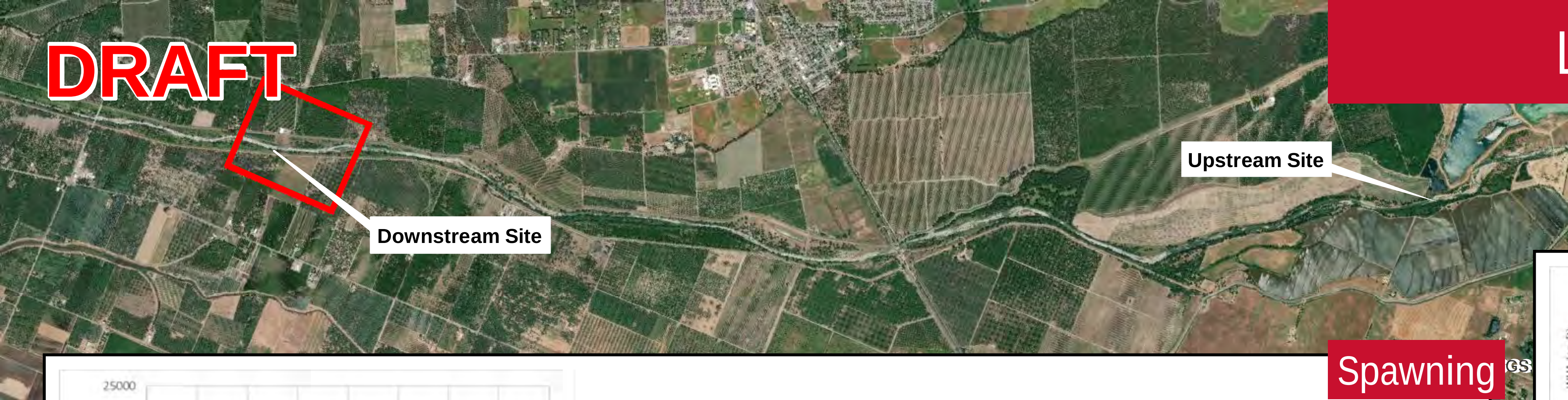


Lower Bear River - Instream Flow Study

SSWD HDR

Fall-Run Chinook Salmon

Downstream Study Site 450 cfs



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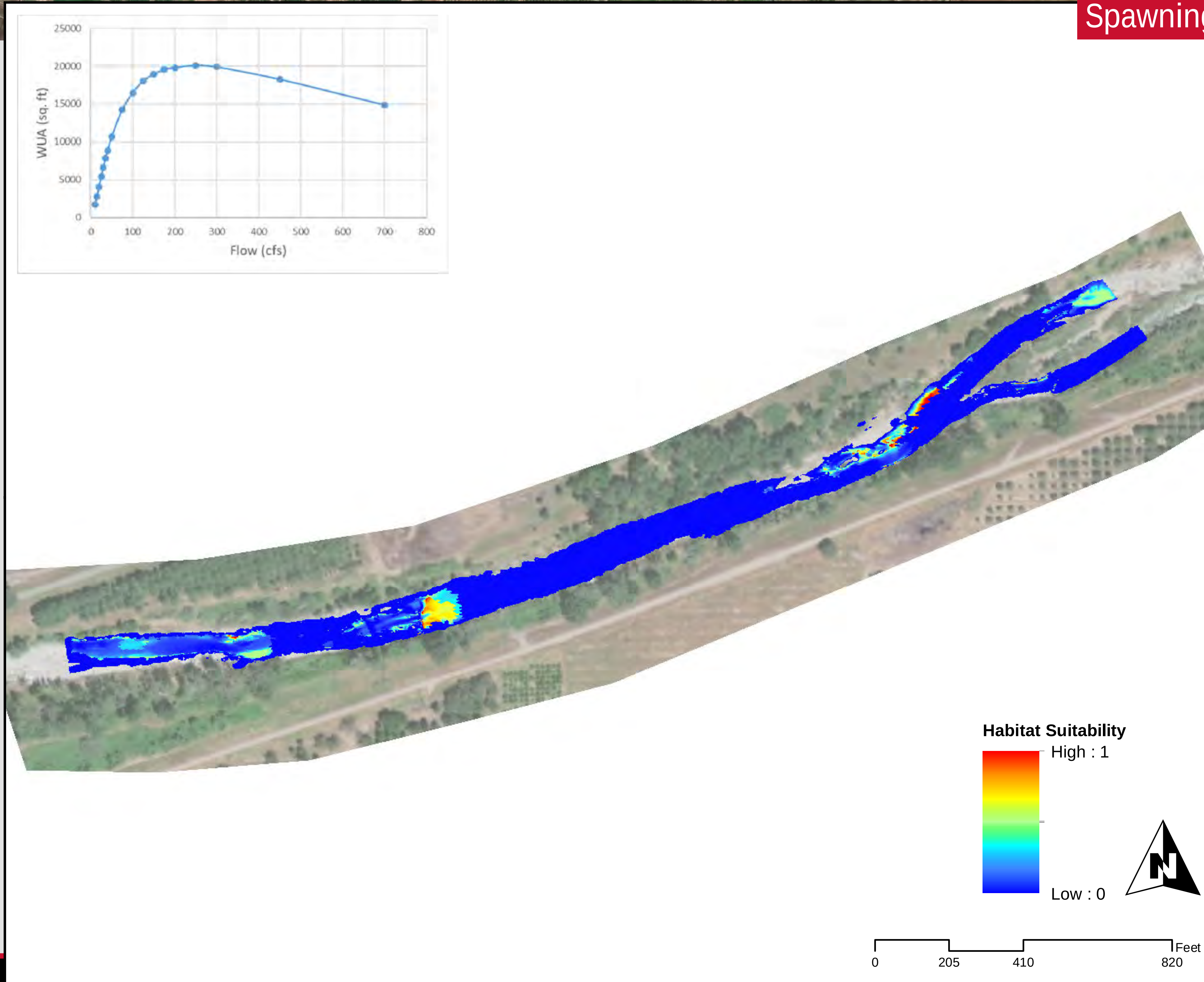
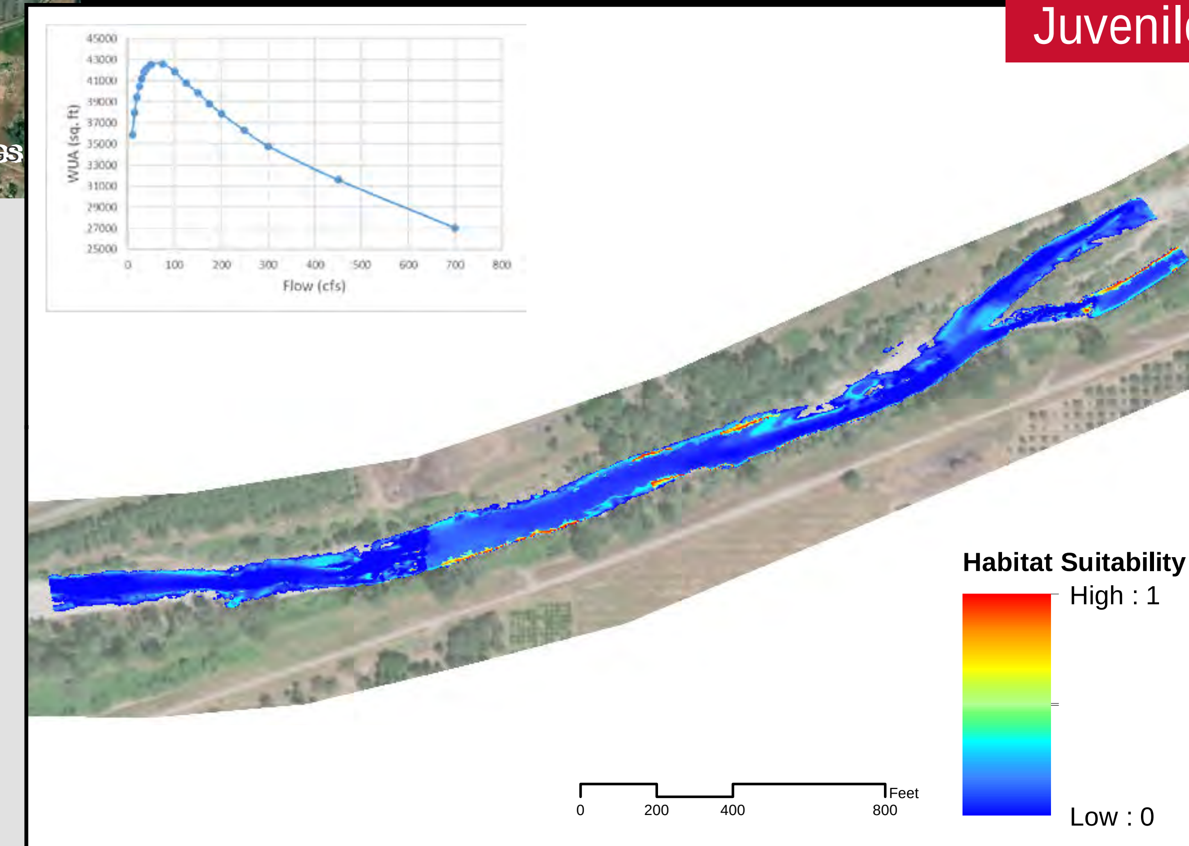


Juvenile



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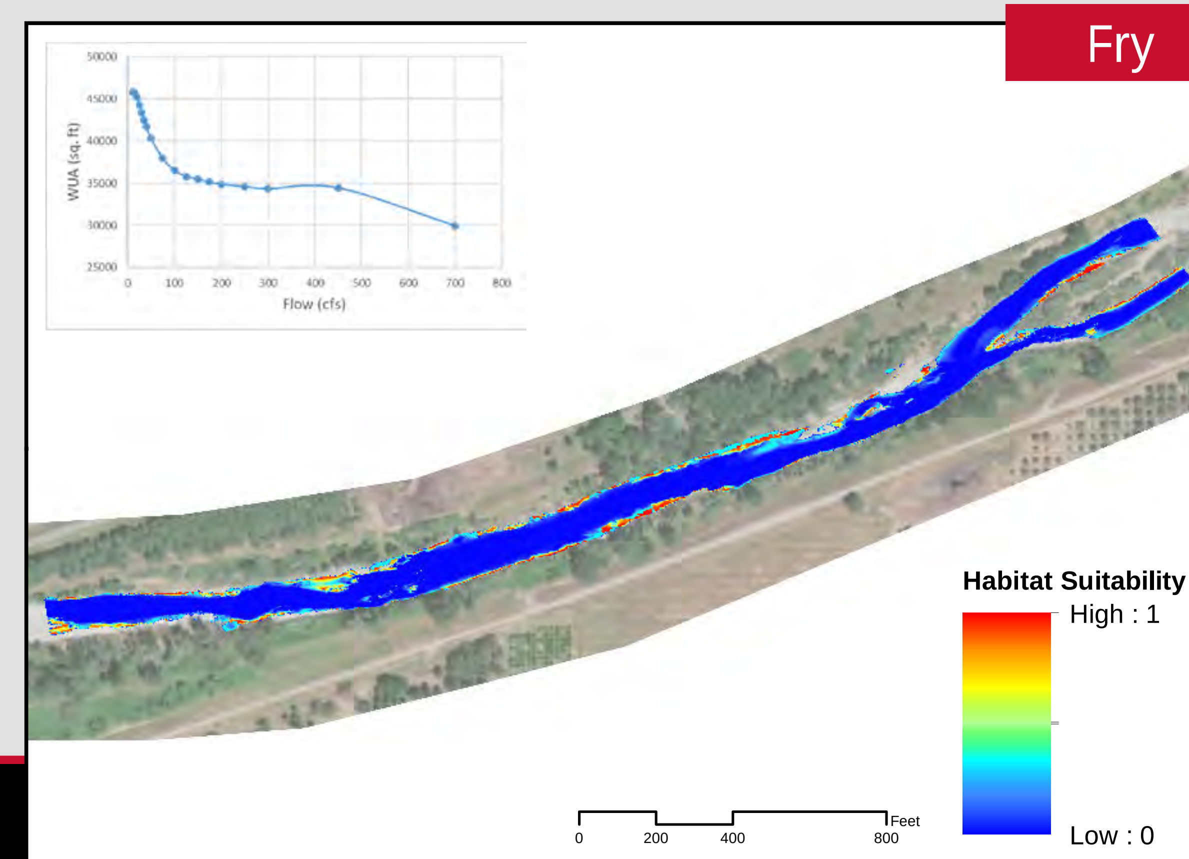


PATH: V:\CLIENT FILES\HDR\SSWD\INSTREAMFLOW\HABITAT\ATTACHMENT_ISF_MODEL_RESULTS.MXD - USER: GPOPULIS - DATE: 12/6/2018

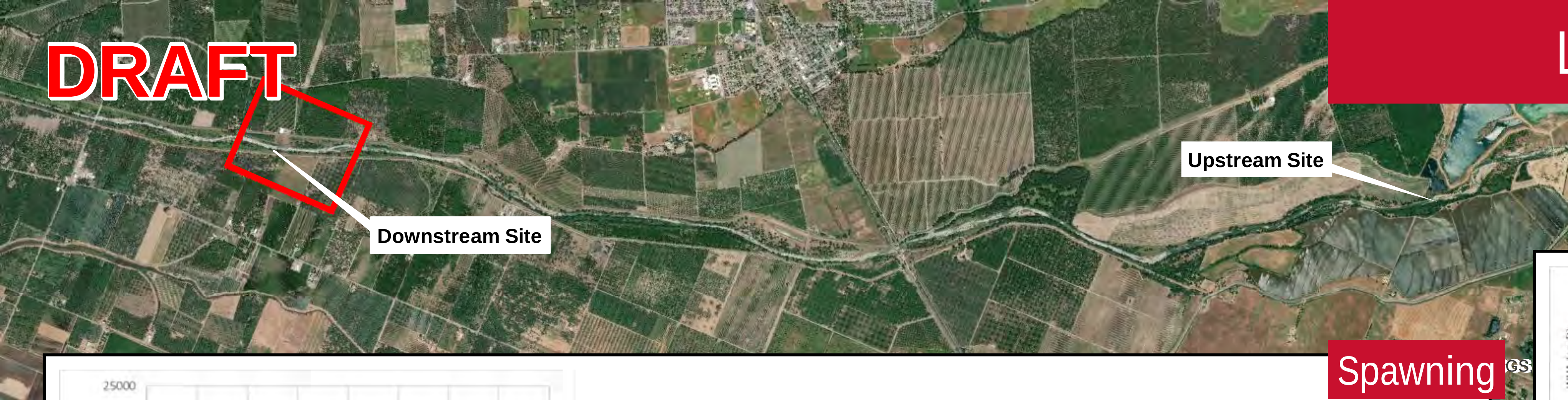
Lower Bear River - Instream Flow Study

SSWD HDR

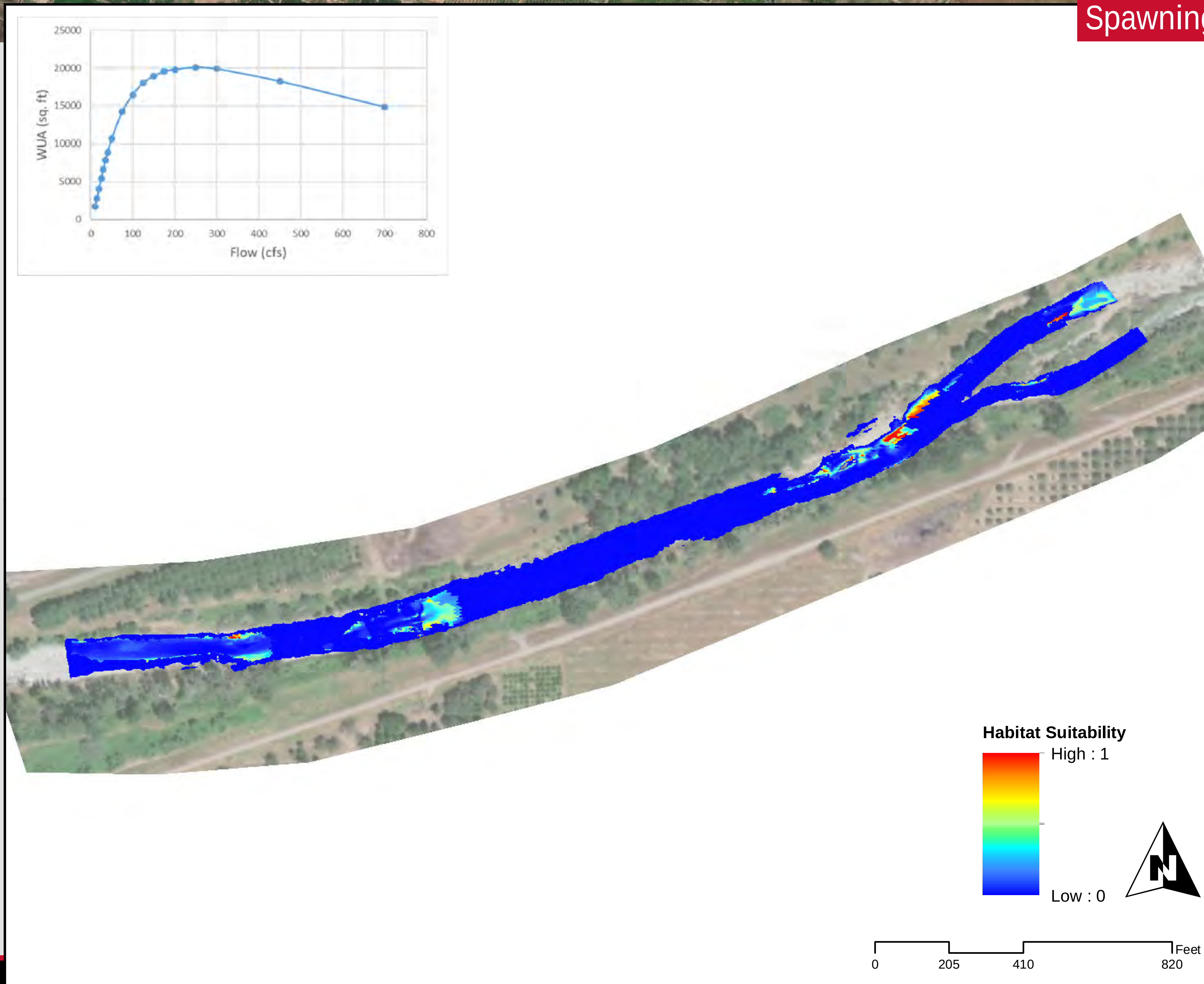
Fall-Run Chinook Salmon

Downstream Study Site 700 cfs

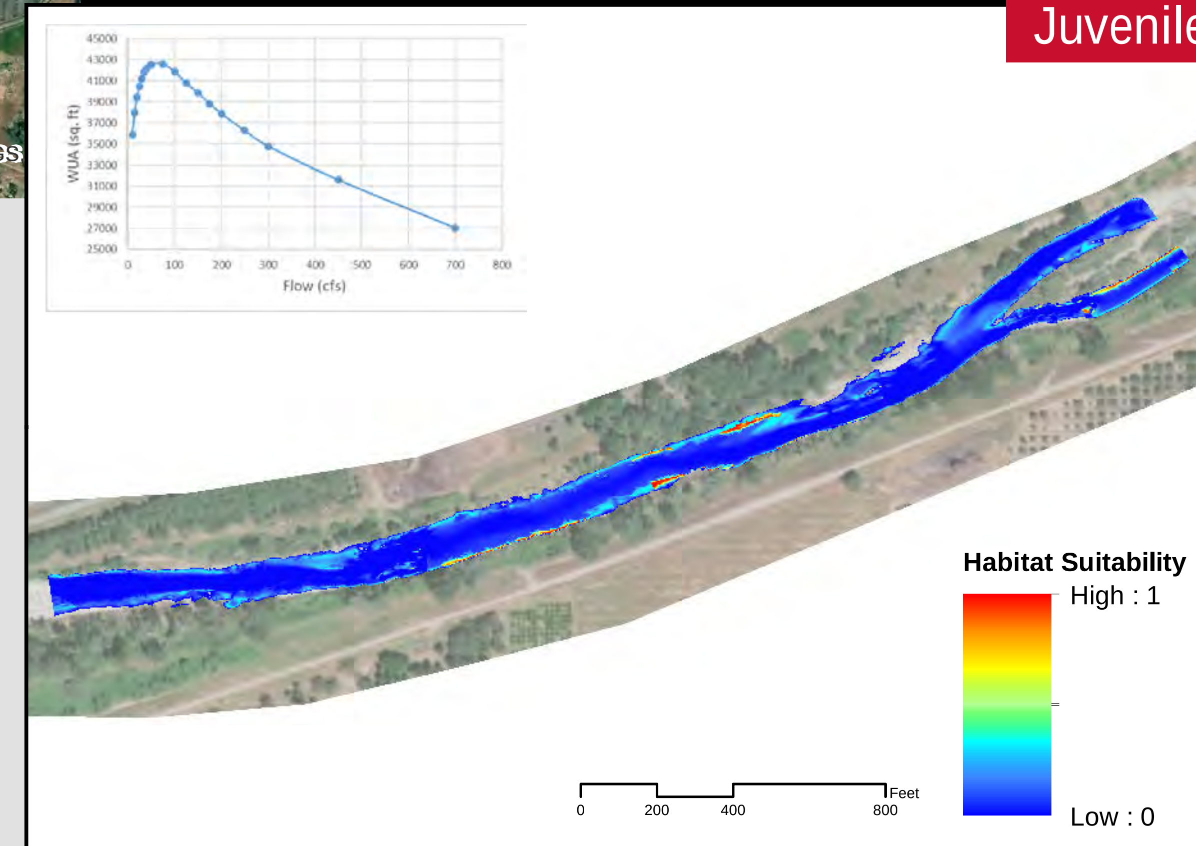
DRAFT



Spawning



Juvenile



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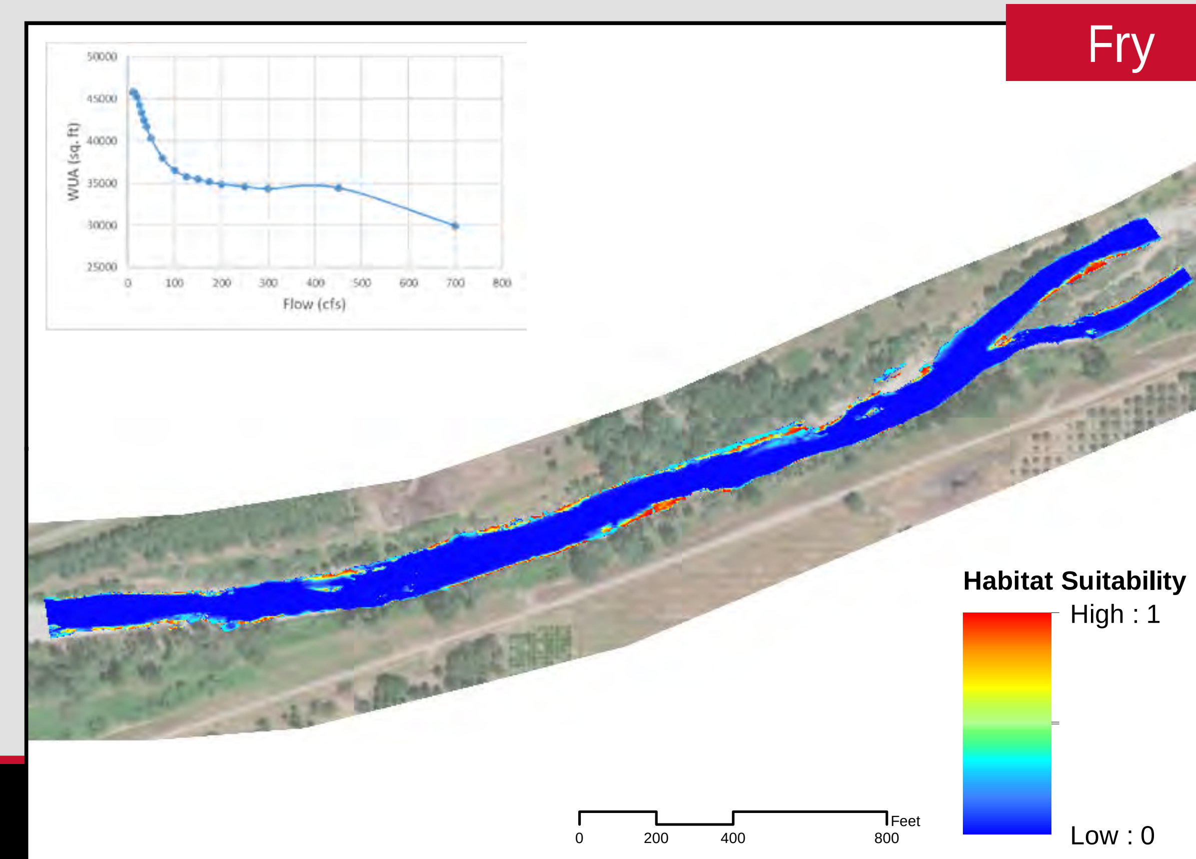

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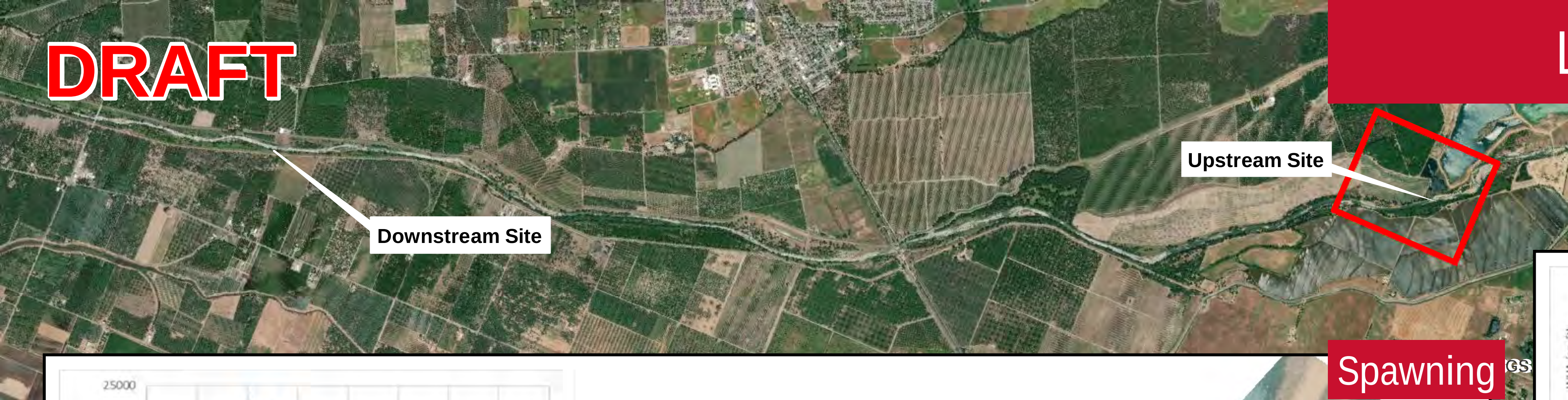
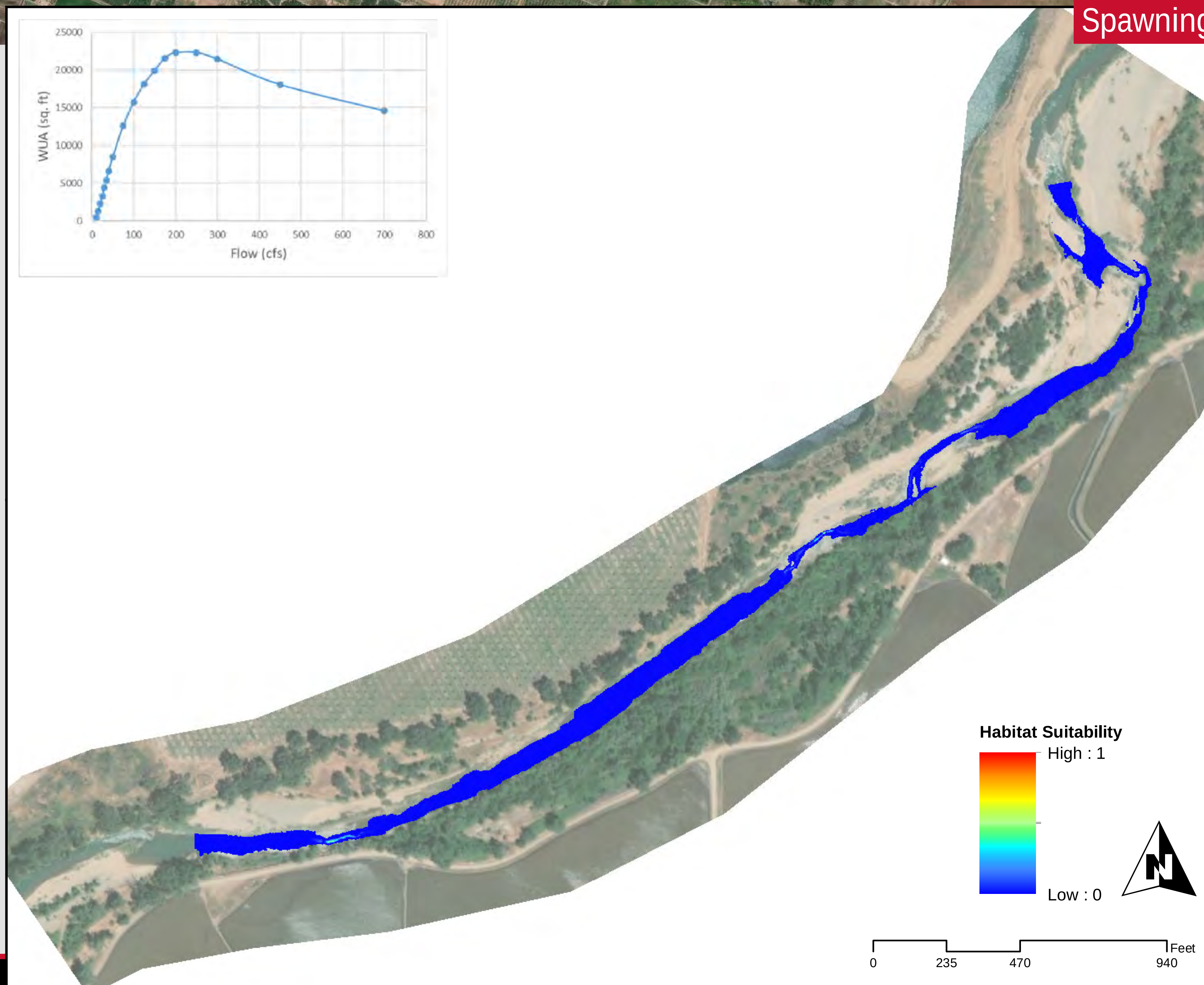
Lower Bear River - Instream Flow Study

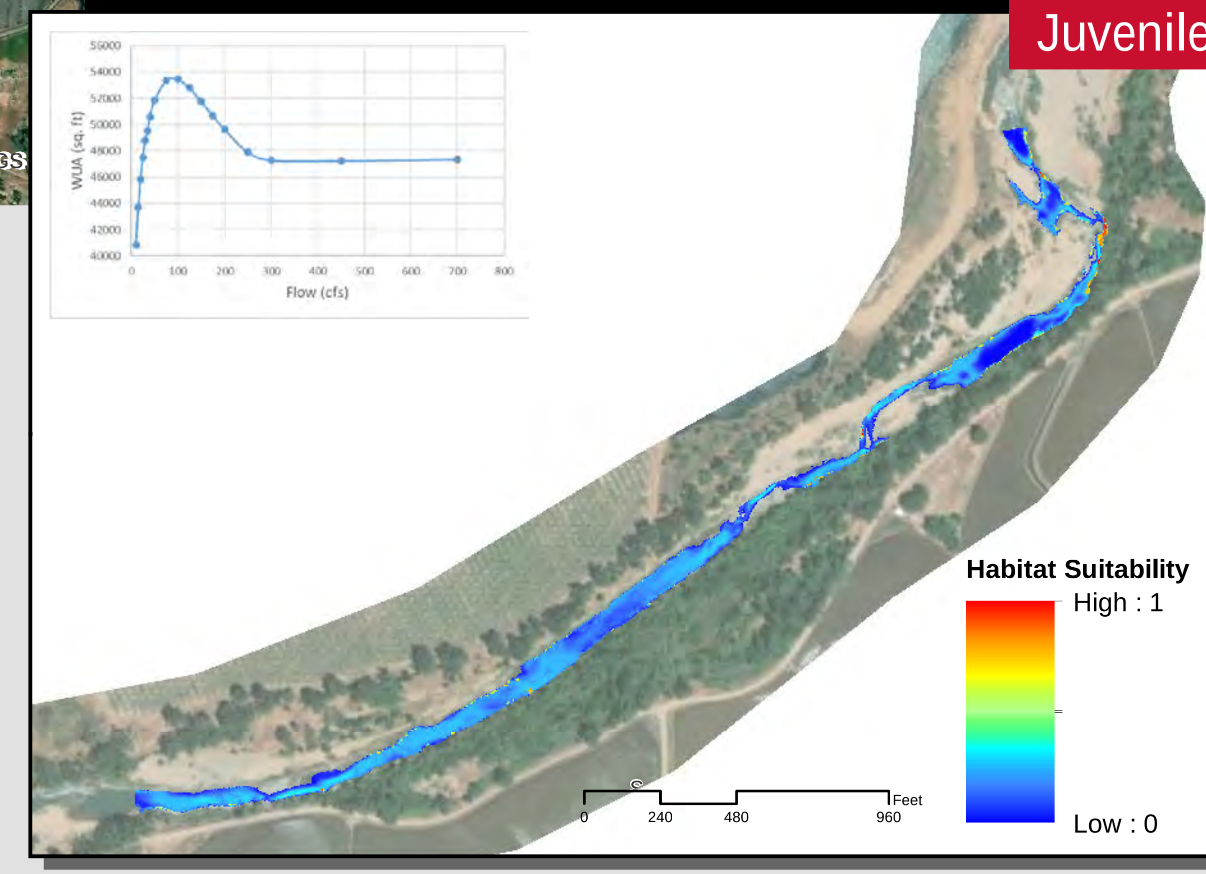
SSWD HDR

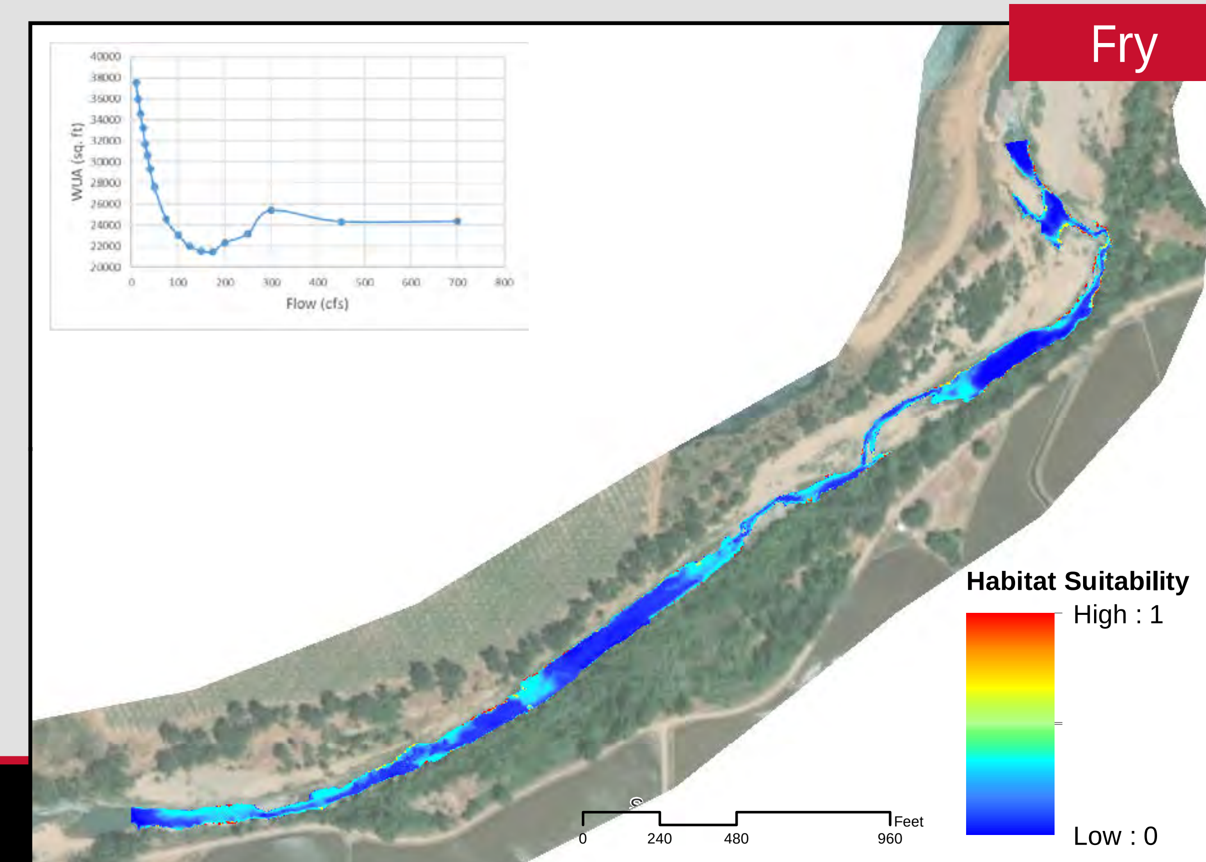
Steelhead

Upstream Study Site 10 cfs









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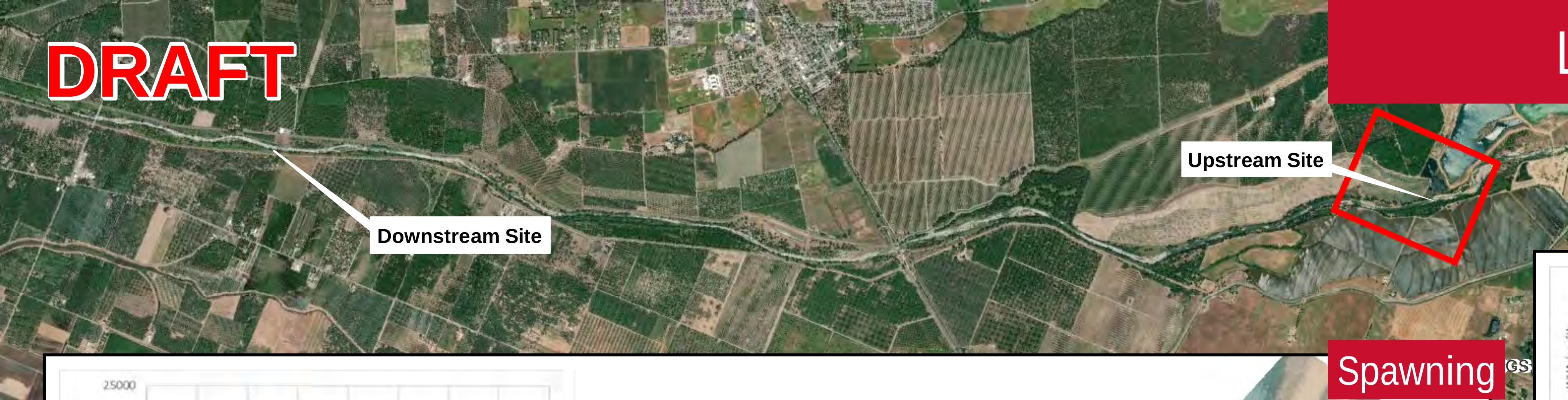
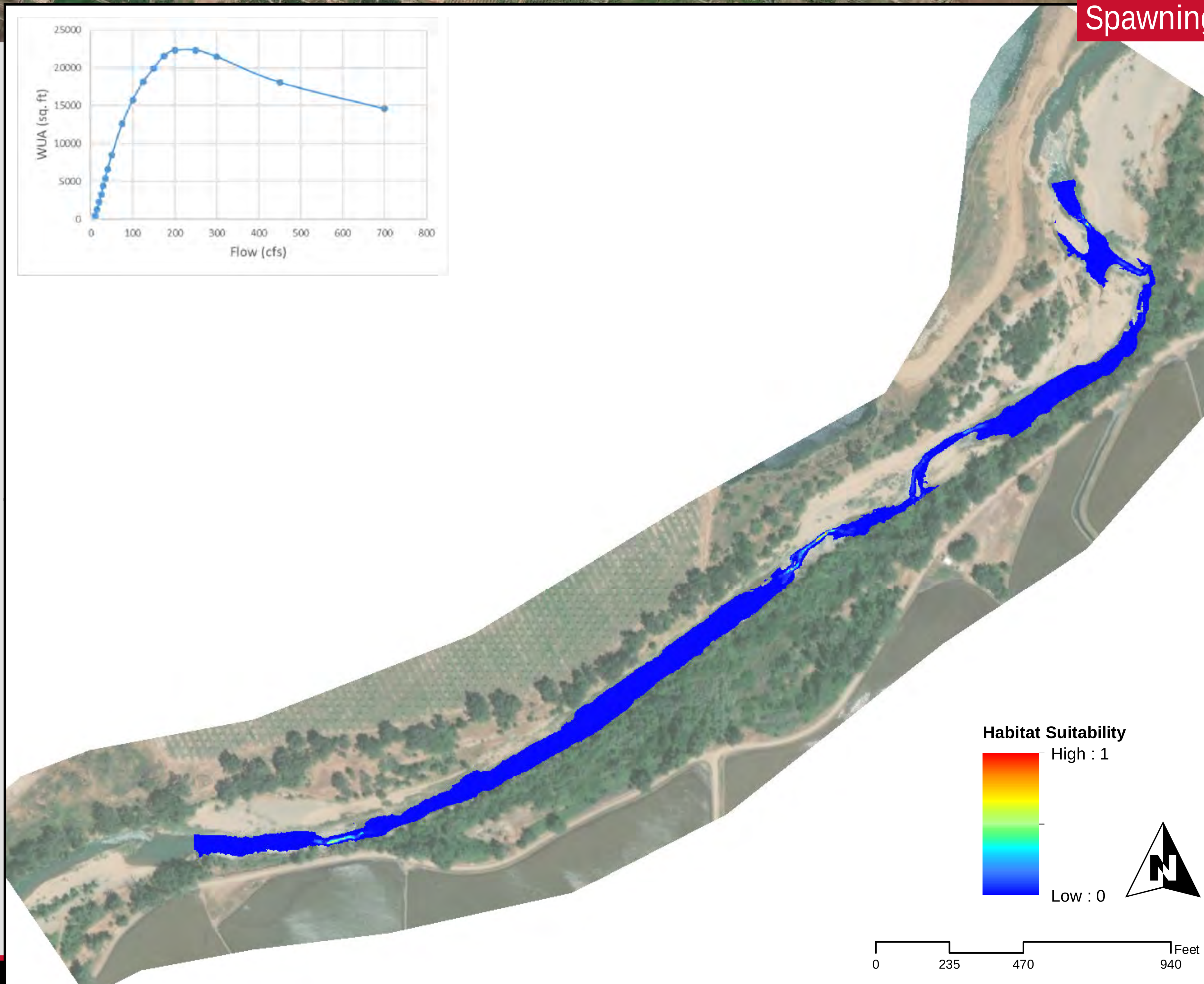
Lower Bear River - Instream Flow Study

Steelhead

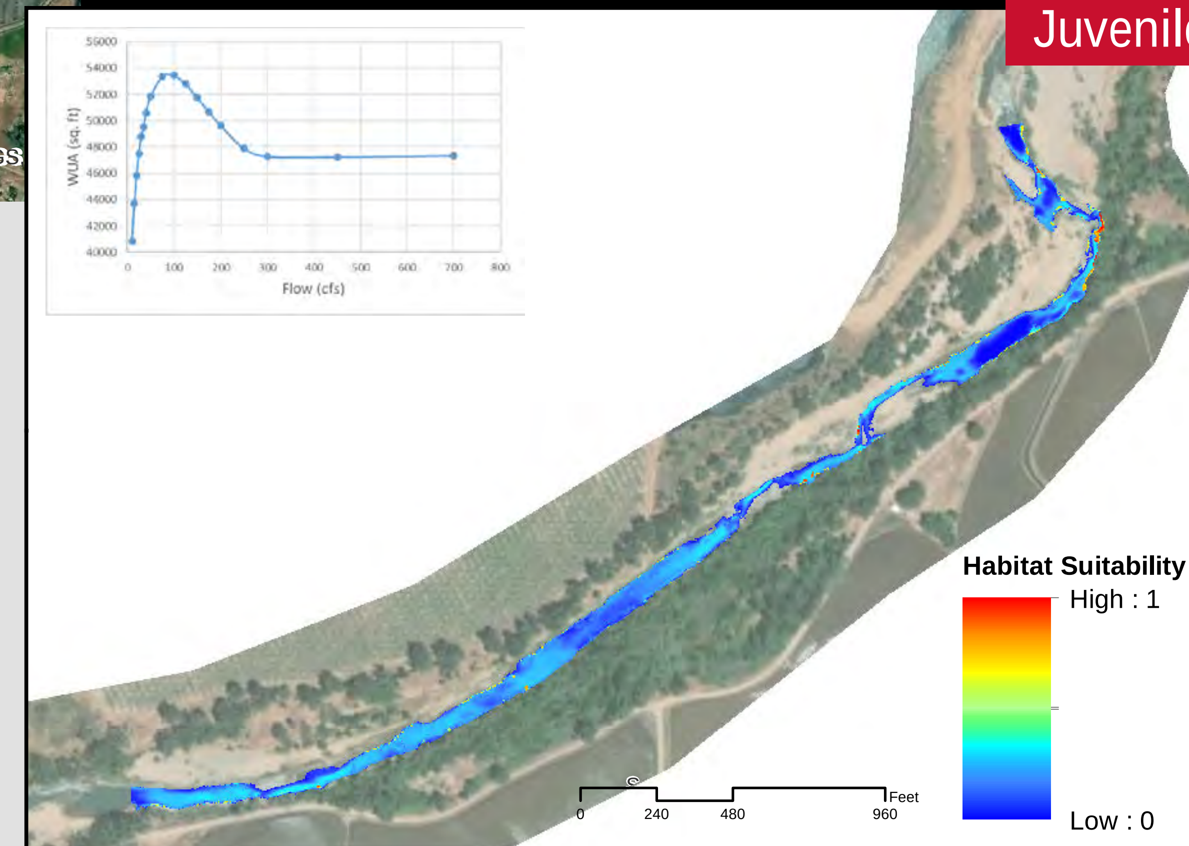
Upstream Study Site 15 cfs



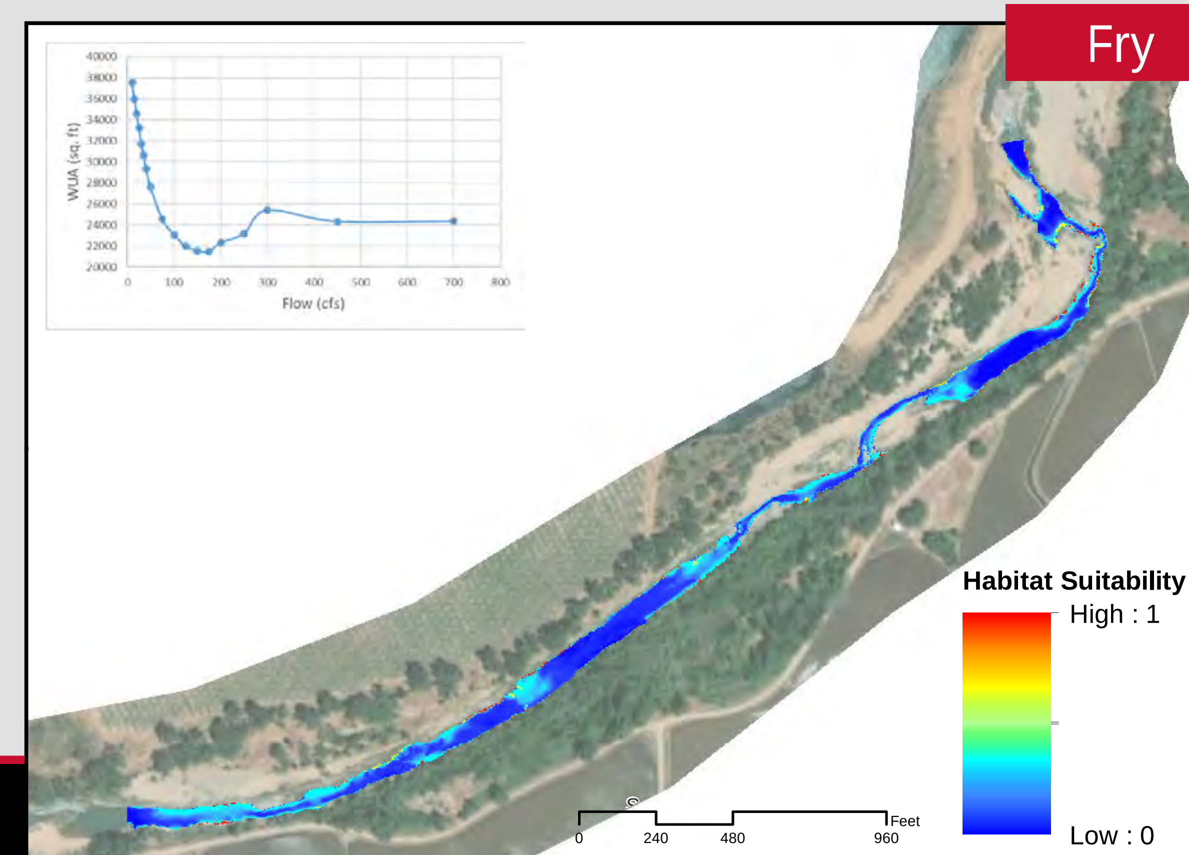
Spawning



Juvenile



Fry



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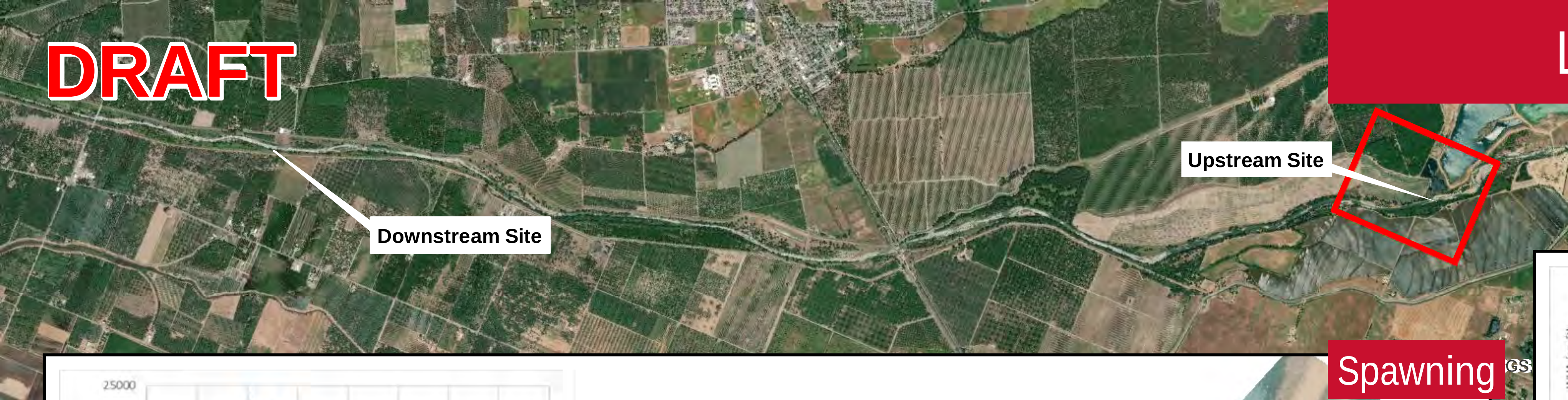
Lower Bear River - Instream Flow Study

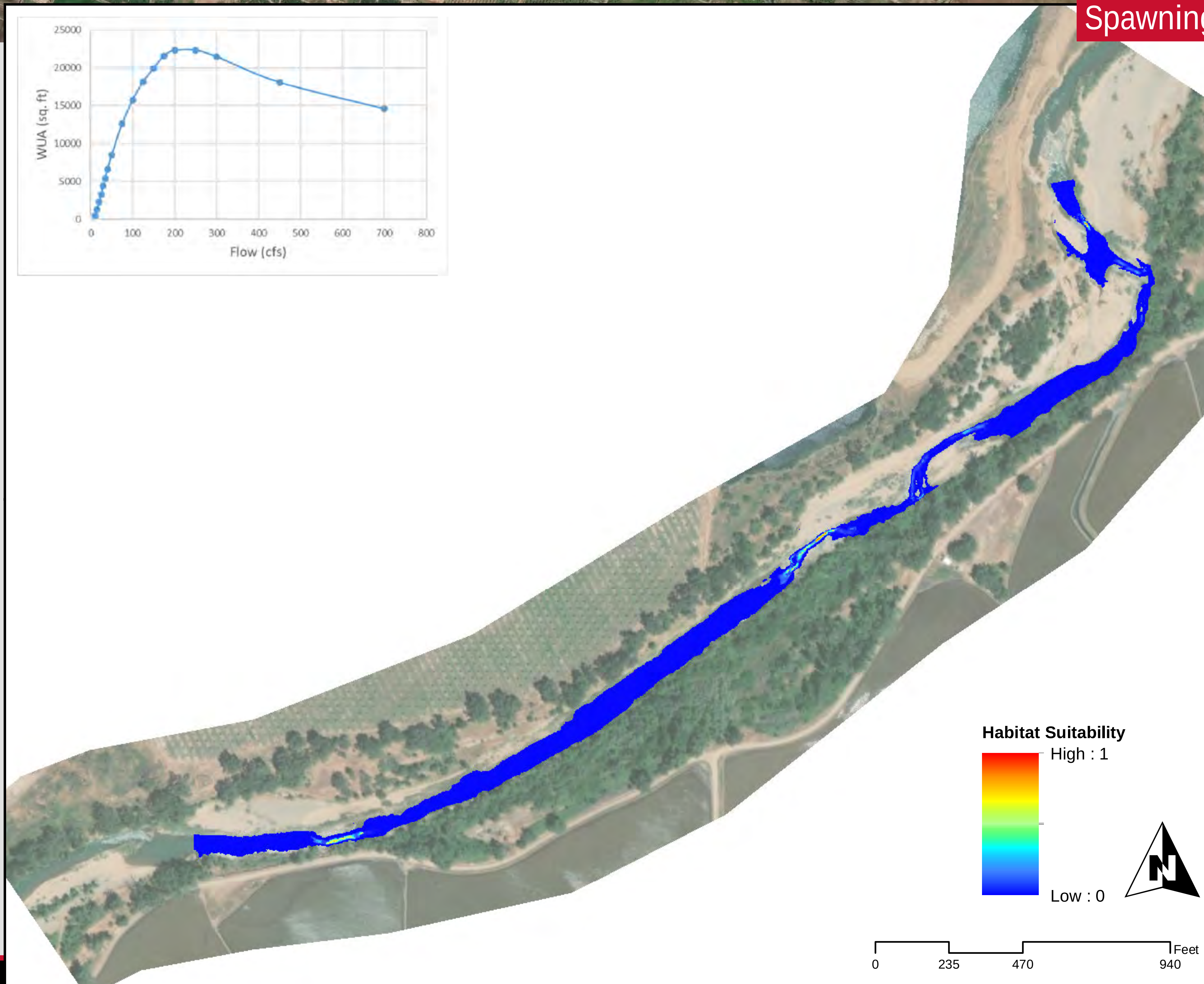
SSWD HDR

Steelhead

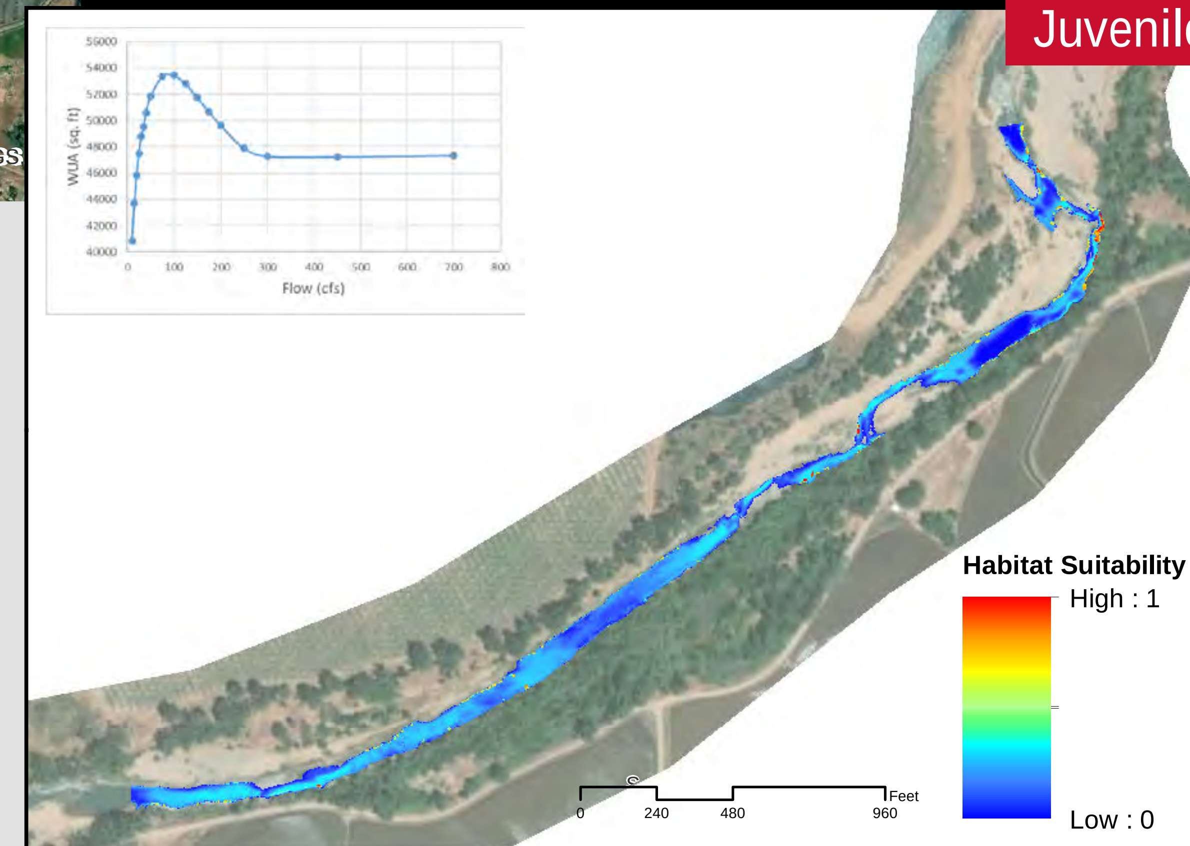
Upstream Study Site 20 cfs



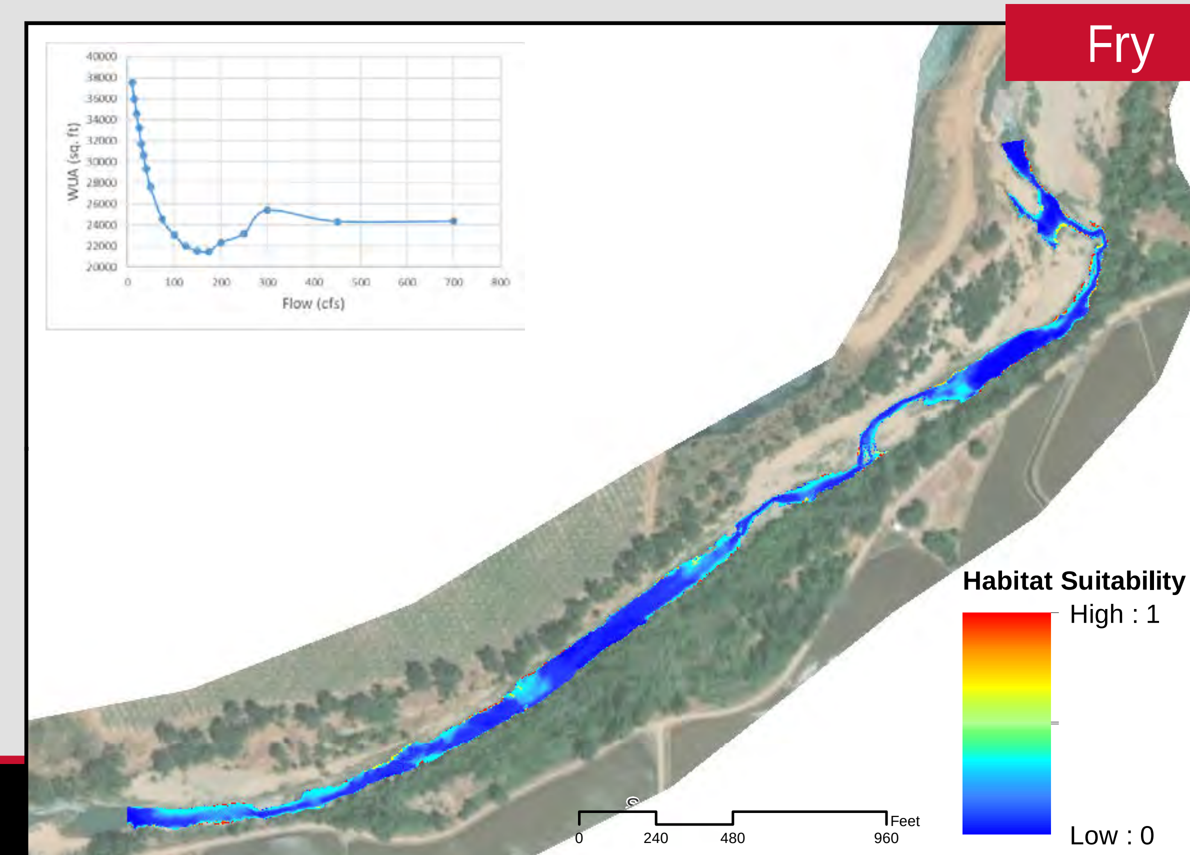
Spawning



Juvenile



Fry



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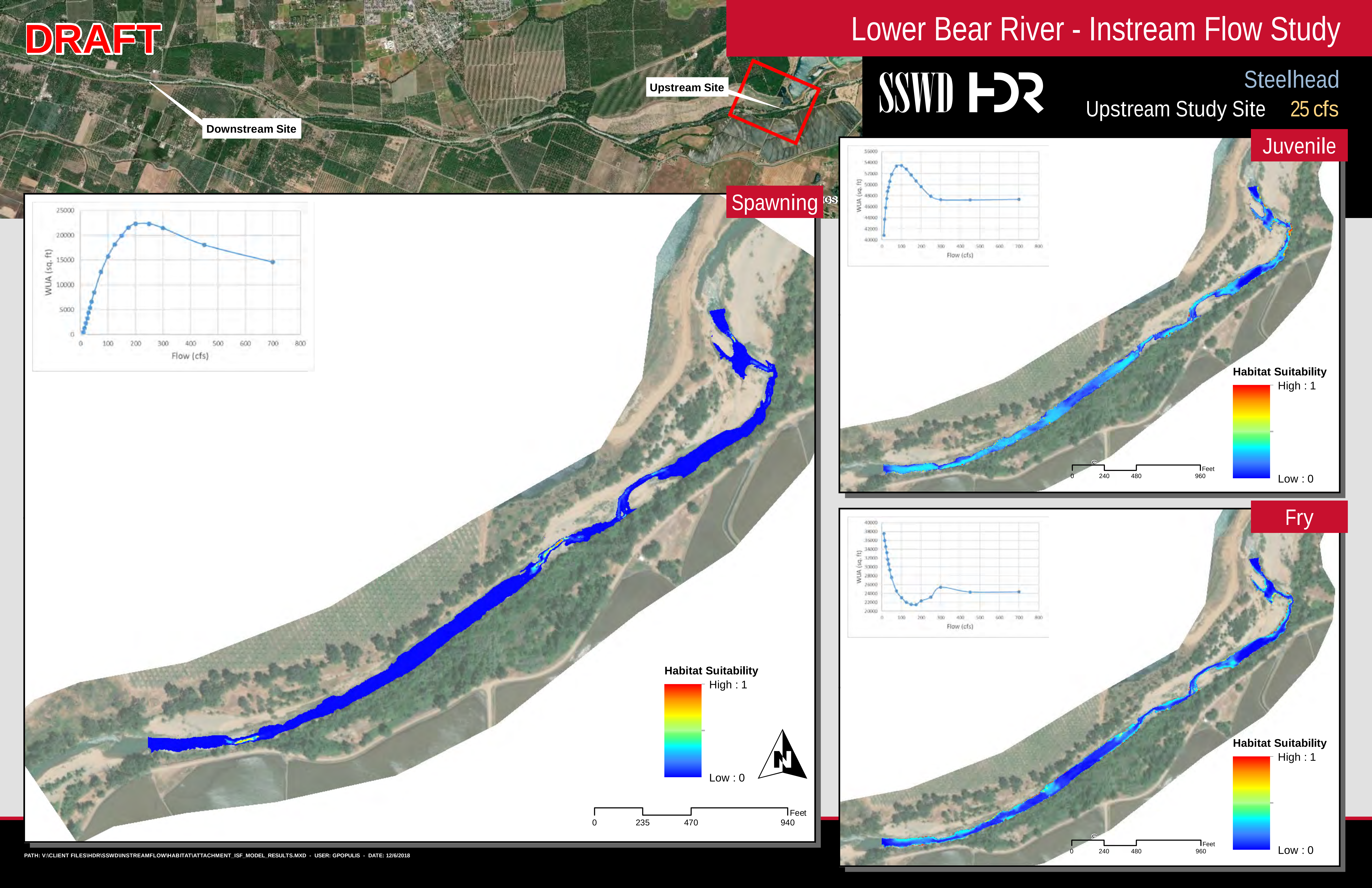
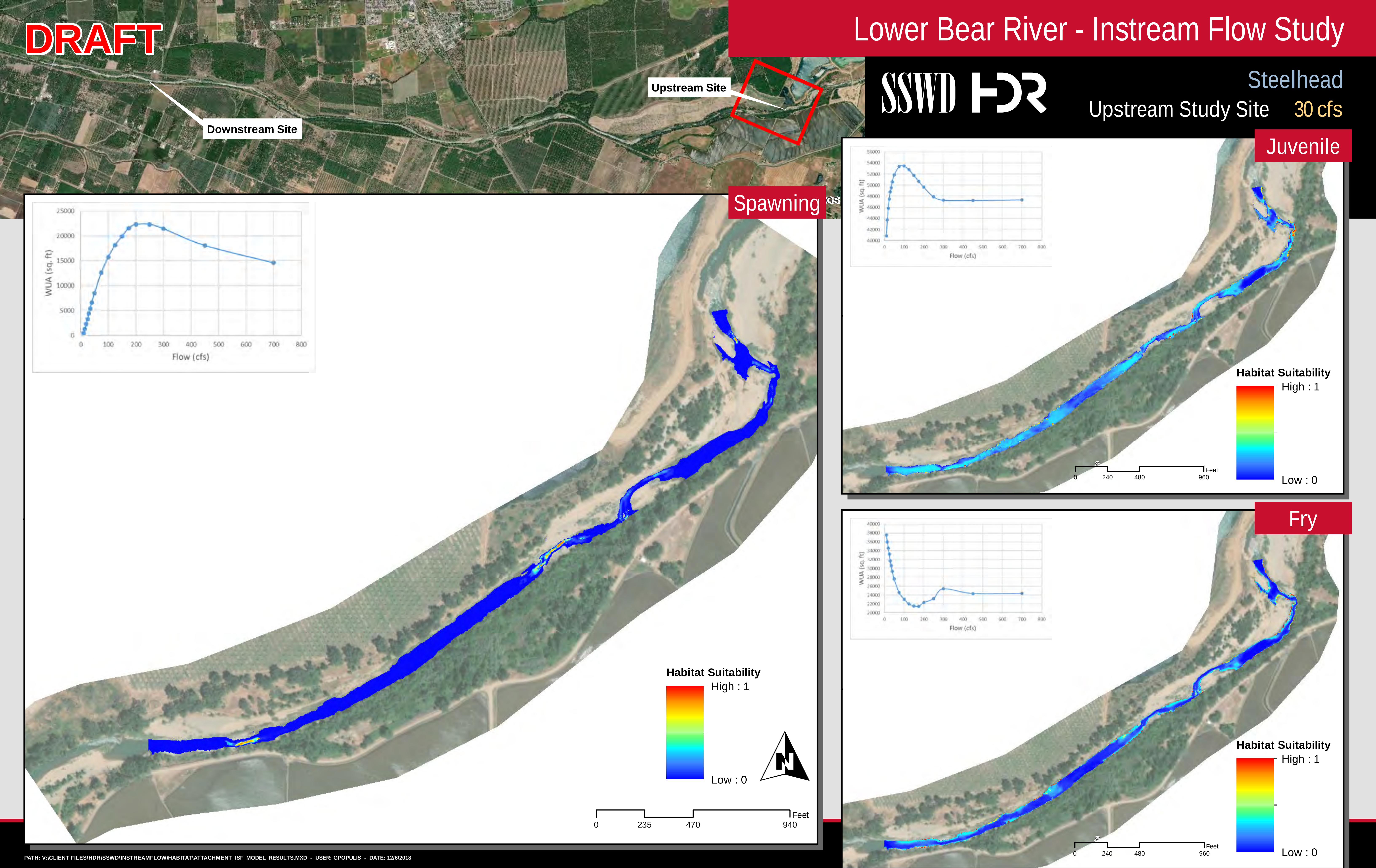

DRAFT
Lower Bear River - Instream Flow Study
SSWD
HDR
Steelhead
Upstream Study Site
25 cfs
Upstream Site
Downstream Site
Spawning
25000
20000
15000
10000
5000
0
WUA (sq. ft)
0
100
200
300
400
500
600
700
800
Flow (cfs)
Habitat Suitability
High : 1
Low : 0
N
0
235
470
940
Feet
Juvenile
WUA (sq. ft)
Flow (cfs)
Habitat Suitability
High : 1
Low : 0
0
240
480
960
Feet
Fry
WUA (sq. ft)
Flow (cfs)
Habitat Suitability
High : 1
Low : 0
0
240
480
960
Feet
PATH: V:\CLIENT FILES\HDR\SSWD\INSTREAMFLOW\HABITAT\ATTACHMENT_ISF_MODEL_RESULTS.MXD - USER: GPOPULIS - DATE: 12/6/2018



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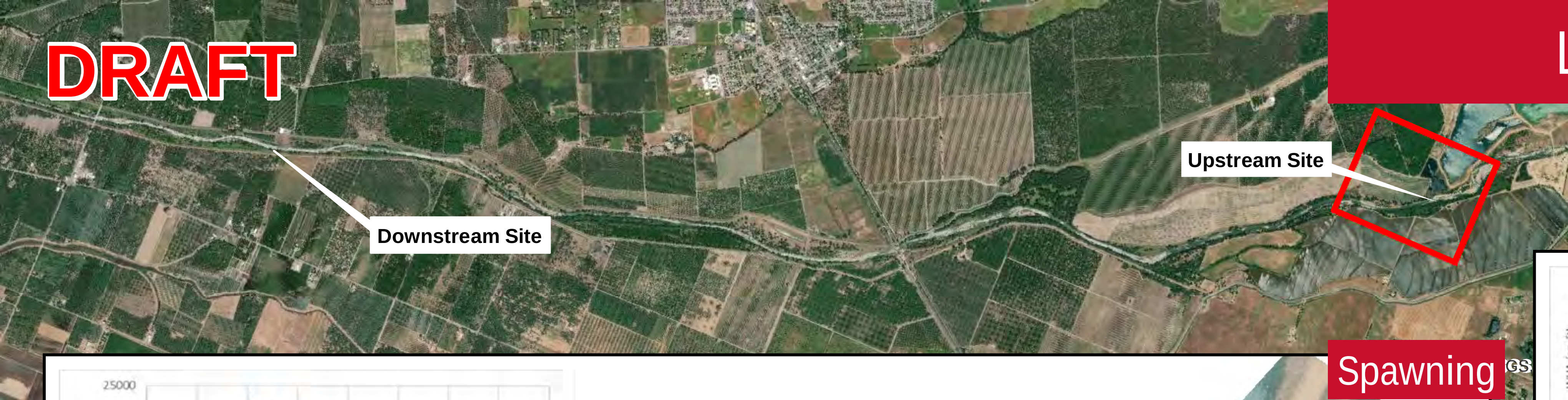
Lower Bear River - Instream Flow Study

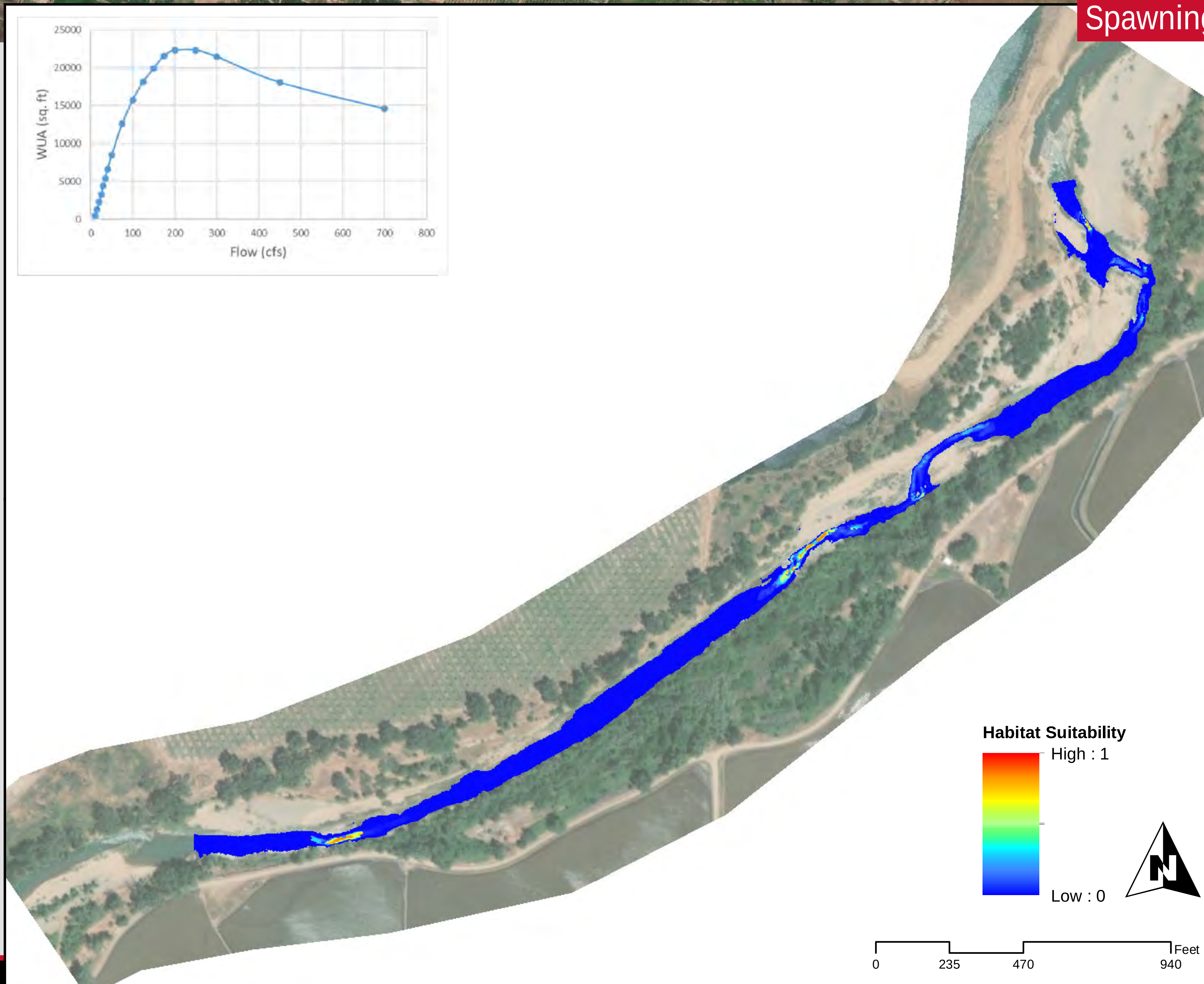
SSWD HDR

Steelhead

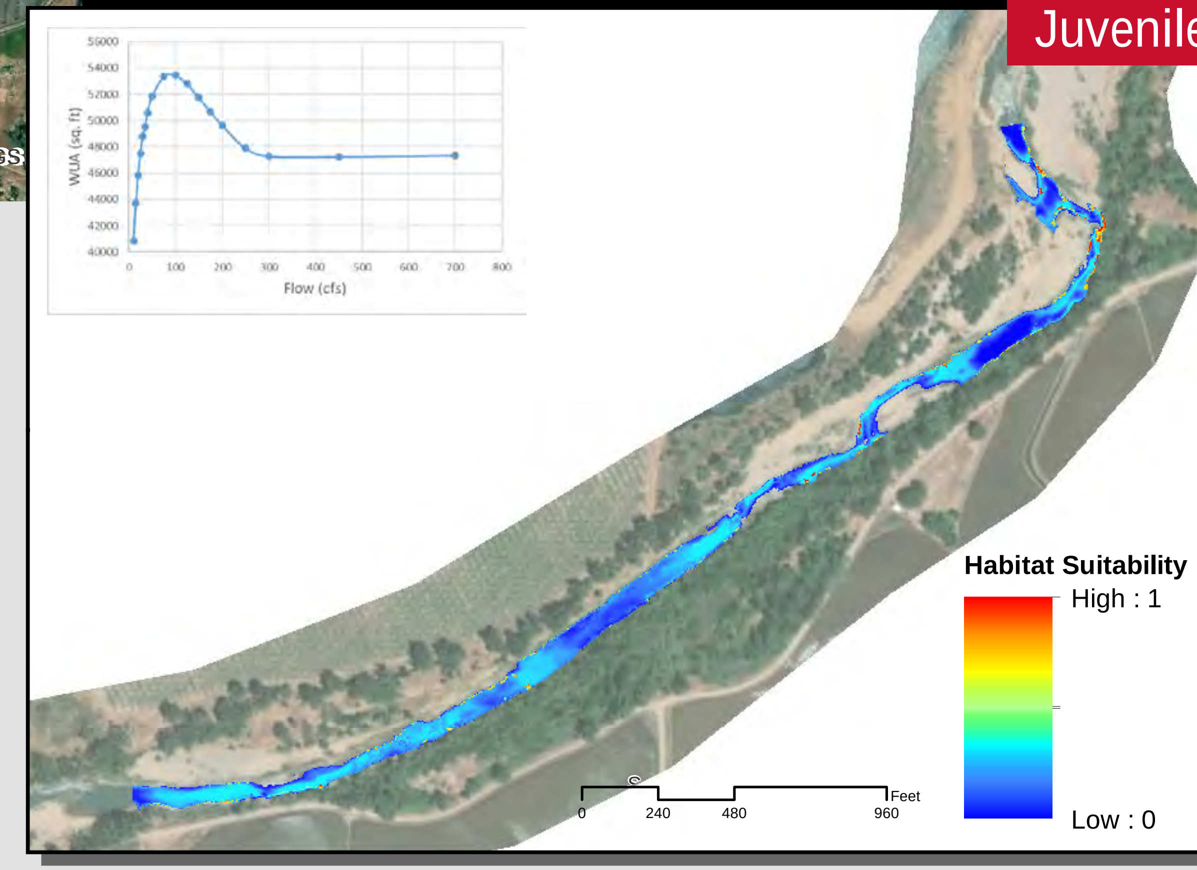
Upstream Study Site 35 cfs



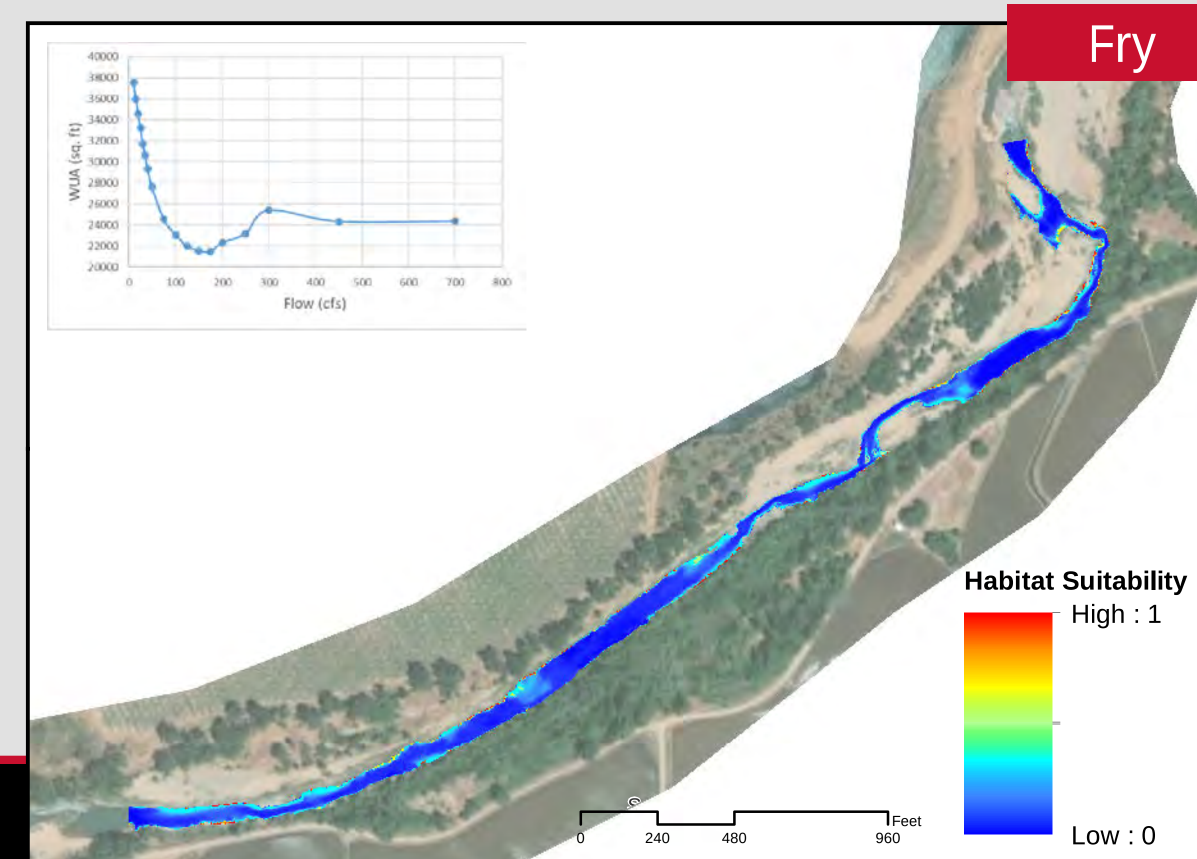
Spawning



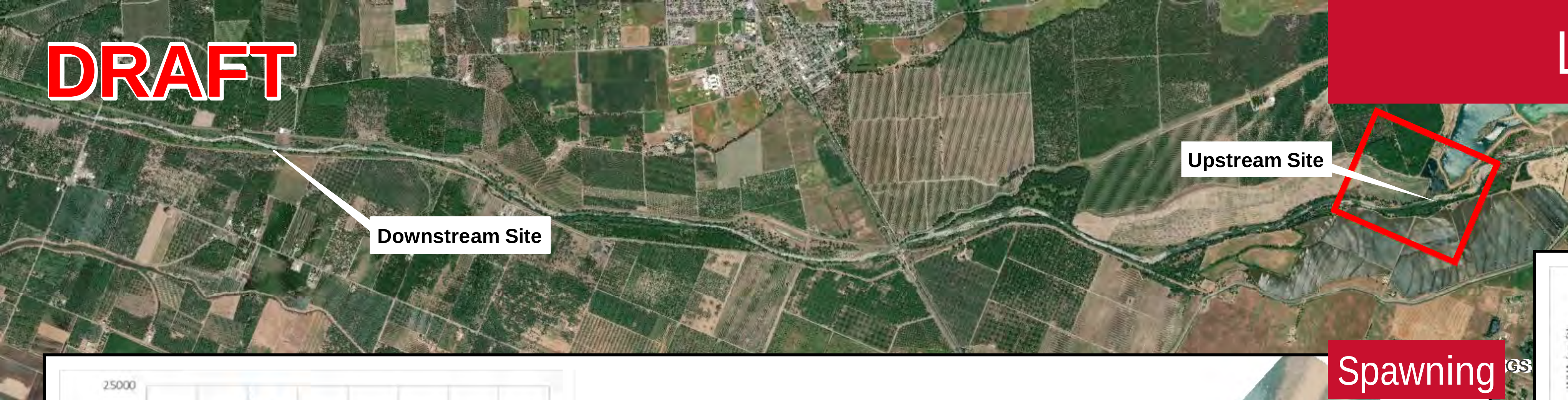
Juvenile



Fry

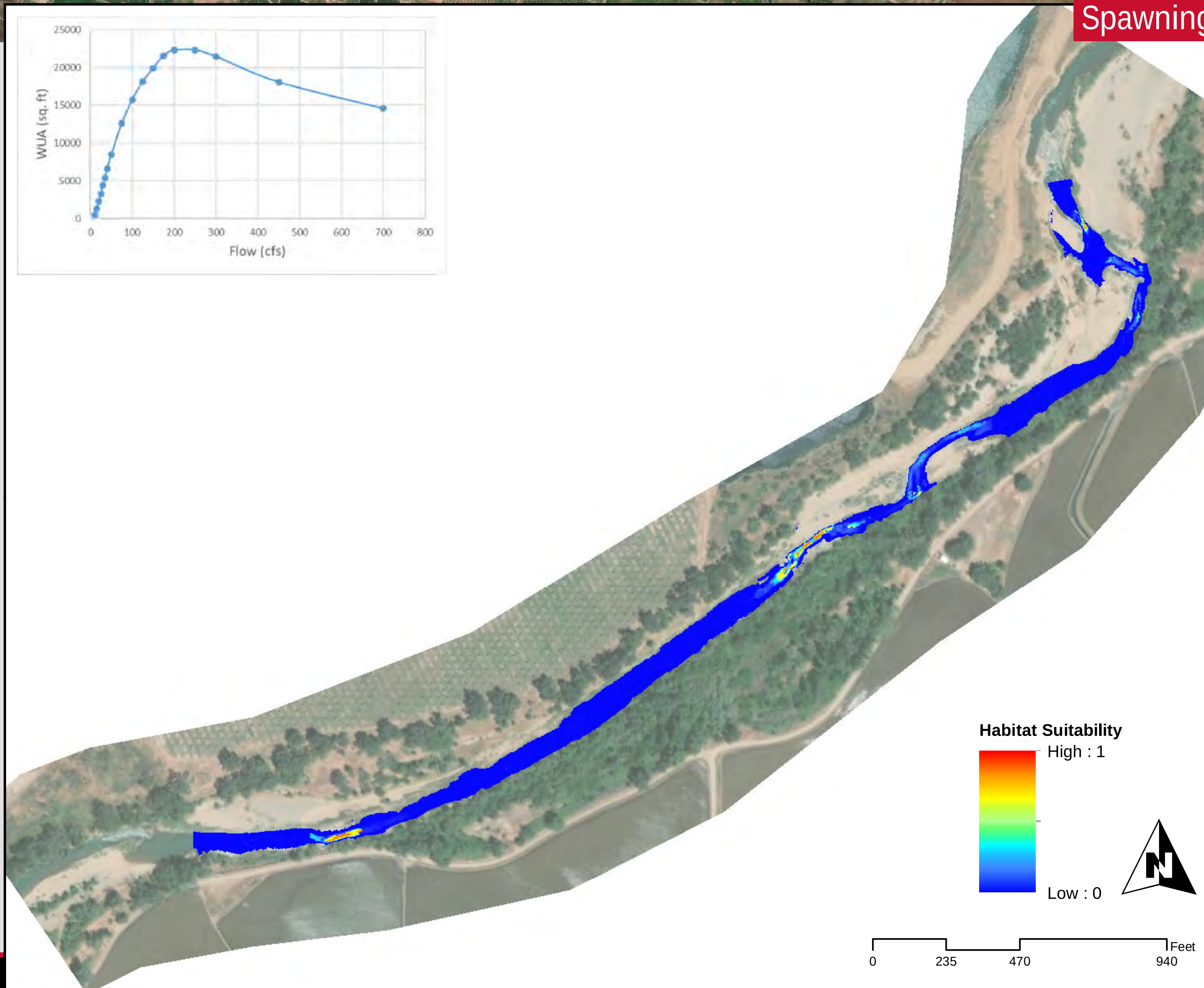


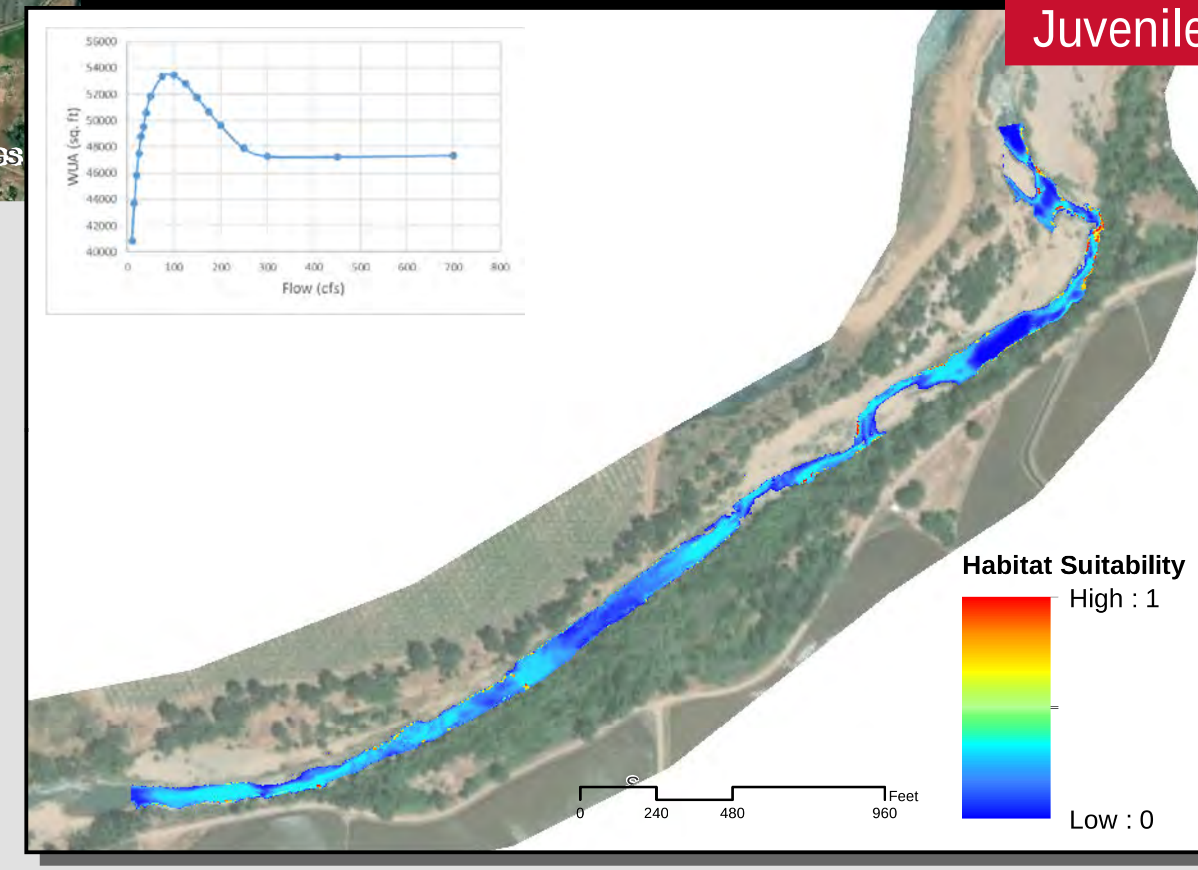
Lower Bear River - Instream Flow Study

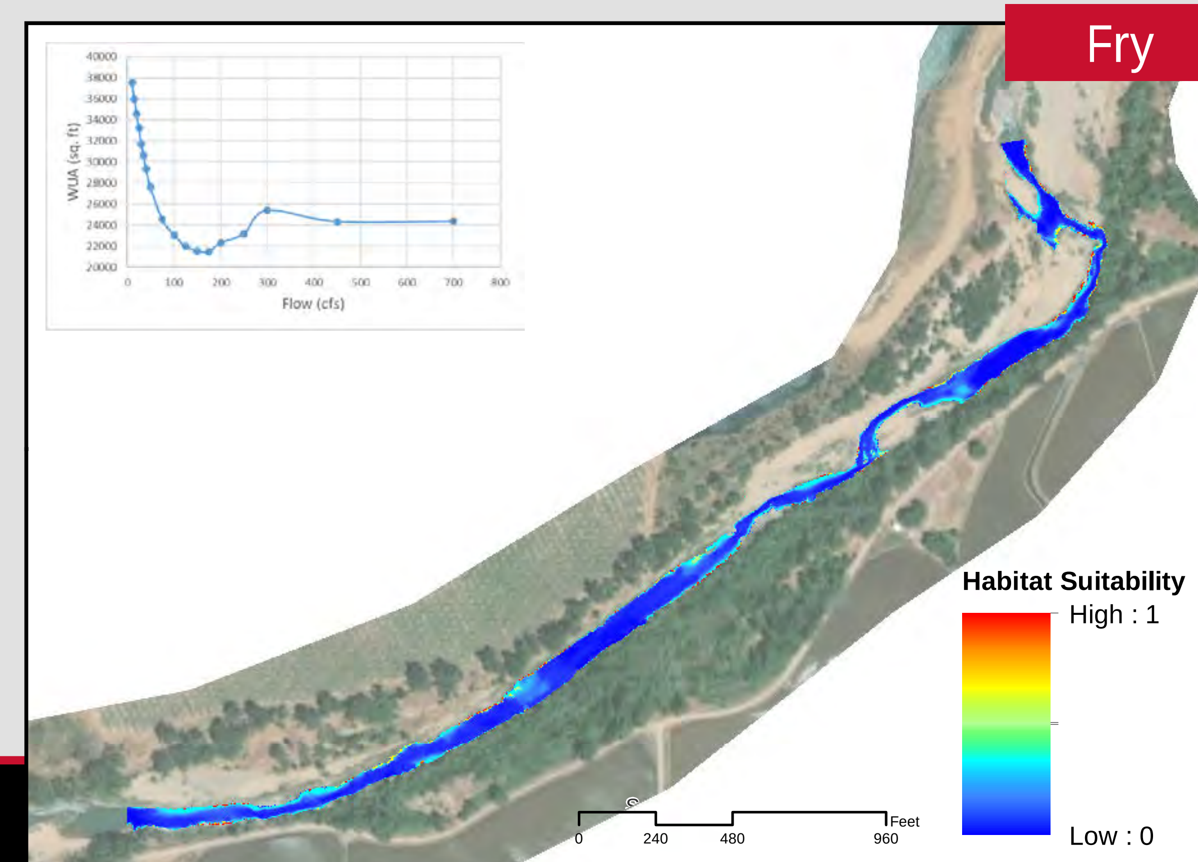


Steelhead

Upstream Study Site 40 cfs







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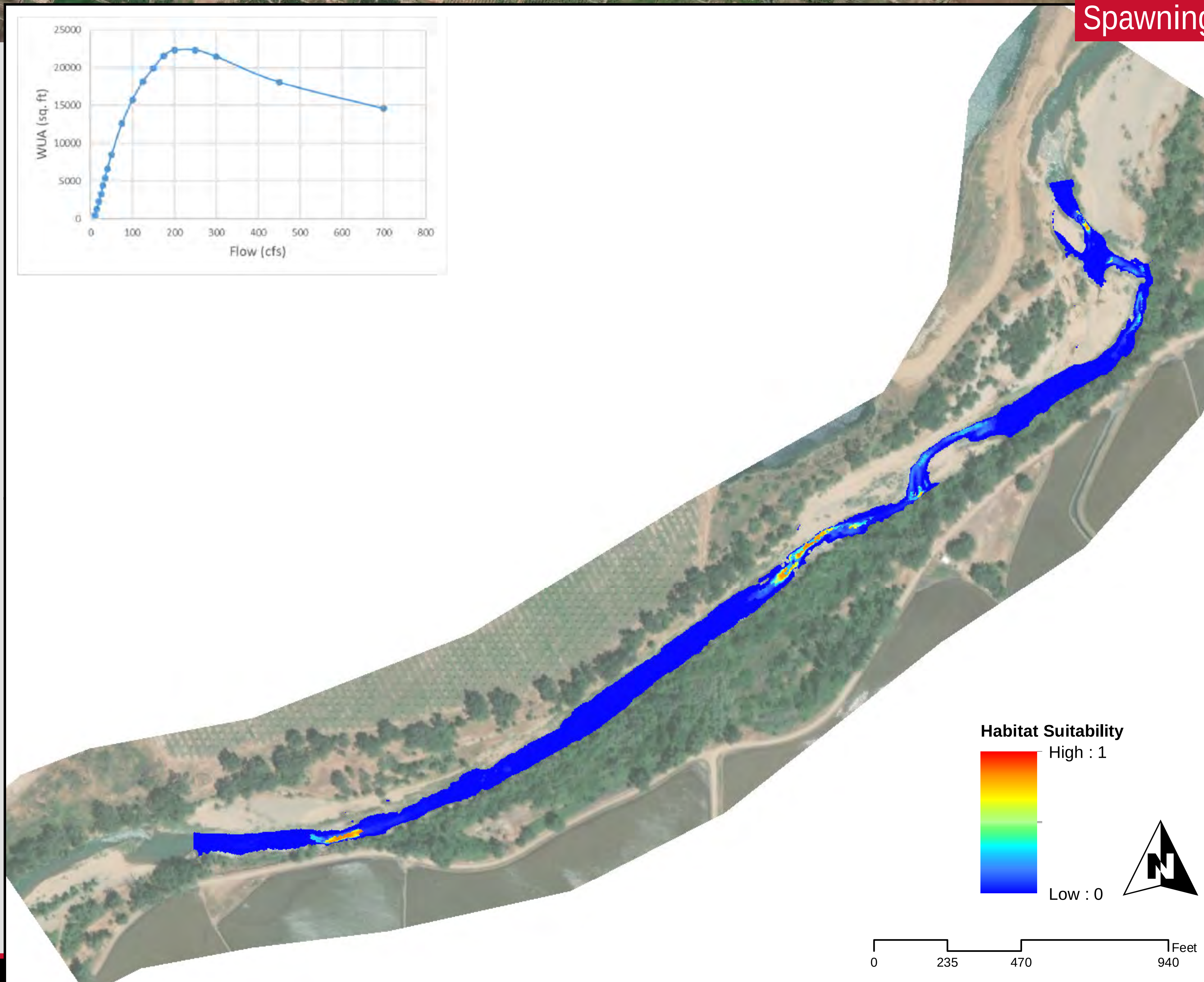
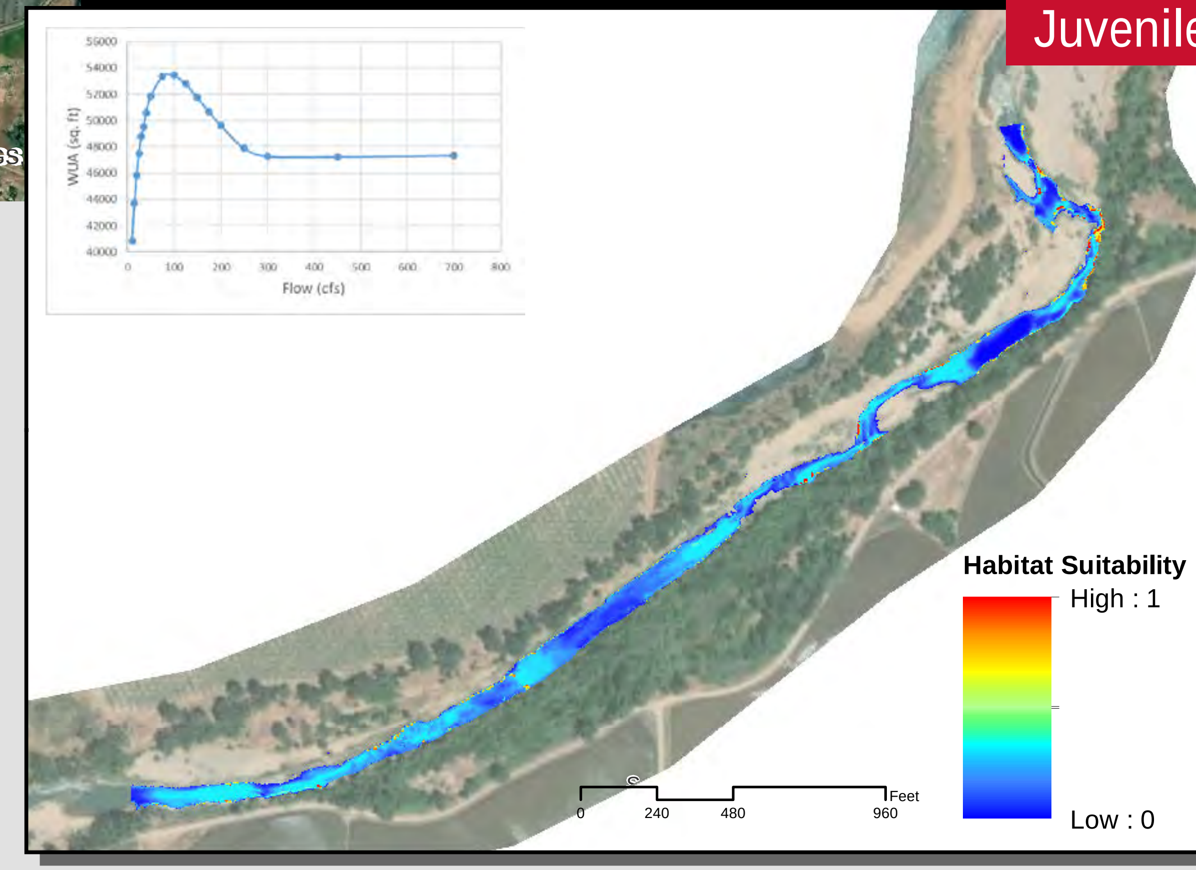
Lower Bear River - Instream Flow Study

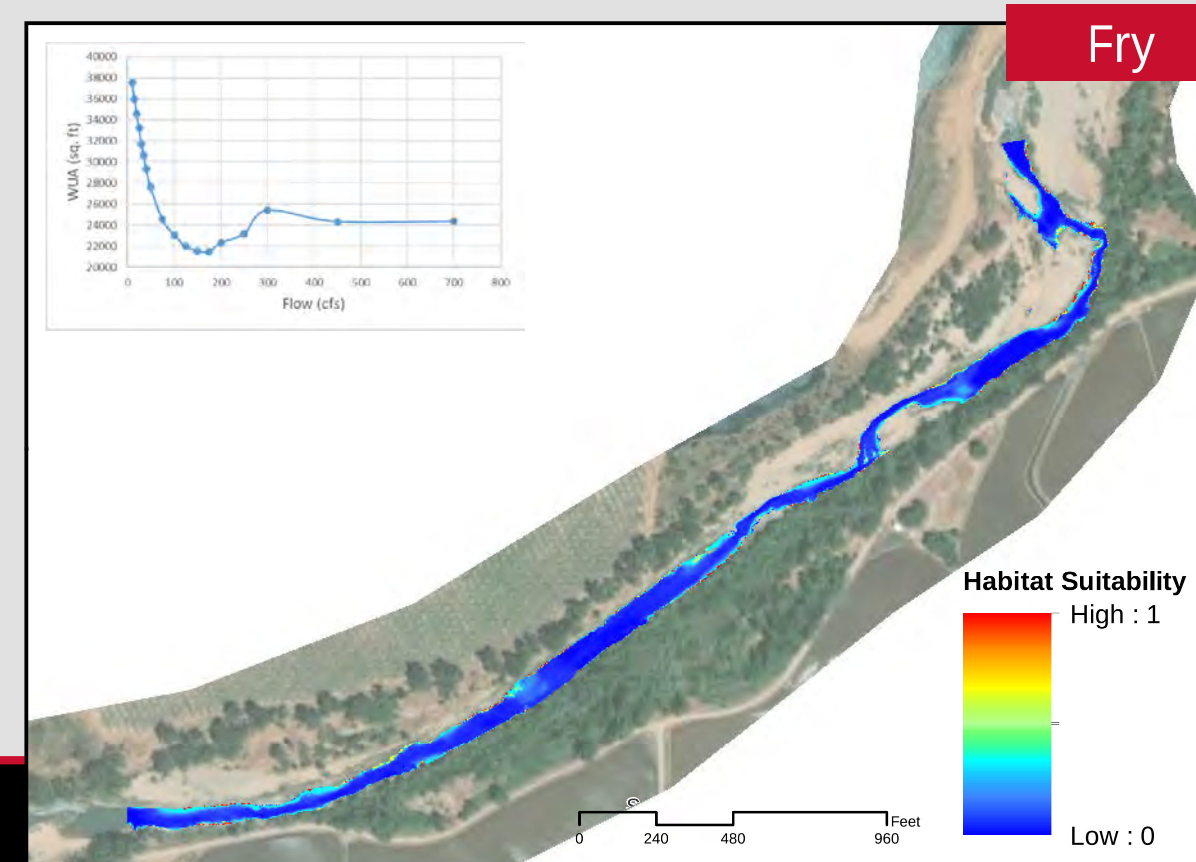
SSWD HDR

Steelhead

Upstream Study Site 50 cfs



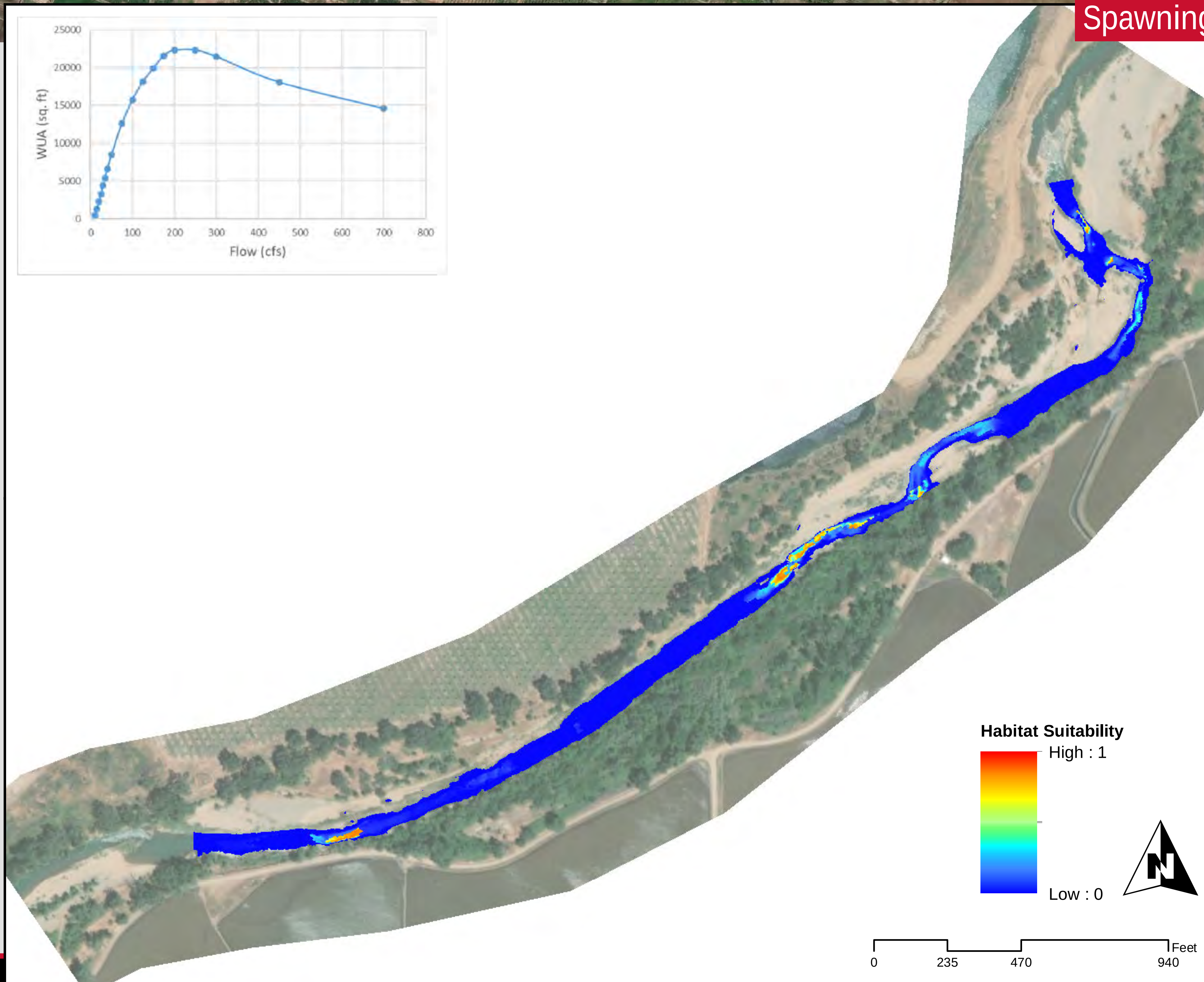


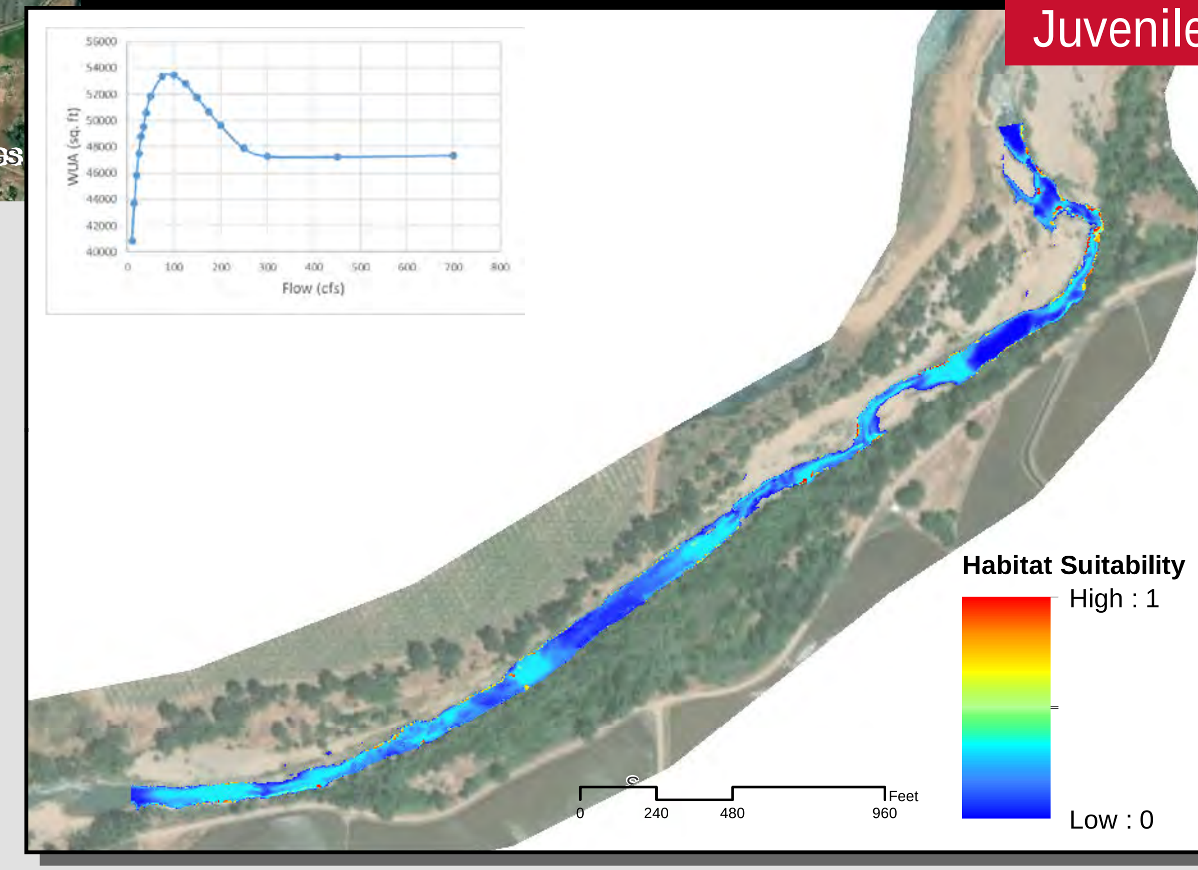


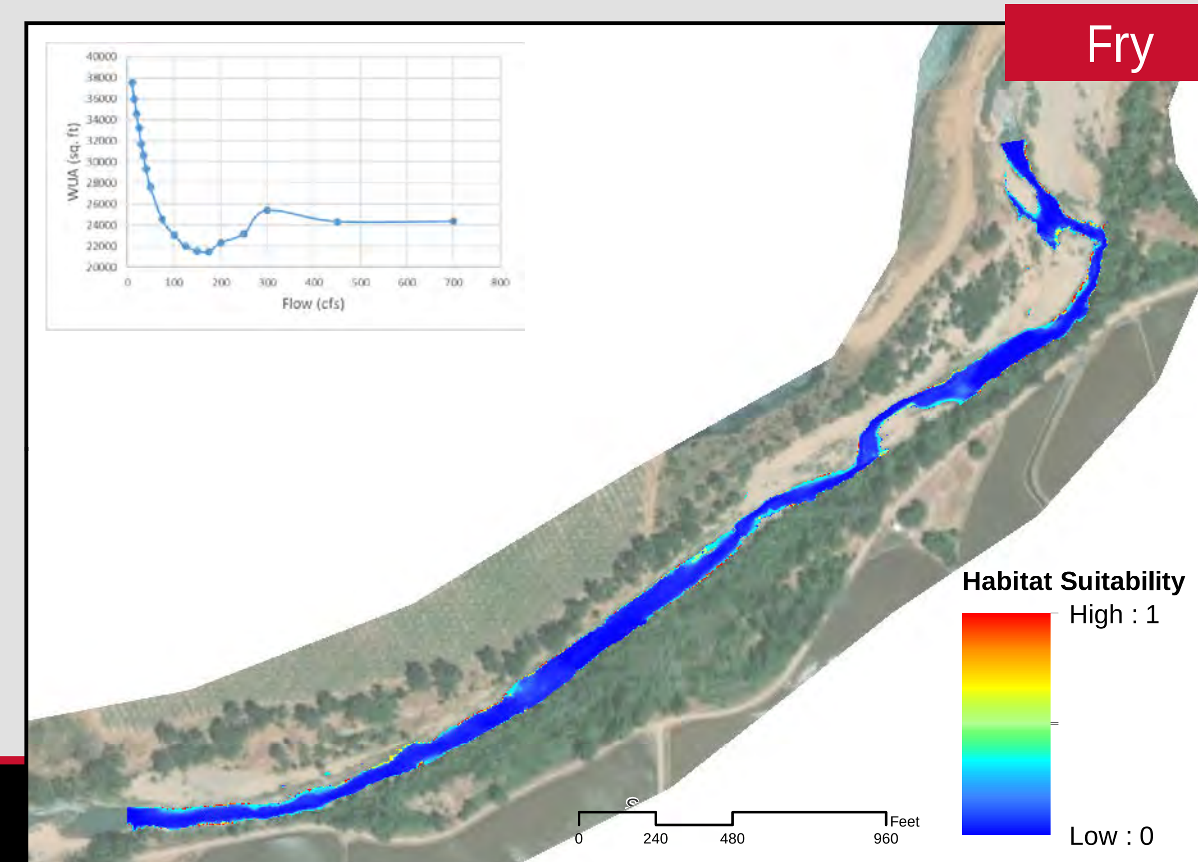
Lower Bear River - Instream Flow Study

Steelhead

Upstream Study Site 75 cfs





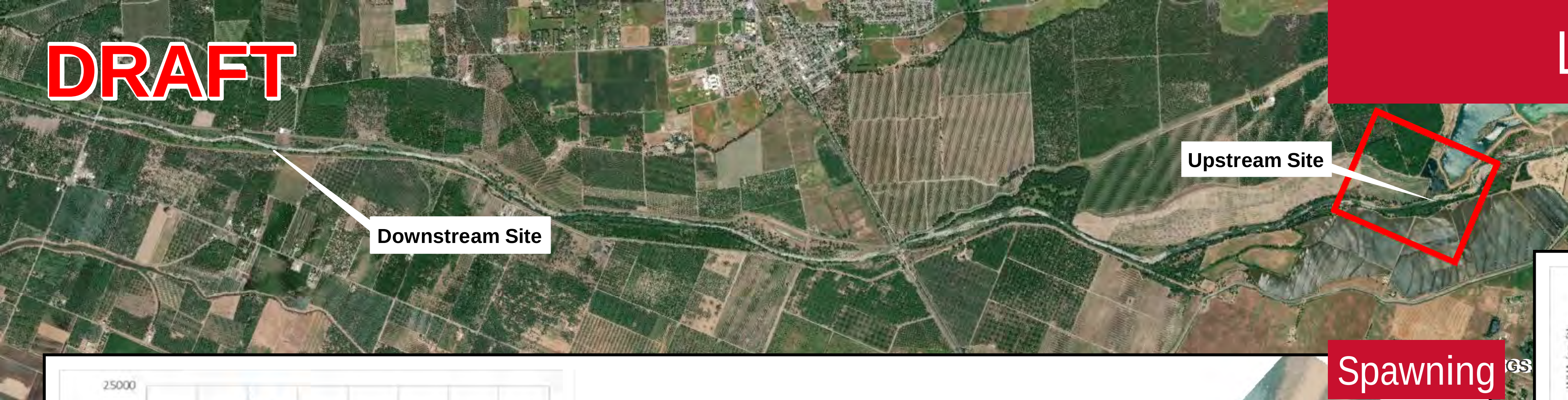


DRAFT

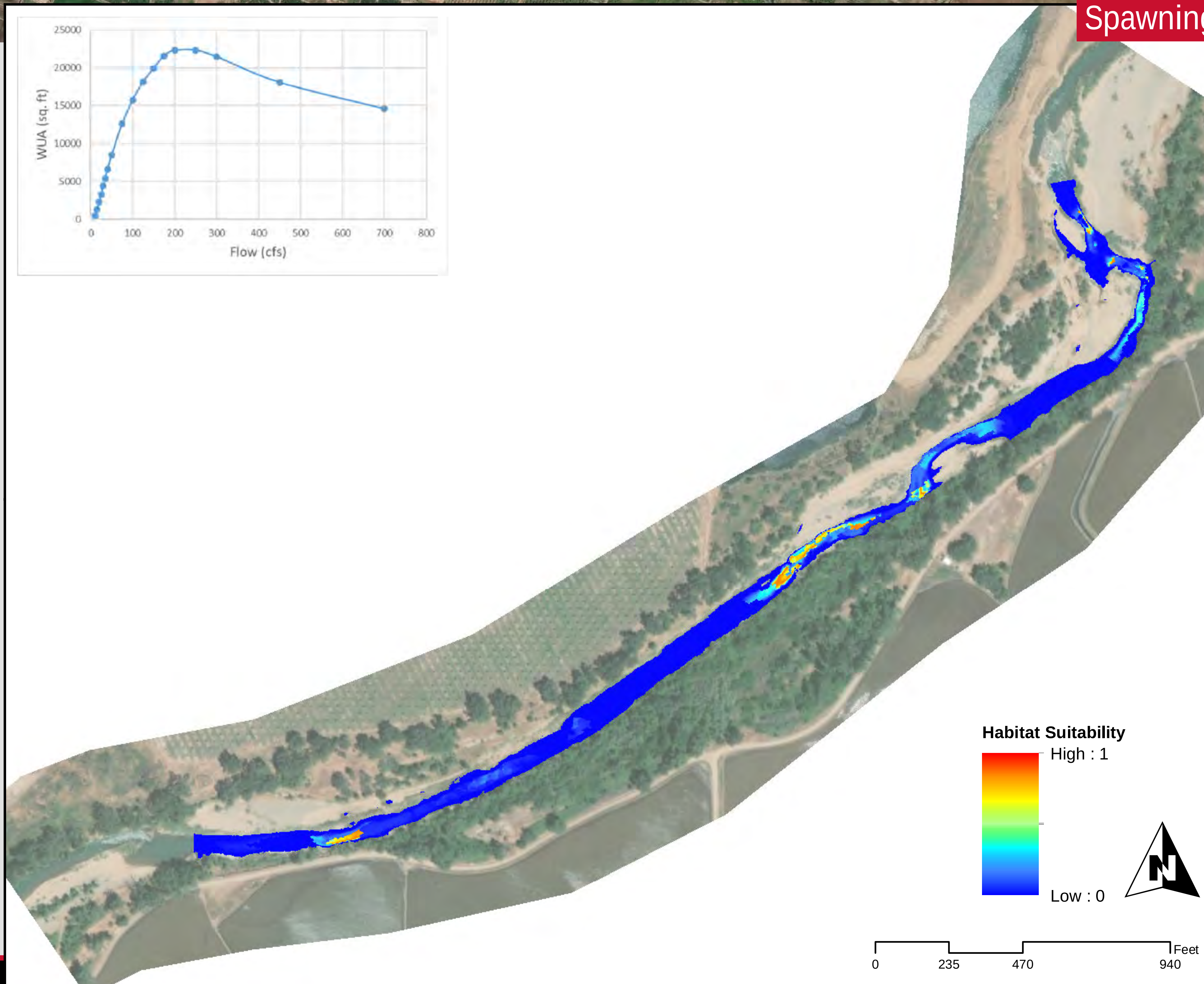
Lower Bear River - Instream Flow Study

Steelhead

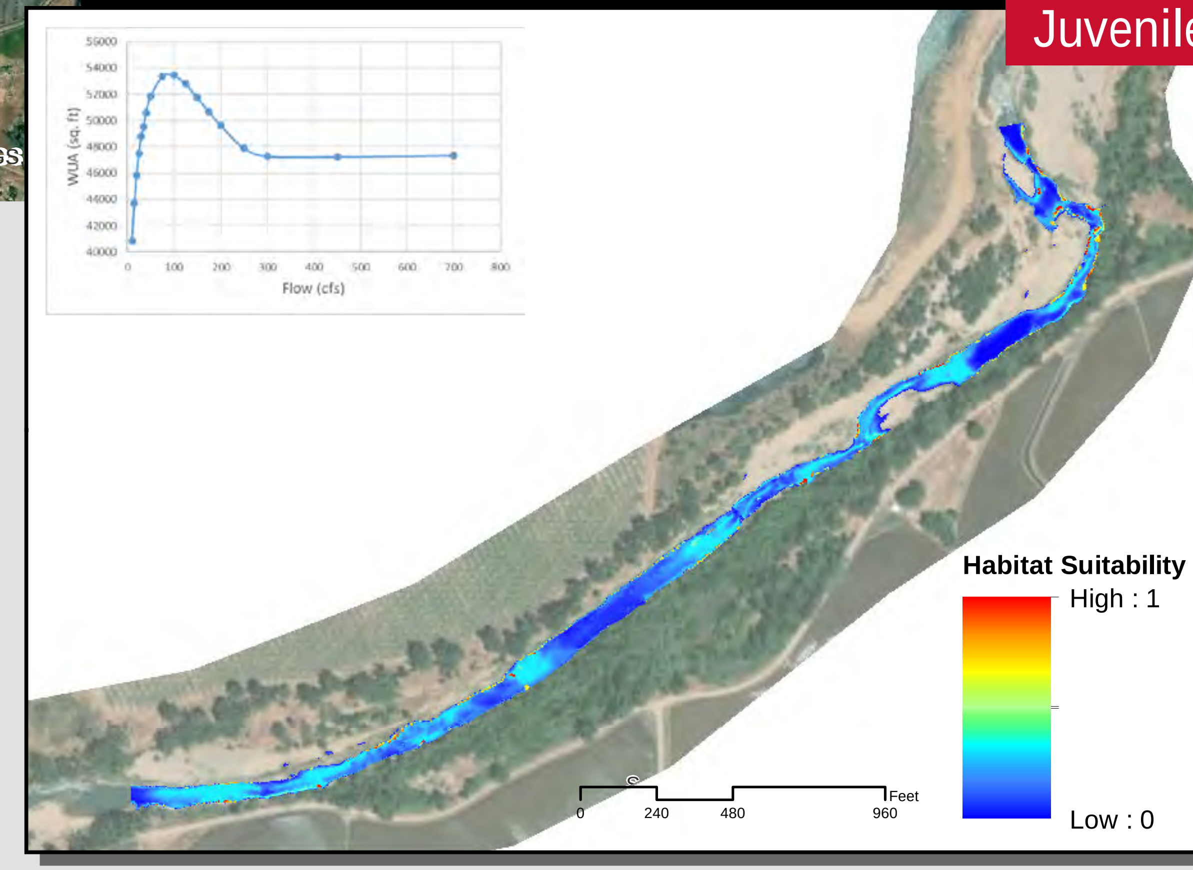
Upstream Study Site 100 cfs



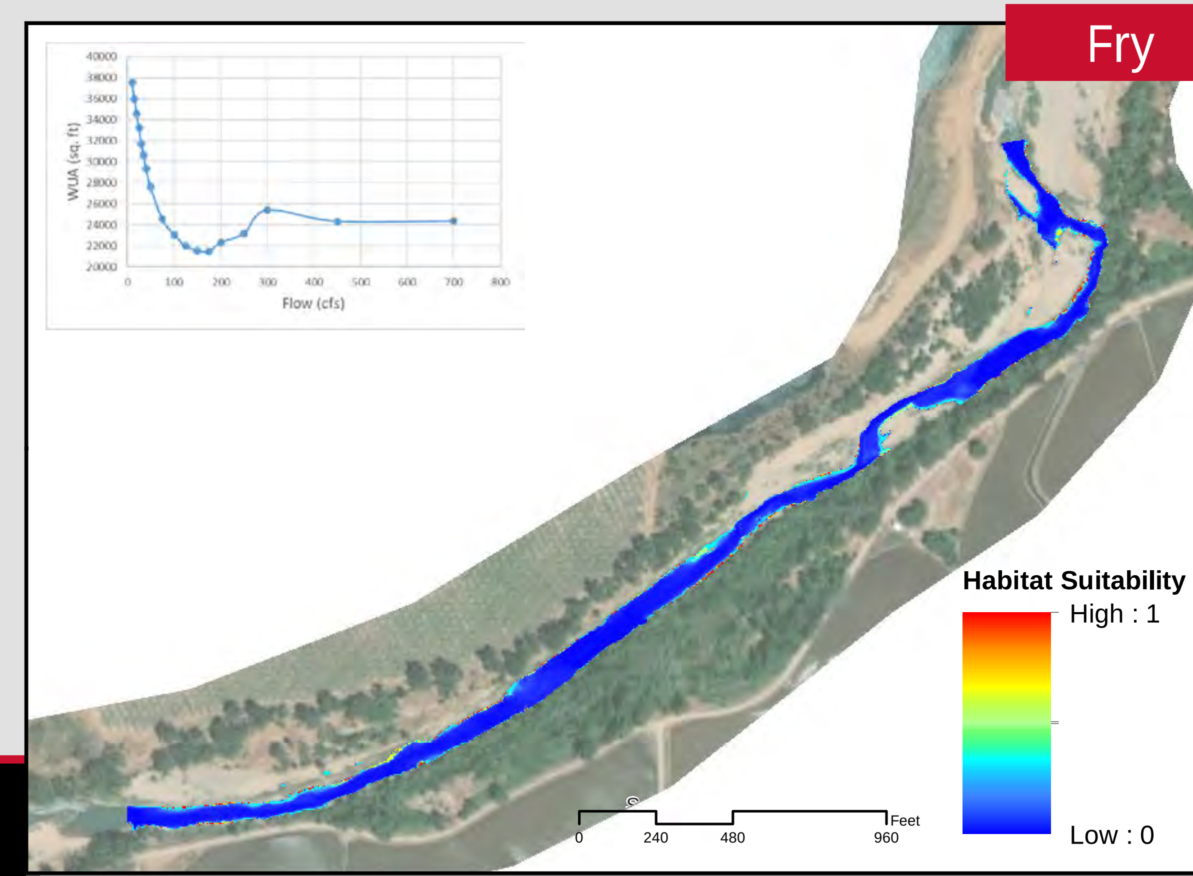
Spawning

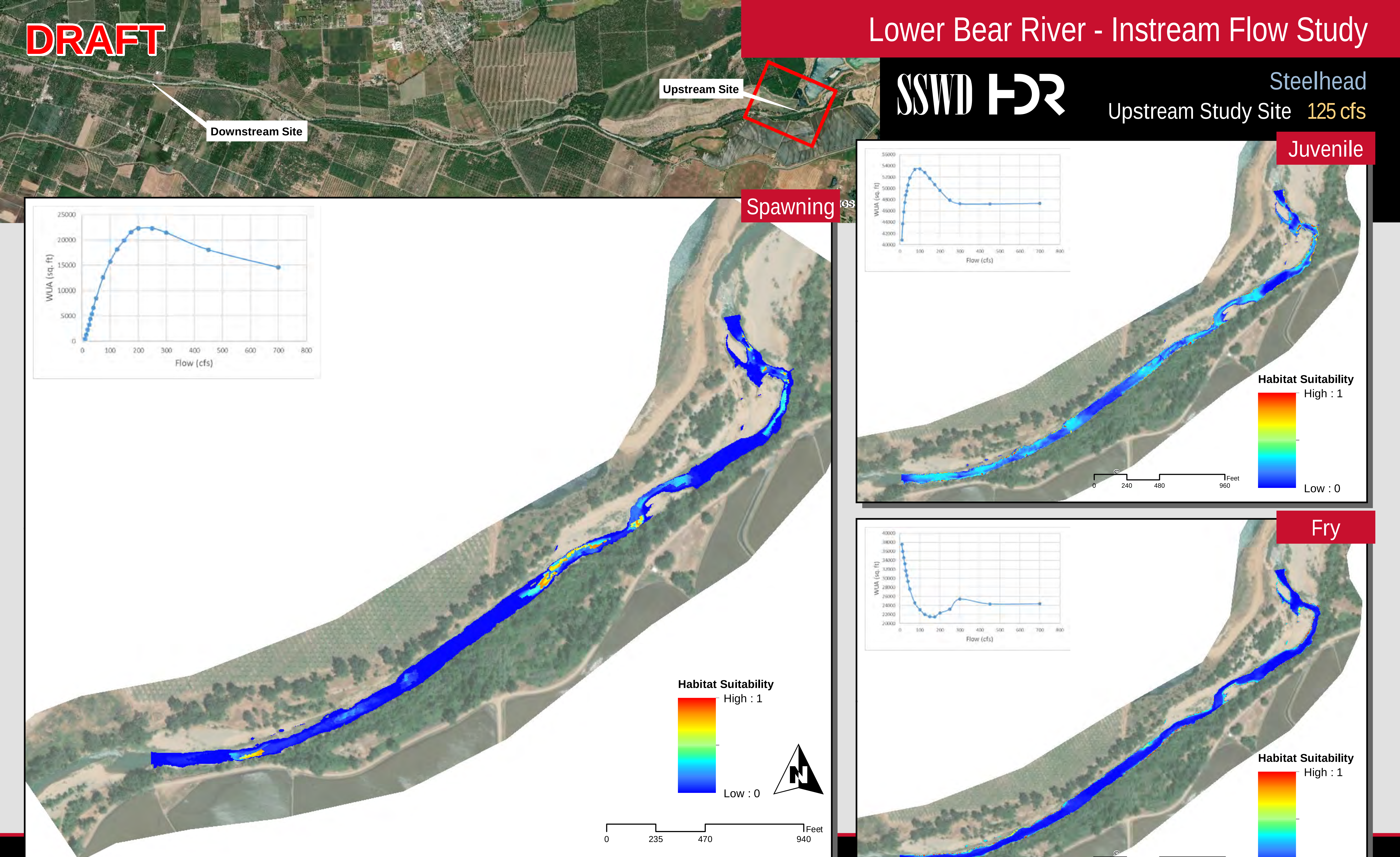


Juvenile



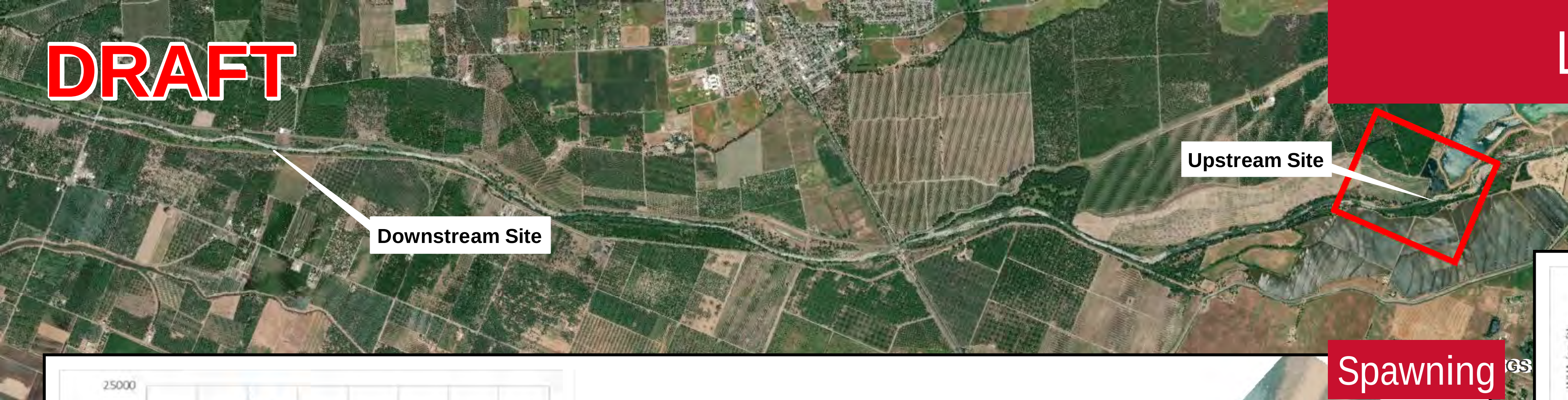
Fry





PATH: V:\CLIENT FILES\HDR\SSWD\INSTREAMFLOW\HABITAT\ATTACHMENT_ISF_MODEL_RESULTS.MXD - USER: GPOPULIS - DATE: 12/6/2018

Lower Bear River - Instream Flow Study

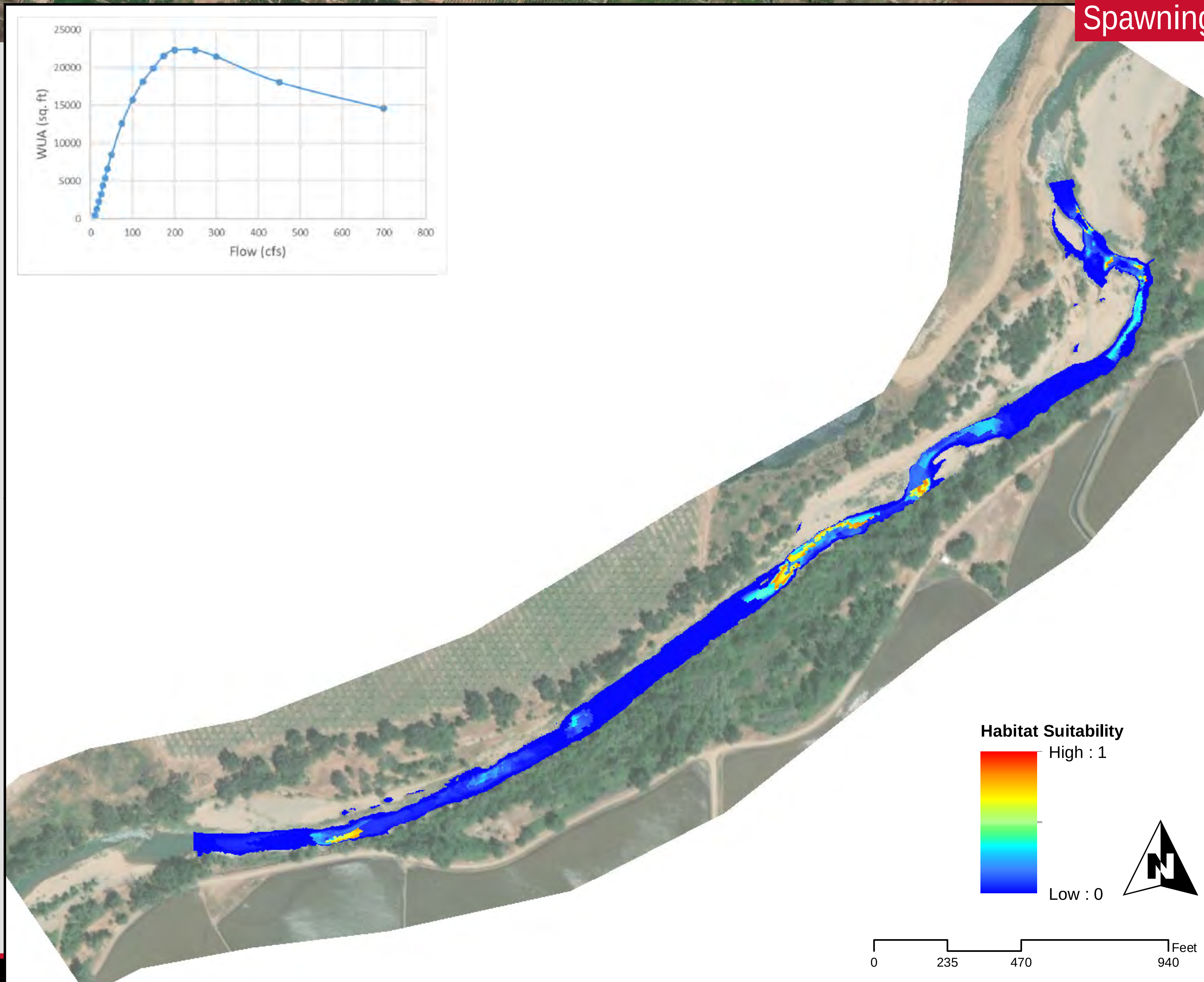


SSWD HDR

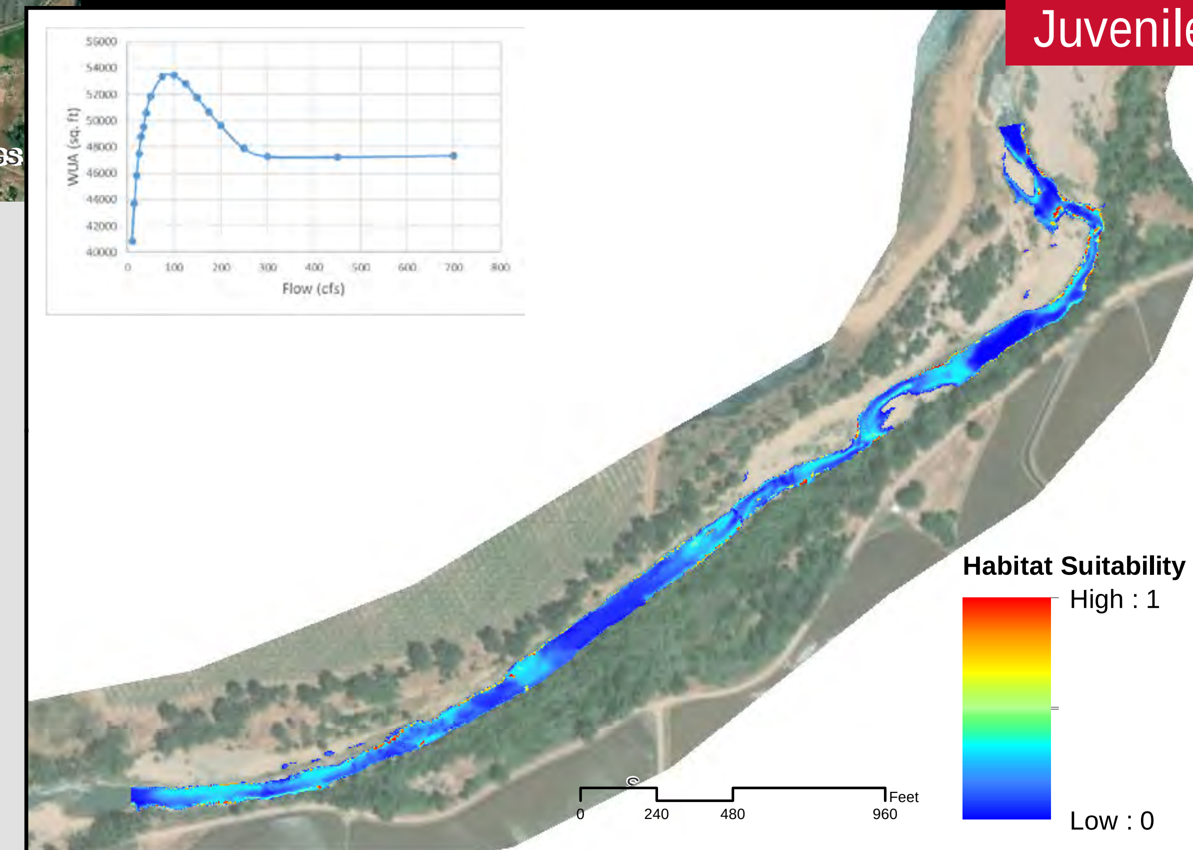
Steelhead

Upstream Study Site 150 cfs

Spawning



Juvenile



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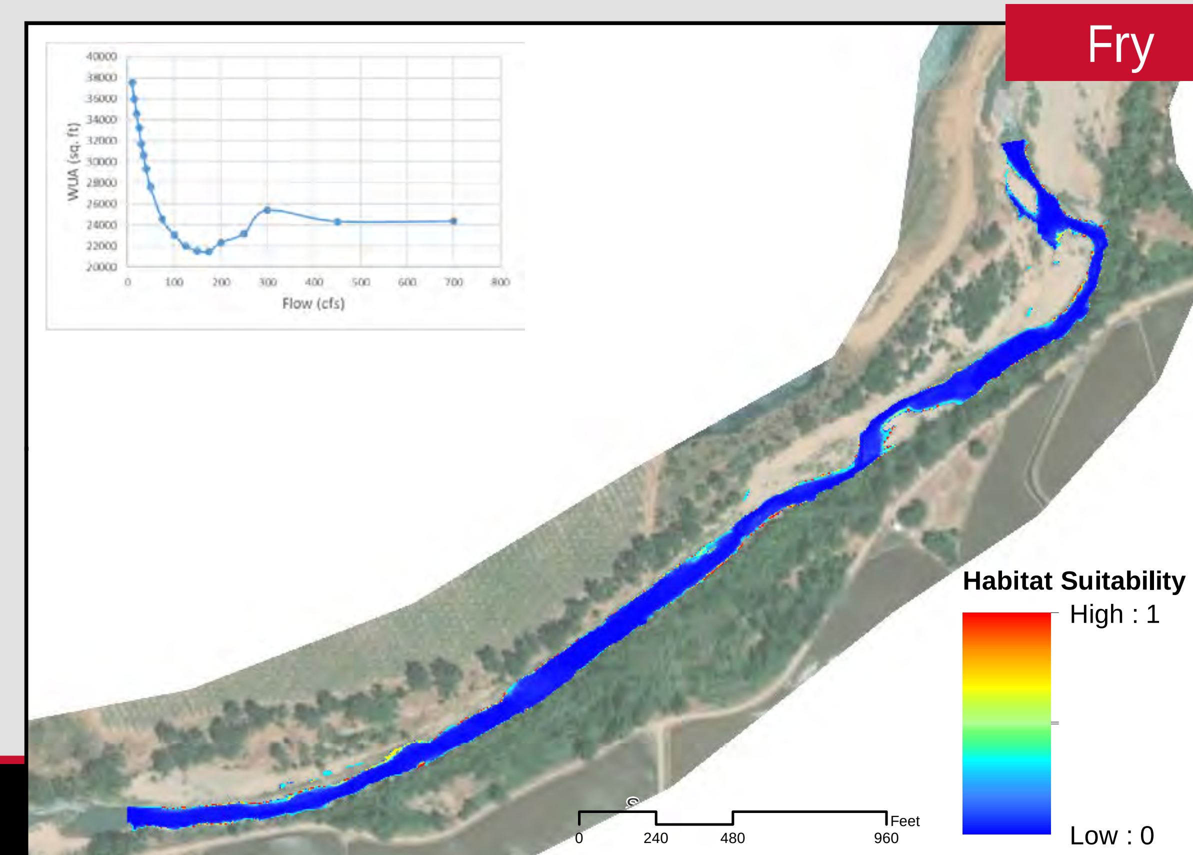


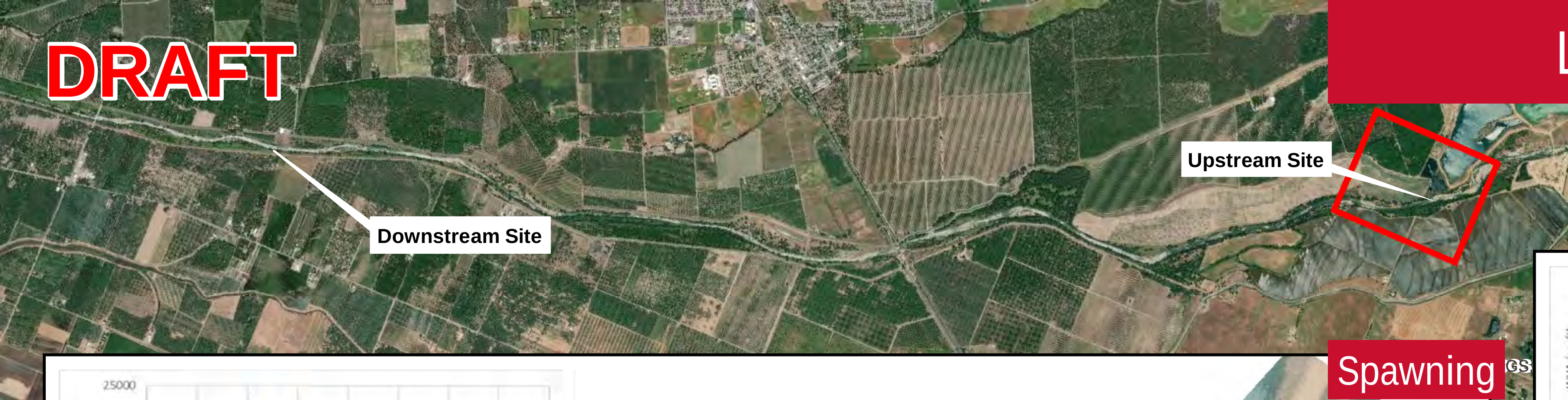
Lower Bear River - Instream Flow Study

SSWD HDR

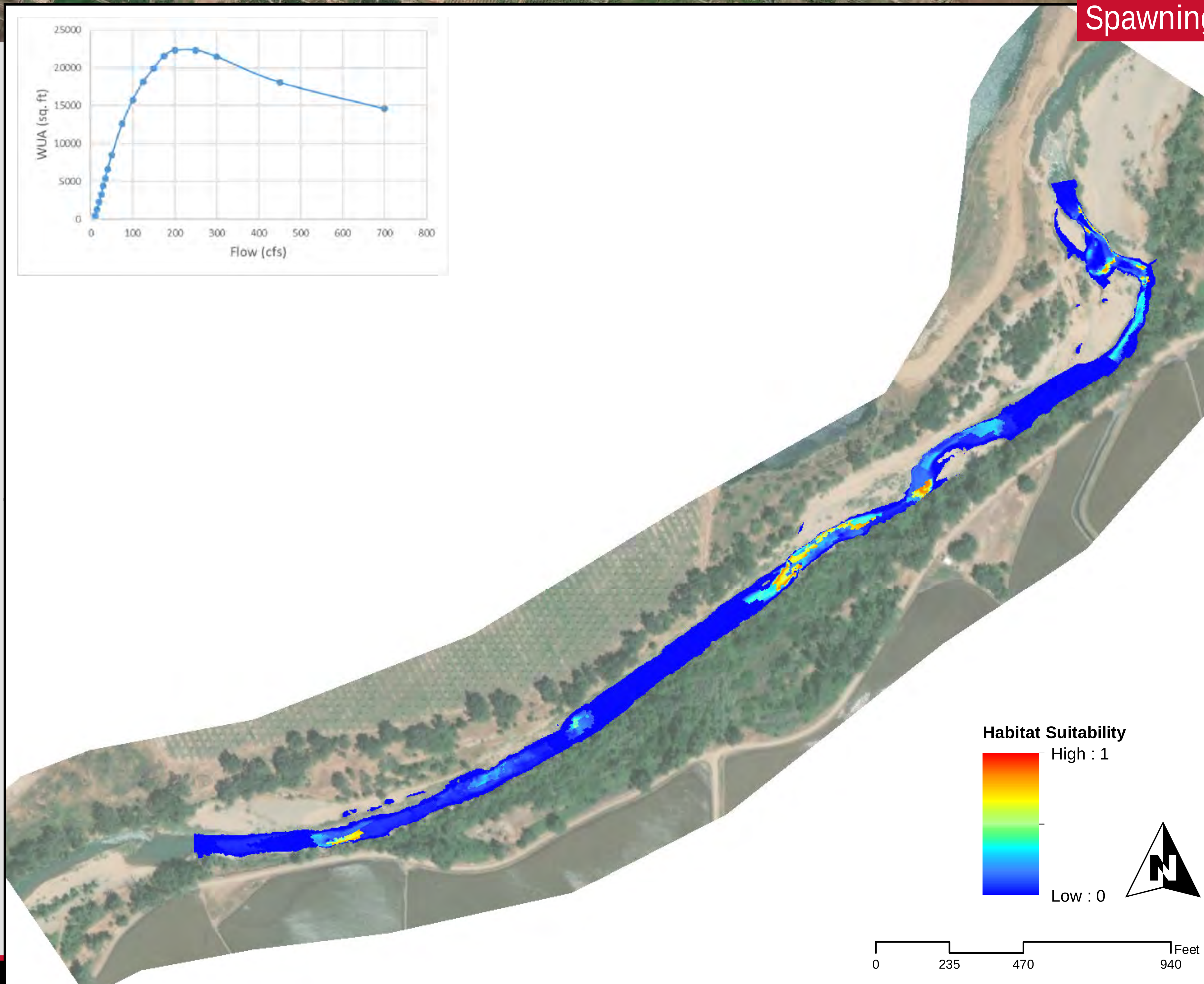
Steelhead

Upstream Study Site 175 cfs

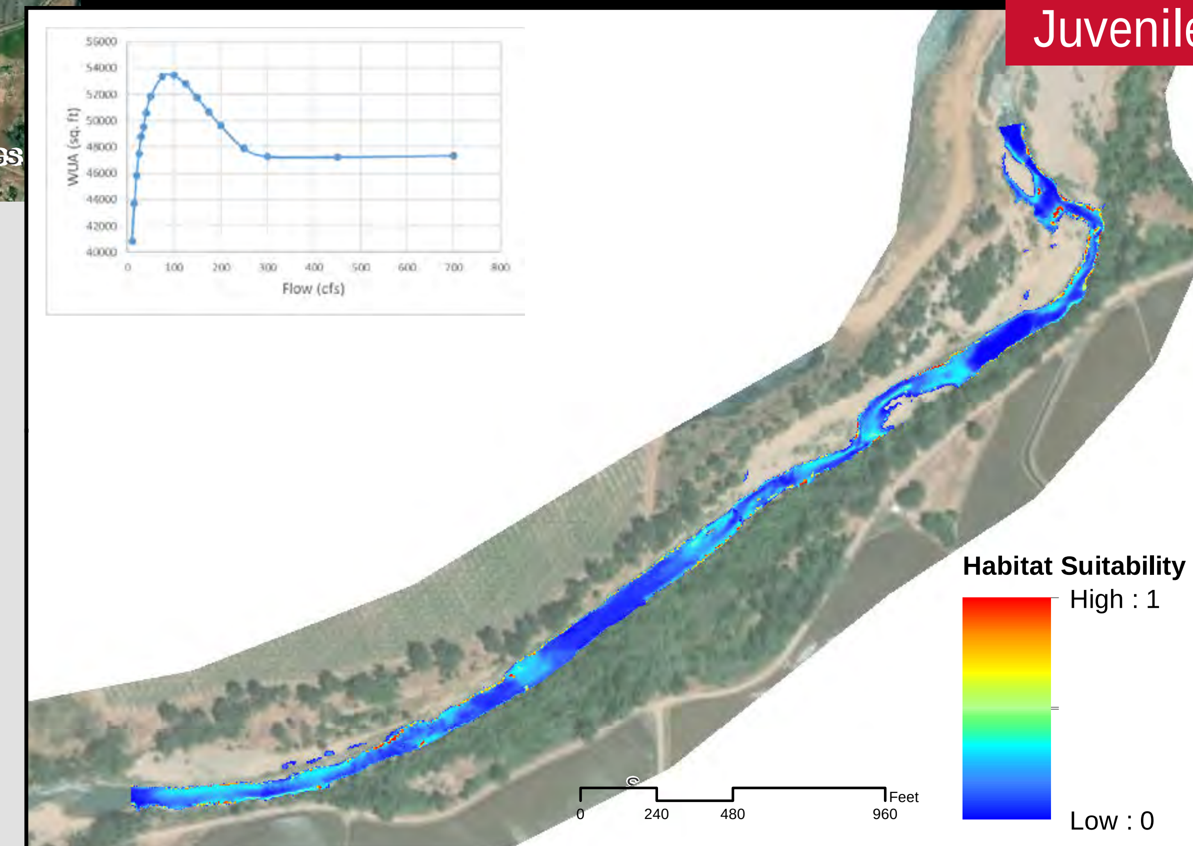
DRAFT



Spawning



Juvenile



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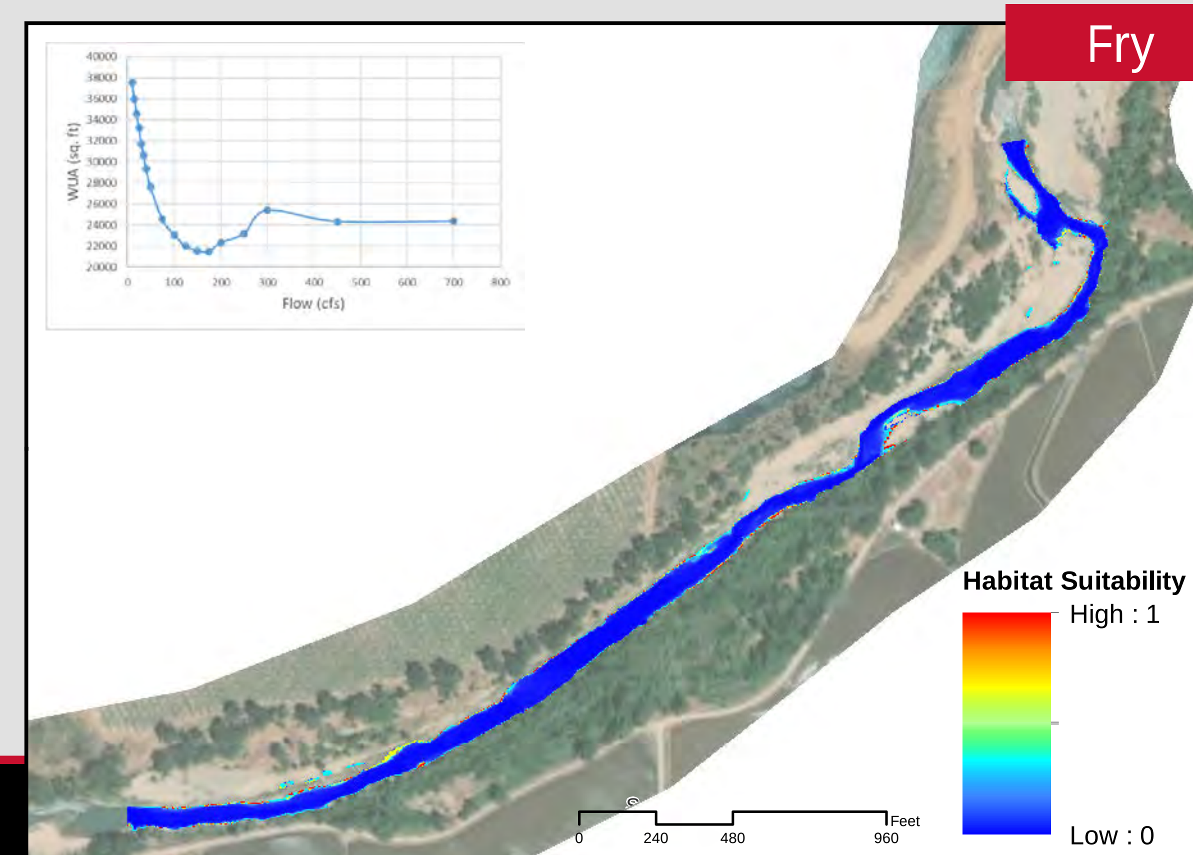
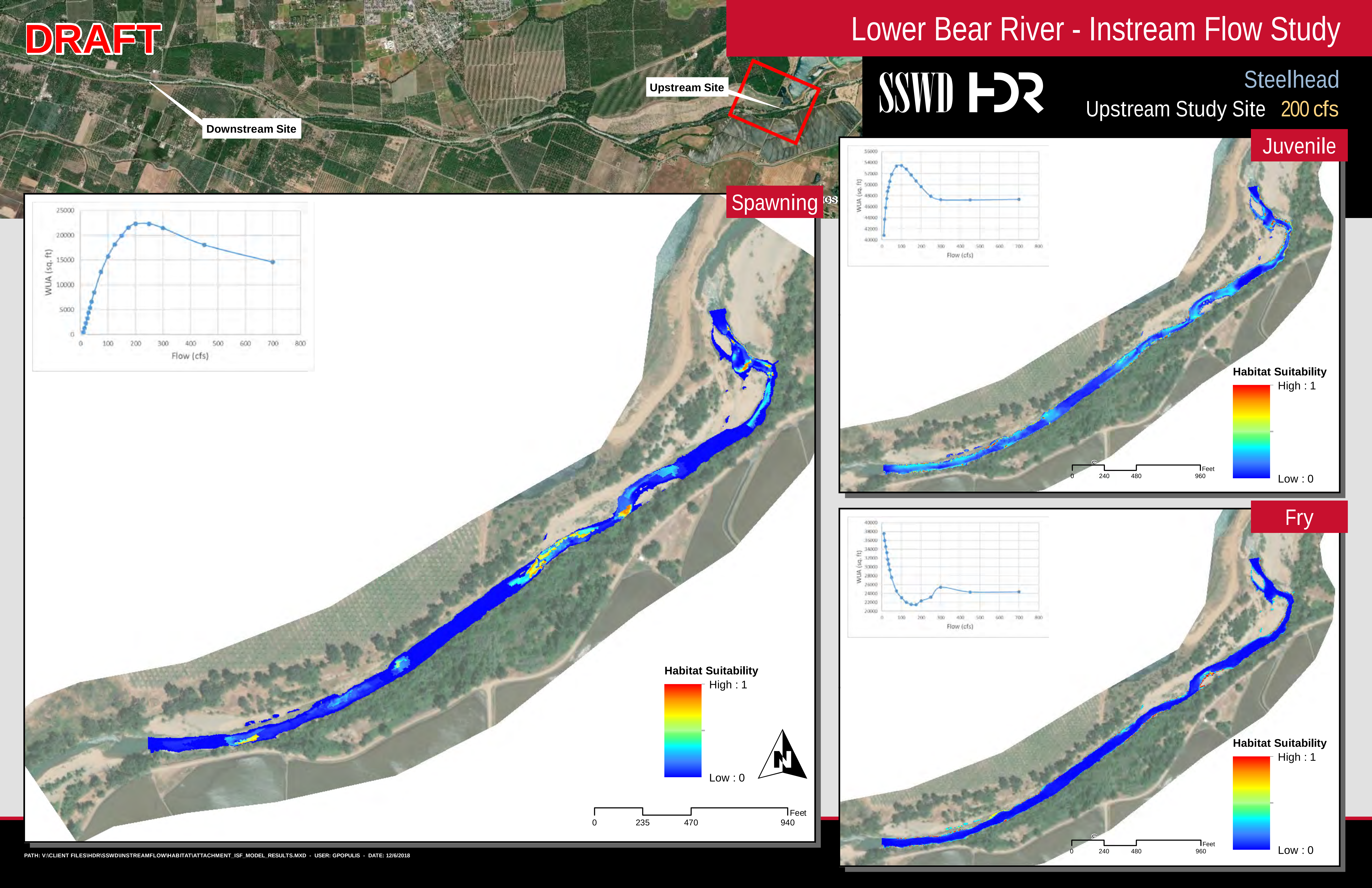




DRAFT
Lower Bear River - Instream Flow Study
SSWD HDR
Steelhead
Upstream Study Site 200 cfs
Upstream Site
Downstream Site
Spawning
WUA (sq. ft)
Flow (cfs)
Habitat Suitability
High : 1
Low : 0
0 235 470 940 Feet
Juvenile
WUA (sq. ft)
Flow (cfs)
Habitat Suitability
High : 1
Low : 0
0 240 480 960 Feet
Fry
WUA (sq. ft)
Flow (cfs)
Habitat Suitability
High : 1
Low : 0
0 240 480 960 Feet
PATH: V:\CLIENT FILES\HDR\SSWD\INSTREAMFLOW\HABITAT\ATTACHMENT_ISF_MODEL_RESULTS.MXD - USER: GPOPULIS - DATE: 12/6/2018

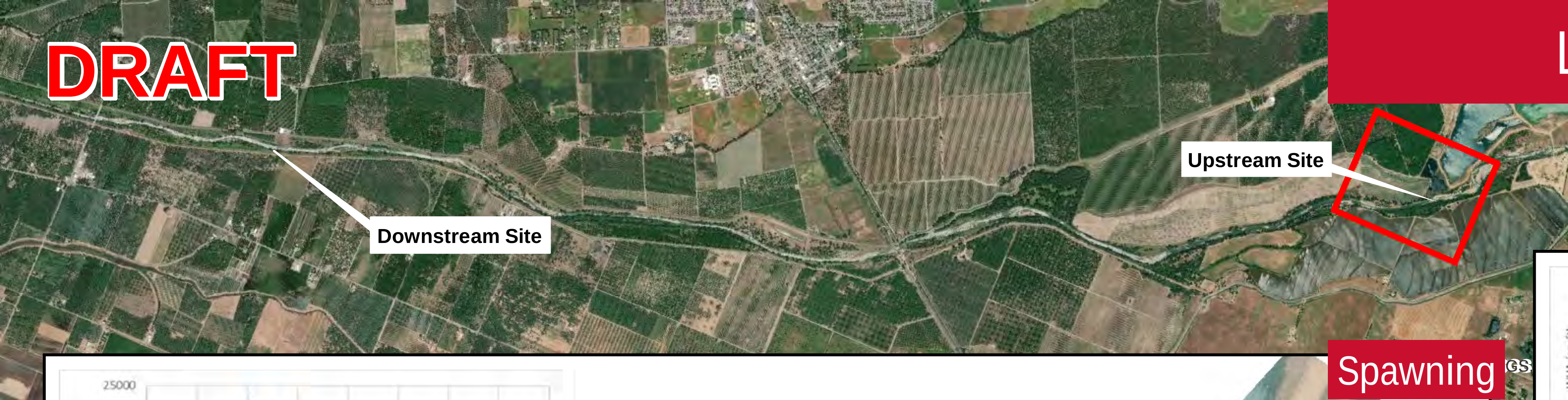
DRAFT

Lower Bear River - Instream Flow Study

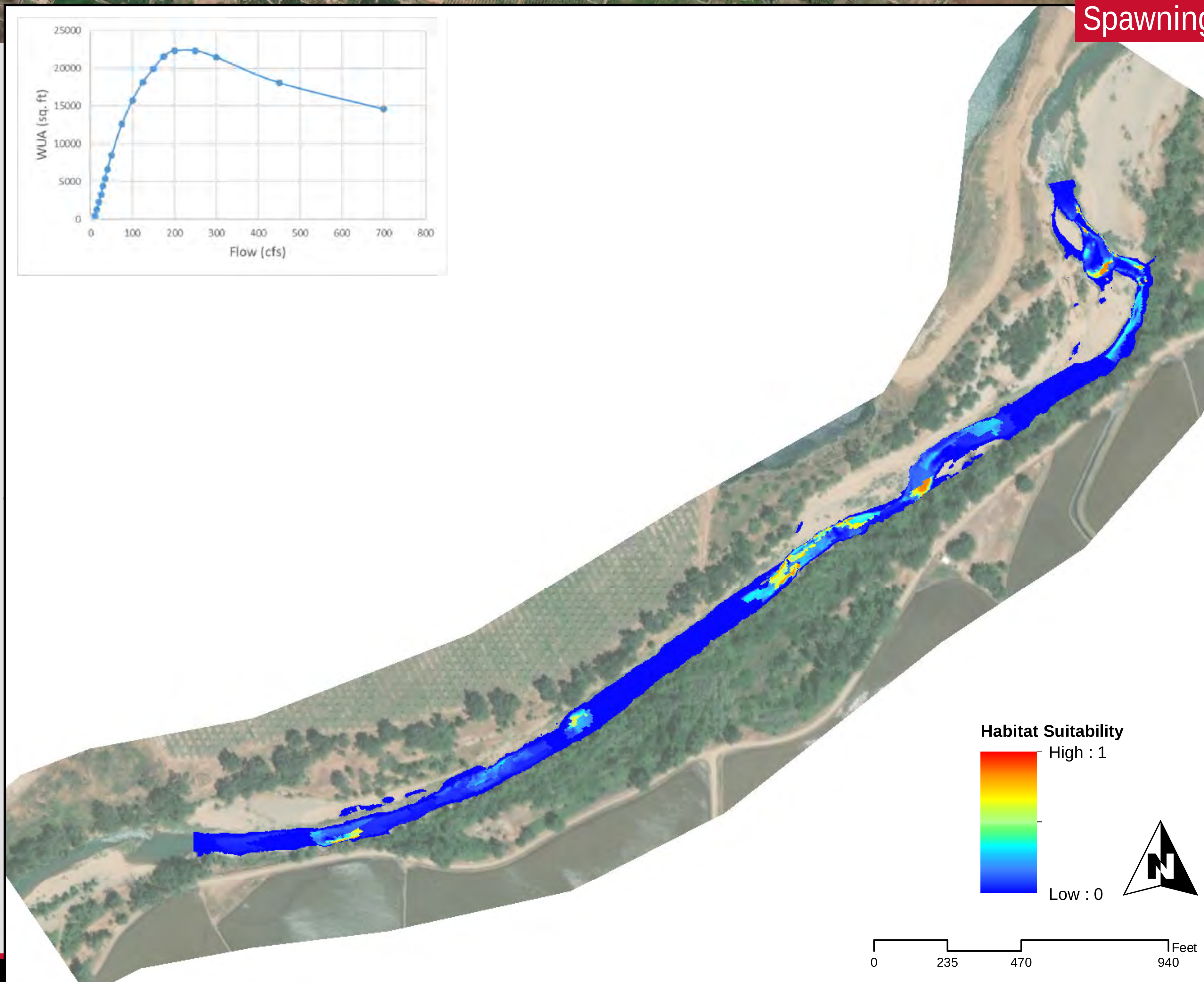
SSWD HDR

Steelhead

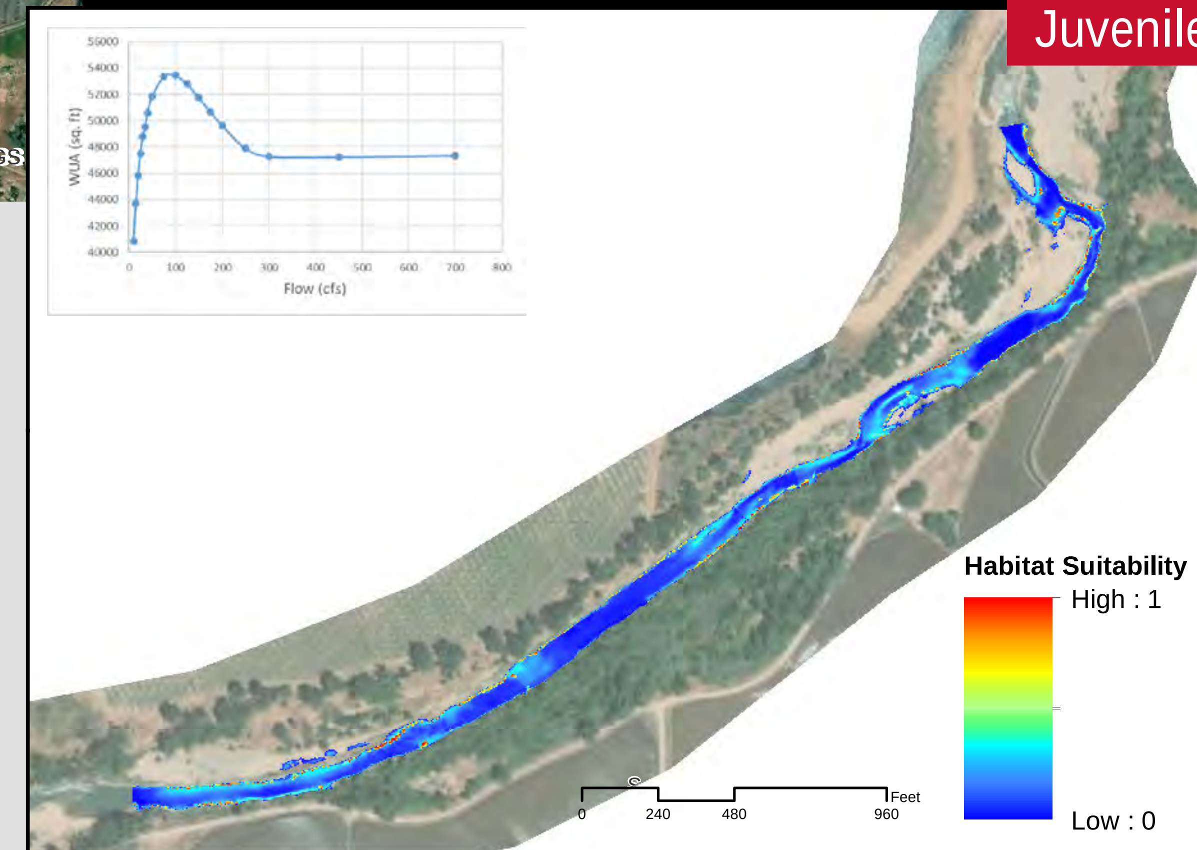
Upstream Study Site 250 cfs



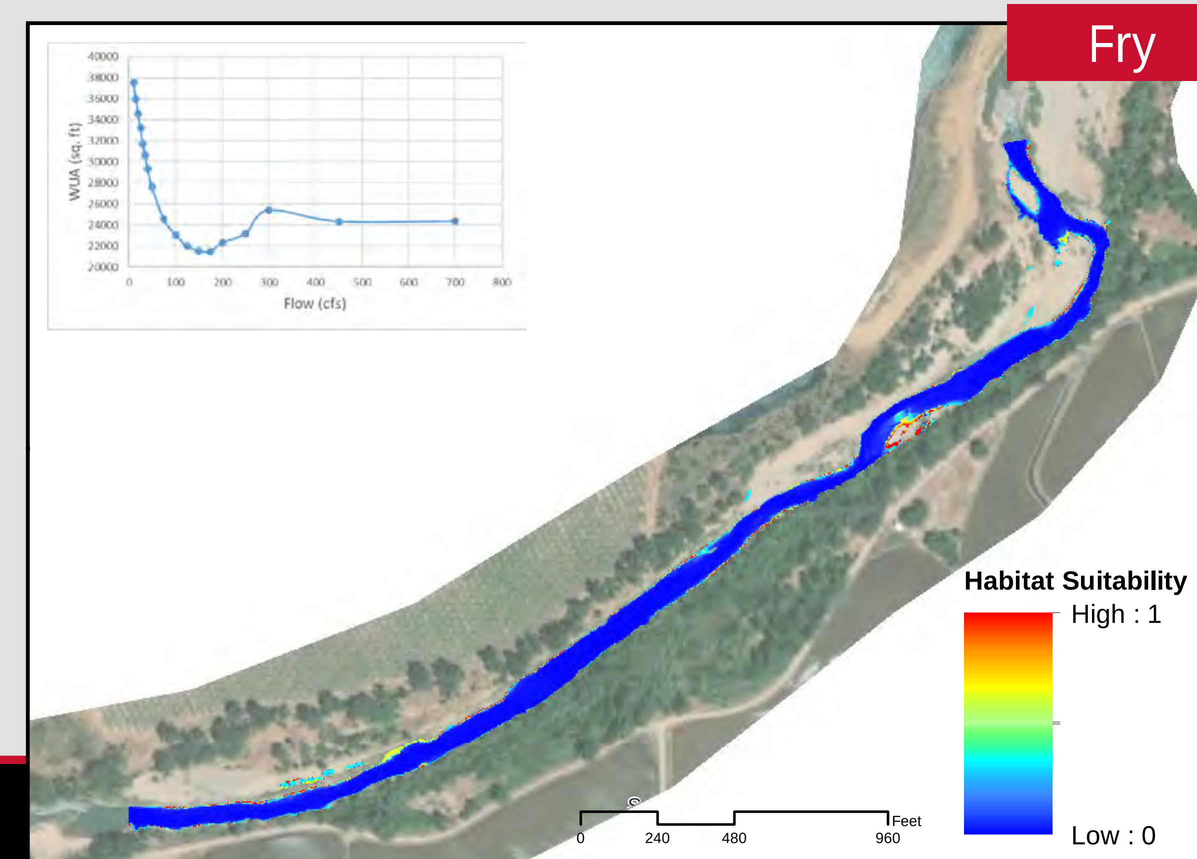
Spawning



Juvenile



Fry



PATH: V:\CLIENT FILES\HDR\SSWD\INSTREAMFLOW\HABITAT\ATTACHMENT_ISF_MODEL_RESULTS.MXD - USER: GPOPULIS - DATE: 12/6/2018

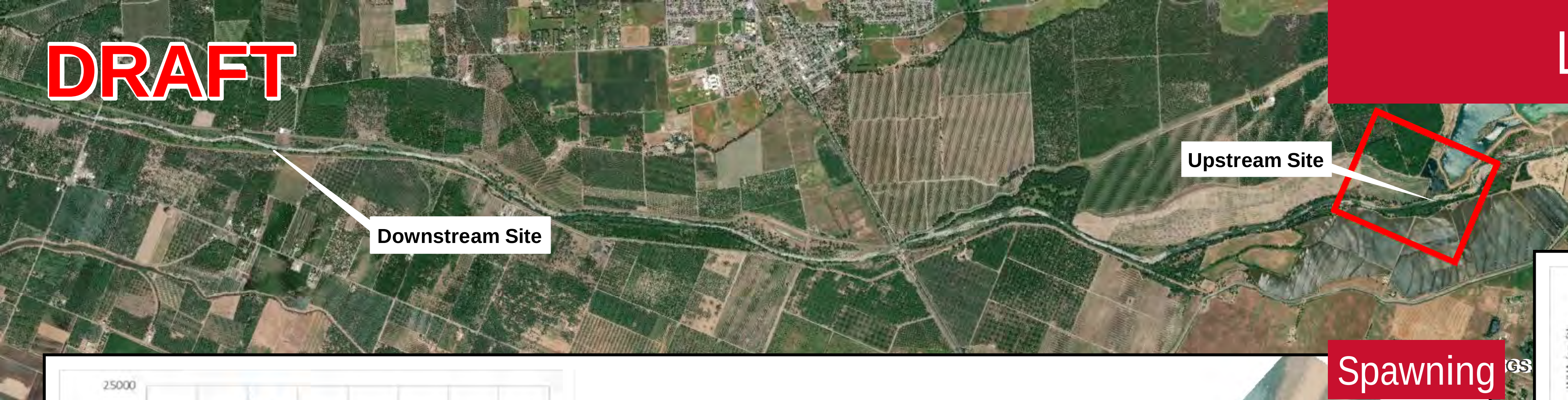
Lower Bear River - Instream Flow Study

DRAFT

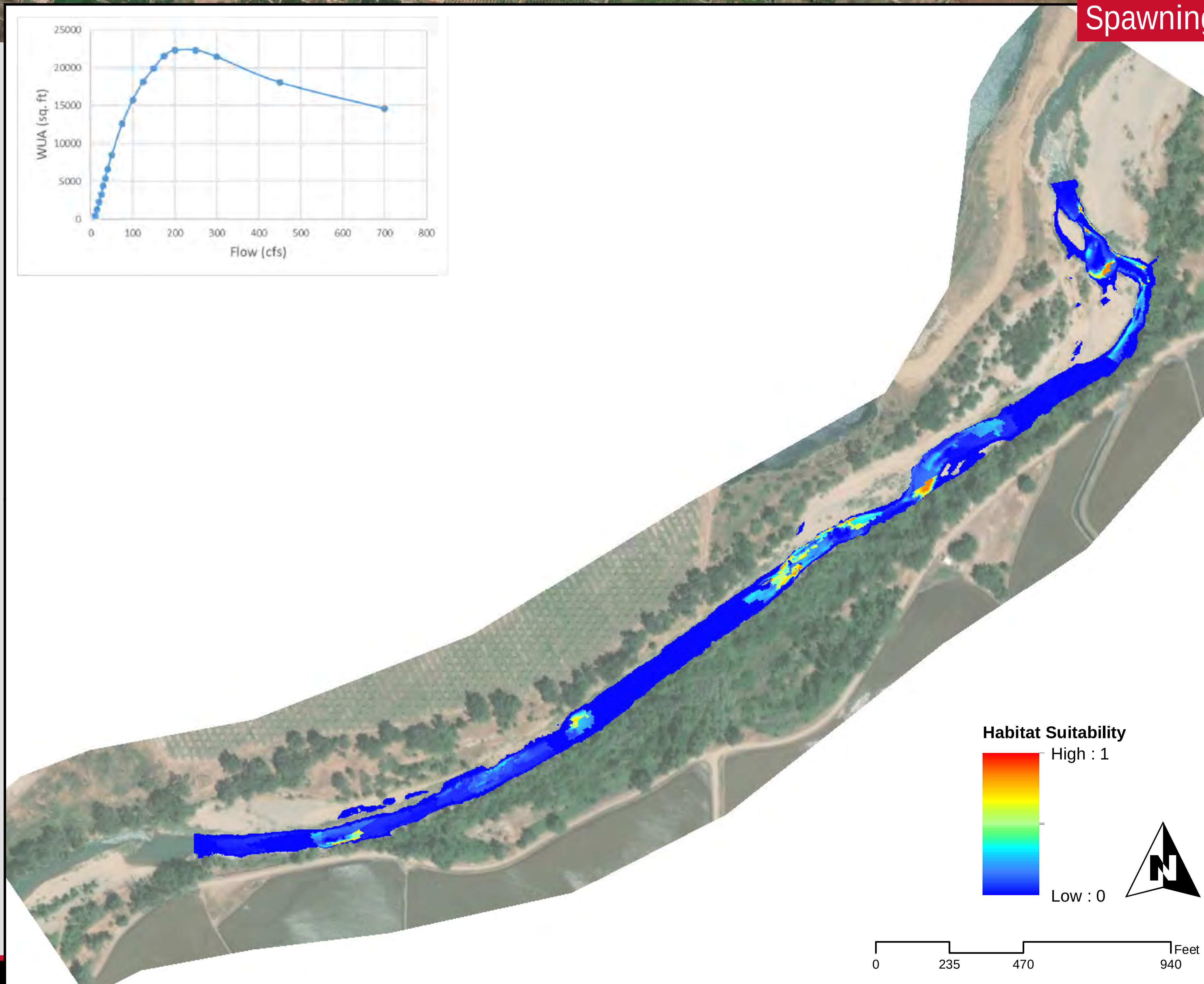
SSWD HDR

Steelhead

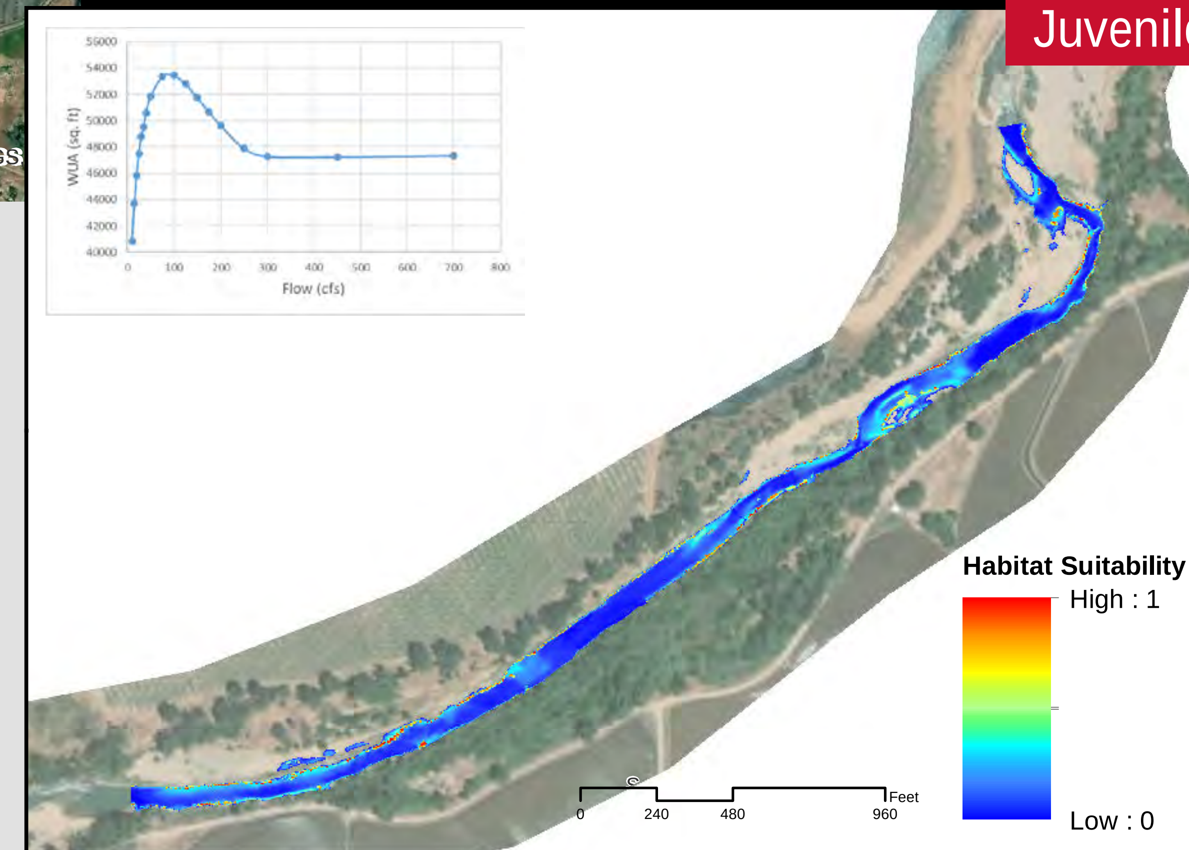
Upstream Study Site 300 cfs



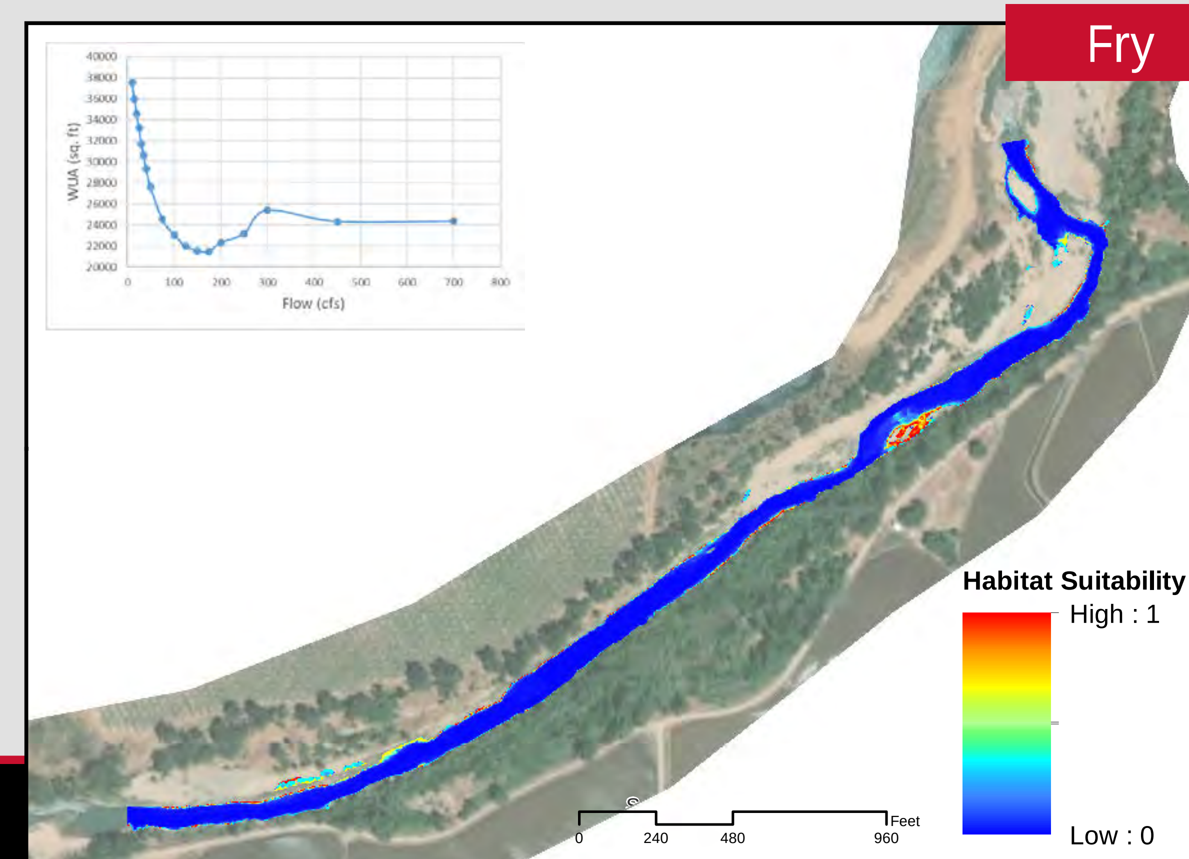
Spawning



Juvenile



Fry



PATH: V:\CLIENT FILES\HDR\SSWD\INSTREAMFLOW\HABITAT\ATTACHMENT_ISF_MODEL_RESULTS.MXD - USER: GPOPULIS - DATE: 12/6/2018

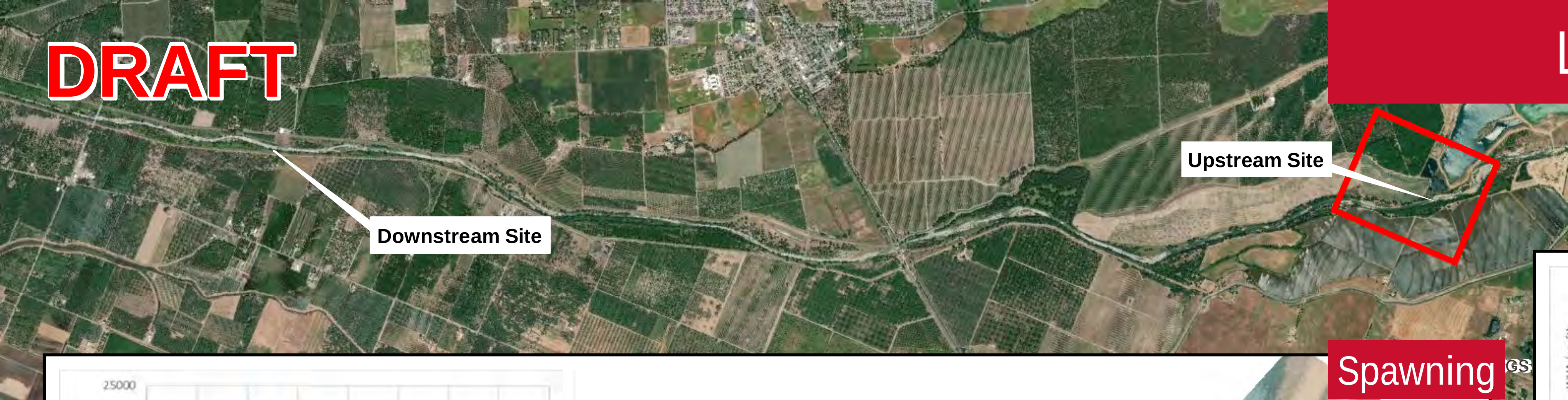
Lower Bear River - Instream Flow Study

DRAFT

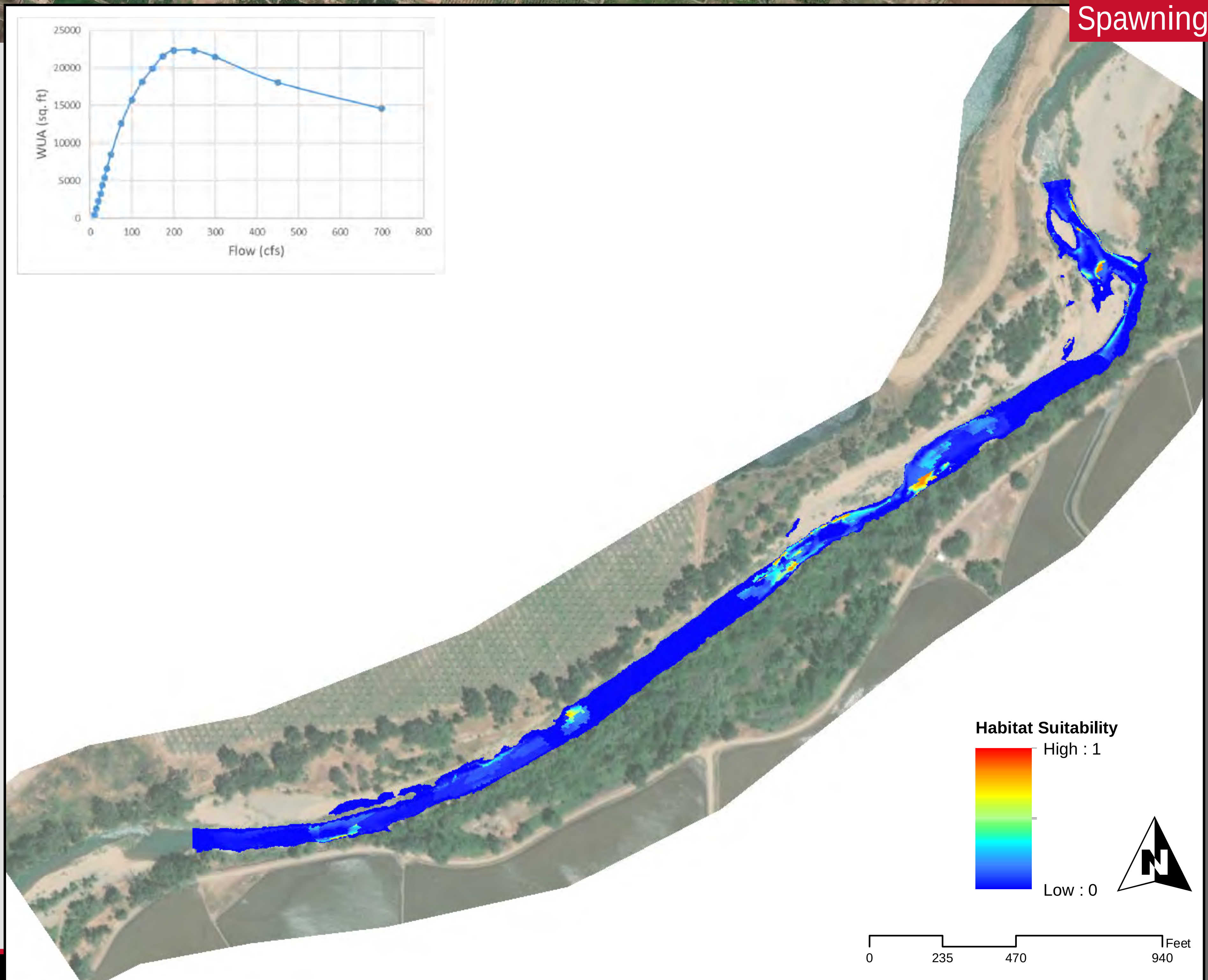
SSWD HDR

Steelhead

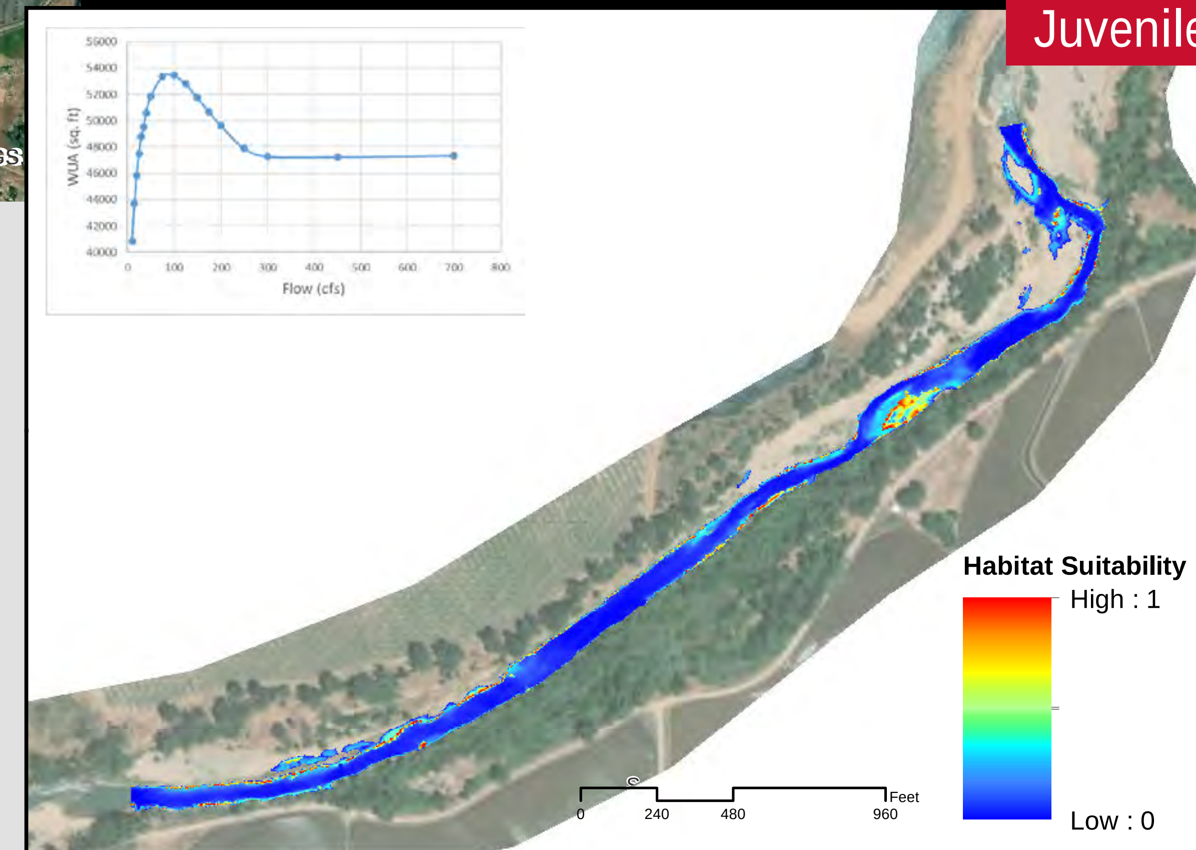
Upstream Study Site 450 cfs



Spawning



Juvenile



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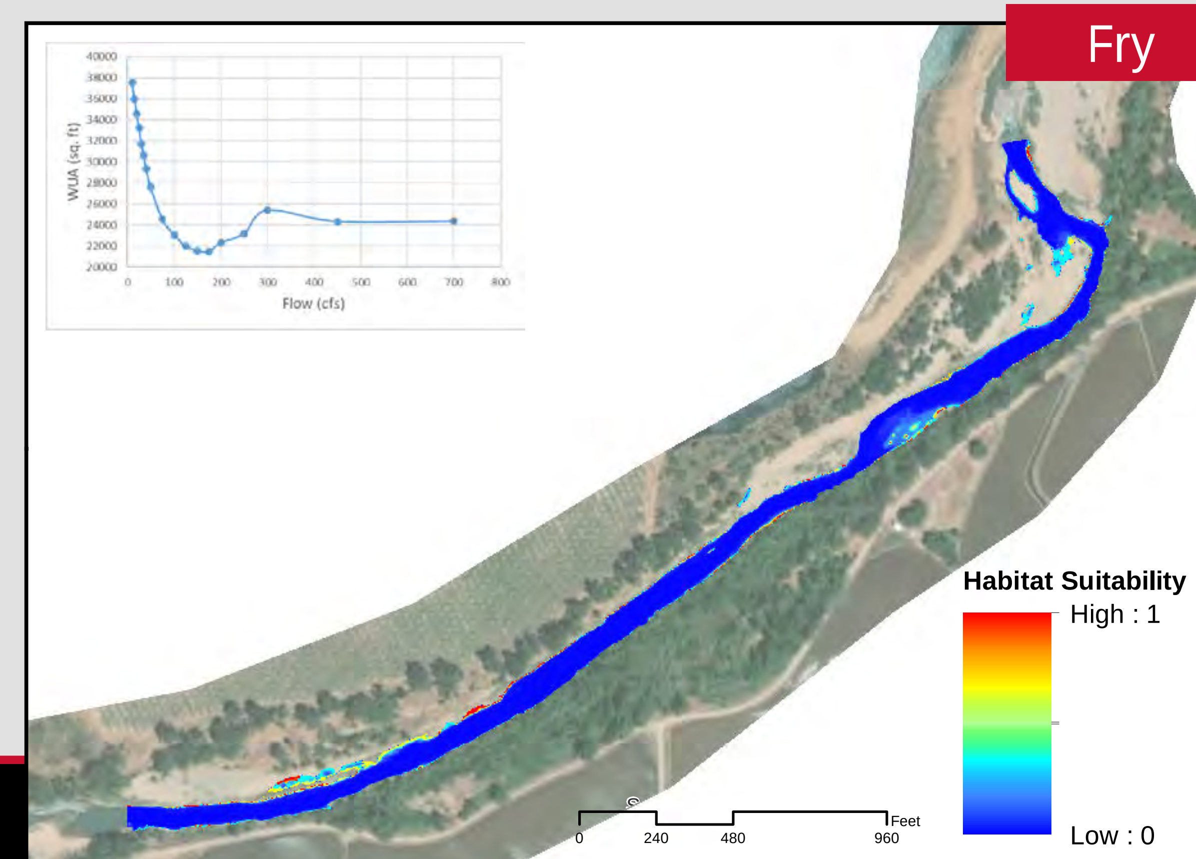
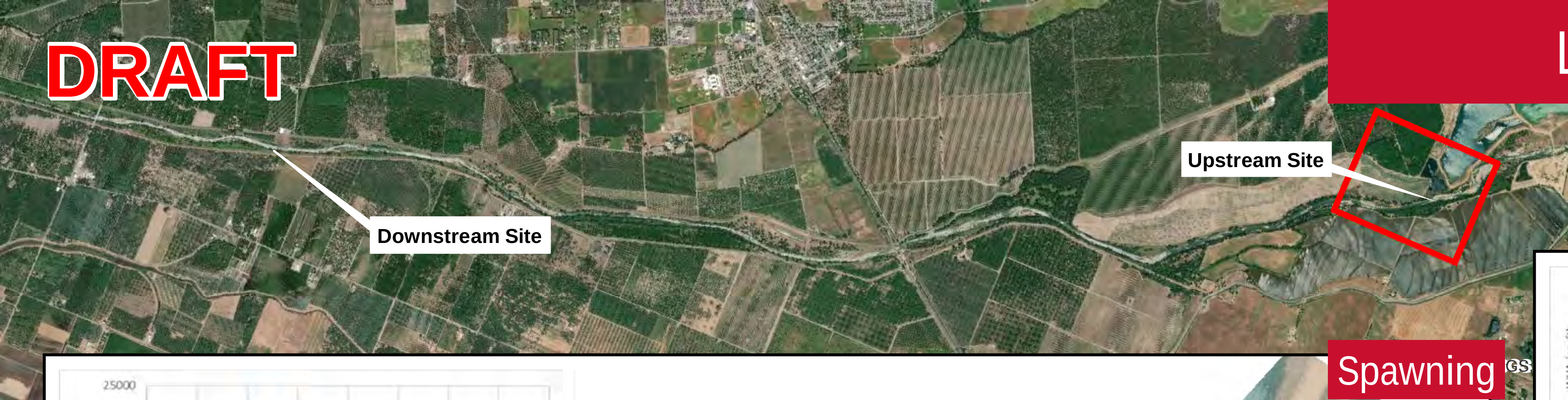


Lower Bear River - Instream Flow Study

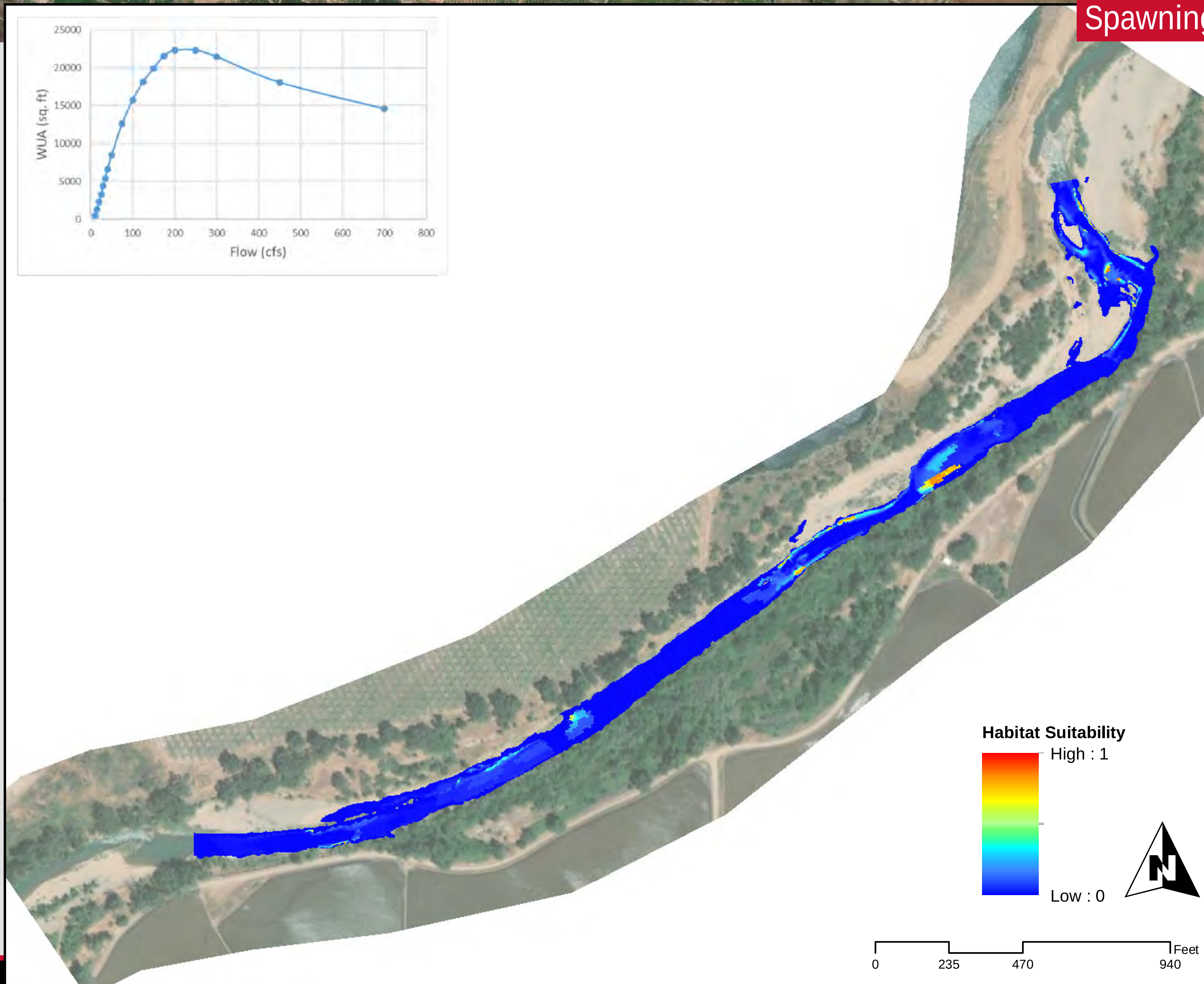
SSWD HDR

Steelhead

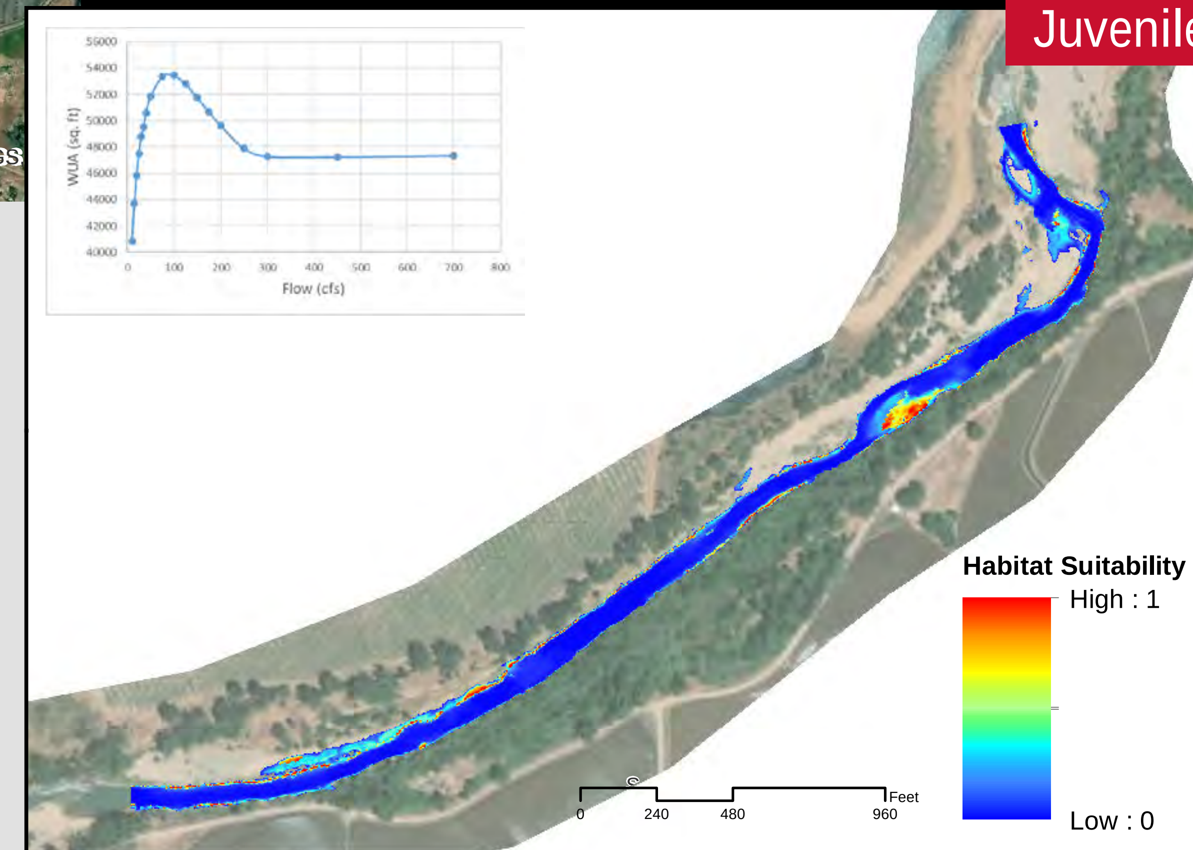
Upstream Study Site 700 cfs



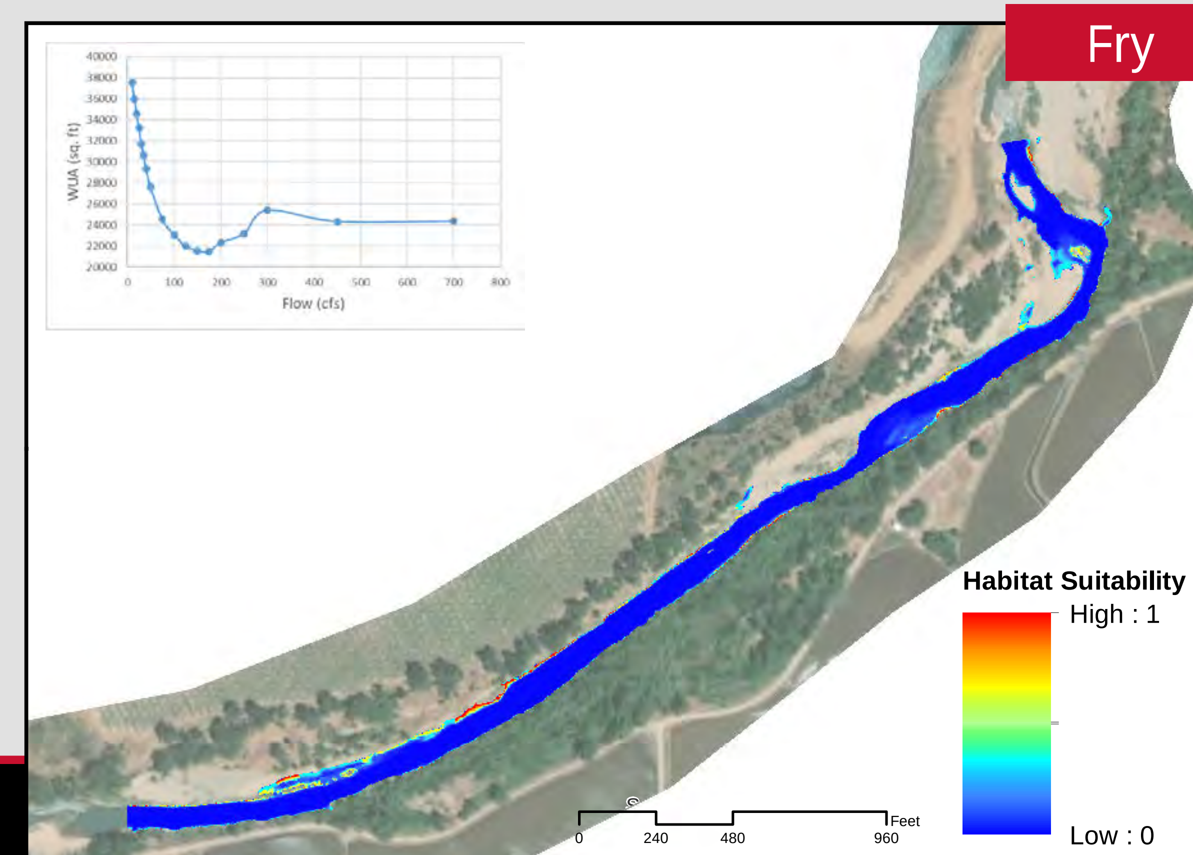
Spawning



Juvenile



Fry

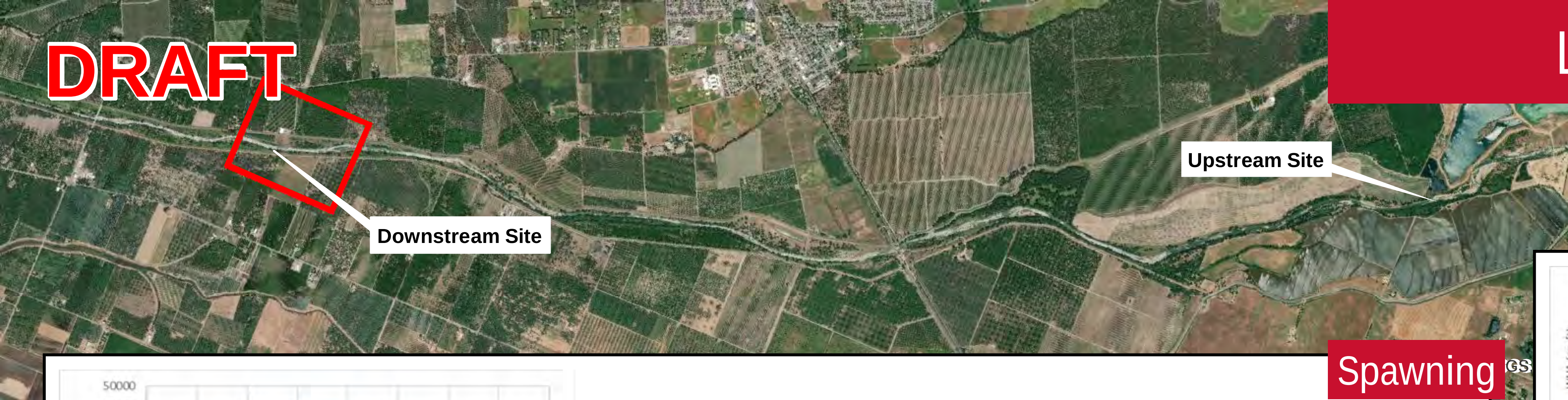


Lower Bear River - Instream Flow Study

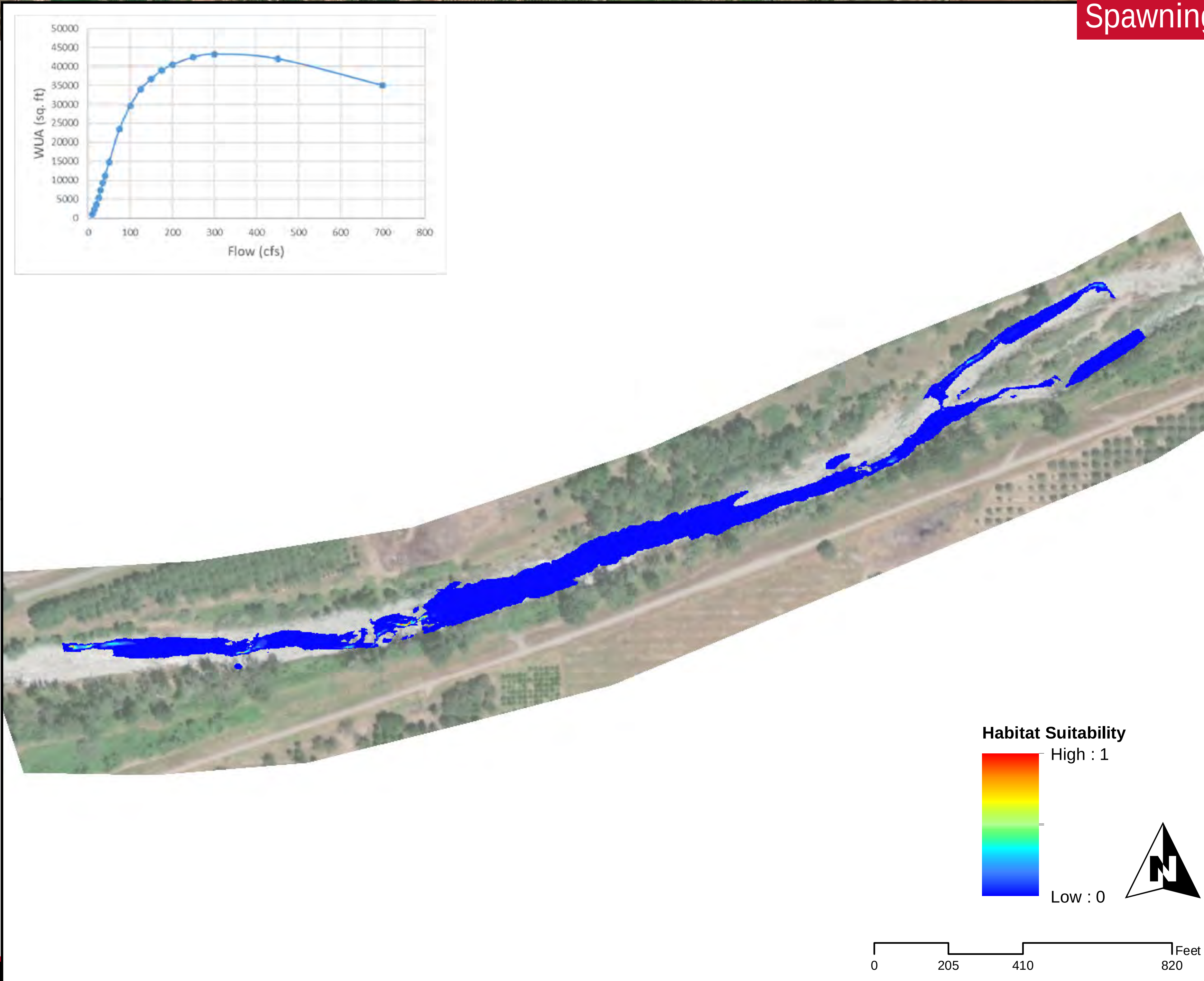
SSWD HDR

Steelhead

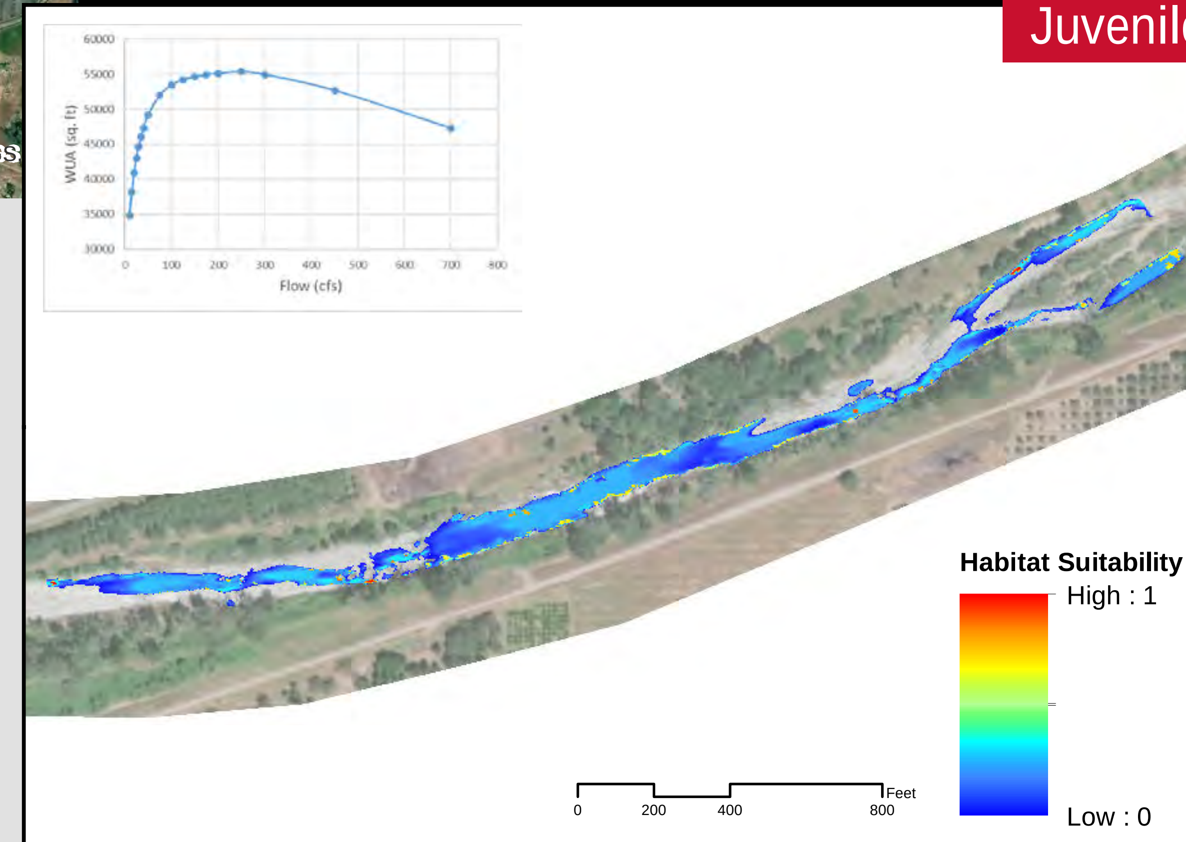
Downstream Study Site 10 cfs



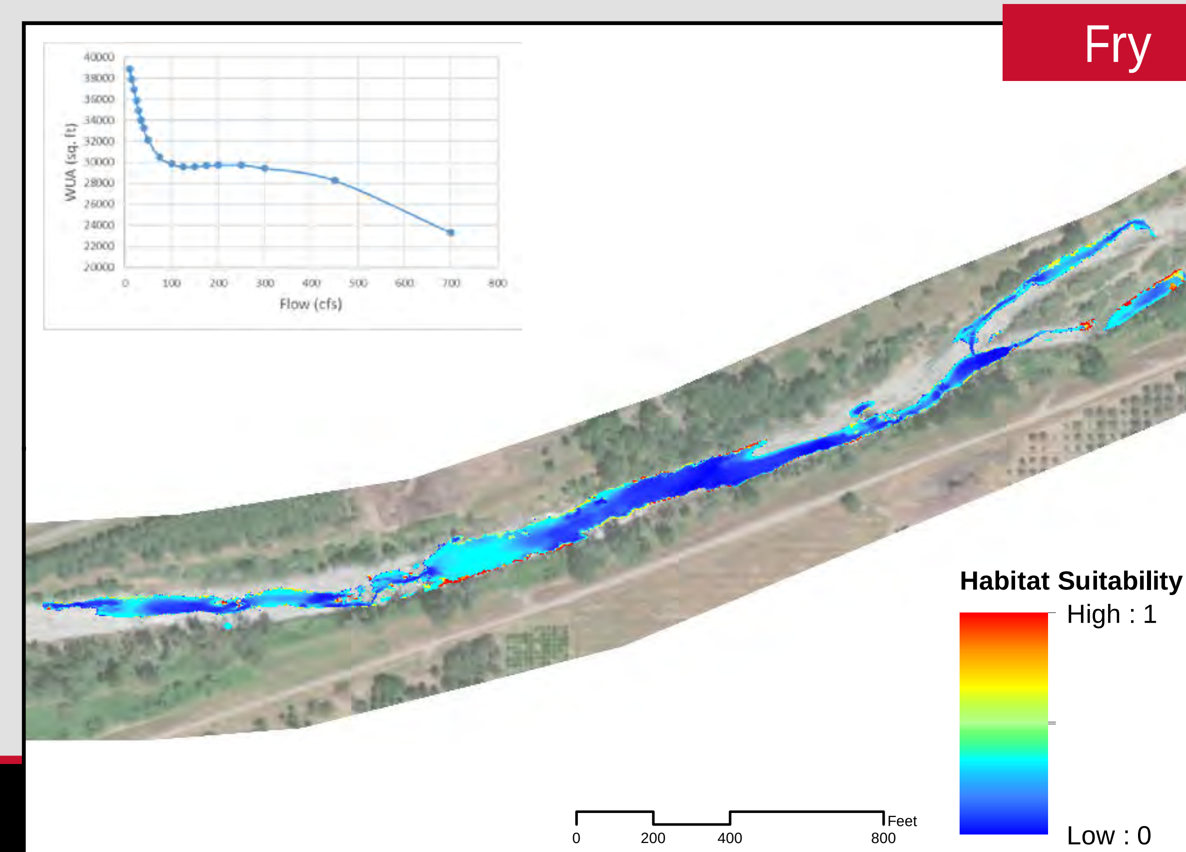
Spawning



Juvenile



Fry



PATH: V:\CLIENT FILES\HDR\SSWD\INSTREAMFLOW\HABITAT\ATTACHMENT_ISF_MODEL_RESULTS.MXD - USER: GPOPULIS - DATE: 12/6/2018

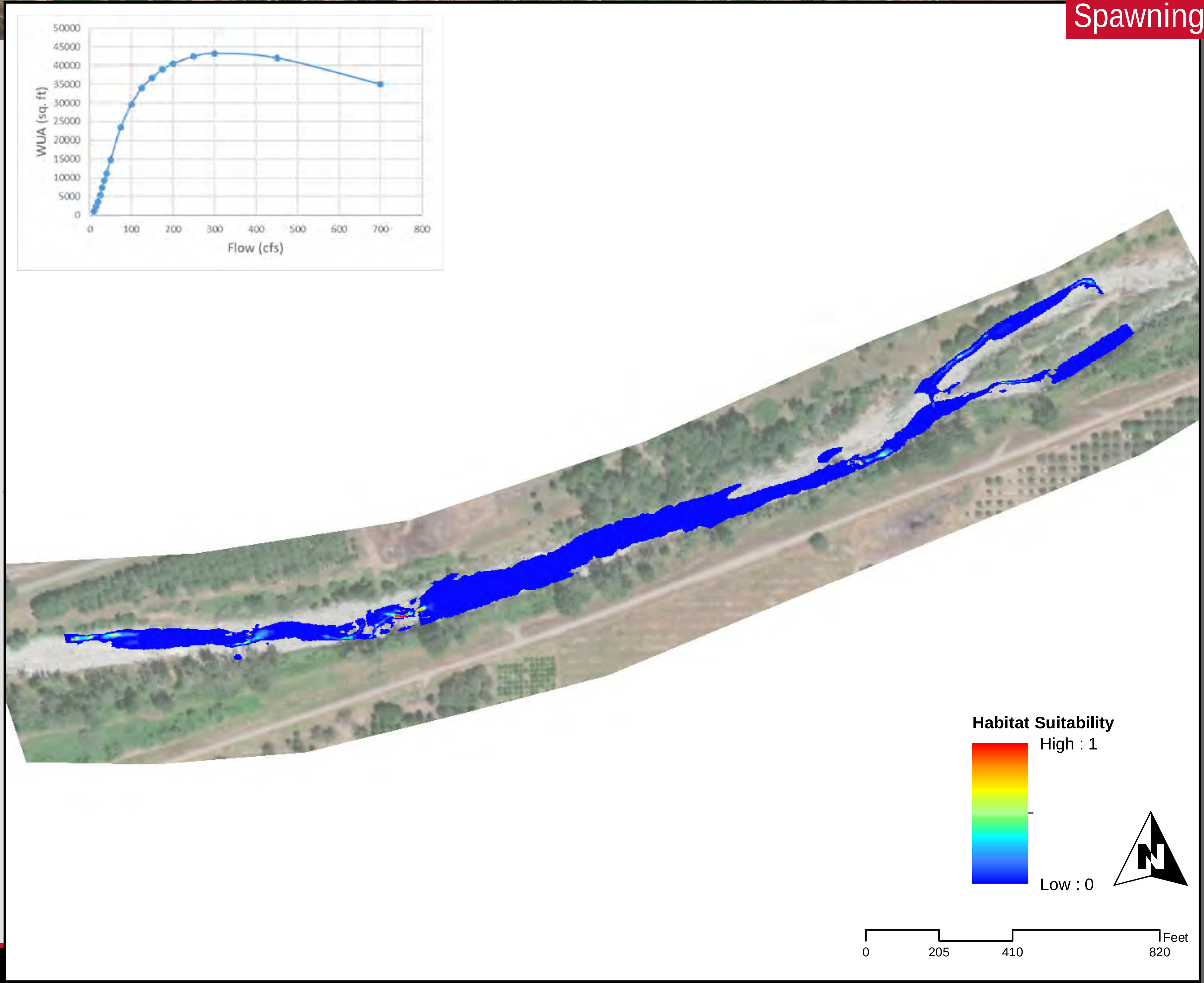
Lower Bear River - Instream Flow Study

SSWD HDR

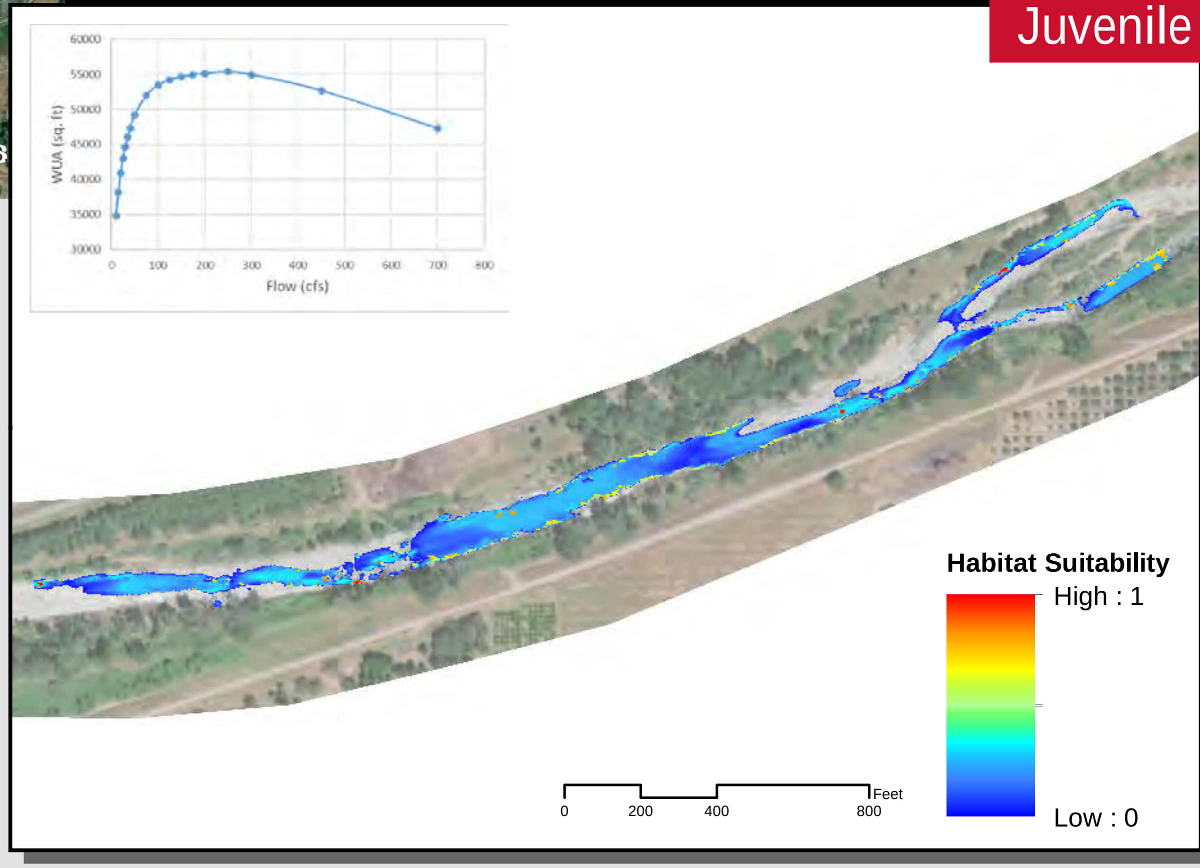
Steelhead

Downstream Study Site 15 cfs

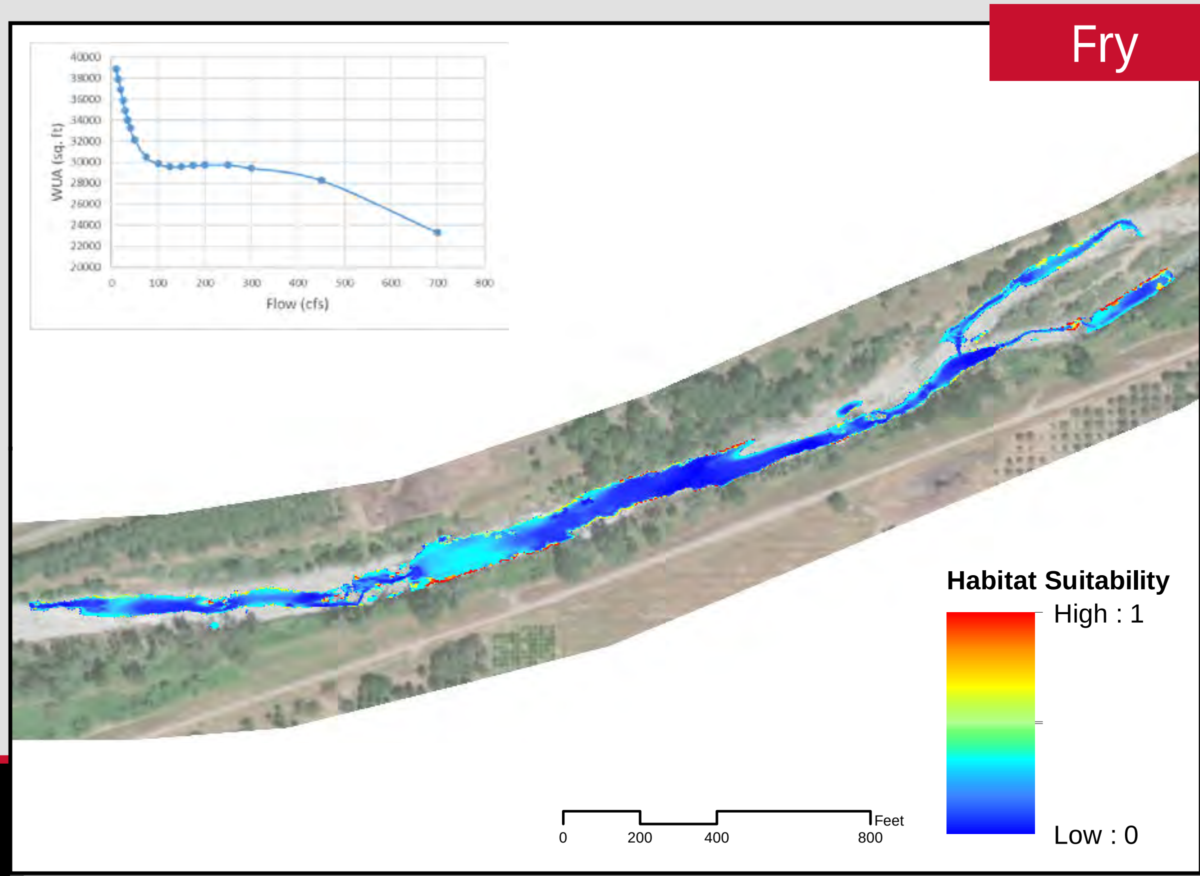
Spawning



Juvenile



Fry

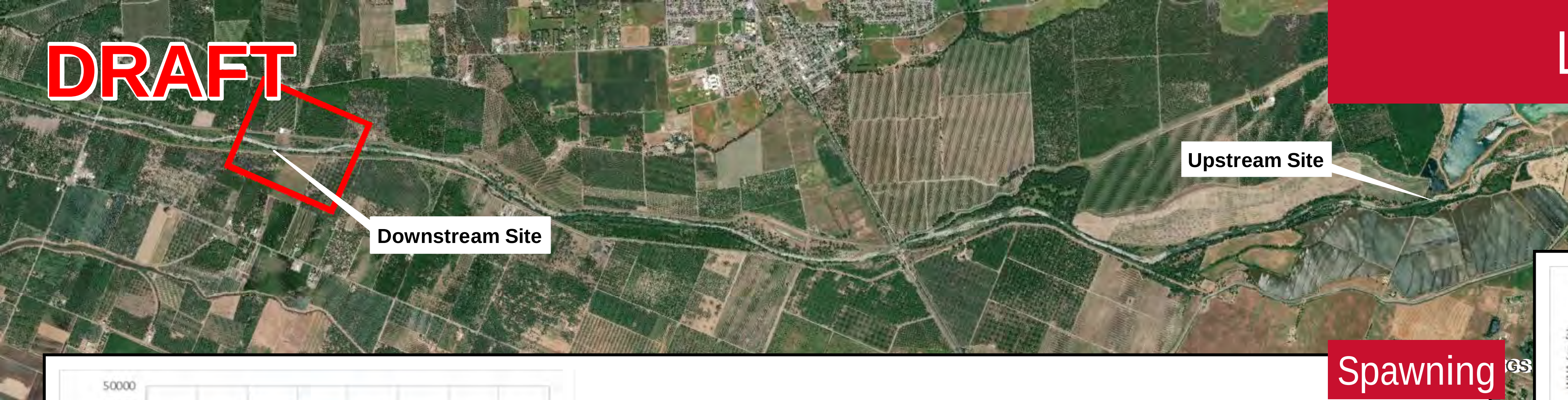


Lower Bear River - Instream Flow Study

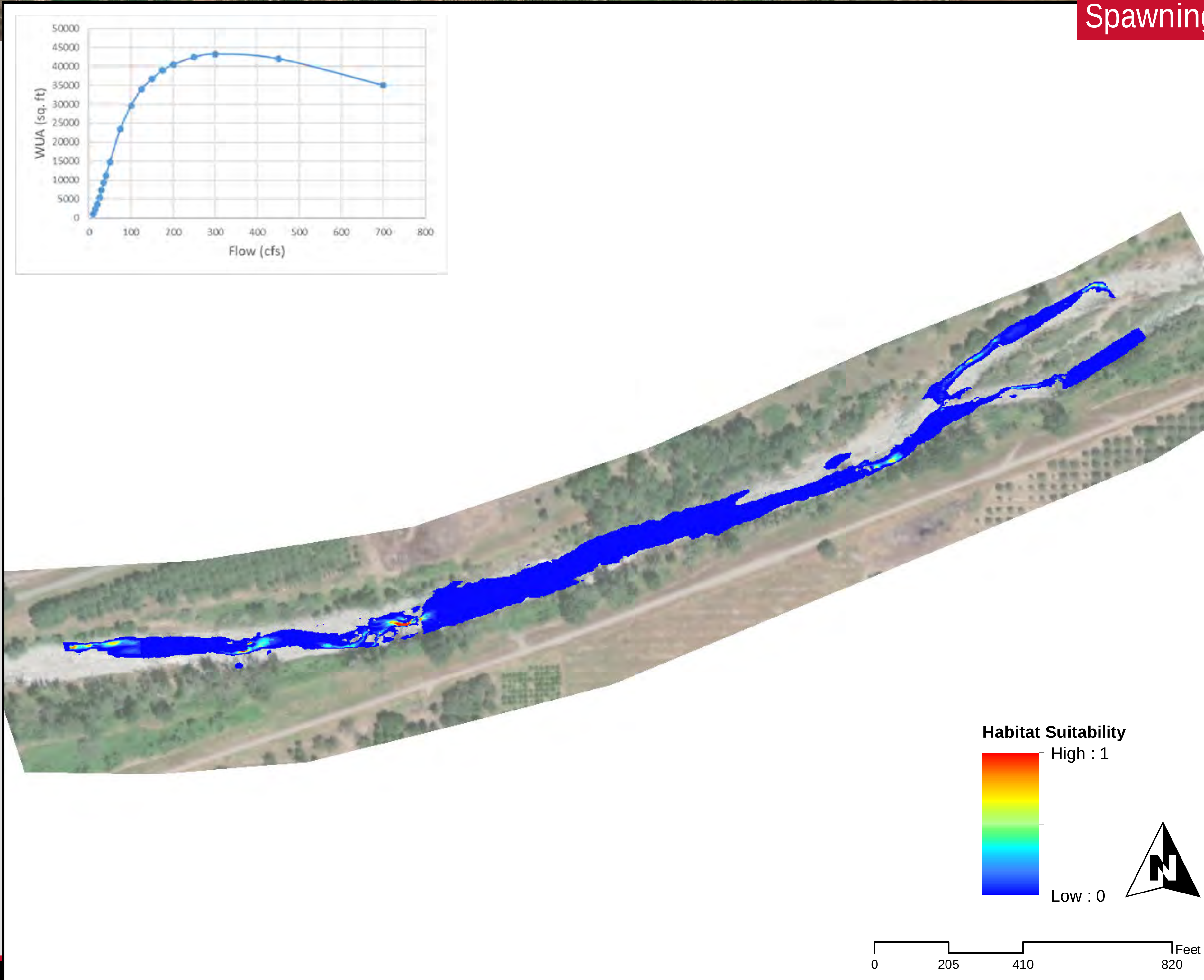
SSWD HDR

Steelhead

Downstream Study Site 20 cfs



Spawning



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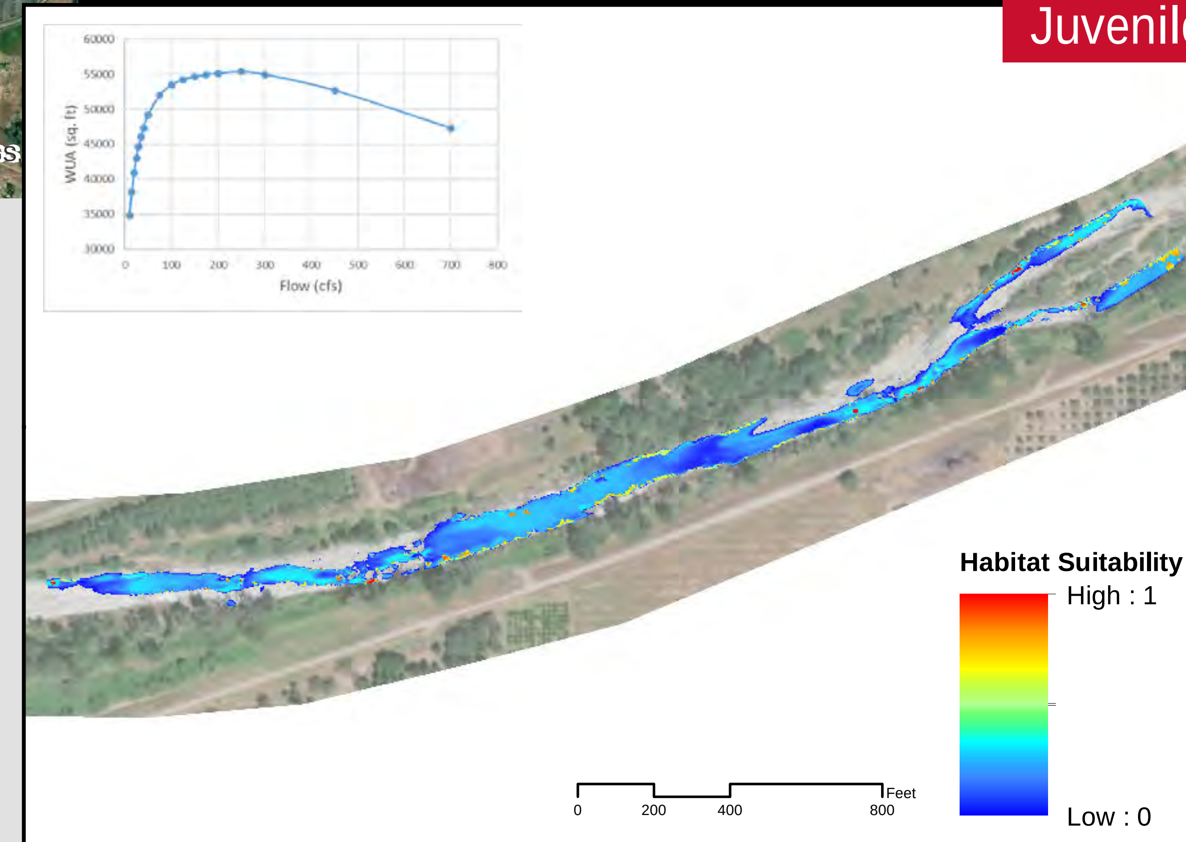
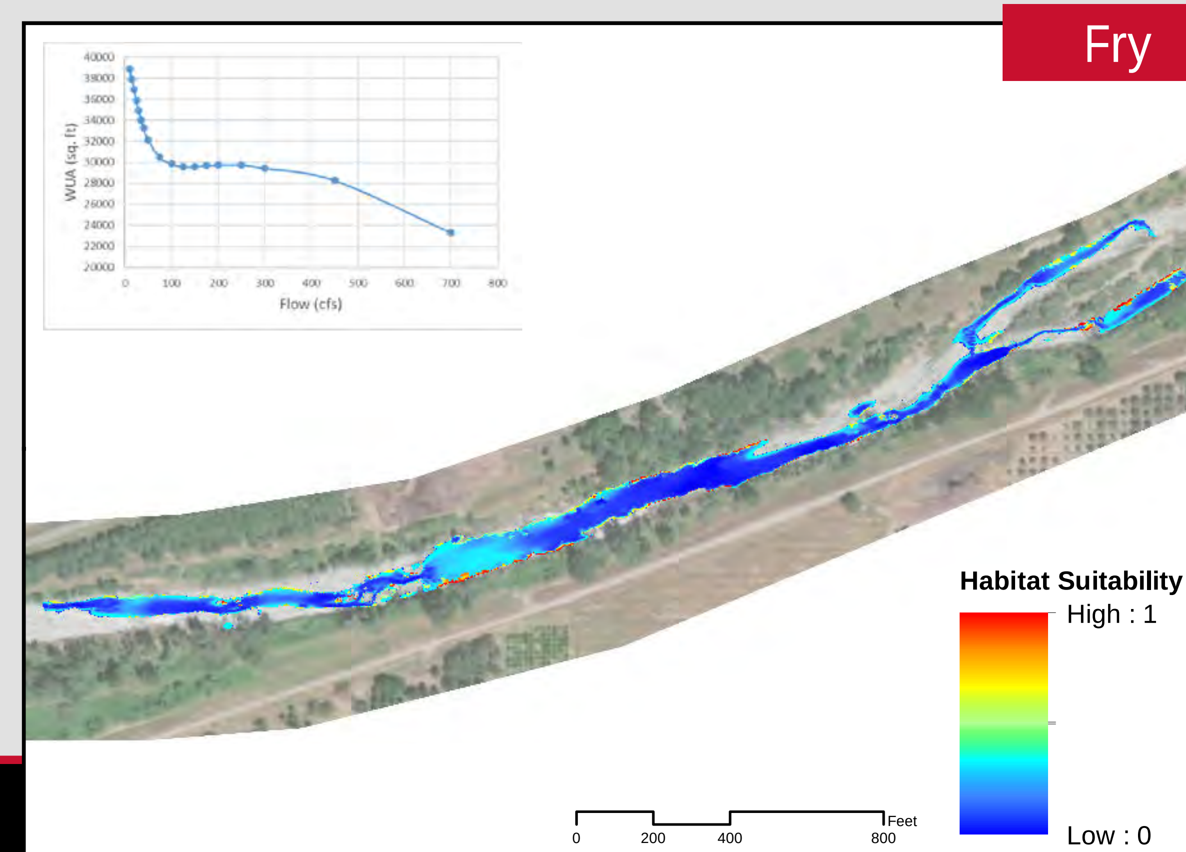


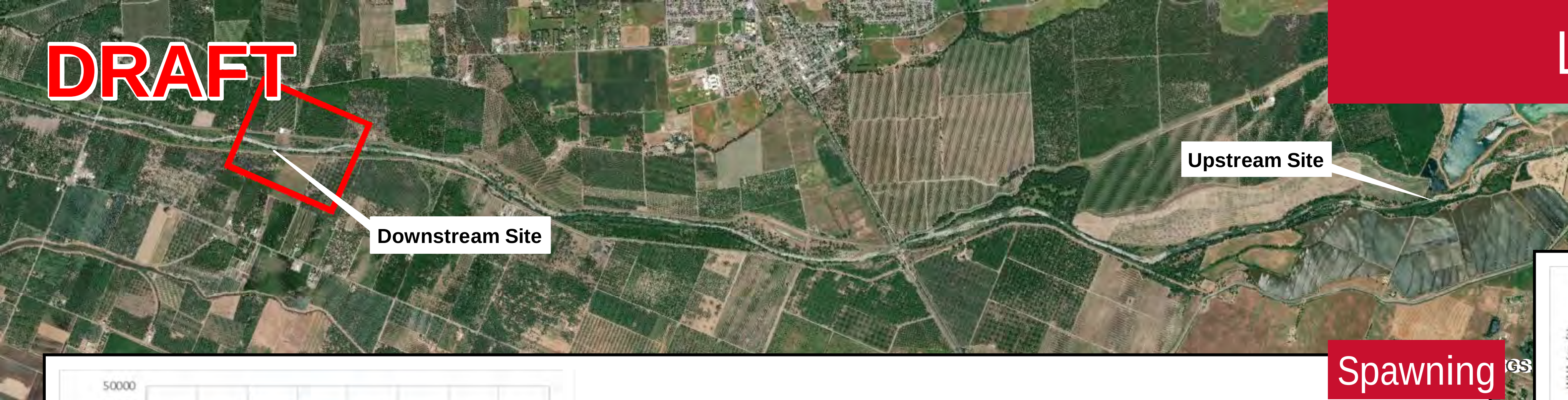
Fry



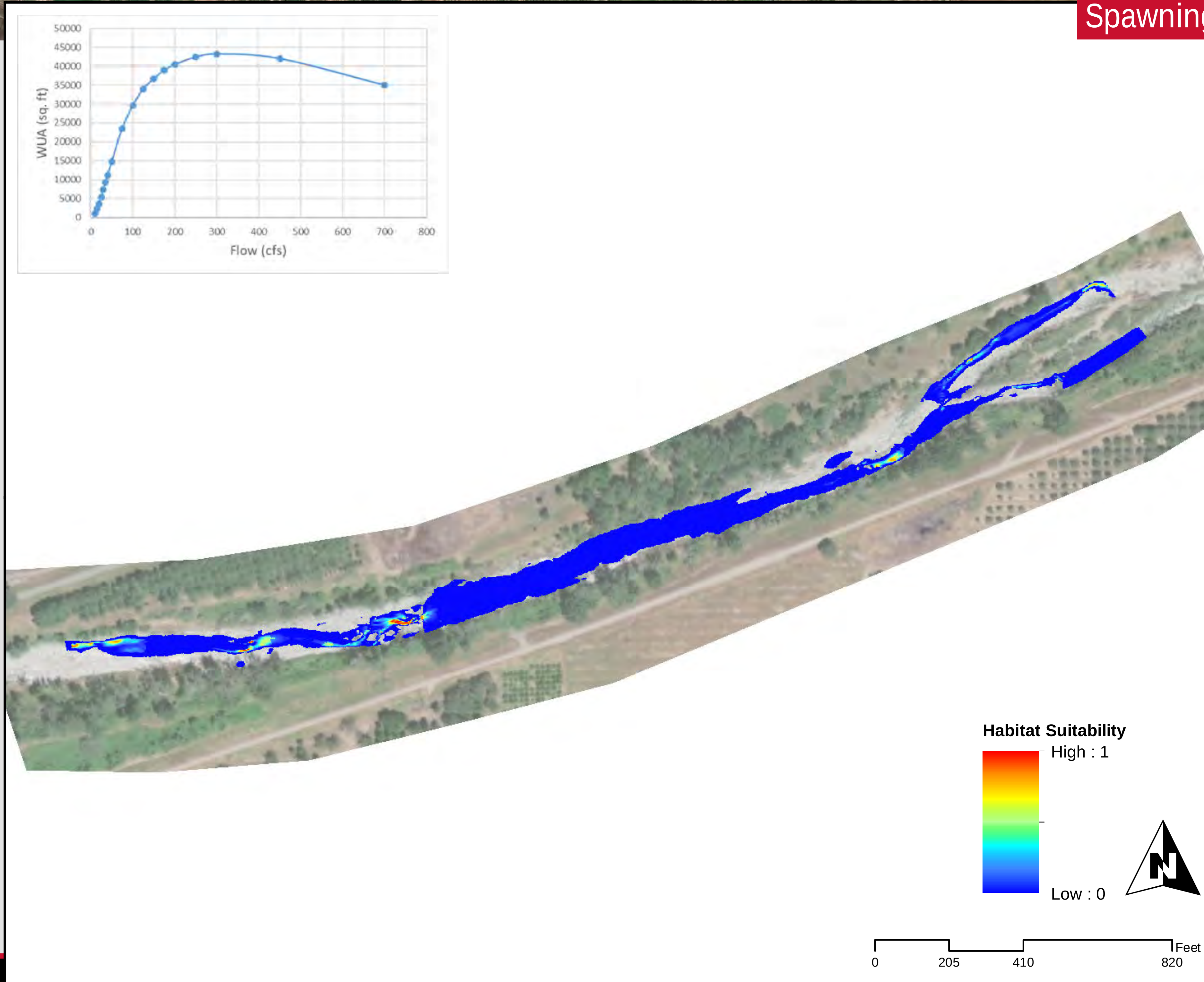
Lower Bear River - Instream Flow Study

Steelhead

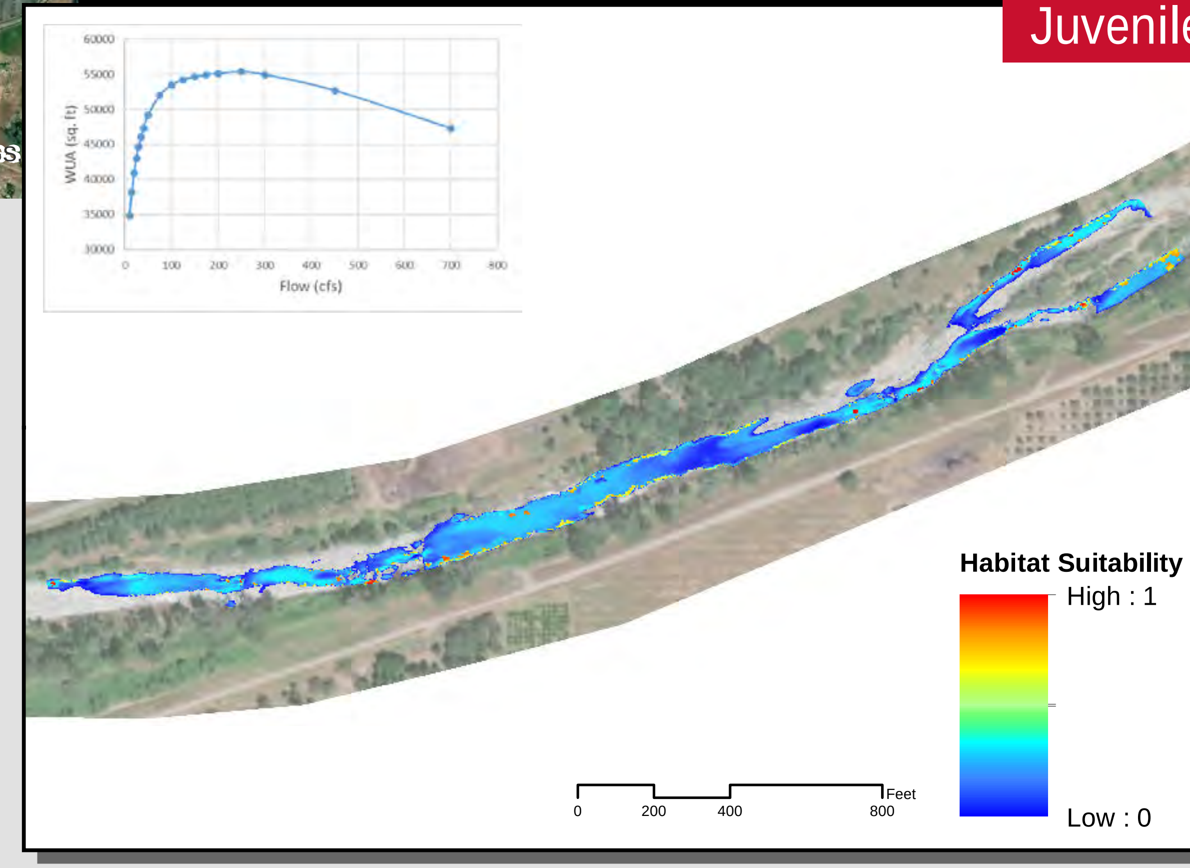
Downstream Study Site 25 cfs



Spawning



Juvenile



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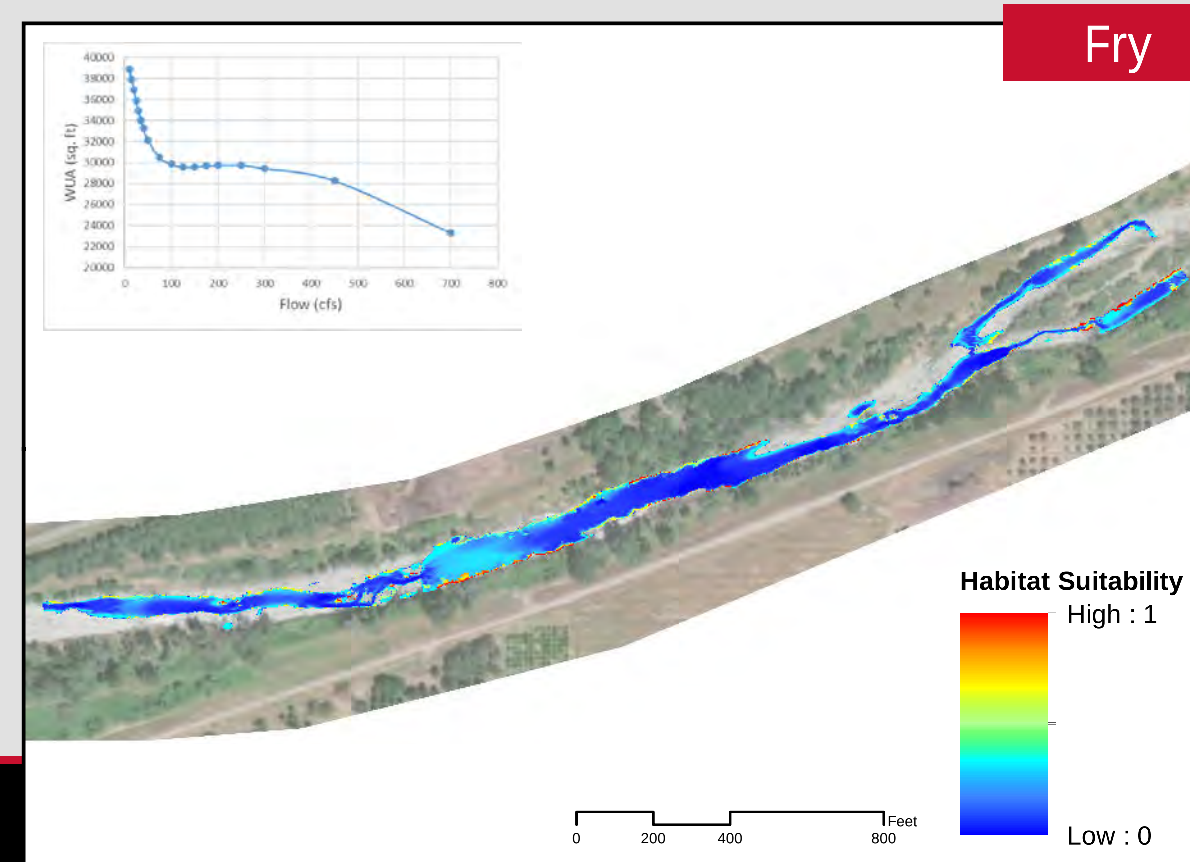
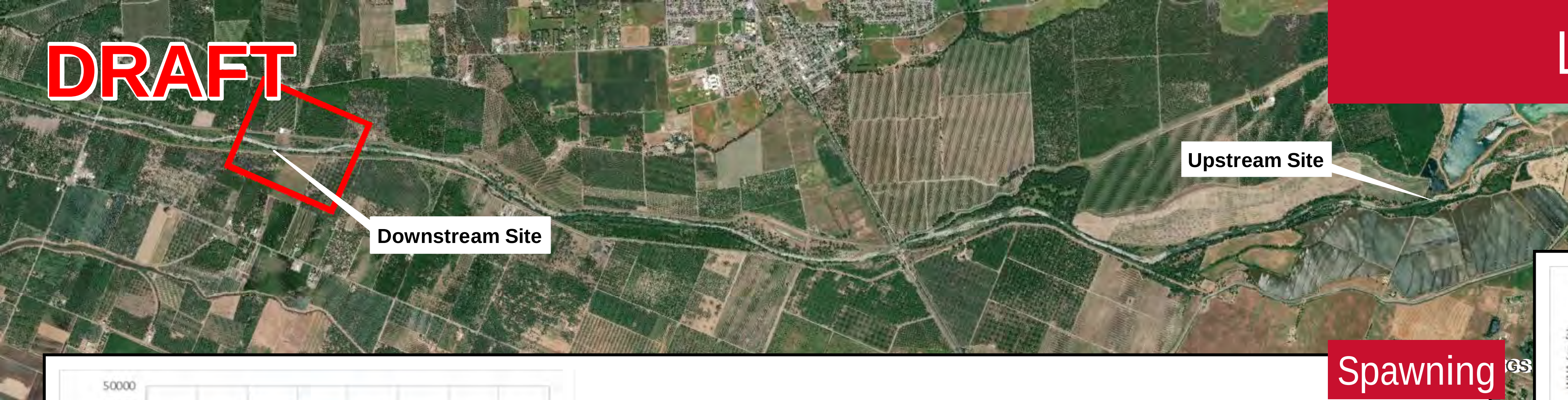


Lower Bear River - Instream Flow Study

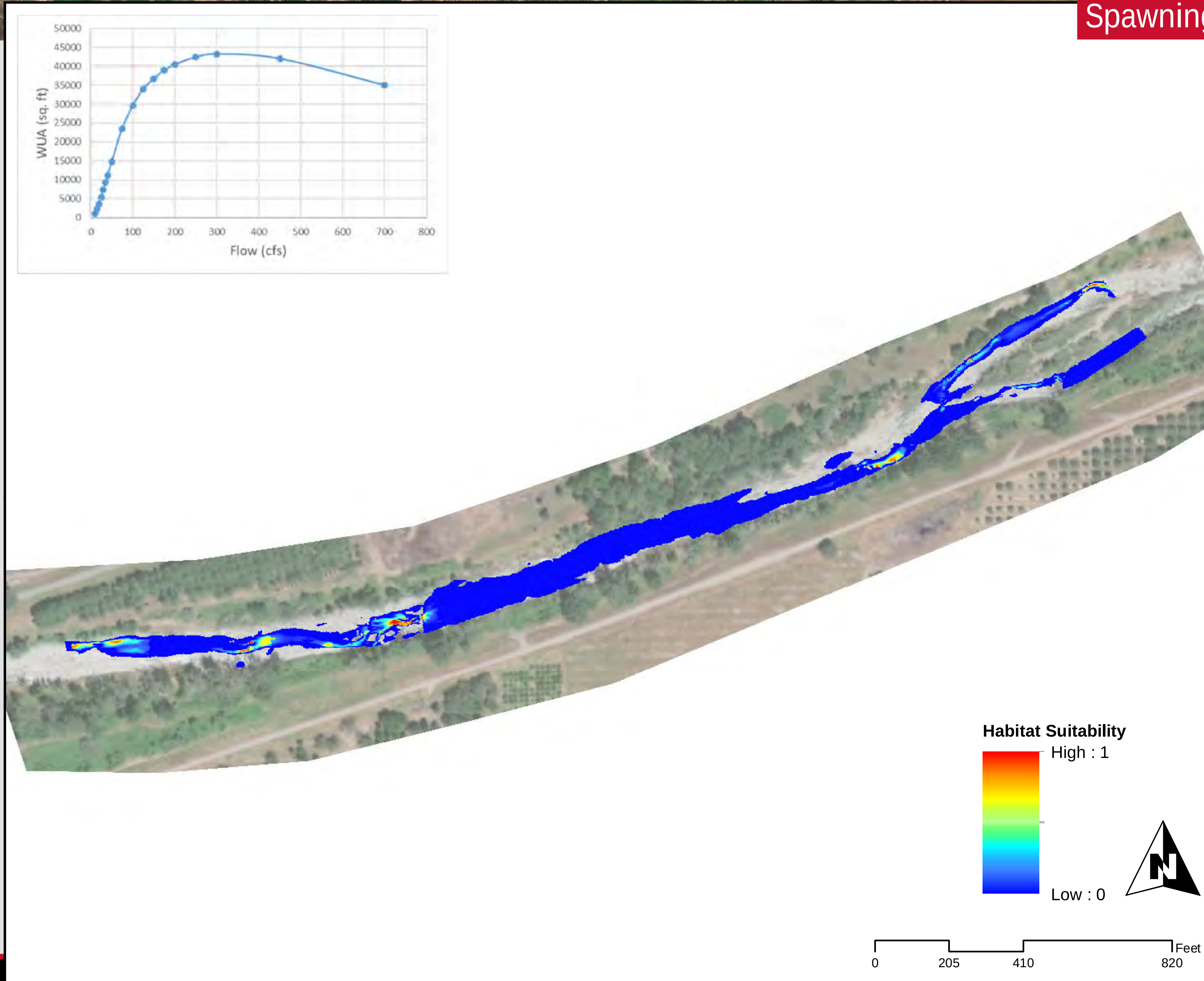
SSWD HDR

Steelhead

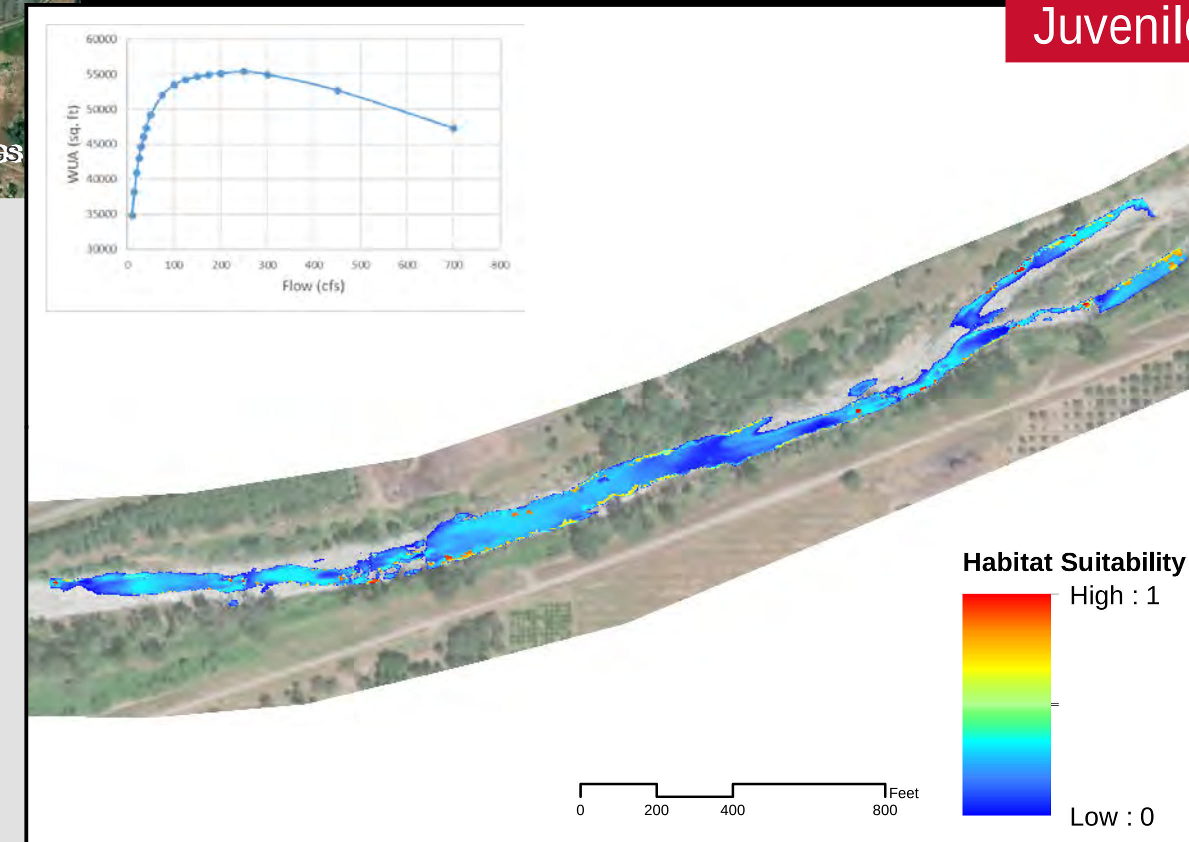
Downstream Study Site 30 cfs



Spawning



Juvenile



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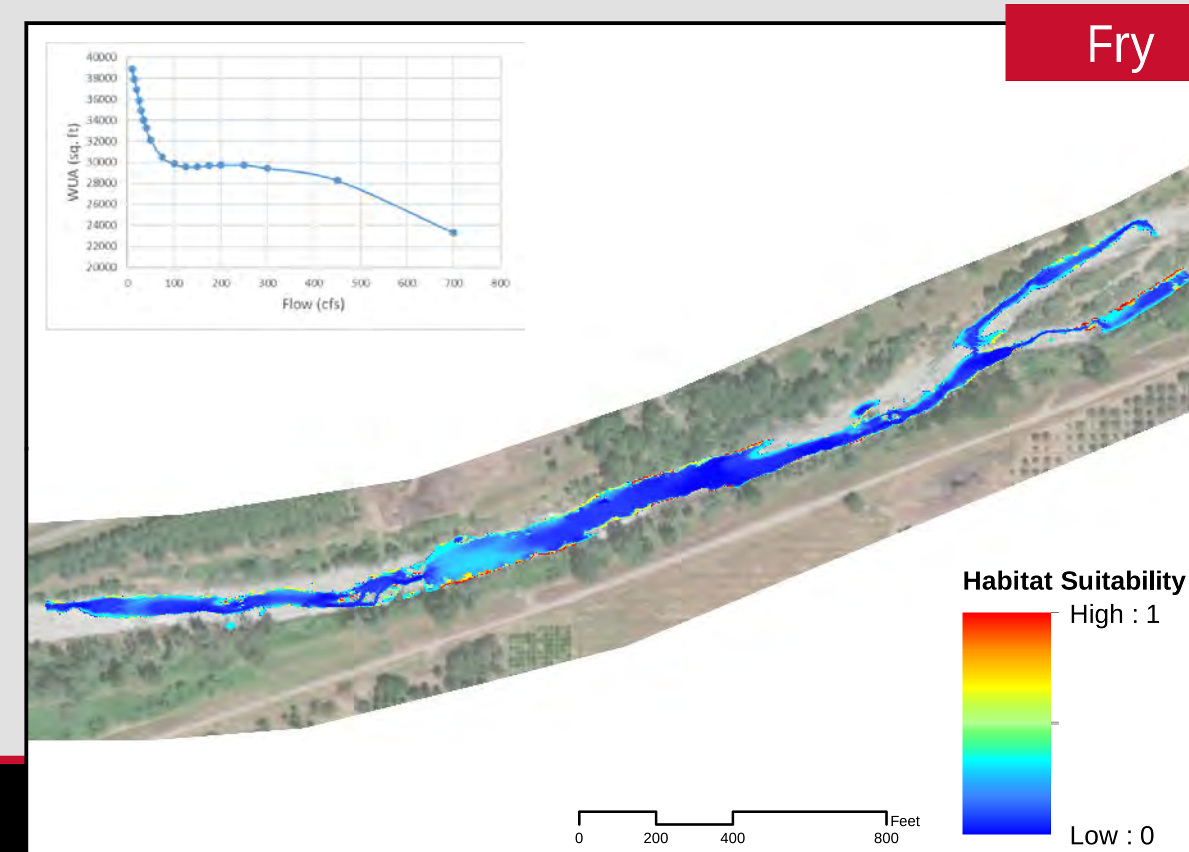
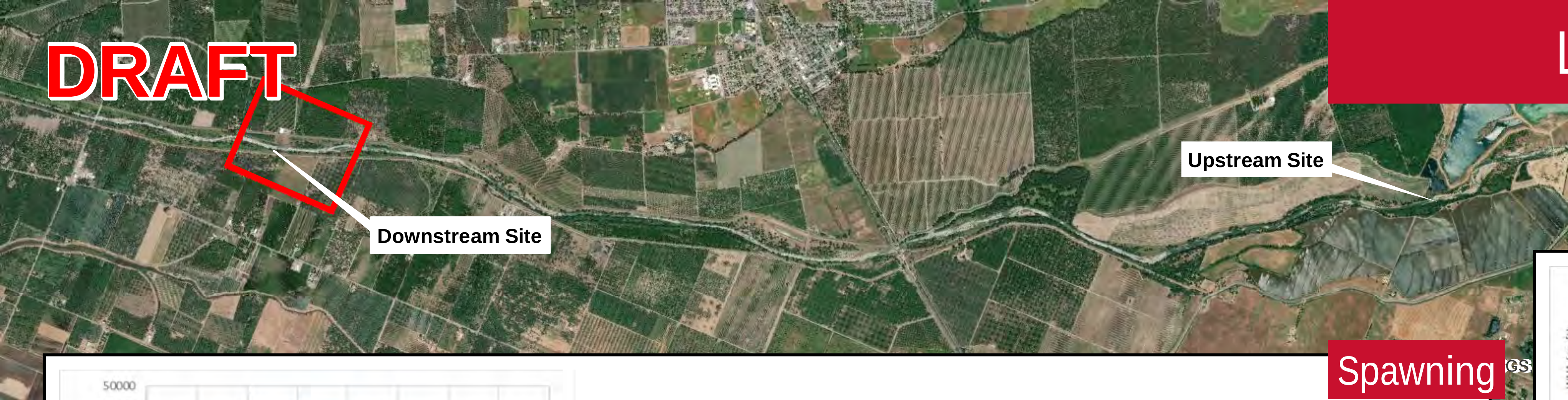


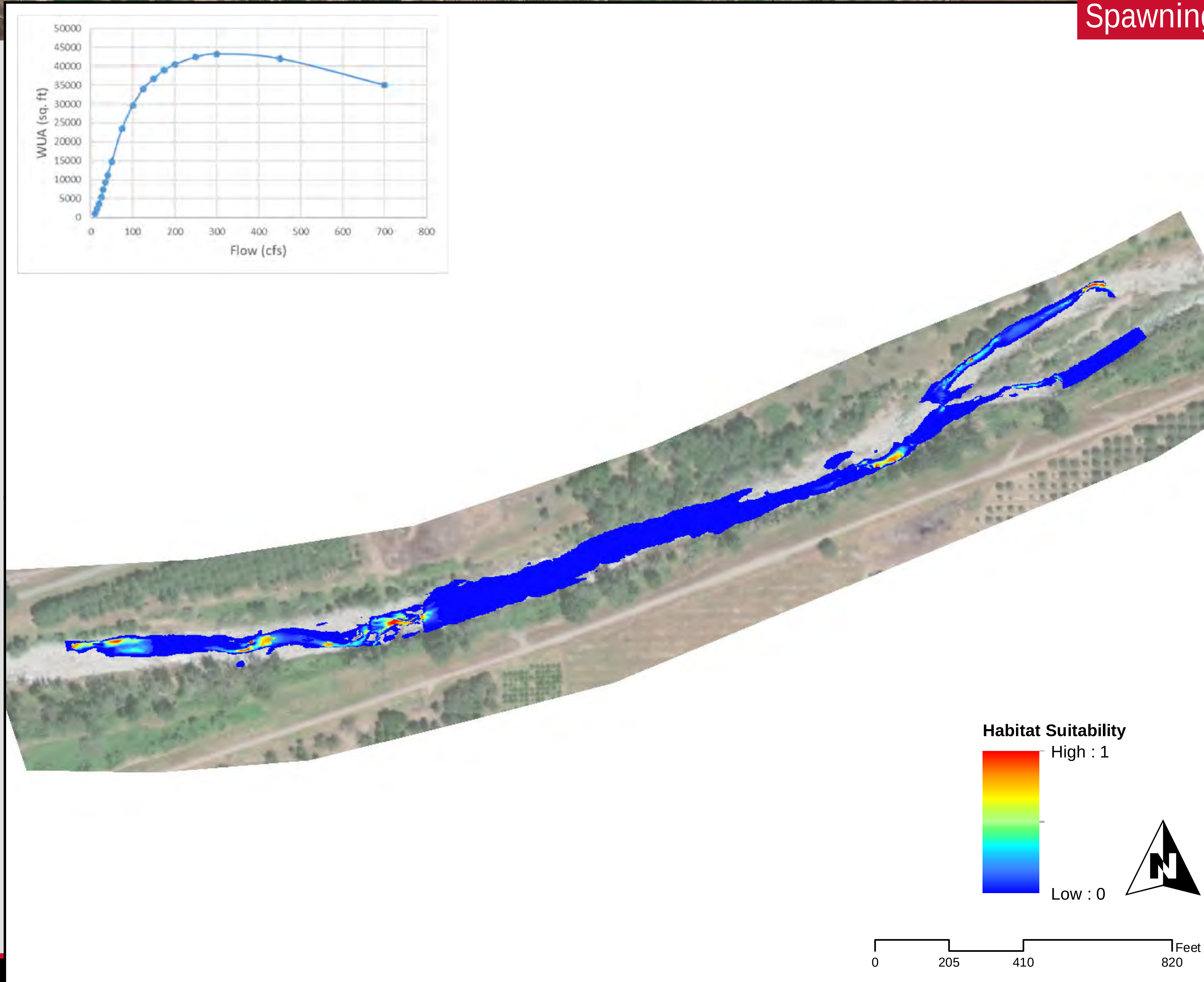
Lower Bear River - Instream Flow Study

Steelhead

Downstream Study Site 35 cfs



Spawning



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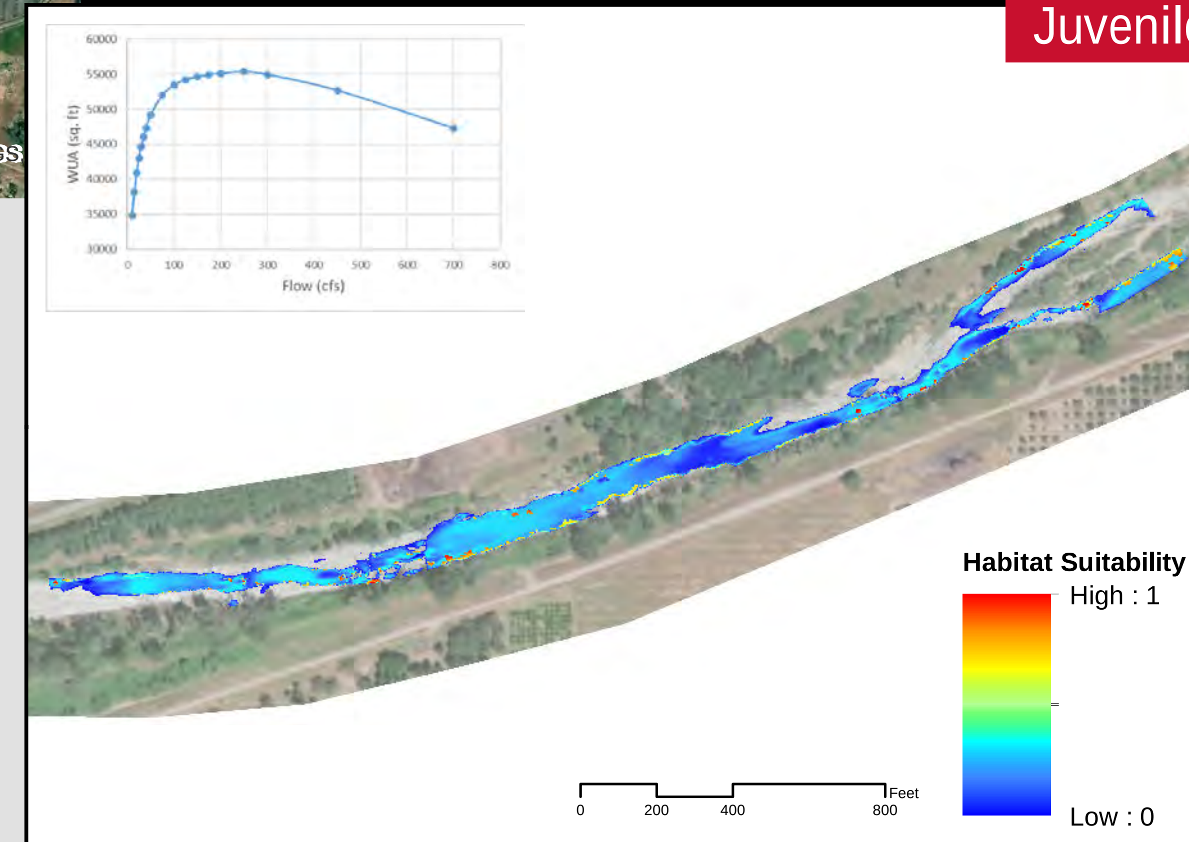

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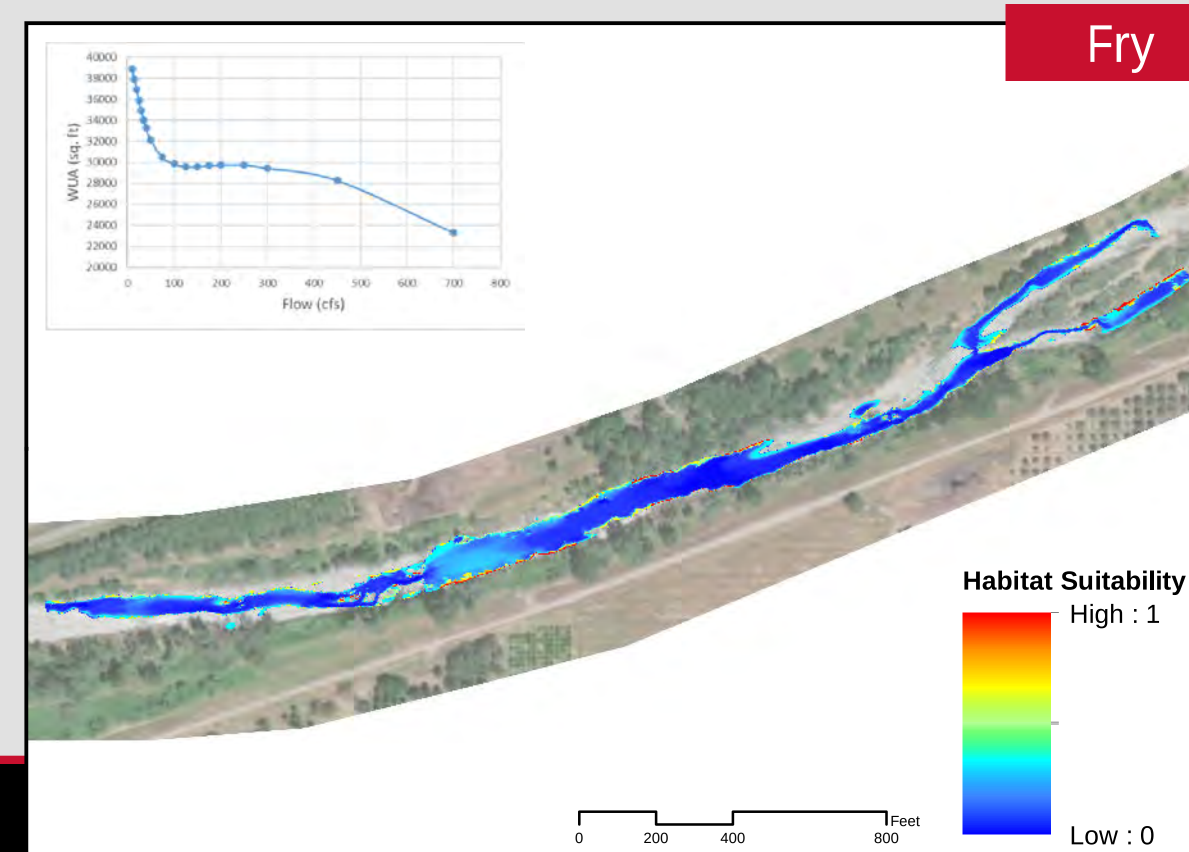


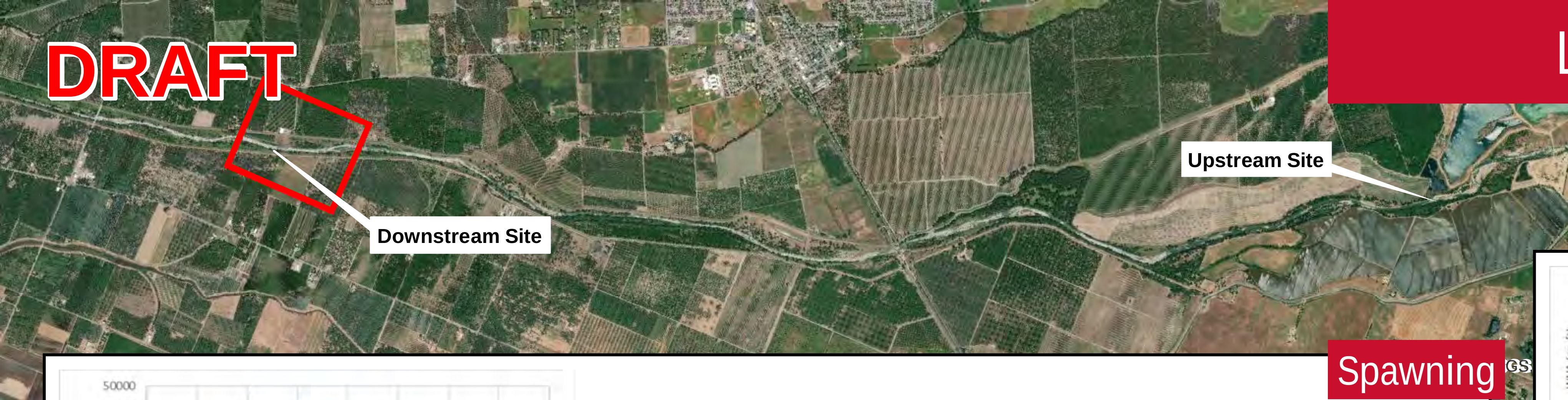
PATH: V:\CLIENT FILES\HDR\SSWD\INSTREAMFLOW\HABITAT\ATTACHMENT_ISF_MODEL_RESULTS.MXD - USER: GPOPULIS - DATE: 12/6/2018

Lower Bear River - Instream Flow Study

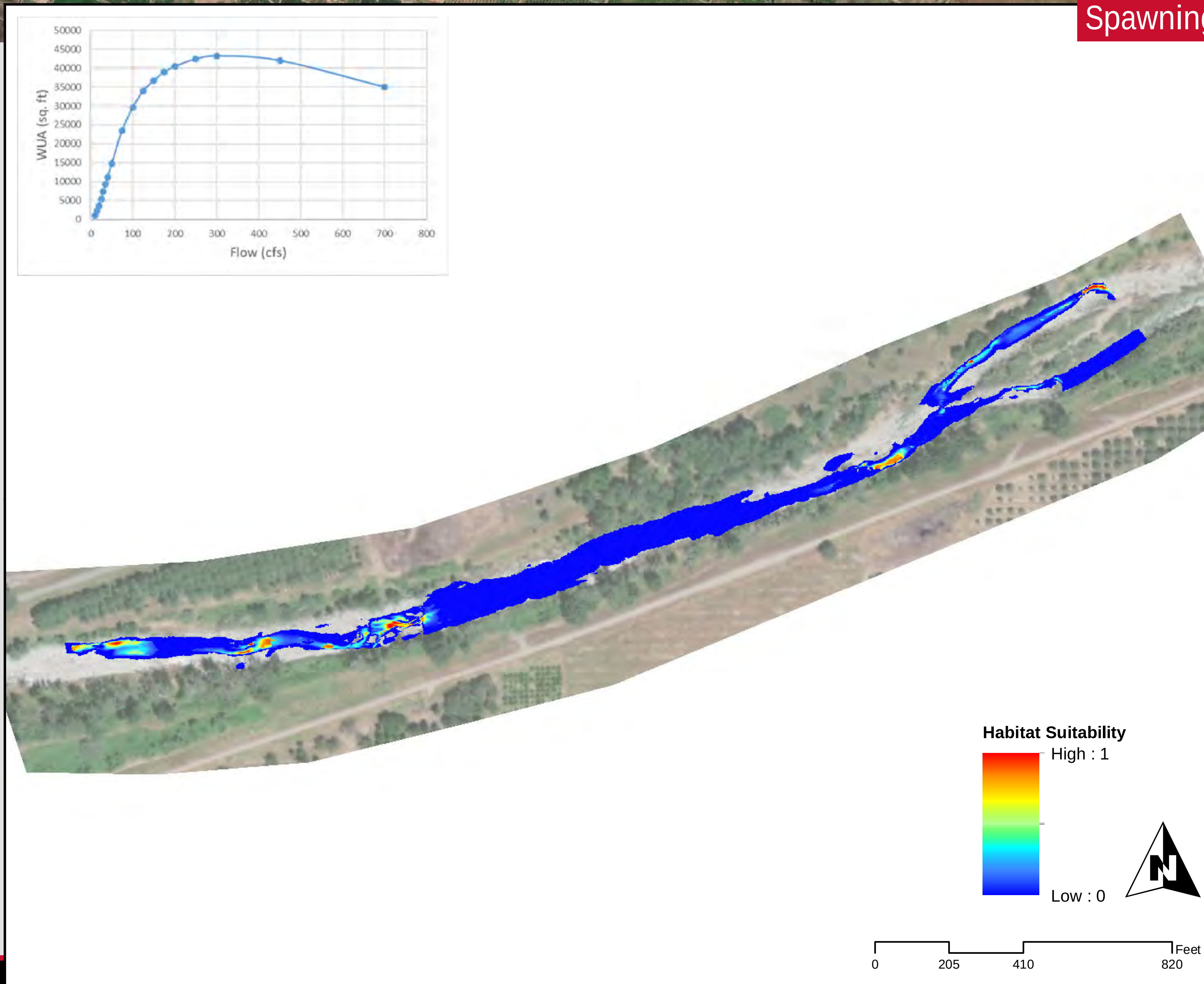
SSWD HDR

Steelhead

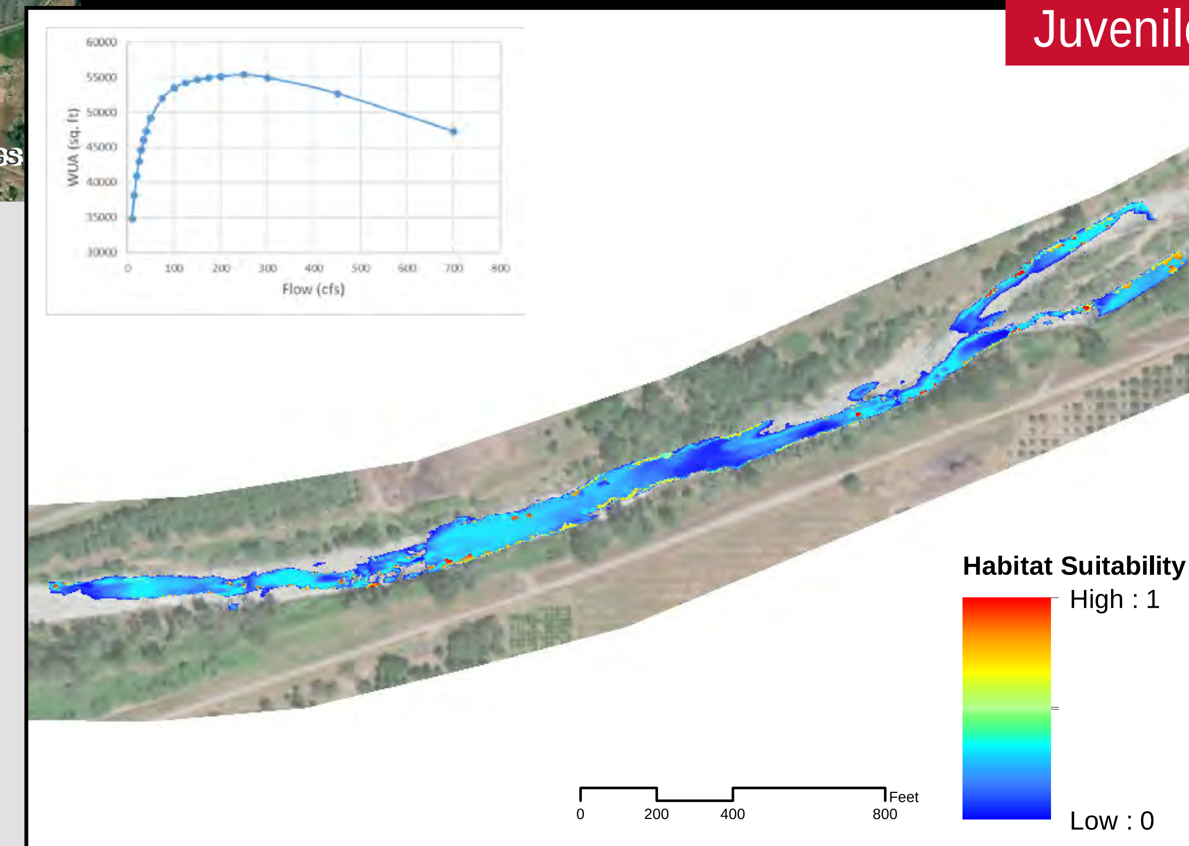
Downstream Study Site 40 cfs



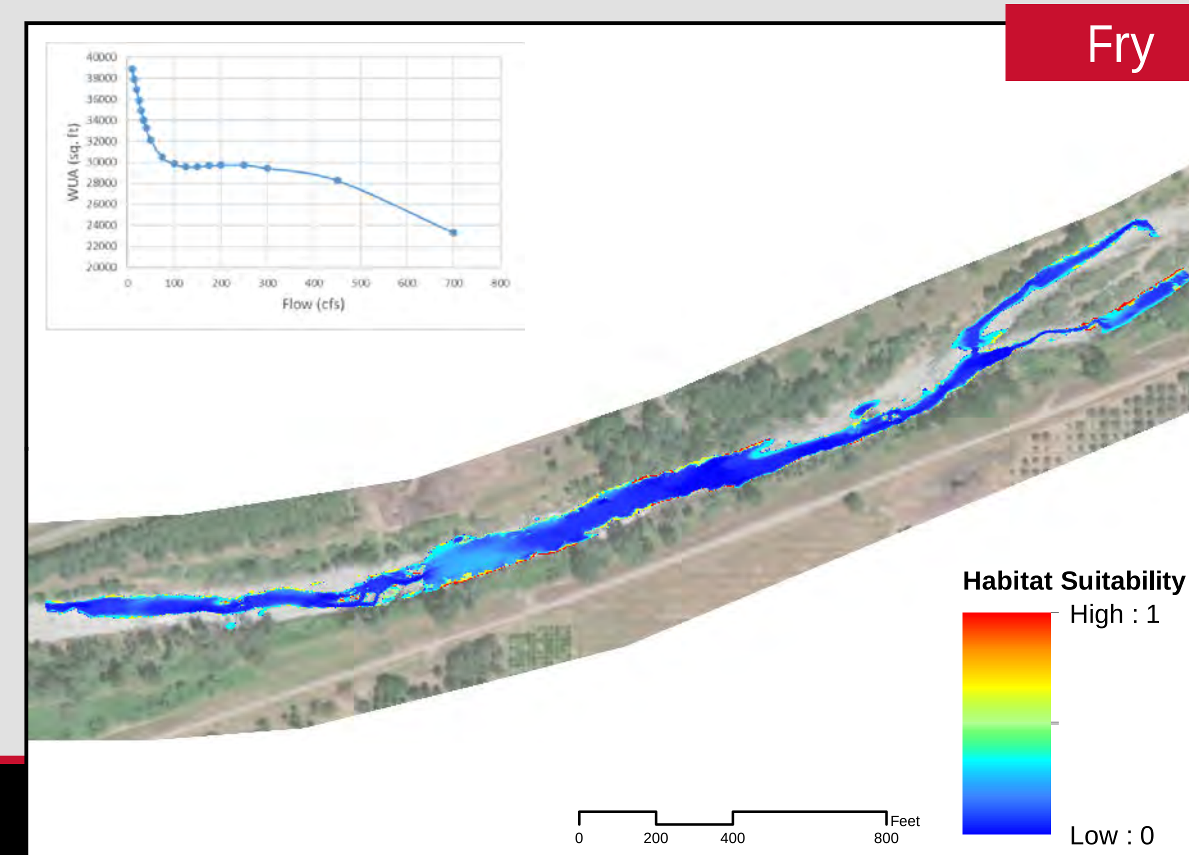
Spawning



Juvenile



Fry



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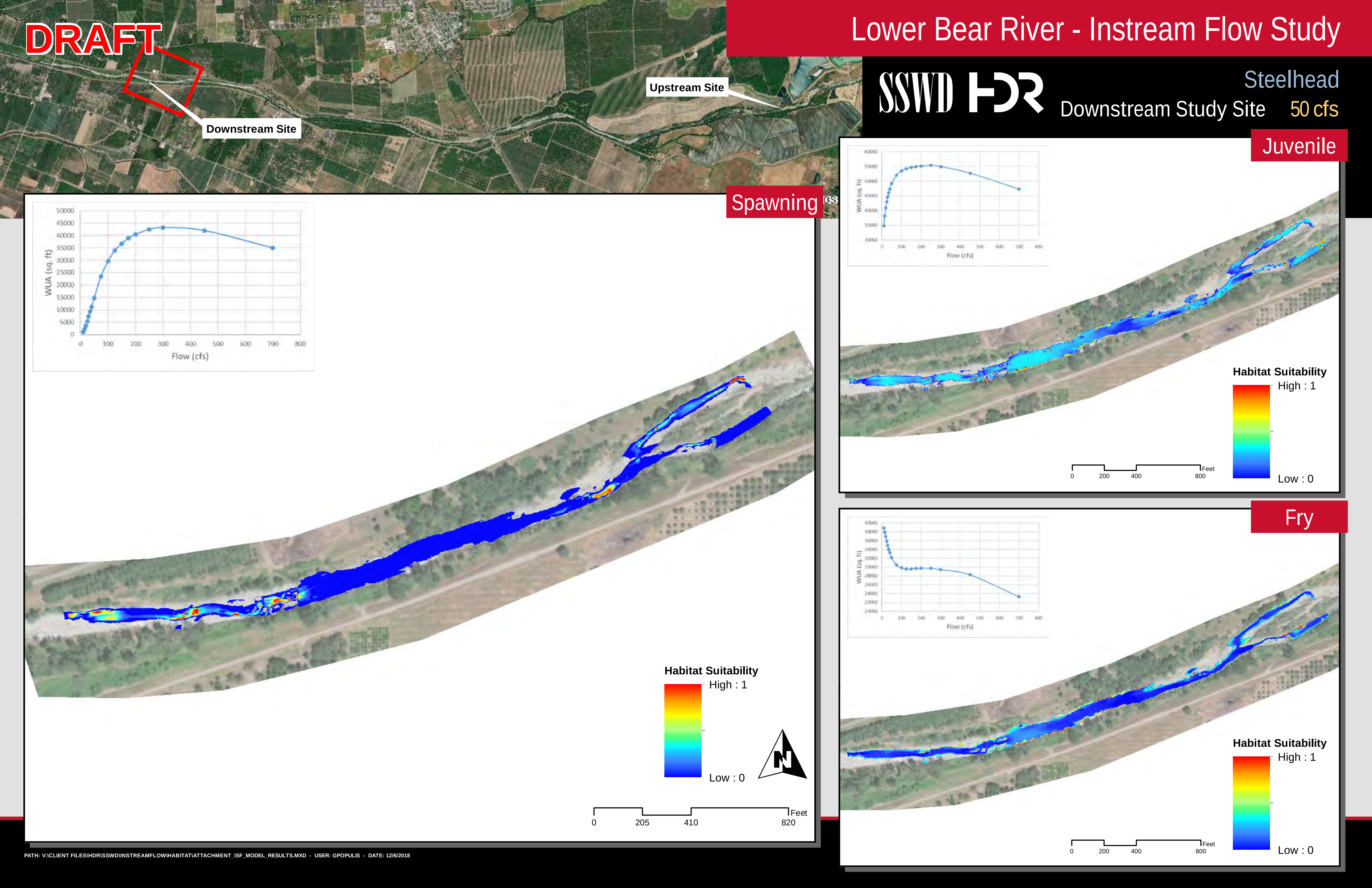
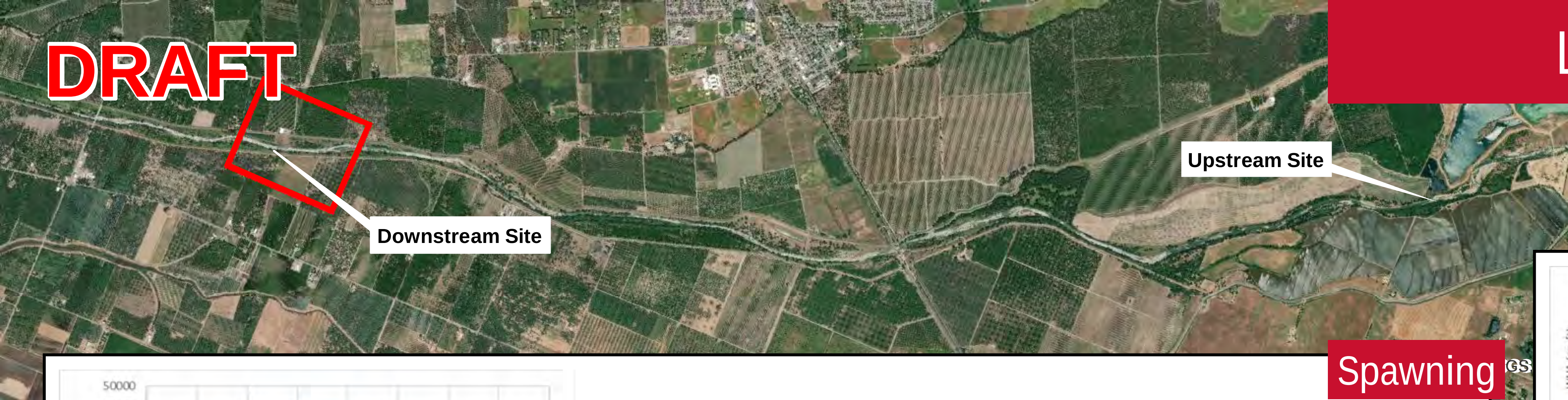

DRAFT
Lower Bear River - Instream Flow Study
SSWD
HDR
Steelhead
Downstream Study Site
50 cfs
Upstream Site
Downstream Site
Spawning
WUA (sq. ft)
Flow (cfs)
Habitat Suitability
High : 1
Low : 0
0
205
410
820
Feet
Juvenile
WUA (sq. ft)
Flow (cfs)
Habitat Suitability
High : 1
Low : 0
0
200
400
800
Feet
Fry
WUA (sq. ft)
Flow (cfs)
Habitat Suitability
High : 1
Low : 0
0
200
400
800
Feet
PATH: V:\CLIENT FILES\HDR\SSWD\INSTREAMFLOW\HABITAT\ATTACHMENT_ISF_MODEL_RESULTS.MXD - USER: GPOPULIS - DATE: 12/6/2018

Lower Bear River - Instream Flow Study

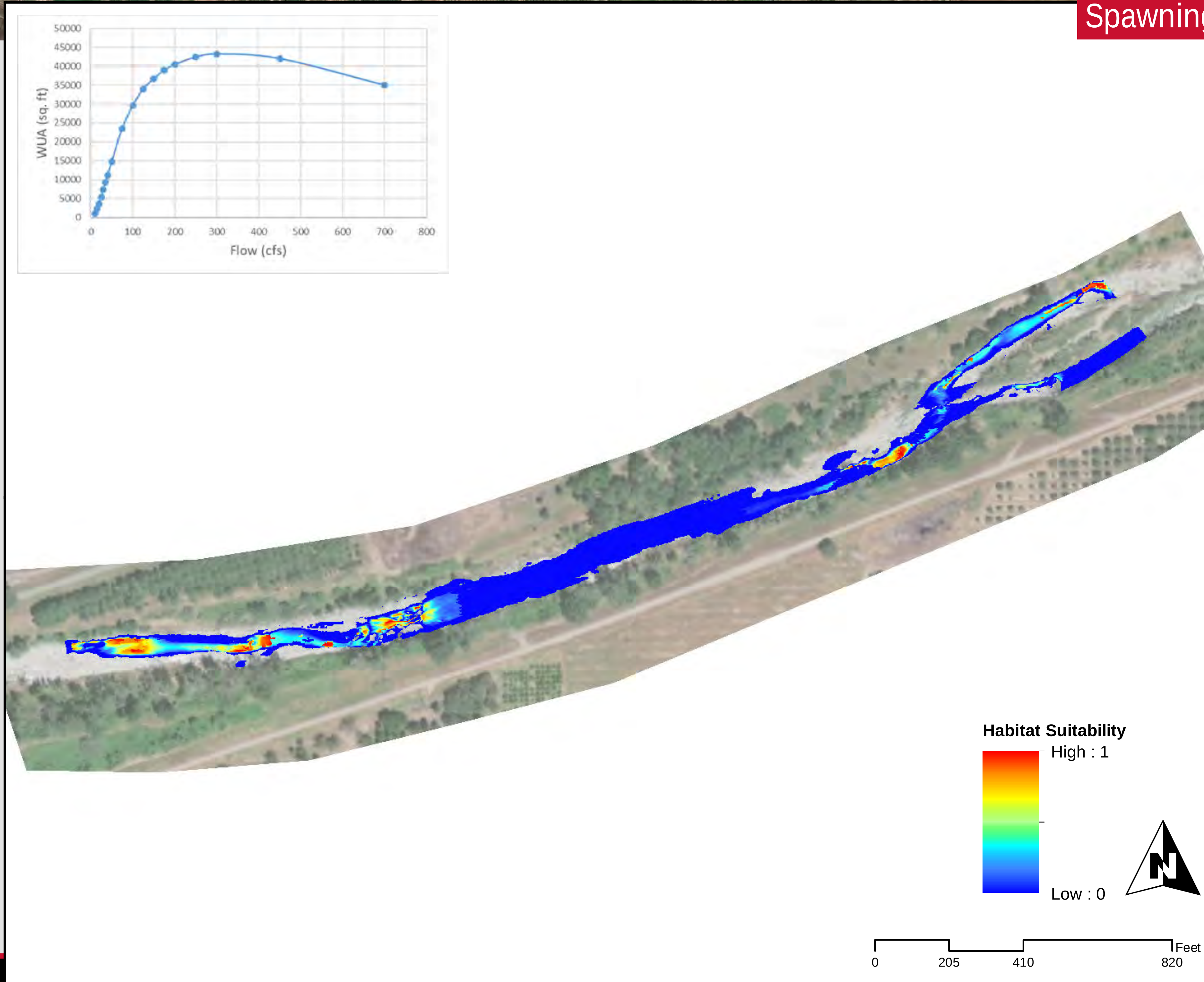
SSWD HDR

Steelhead

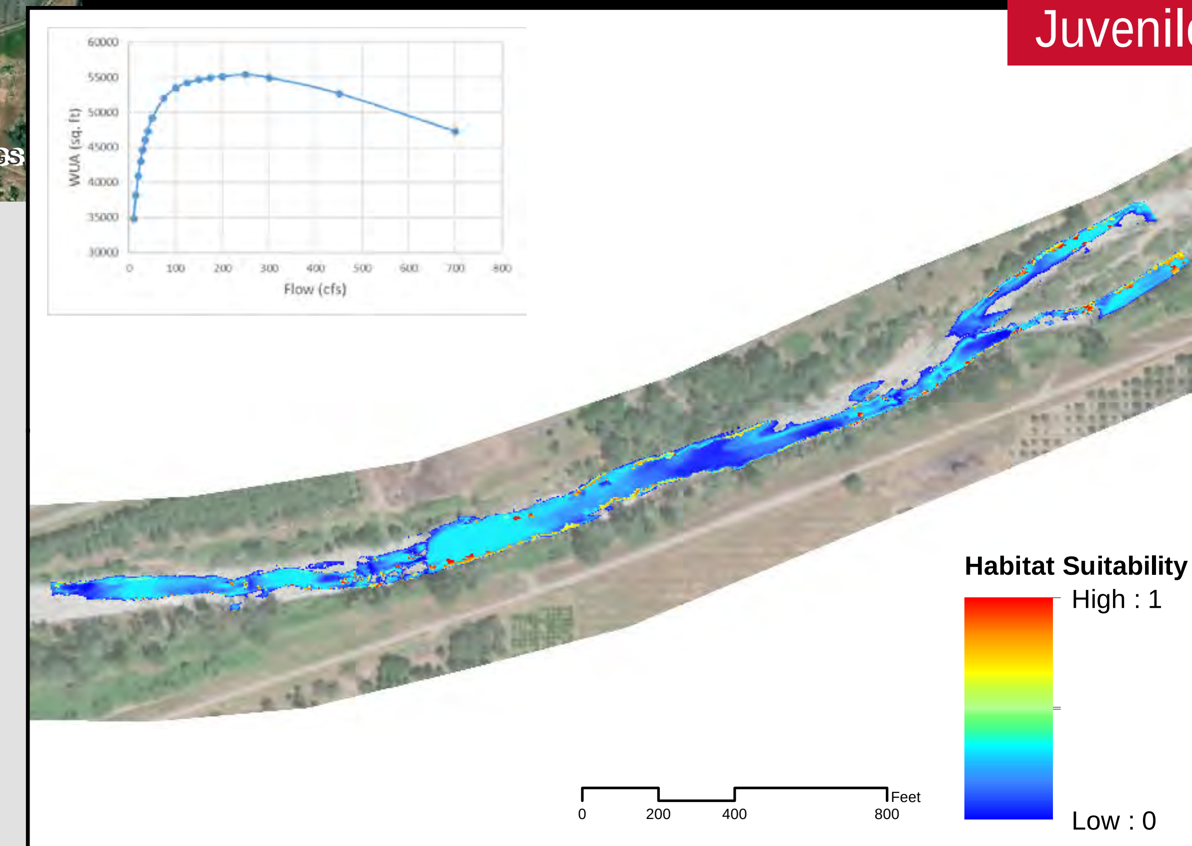
Downstream Study Site 75 cfs



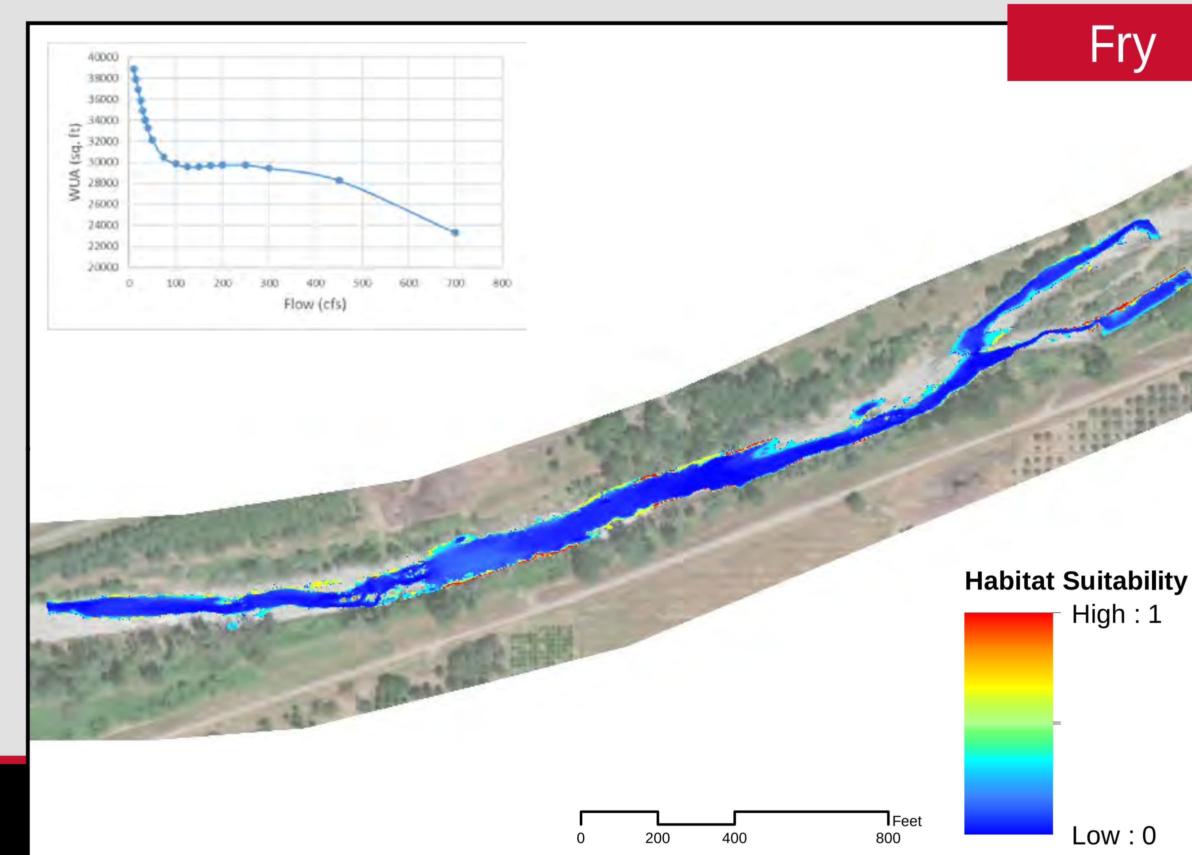
Spawning



Juvenile



Fry

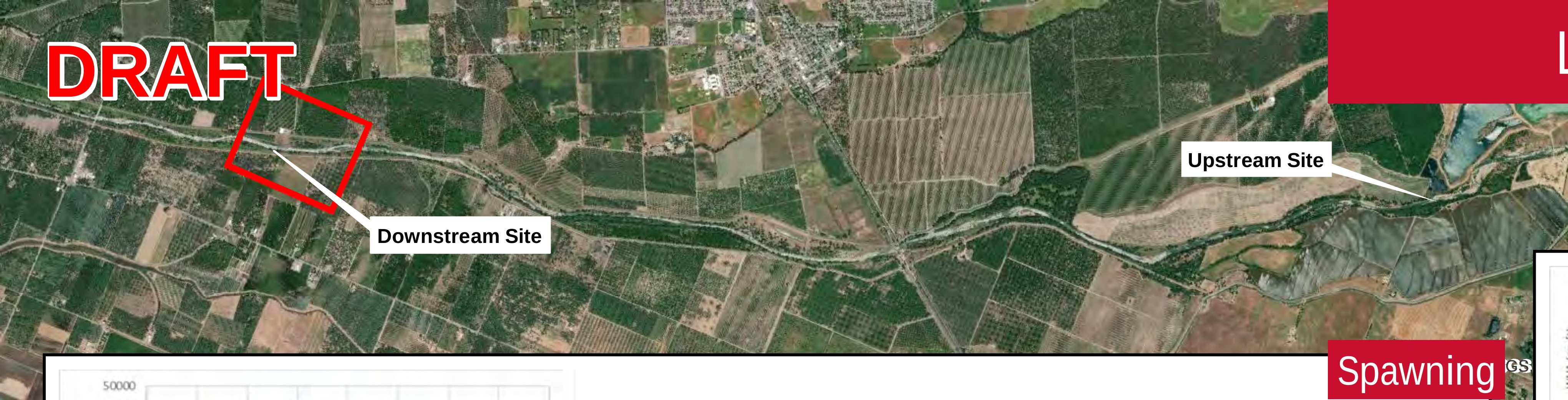


PATH: V:\CLIENT FILES\HDR\SSWD\INSTREAMFLOW\HABITAT\ATTACHMENT_ISF_MODEL_RESULTS.MXD - USER: GPOPULIS - DATE: 12/6/2018

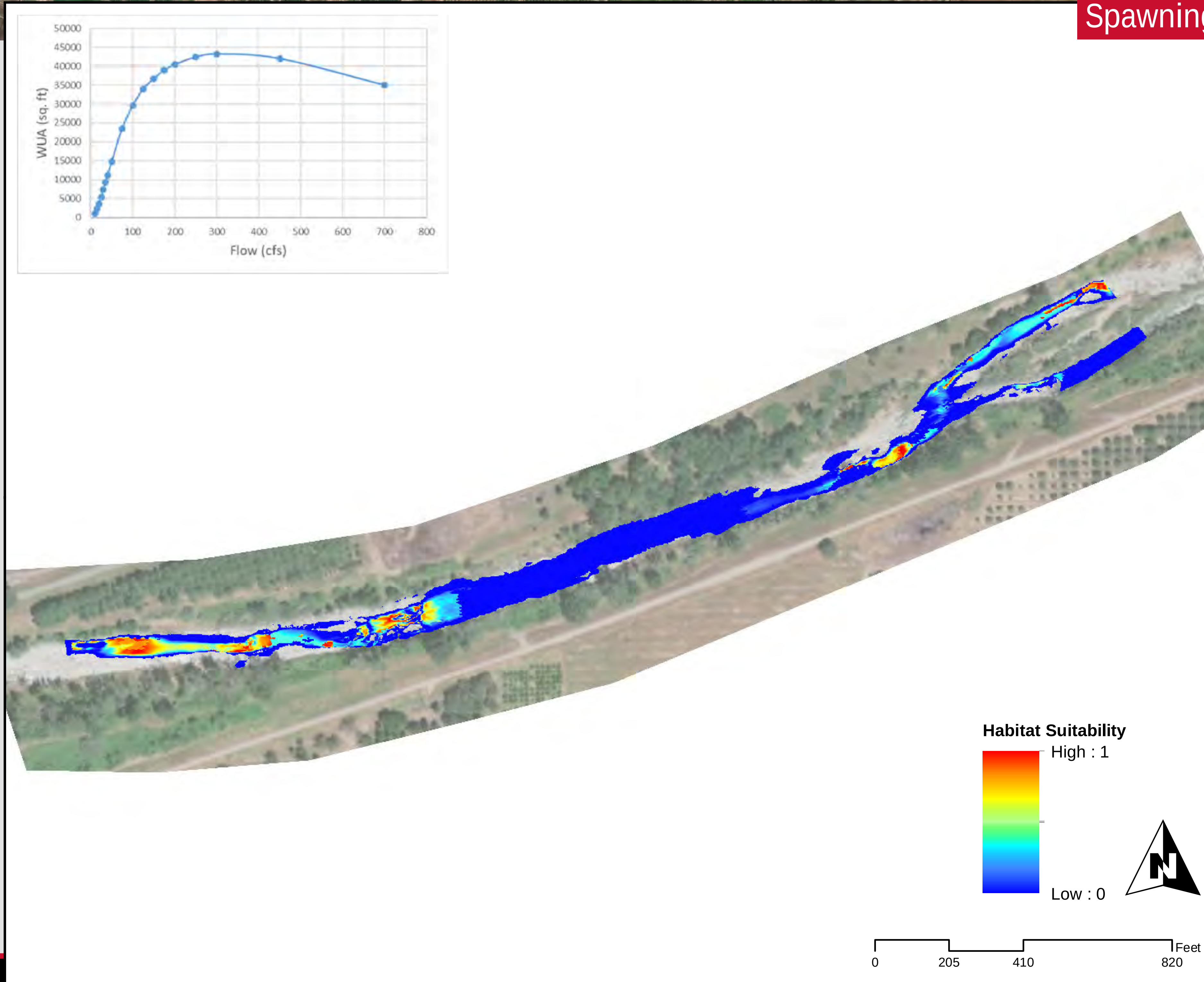
Lower Bear River - Instream Flow Study

Steelhead

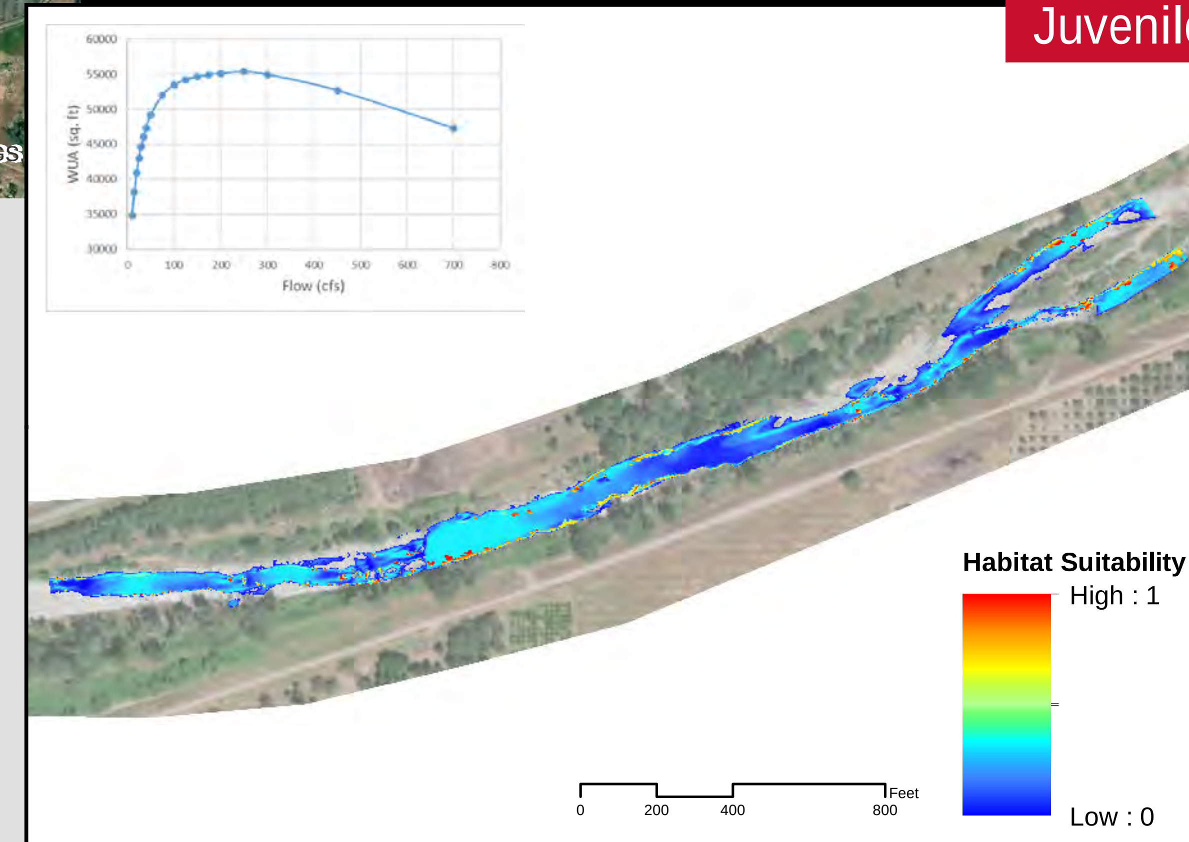
Downstream Study Site 100 cfs



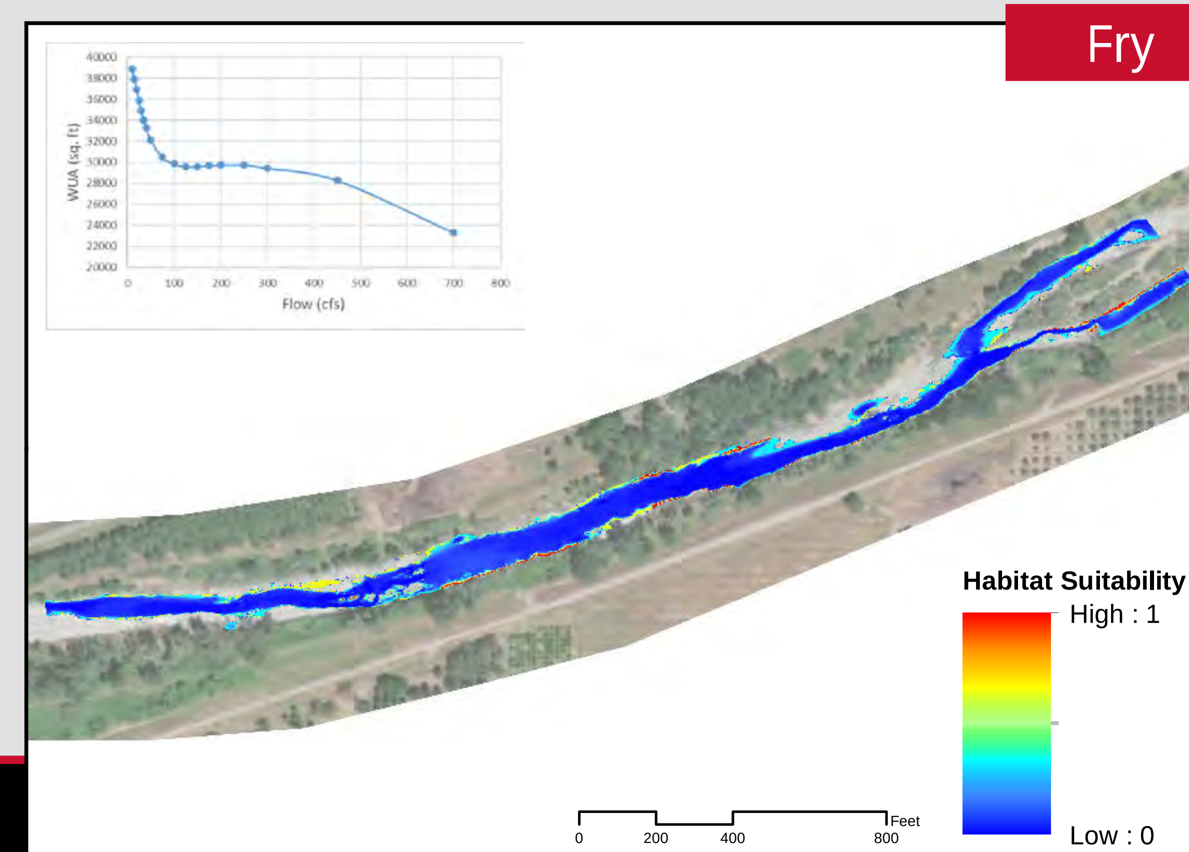
Spawning



Juvenile



Fry



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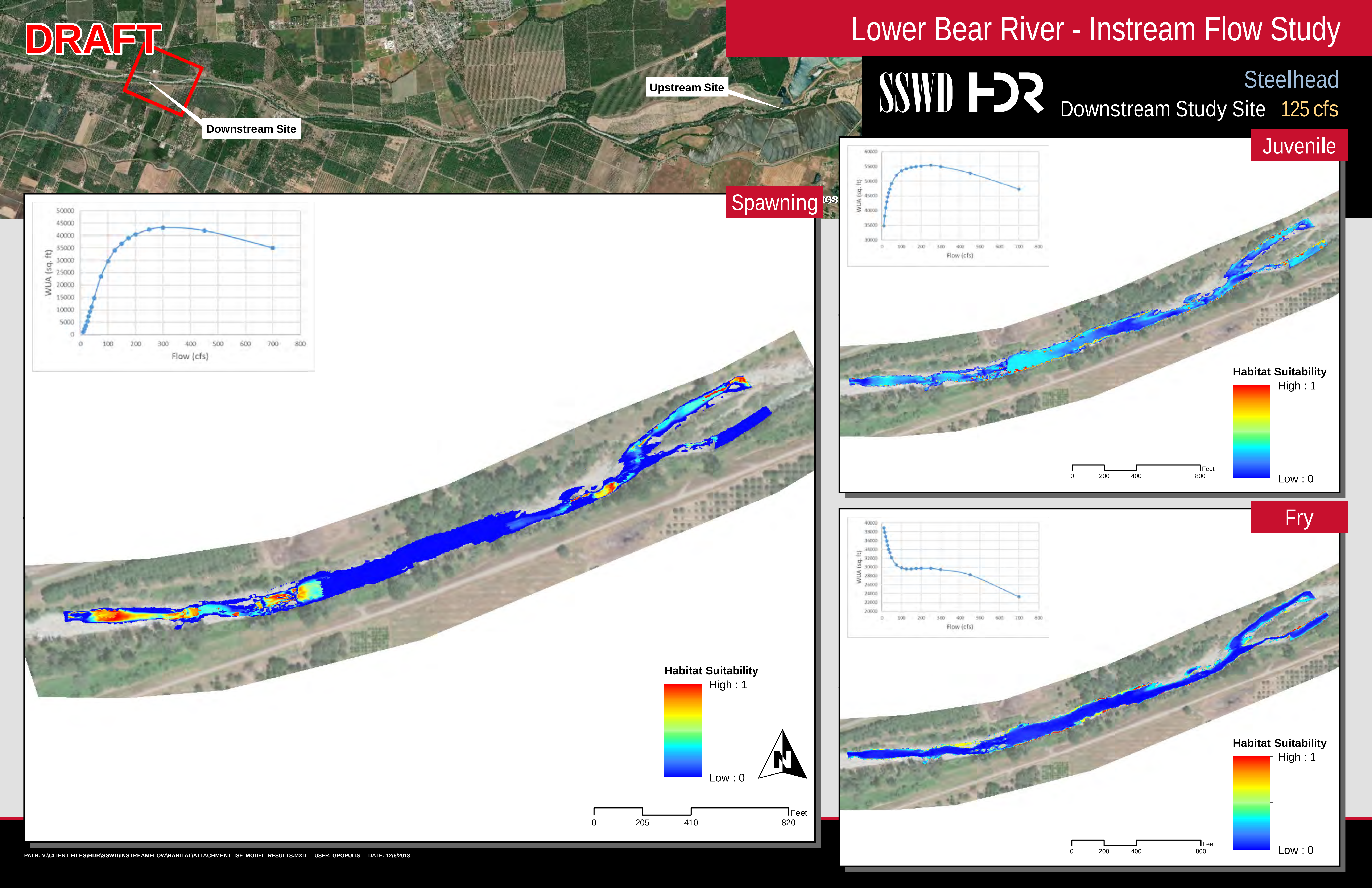
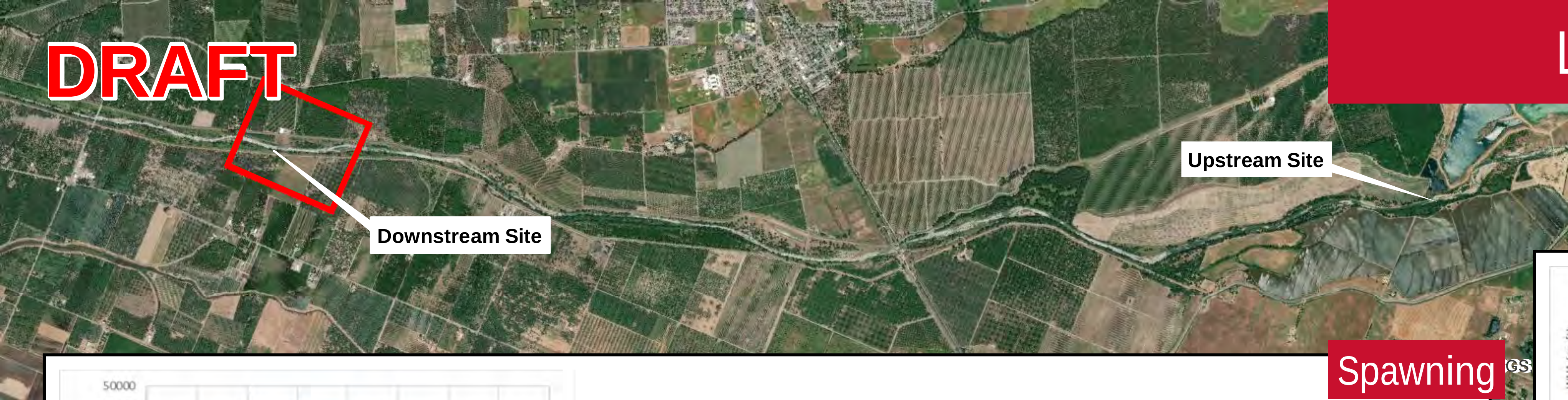


DRAFT
Lower Bear River - Instream Flow Study
SSWD
HDR
Steelhead
Downstream Study Site
125 cfs
Upstream Site
Downstream Site
Spawning
WUA (sq. ft)
Flow (cfs)
Habitat Suitability
High : 1
Low : 0
N
0
205
410
820
Feet
Juvenile
WUA (sq. ft)
Flow (cfs)
Habitat Suitability
High : 1
Low : 0
0
200
400
800
Feet
Fry
WUA (sq. ft)
Flow (cfs)
Habitat Suitability
High : 1
Low : 0
0
200
400
800
Feet
PATH: V:\CLIENT FILES\HDR\SSWD\INSTREAMFLOW\HABITAT\ATTACHMENT_ISF_MODEL_RESULTS.MXD - USER: GPOPULIS - DATE: 12/6/2018

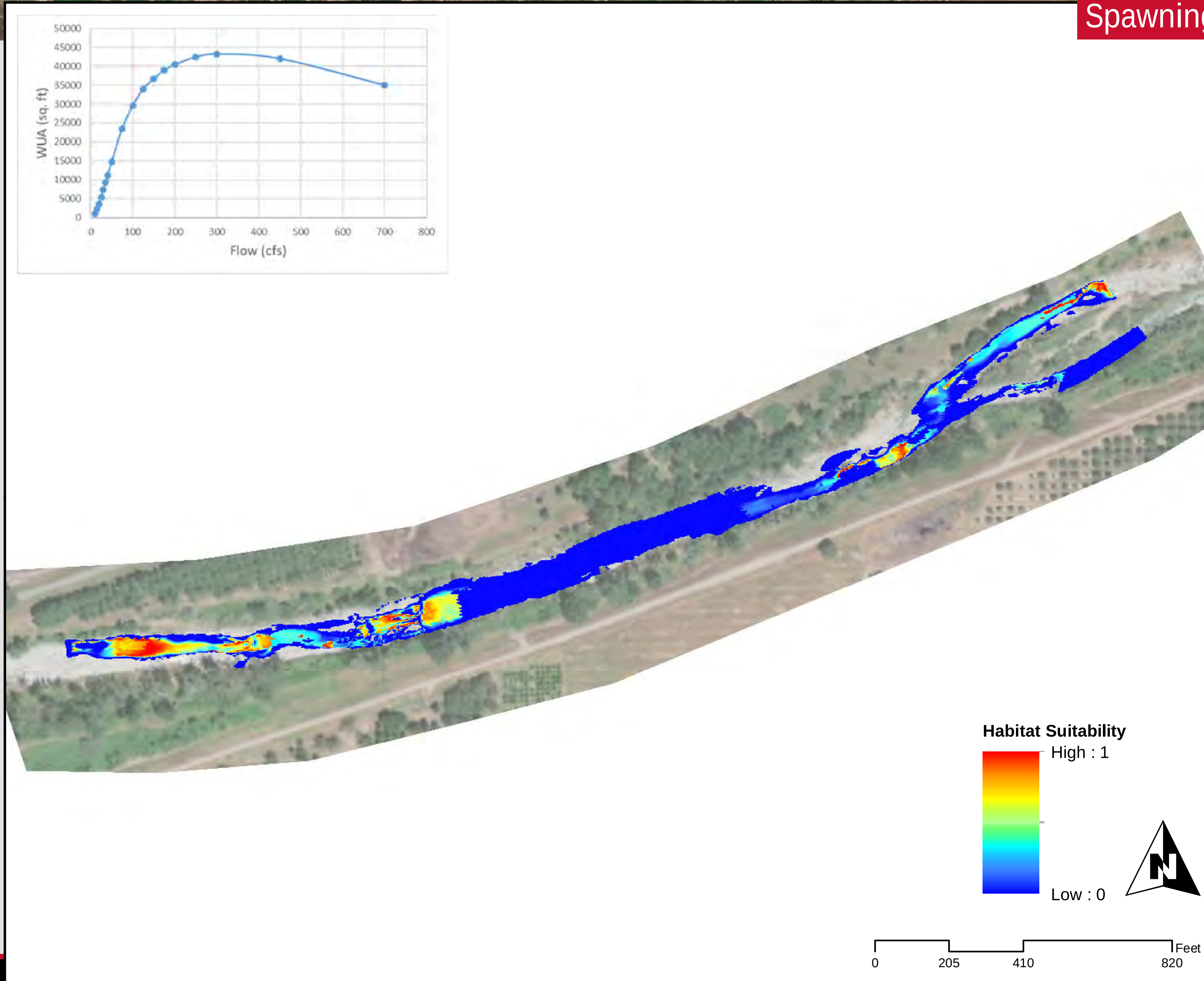
Lower Bear River - Instream Flow Study

Steelhead

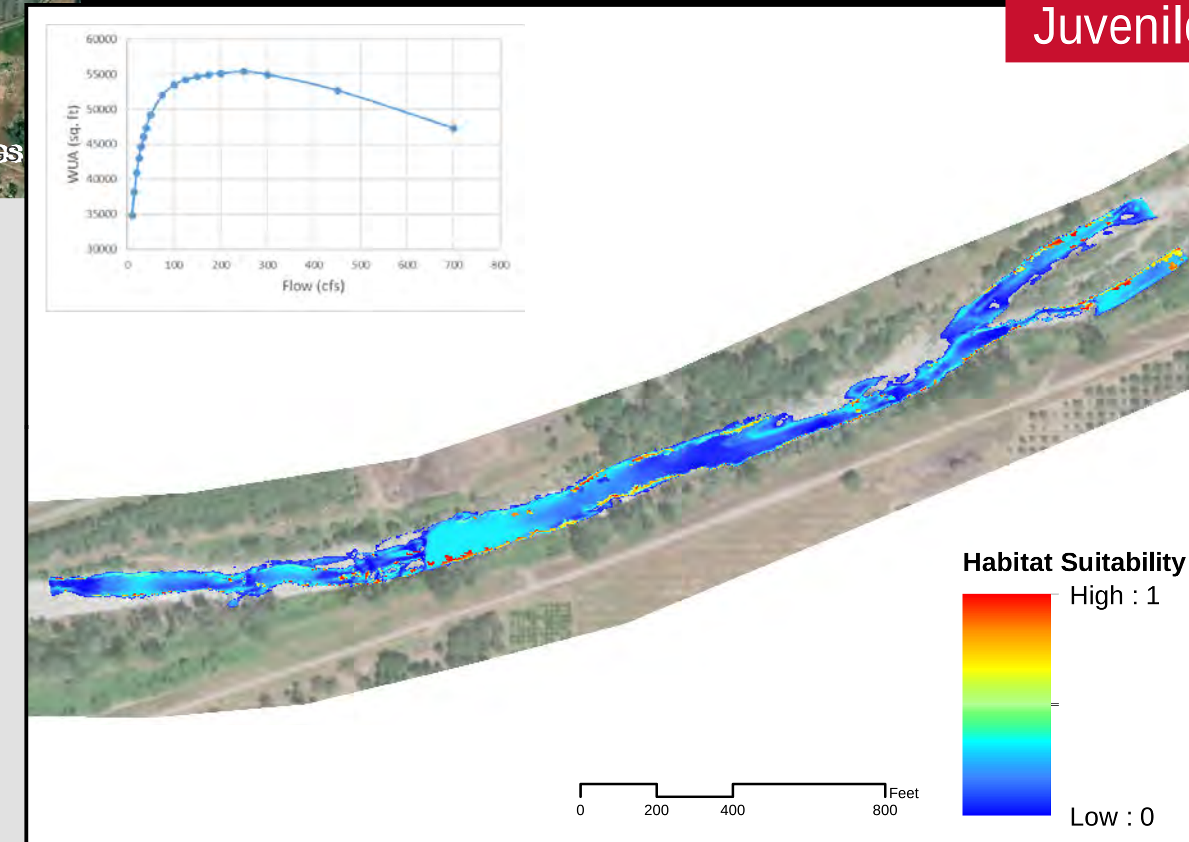
Downstream Study Site 150 cfs



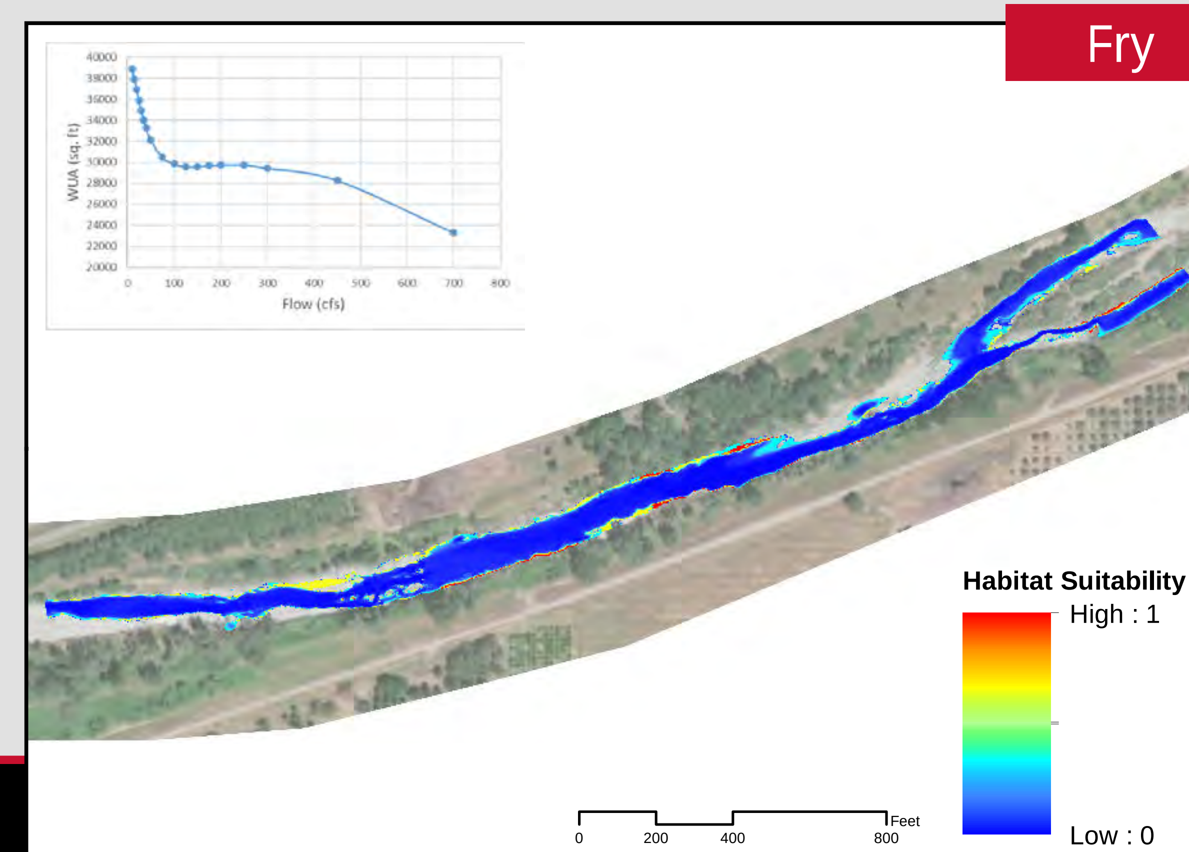
Spawning



Juvenile



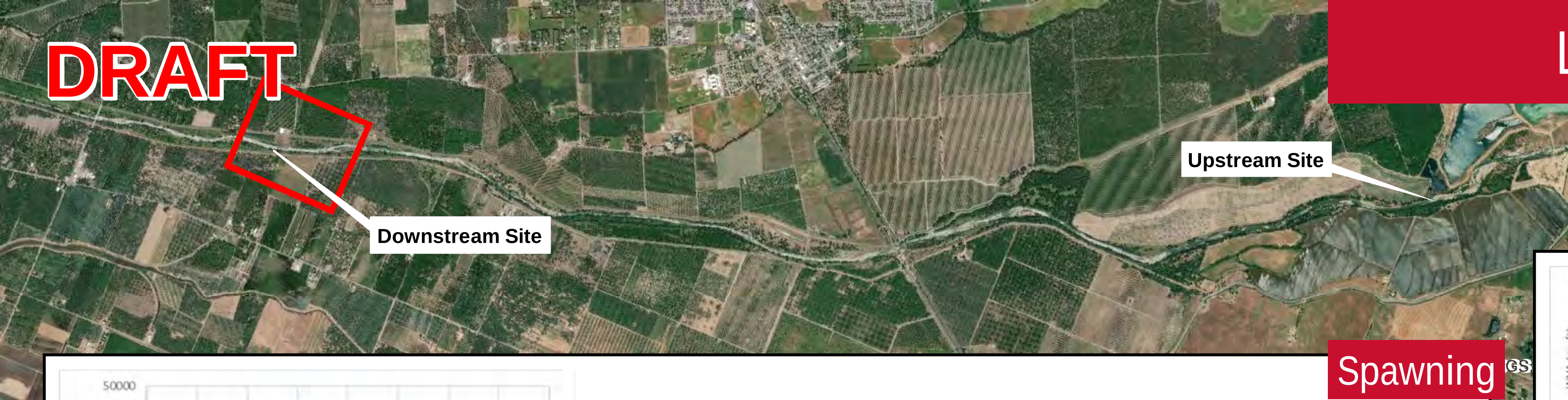
Fry



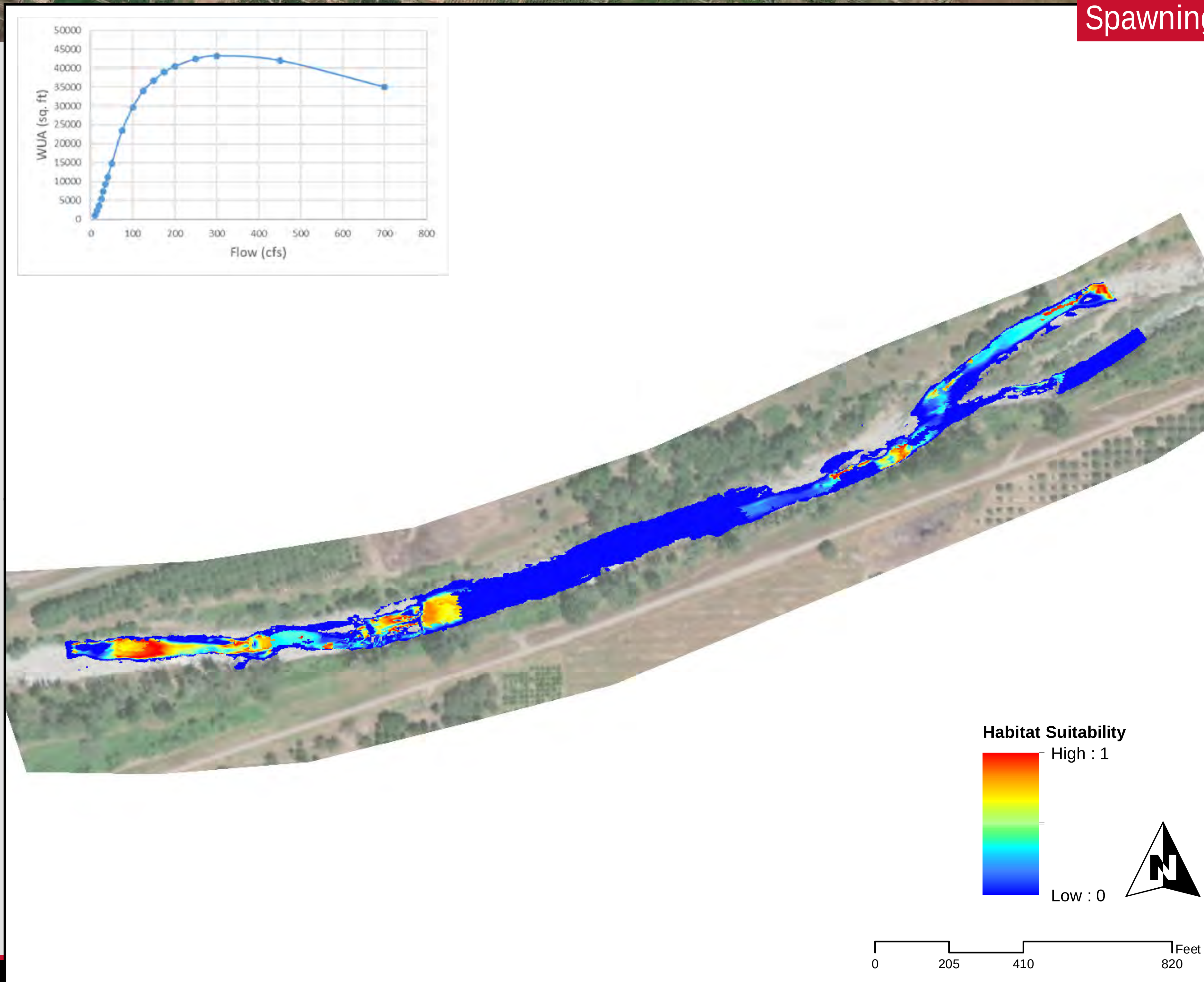
Lower Bear River - Instream Flow Study

Steelhead

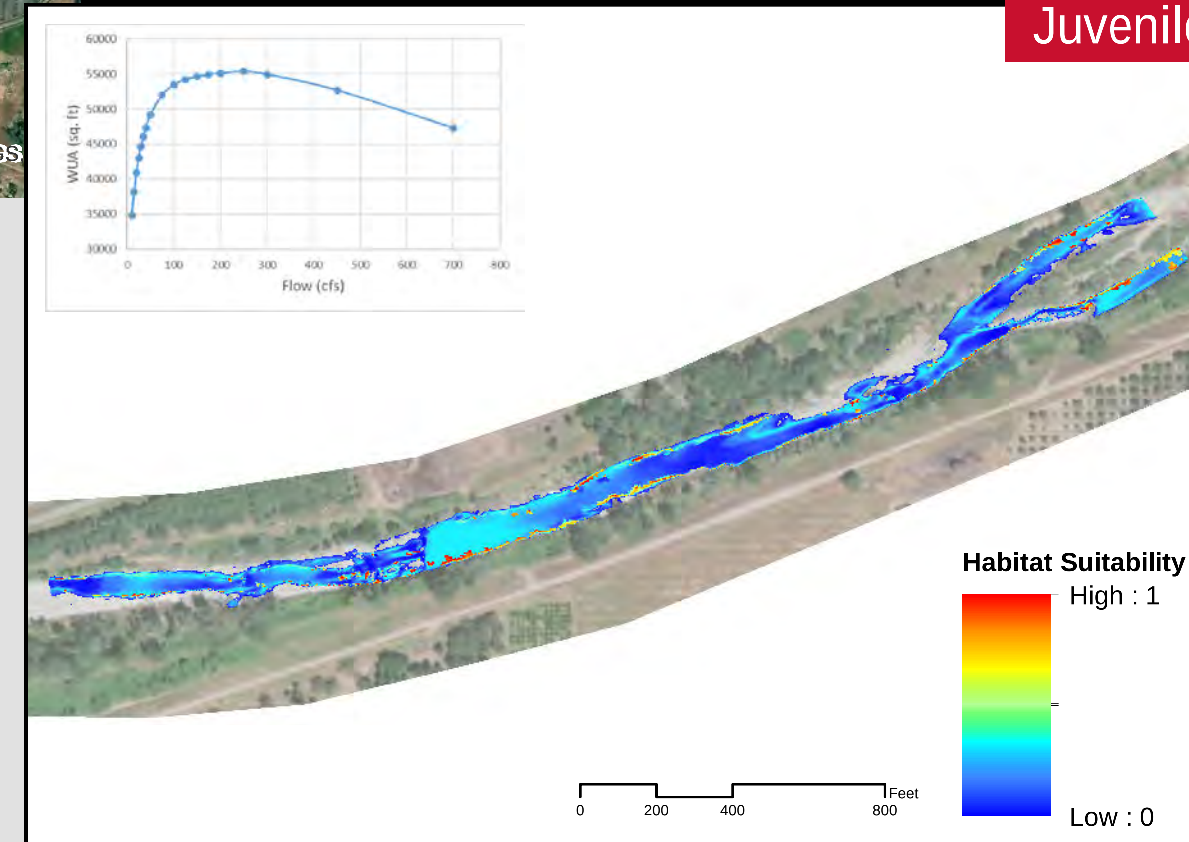
Downstream Study Site 175 cfs



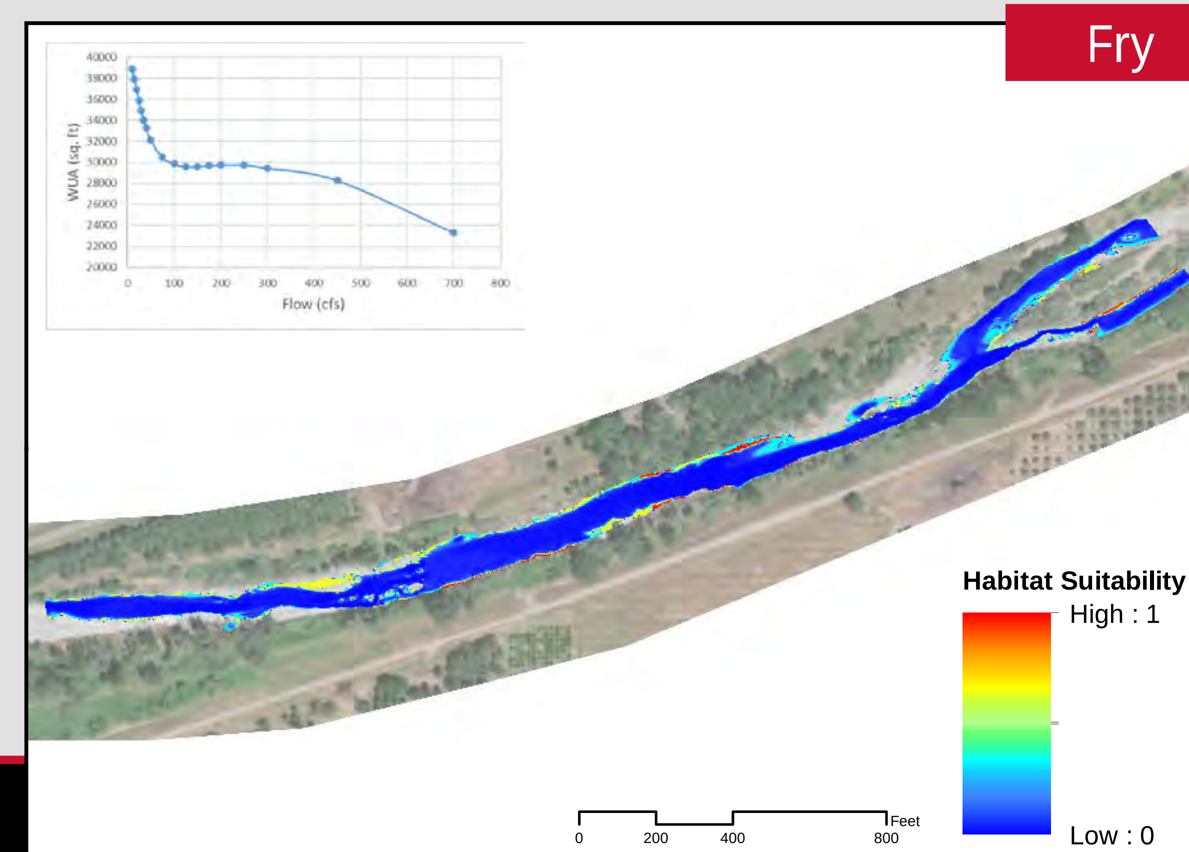
Spawning



Juvenile



Fry



PATH: V:\CLIENT FILES\HDR\SSWD\INSTREAMFLOW\HABITAT\ATTACHMENT_ISF_MODEL_RESULTS.MXD - USER: GPOPULIS - DATE: 12/6/2018

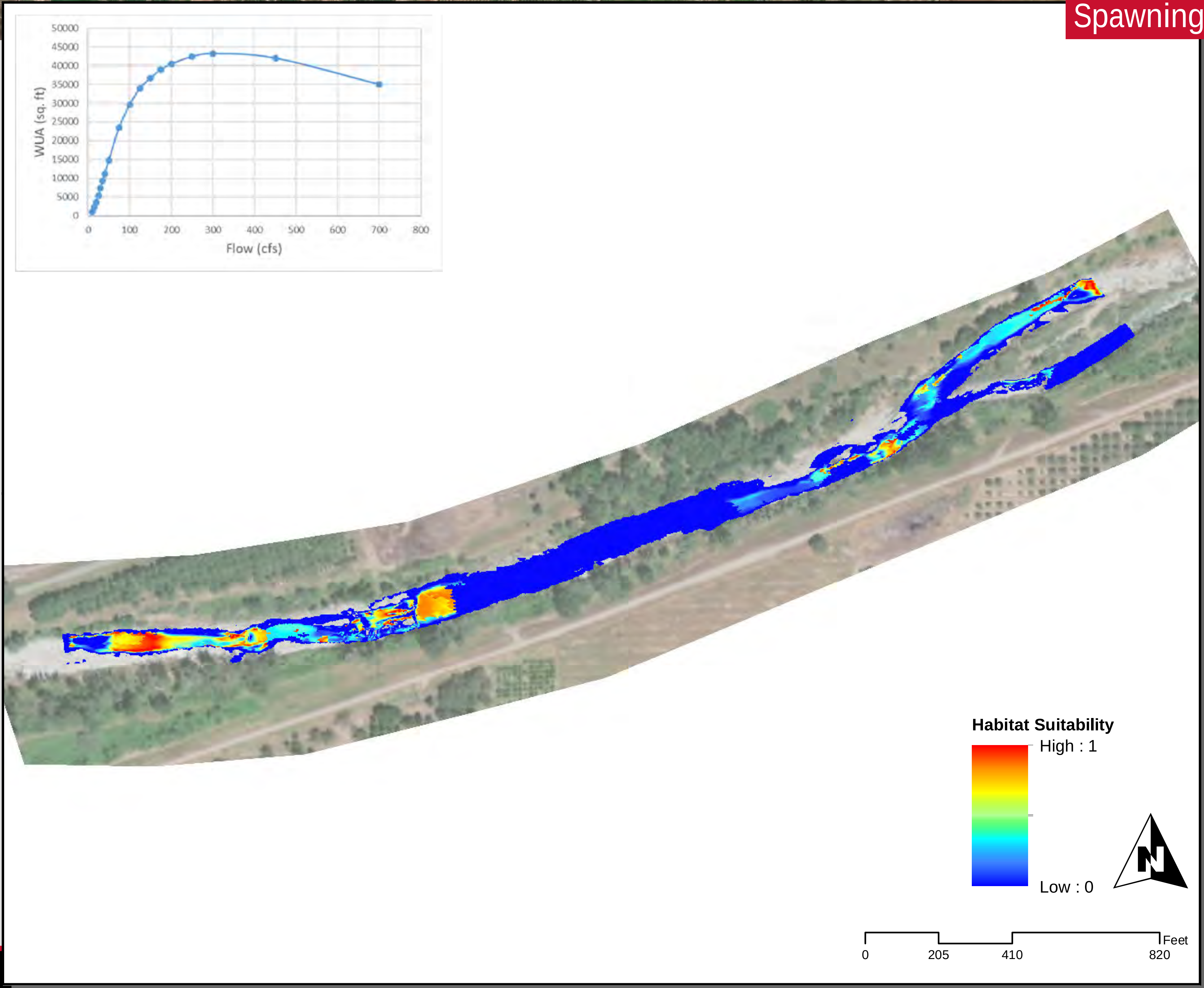
Lower Bear River - Instream Flow Study

SSWD HDR

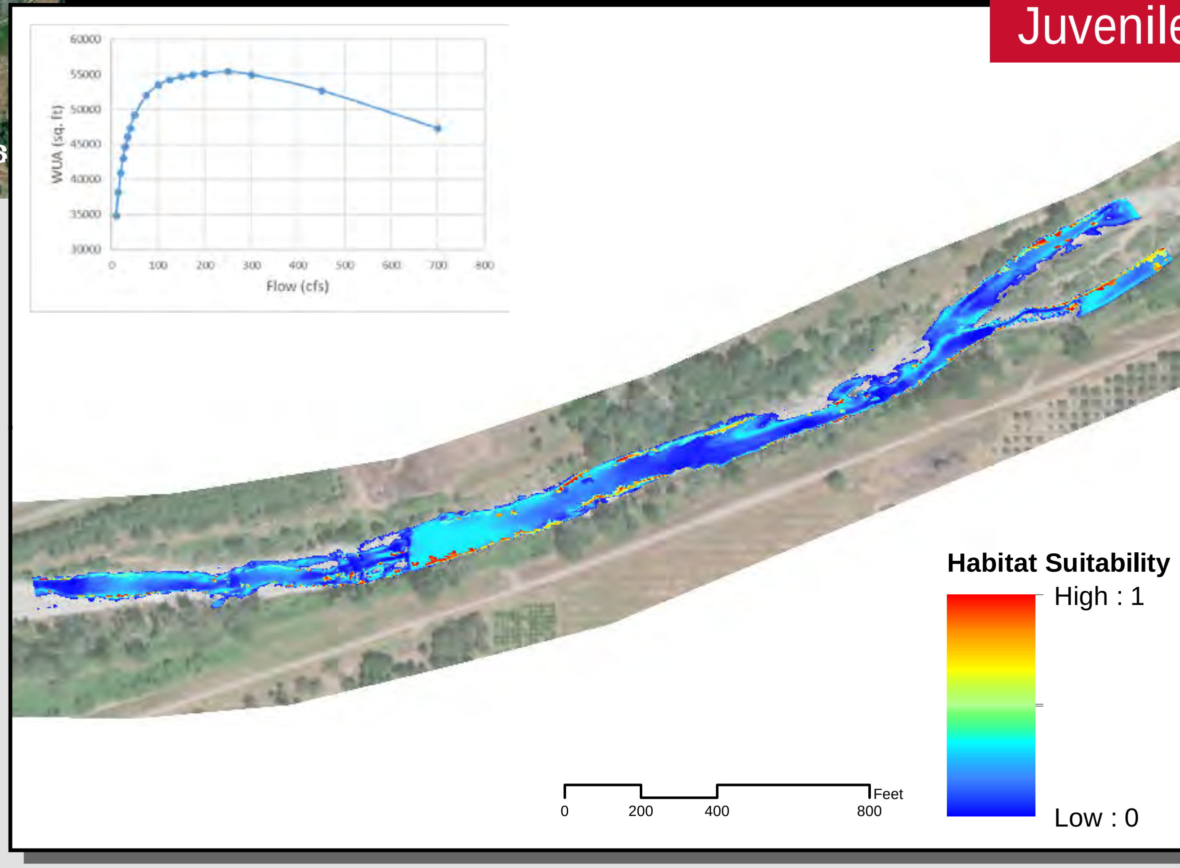
Steelhead

Downstream Study Site 200 cfs

Spawning



Juvenile



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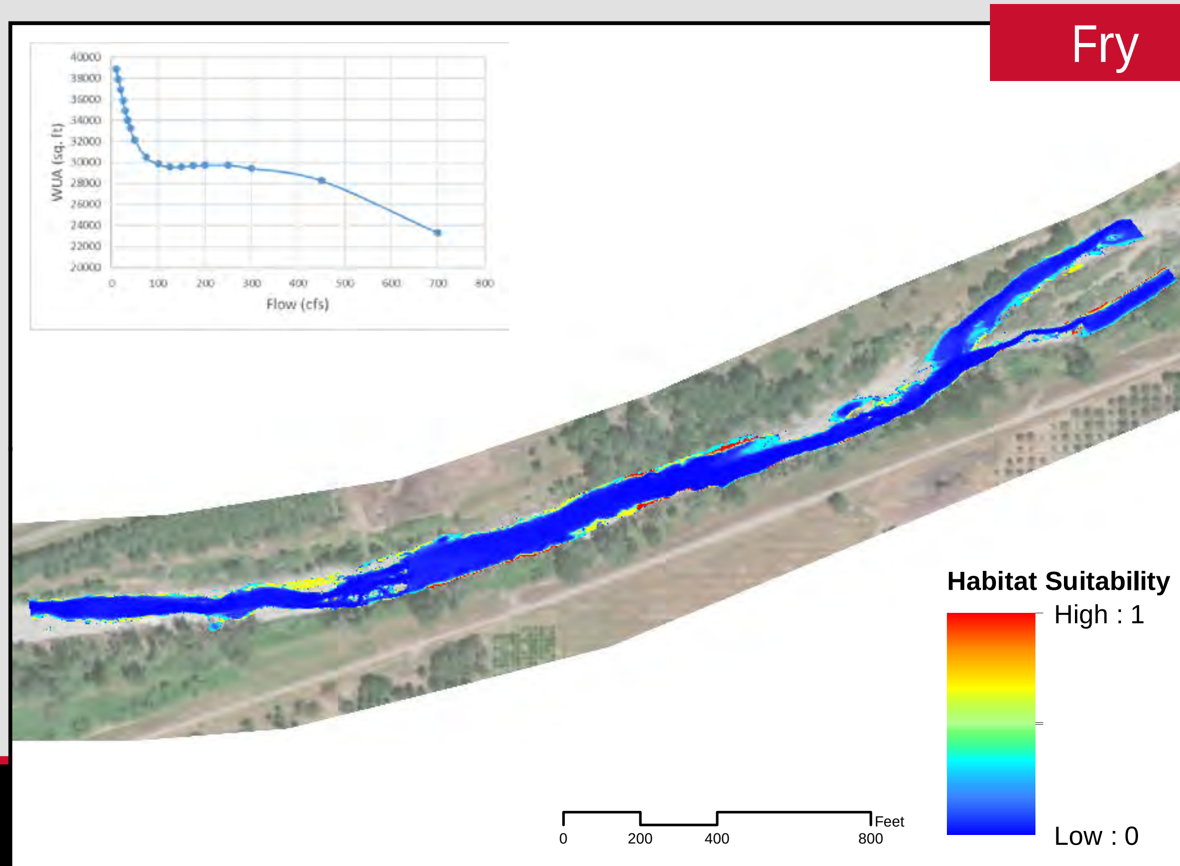

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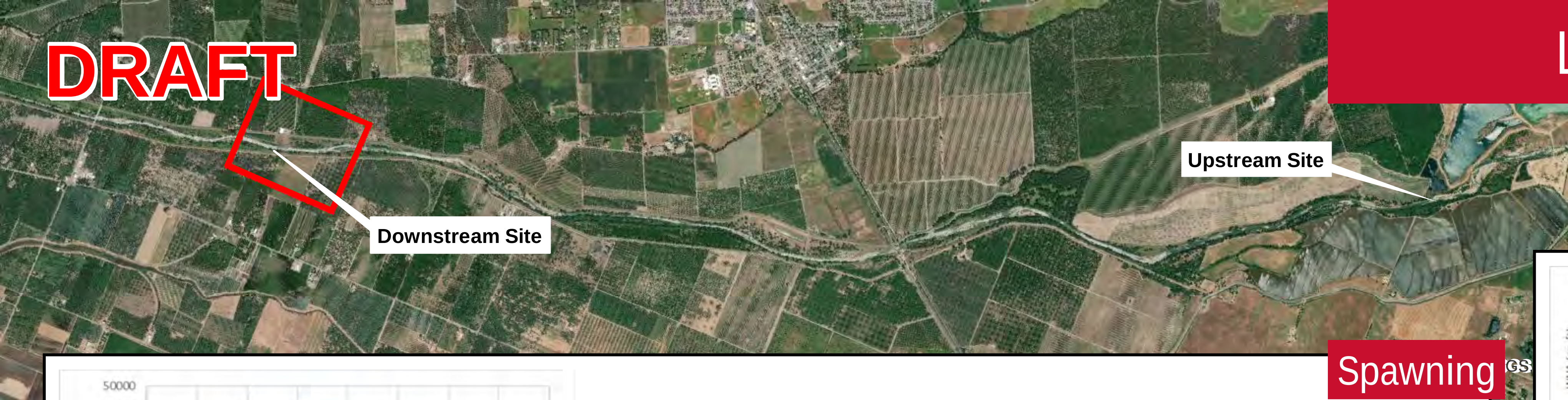
Lower Bear River - Instream Flow Study

Steelhead

Downstream Study Site 250 cfs



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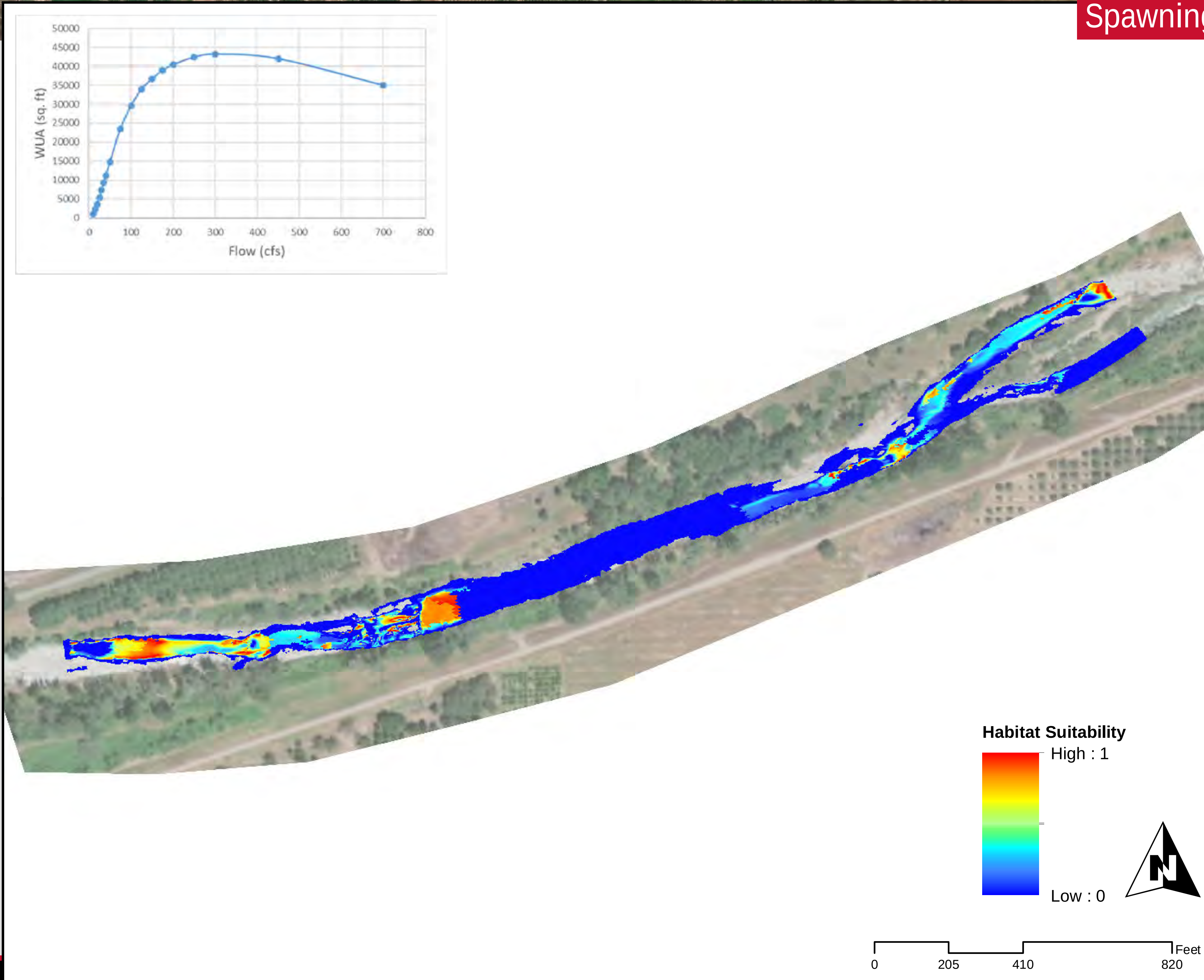

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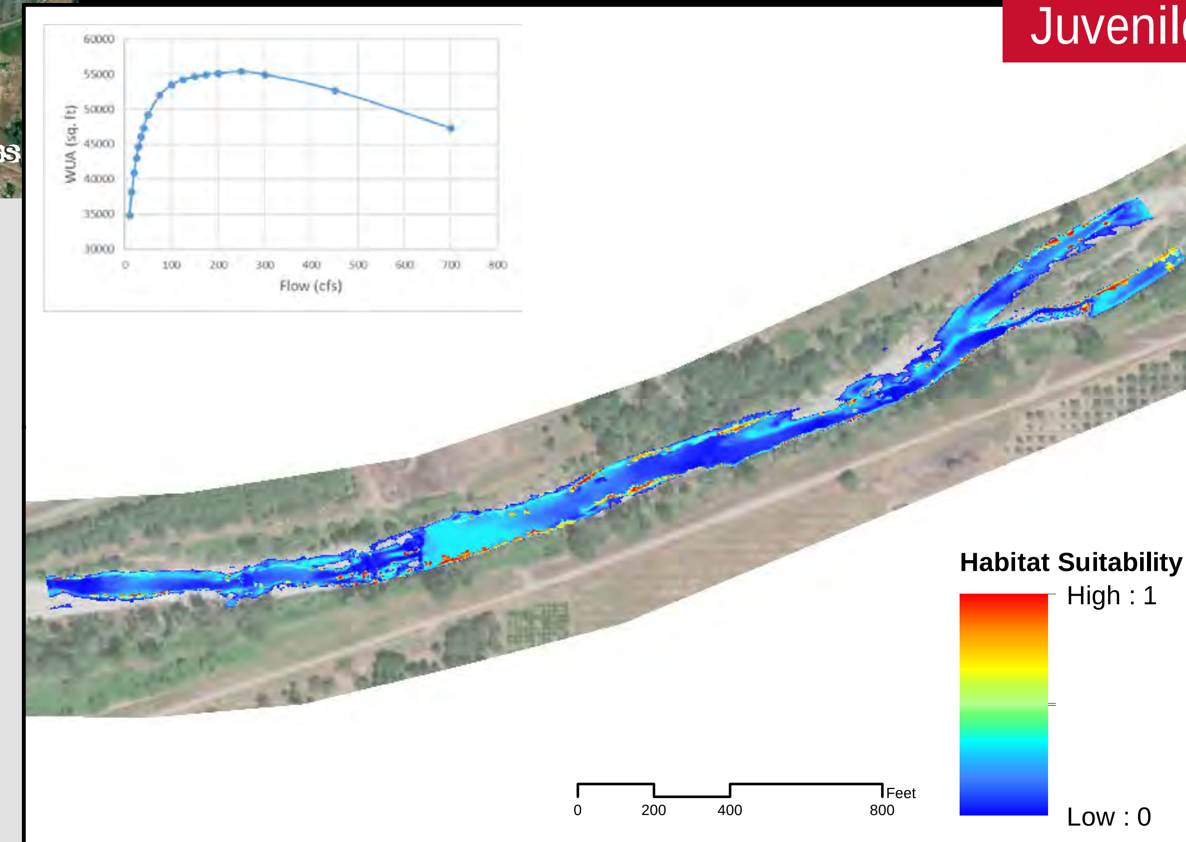

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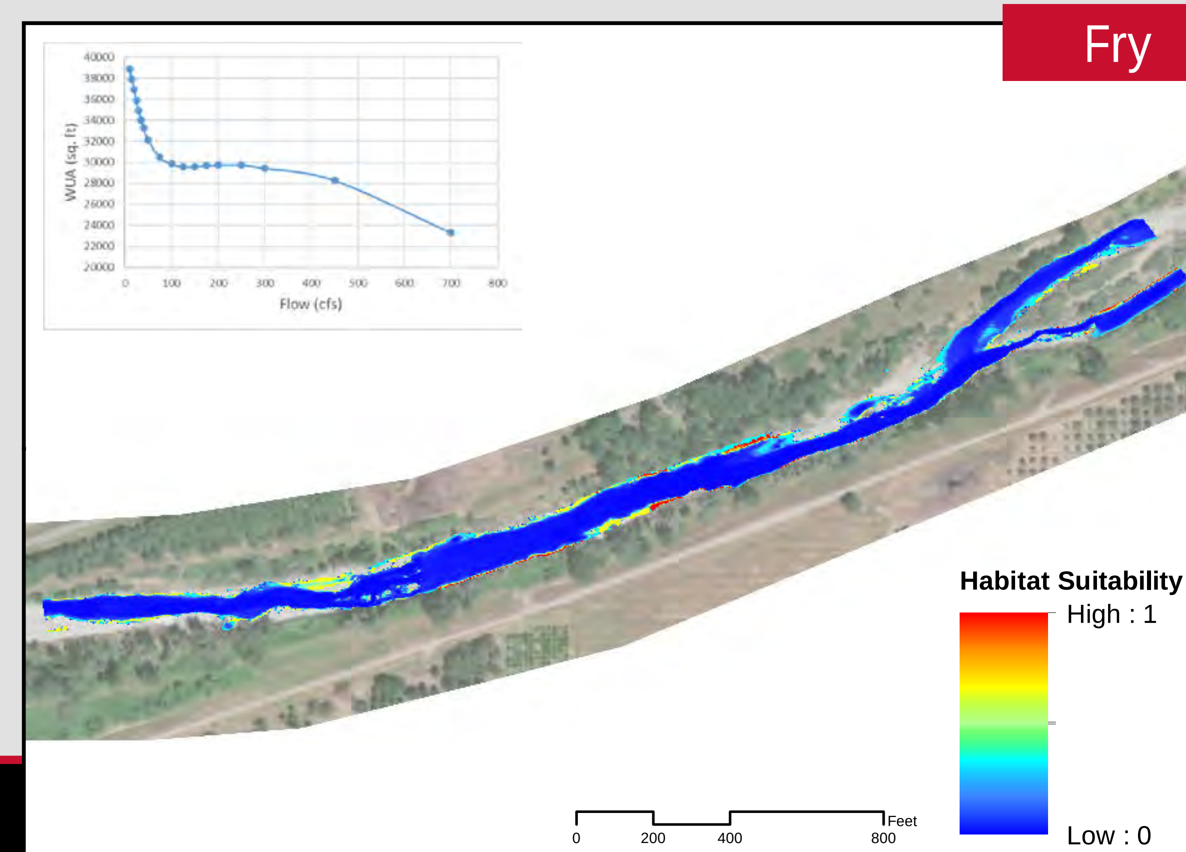

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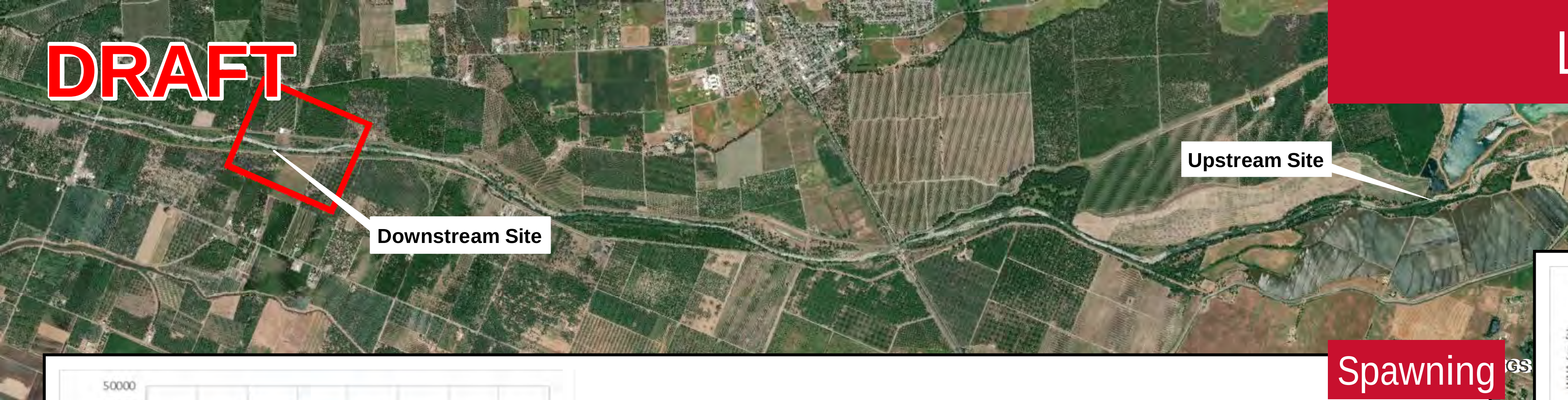
Lower Bear River - Instream Flow Study

SSWD HDR

Steelhead

Downstream Study Site 300 cfs



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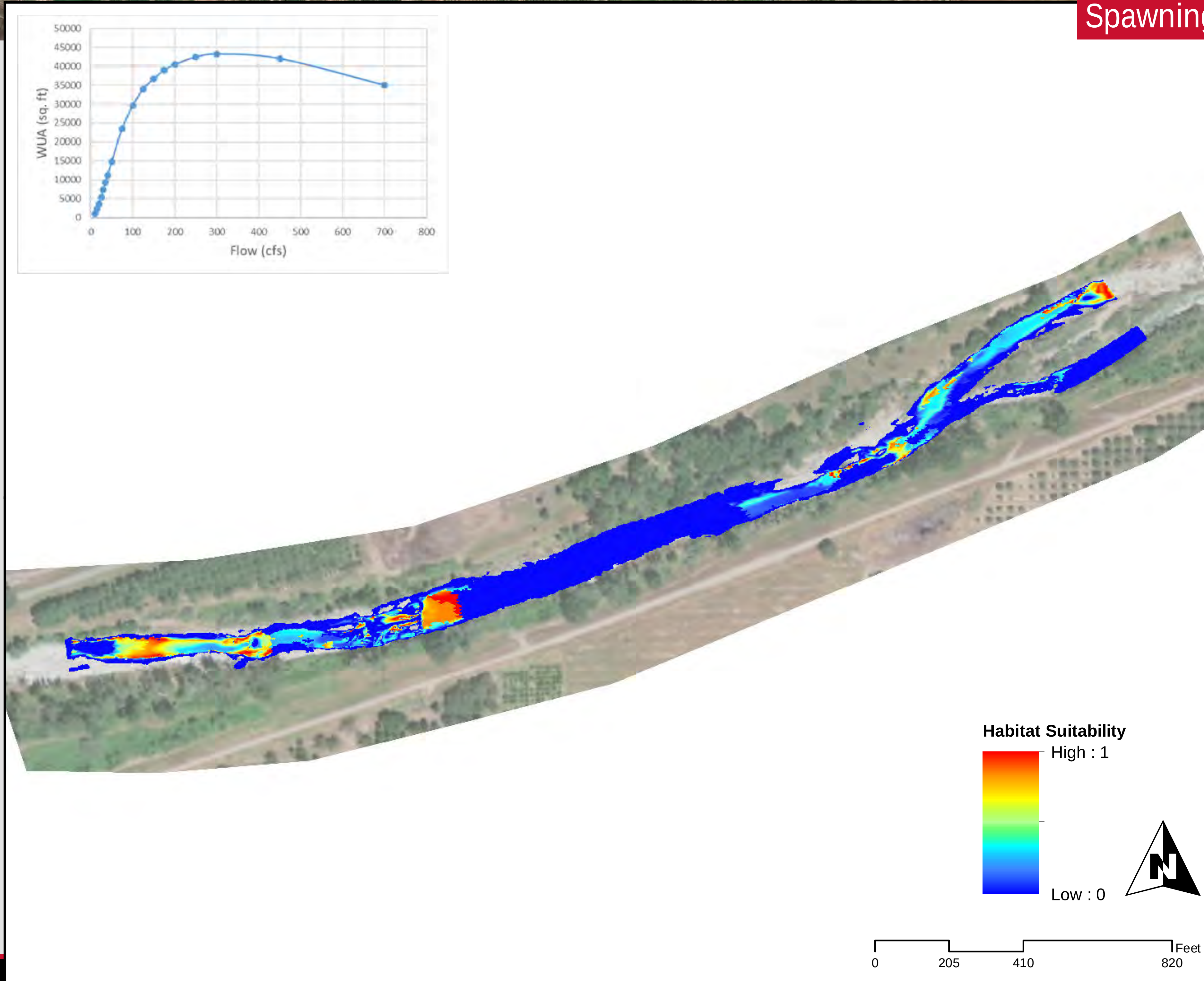

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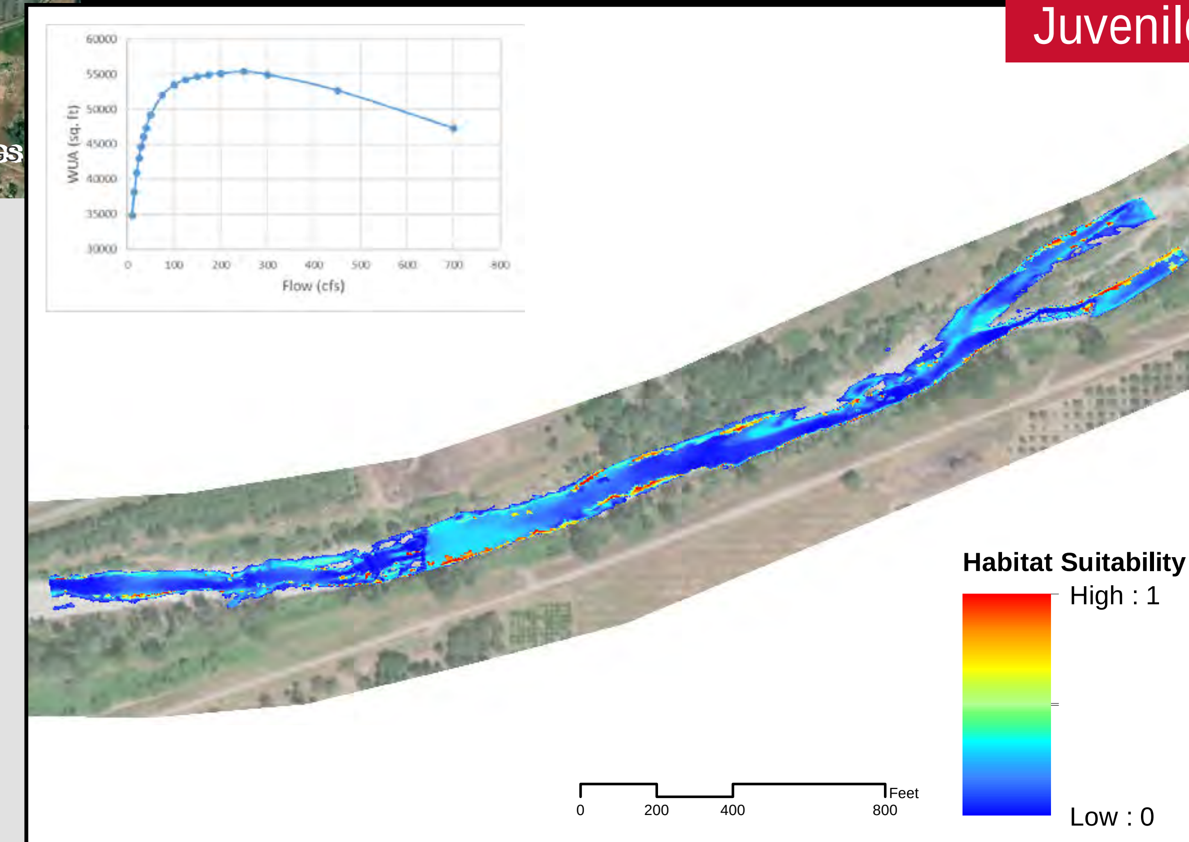

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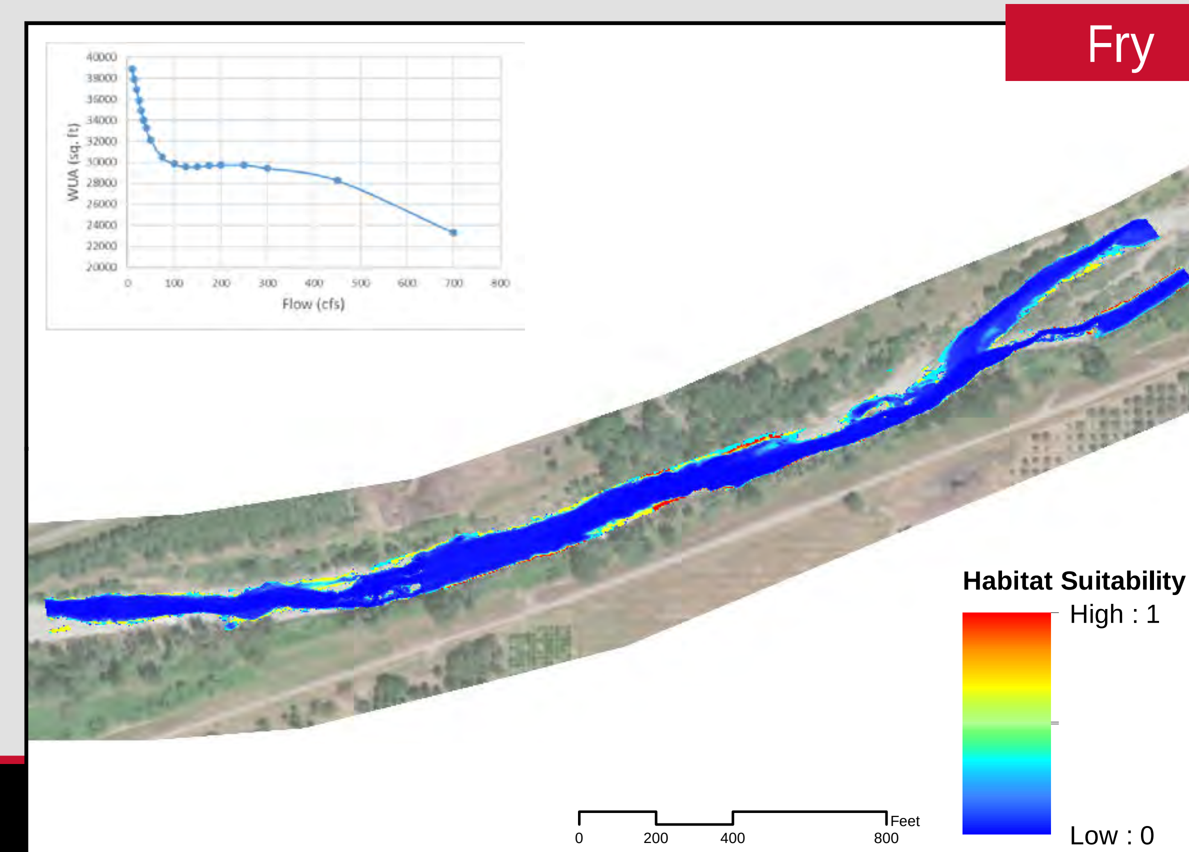


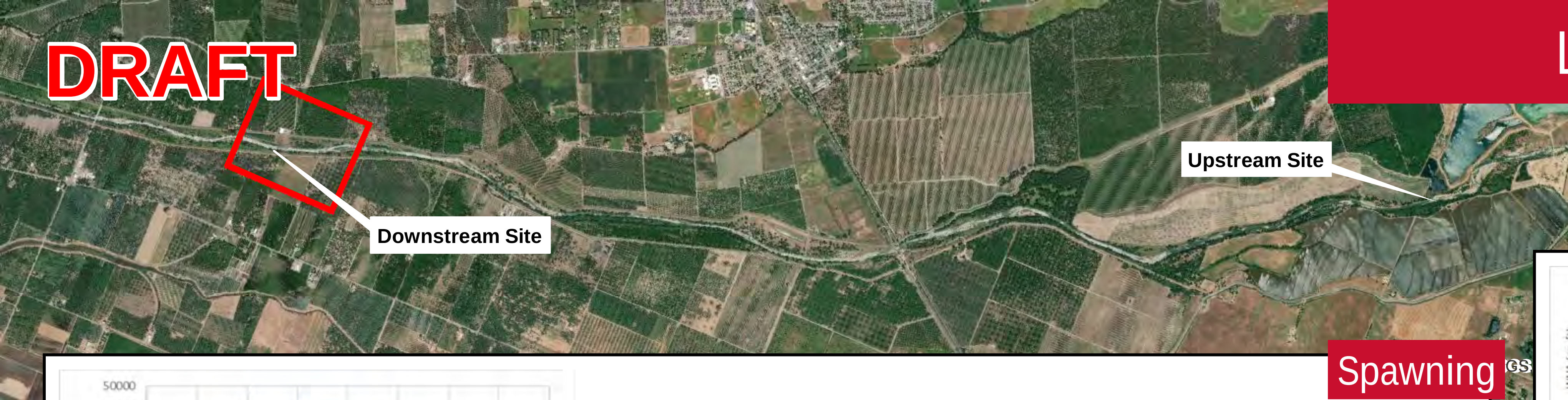
Lower Bear River - Instream Flow Study

SSWD HDR

Steelhead

Downstream Study Site 450 cfs

DRAFT



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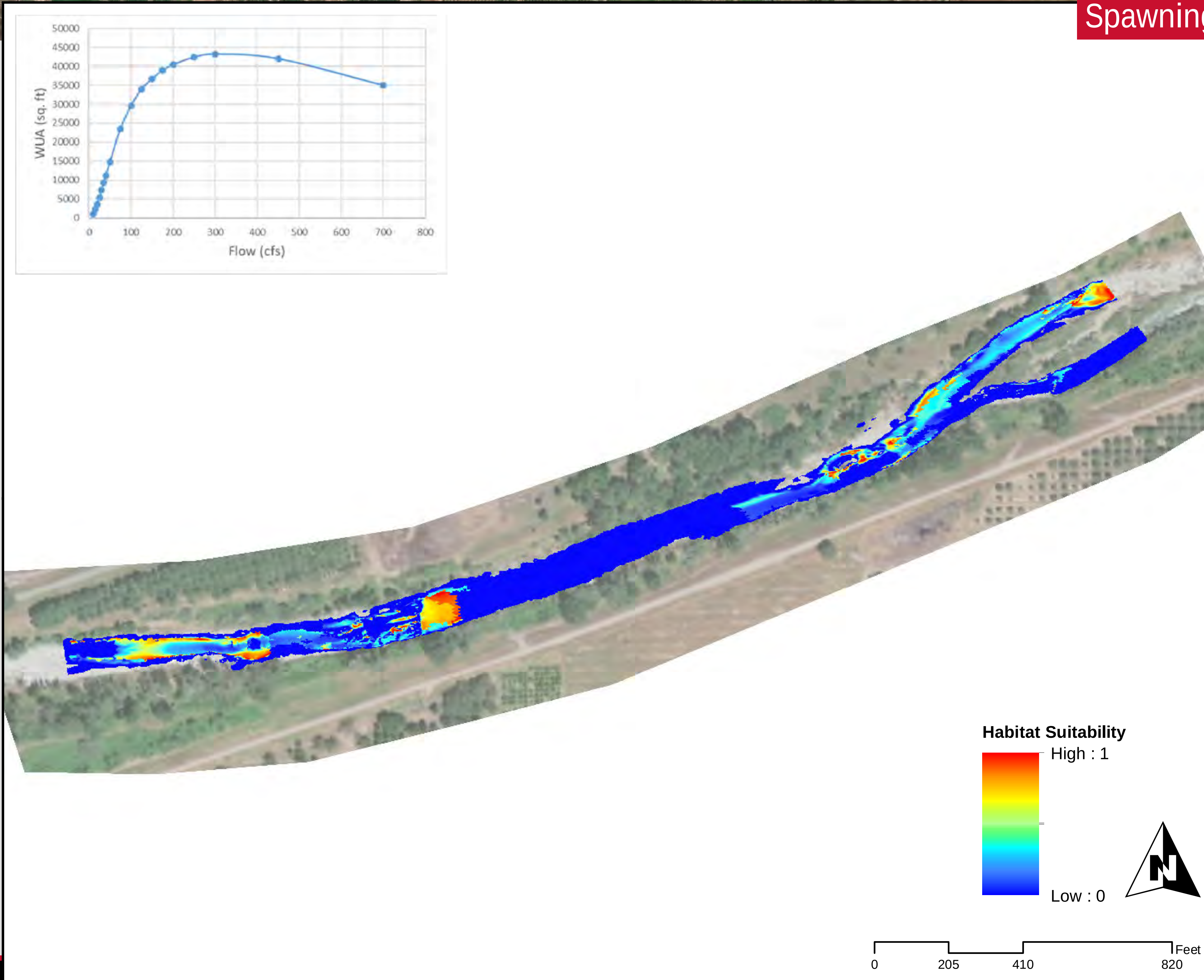

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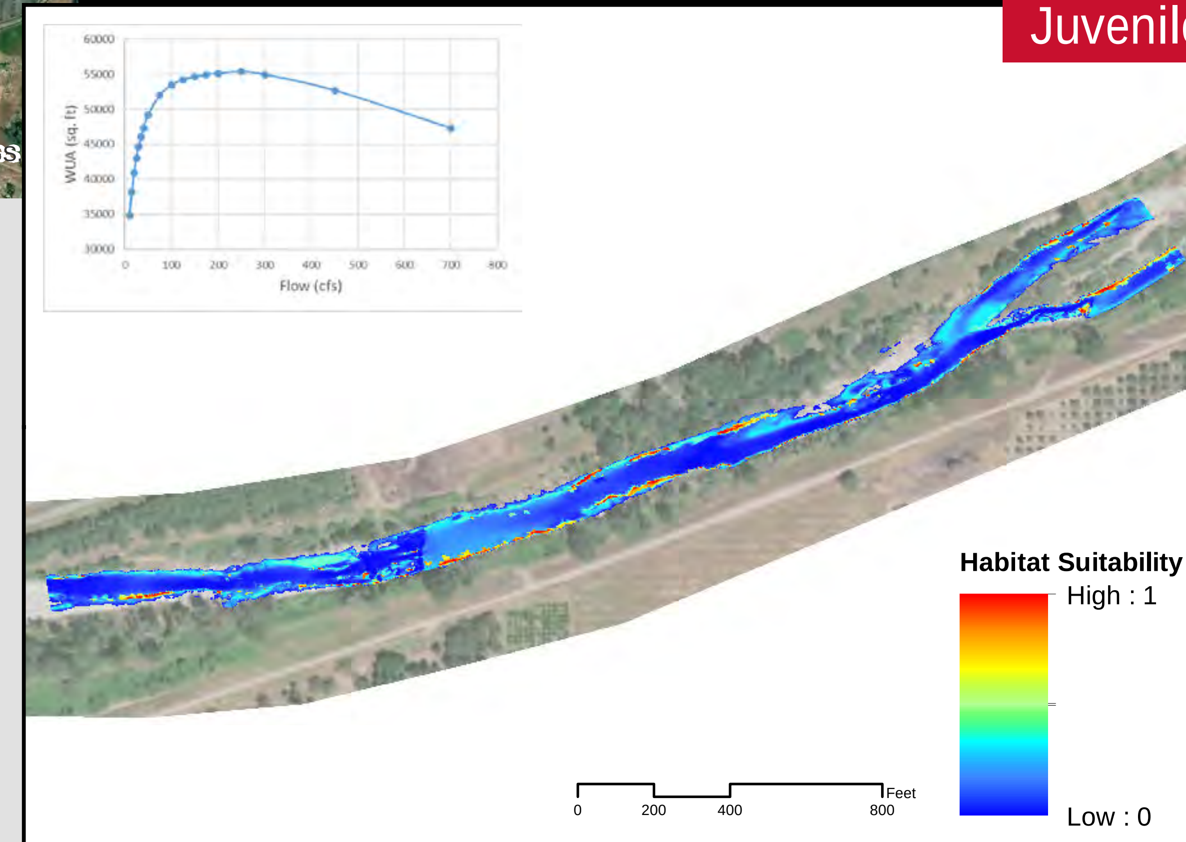

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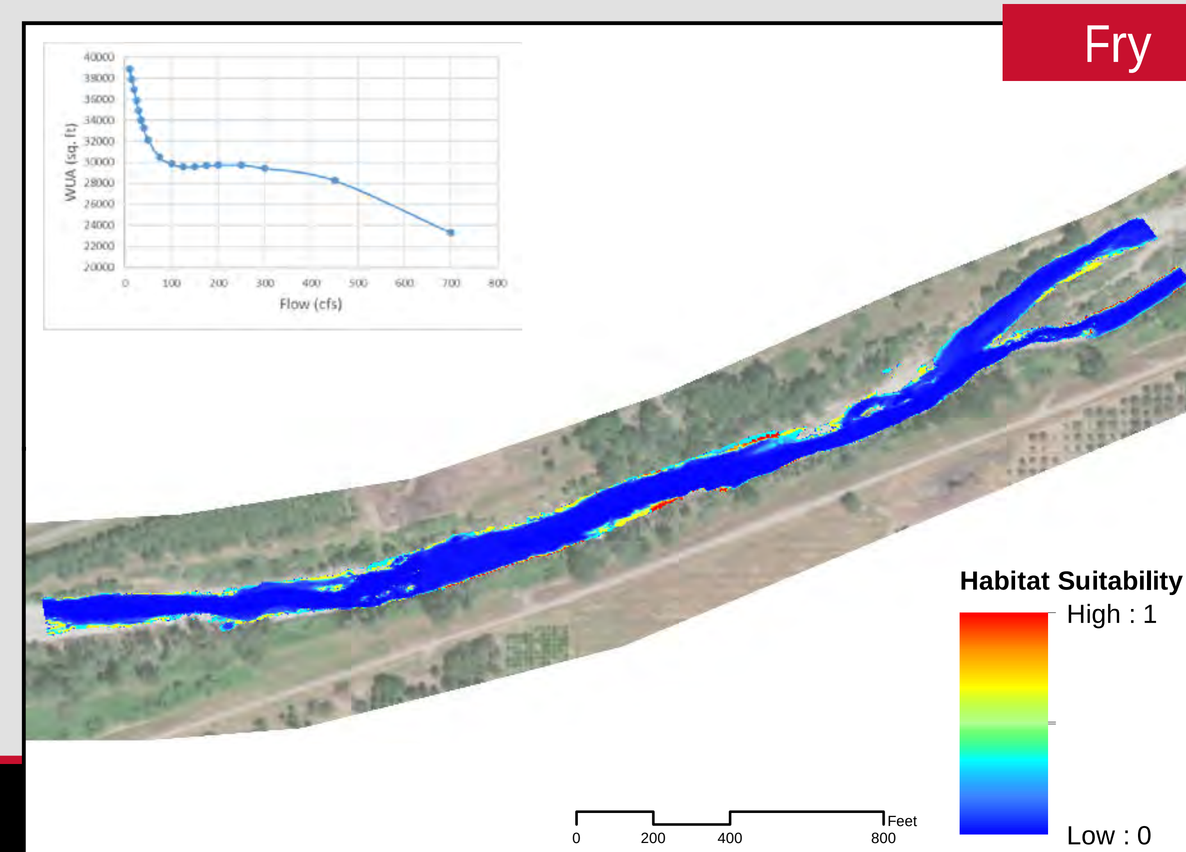
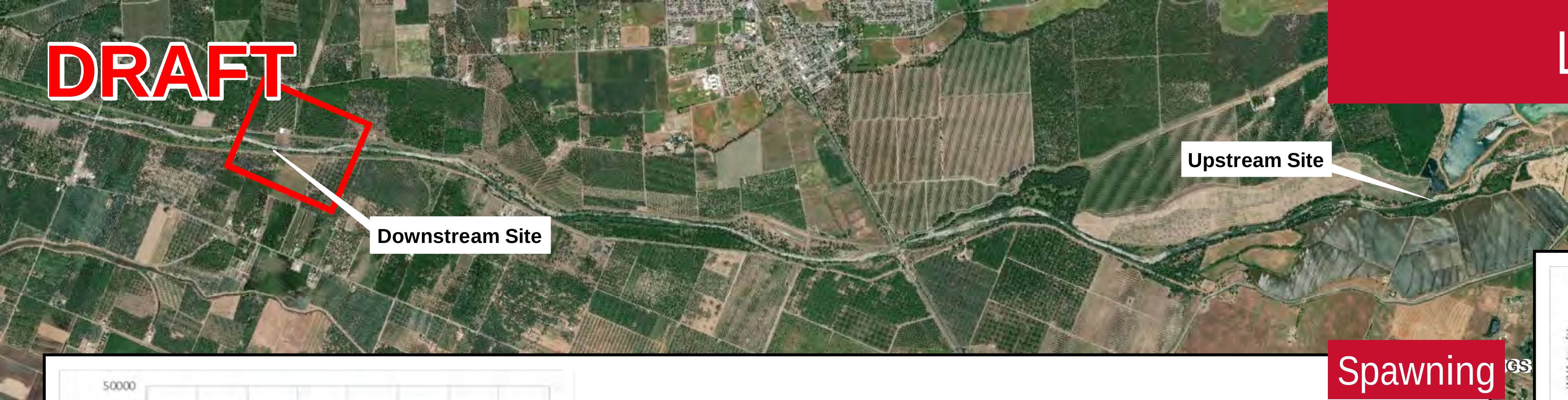


Lower Bear River - Instream Flow Study

SSWD HDR

Steelhead

Downstream Study Site 700 cfs



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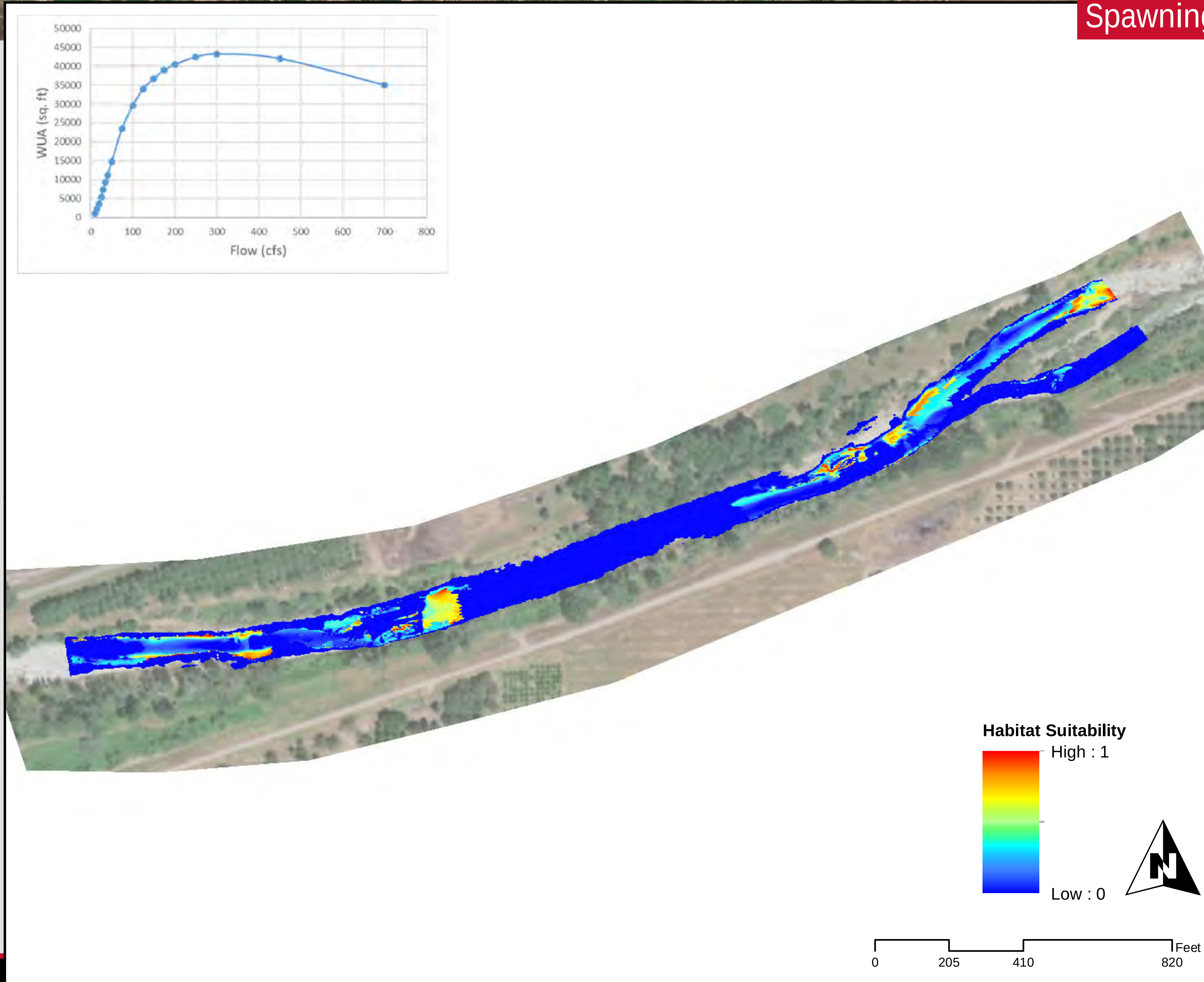

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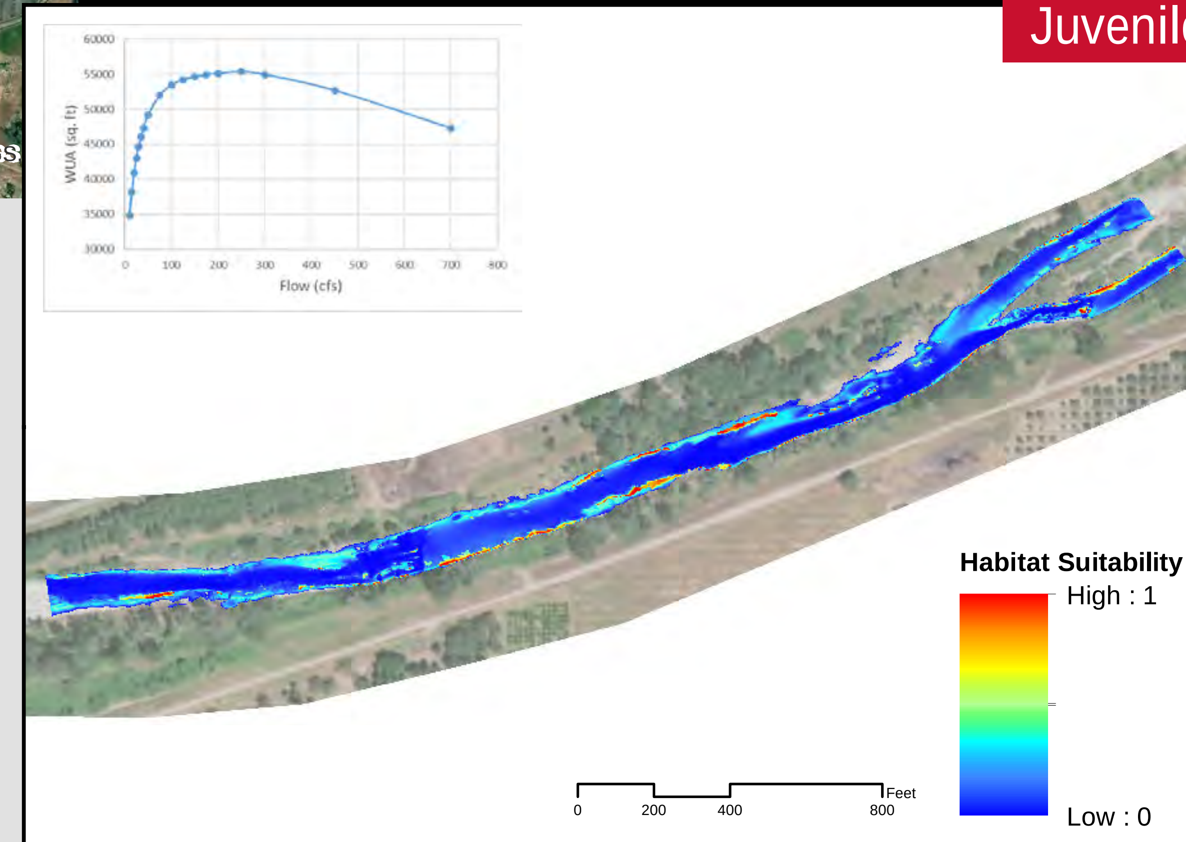

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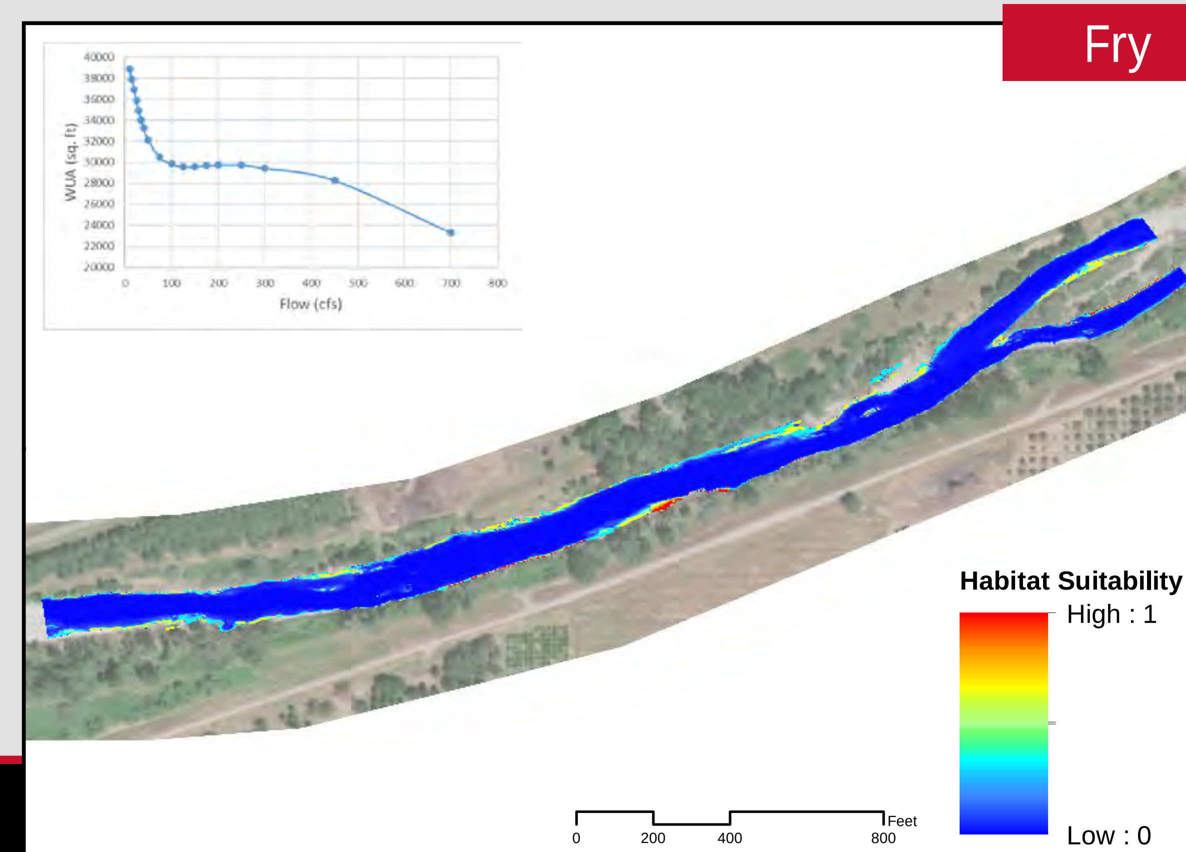

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3.3.4 Terrestrial Resources

In addition to this introductory information, this section is divided into three subsections. Section 3.3.4.1 discusses the Affected Environment (environmental baseline), including vegetation classifications, special-status plants[1], non-native invasive plants (NNIP);[2] wildlife habitat, special-status wildlife,[3] commercially valuable wildlife,[4] and wetland, riparian and littoral habitats.[5] Section 3.3.4.2 describes known or potential Project effects on terrestrial resources, including Cumulative Effects, and Section 3.3.4.3 describes Unavoidable Adverse Effects.

Where existing, relevant and reasonably available information from was not sufficient to determine the potential effects of the Project on terrestrial resources, SSWD conducted four studies: 1) Study 3.3, *Instream Flow*; 2) Study 4.1, *Special-Status Plants and Non-Native Invasive Plants*; 3) Study 4.2, *Special-Status Wildlife – Raptors*; and 4) Study 4.3, *Special-Status Wildlife – Bats.* The studies are complete, and information on the study results can be found in this Application for New License. During relicensing studies, SSWD's field crews also recorded incidental records of aquatic, botanical and wildlife species observed during the performance of each study. All incidental observations are reported in this Application for New License.

3.3.4.1 Affected Environment

3.3.4.1.1 Vegetation

SSWD assessed vegetation with information from the CDFW's Vegetation Classification and Mapping Program (VegCAMP), which is publicly available data. The data were mapped using a GIS database and overlaid in layers. The area depicted included the proposed FERC Project Boundary, and VegCAMP classifications within this area were quantified using GIS.

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[1] For the purpose of this Application for New License, a special-status plant is a species that has a reasonable possibility of being affected by Project O&M or associated recreation and meets one or more of the following criteria: 1) listed on CDFW's list of California Rare (SR) species under the Native Species Plant Protection Act; 2) listed as threatened or endangered under CESA; or 3) listed on the California Native Plant Society's (CNPS) Inventory of Rare and Endangered Plants. Botanical species listed as threatened or endangered, or a candidate or proposed for listing, under the ESA are discussed separately in Section 3.3.5.

[2] For the purpose of this Application for New License, NNIP are defined as those plant species listed as noxious weeds by the California Department of Food and Agriculture (CDFA). State-designated noxious weeds are typically assigned one of three ratings: 1) A-list species are mandated for eradication or control; 2) B-list species are widespread plants that agricultural commissioners may designate for local control efforts; and 3) C-list species are considered too widespread to control (CDFA 2018). Aquatic invasive plants, including algae, are discussed in Section 3.3.3.

[3] For the purpose of this Application for New License, a special-status wildlife species is a species that has a reasonable possibility of being affected by Project O&M or associated recreation and meets one or more of the following criteria: 1) protected under the Bald and Golden Eagle Protection Act; 2) designated by CDFW as a Species of Special Concern (SSC); 3) listed as threatened or endangered, or a candidate or proposed for listing under CESA; or 4) Fully Protected (FP) under California law. Wildlife species listed as threatened or endangered, or a candidate or proposed for listing, under the ESA are discussed separately in Section 3.2.5.

[4] For the purpose of this Application for New License, a commercially-valuable wildlife species is any species listed as a 'Harvest species' by CDFW. Per CDFW, a "Harvest species" is "game birds (Fish and Game Code § 3500); Game Mammals (Fish and Game Code § 3950) and Fur-bearing Mammals and Non-game animals as designated in the California Code of Regulations" (CDFW 2015a).

[5] Aquatic reptiles, mollusks and snails are discussed in Section 3.3.3.

The area within the proposed FERC Project Boundary encompasses 2,661.9 ac. The VegCAMP classifications and total acreage within the proposed FERC Project Boundary are summarized in Table 3.3.4-1, and shown in Figure 3.3.4-1. This information is generated by software and not necessarily ground-truthed at any given location.

Table 3.3.4-1. Acres of each VegCAMP vegetation classification within the Camp Far West Hydroelectric Proposed FERC Project Boundary.

Vegetation and Habitat Type	Sensitive Natural Community[1]	Acres	Percentage
TREE DOMINATED HABITATS			
Aesculus californicus	Y - S3	1.42	0.05
Pinus sabiniana	N	2.66	0.10
Populus fremontii	Y - S3	1.33	0.05
Quercus douglasii	N	452.60	17.00
Quercus lobata	Y - S3	2.99	0.12
Quercus wislizeni	N	91.55	3.45
Salix laevigata	Y - S3	3.35	0.12
Subtotal		555.90	20.89
HERBACEOUS HABITATS			
California Annual and Perennial Grassland	N	231.43	8.70
Californian Warm Temperate Marsh/Seep Group	Y - S2	2.83	0.11
Irrigated Pasture Lands	N	9.00	0.34
Mediterranean California Naturalized Annual and Perennial Grassland	N	80.78	3.03
Subtotal		324.04	12.18
OTHER HABITATS			
Built-Up and Urban Disturbance	N	27.81	1.04
Perennial Stream Channel	N	0.84	0.03
Reservoir	N	1,749.61	65.73
River and Lacustrine Flats and Streambeds	N	1.73	0.06
Small Earthen Dam Ponds and Natural Lakes	N	1.58	0.06
Vernal Pool & Californian Annual and Perennial Grassland Matrix	Y - S2	0.39	0.01
Subtotal		1,781.96	66.93
Total		**2,661.9**	**100%**

Source: CDFW 2018a

[1] S2 = Imperiled—Imperiled in the state because of rarity due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors making it very vulnerable to extirpation from the state.
S3 = Vulnerable—Vulnerable in the state due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors making it vulnerable to extirpation from the state.

There are six VegCAMP natural communities identified within the proposed Project Boundary - *Aesculus californicus*, *Populus fremontii*, *Quercus lobata*, *Salix laevigata*, Californian Warm Temperate Marsh/Seep Group, and Vernal Pool & Californian Annual and Perennial Grassland Matrix - which are considered Sensitive Natural Communities by the CDFW.[6] There are 12.31 ac of Sensitive Habitat, the majority of which are in riparian and wetland habitat types.

[6] CDFW considers Natural Communities with ranks of S1-S3 to be Sensitive Natural Communities to be addressed in the environmental review processes of CEQA and its equivalents (CDFW 2018a). The ranks are defined as follows: **S1 = Critically Imperiled**—Critically imperiled in the state because of extreme rarity (often 5 or fewer populations) or because of factor(s) such as very steep declines making it especially vulnerable to extirpation from the state. **S2 = Imperiled**—Imperiled in the state because of rarity due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors making it very vulnerable to extirpation from the state. **S3 = Vulnerable**—Vulnerable in the state due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors making it vulnerable to extirpation from the state.

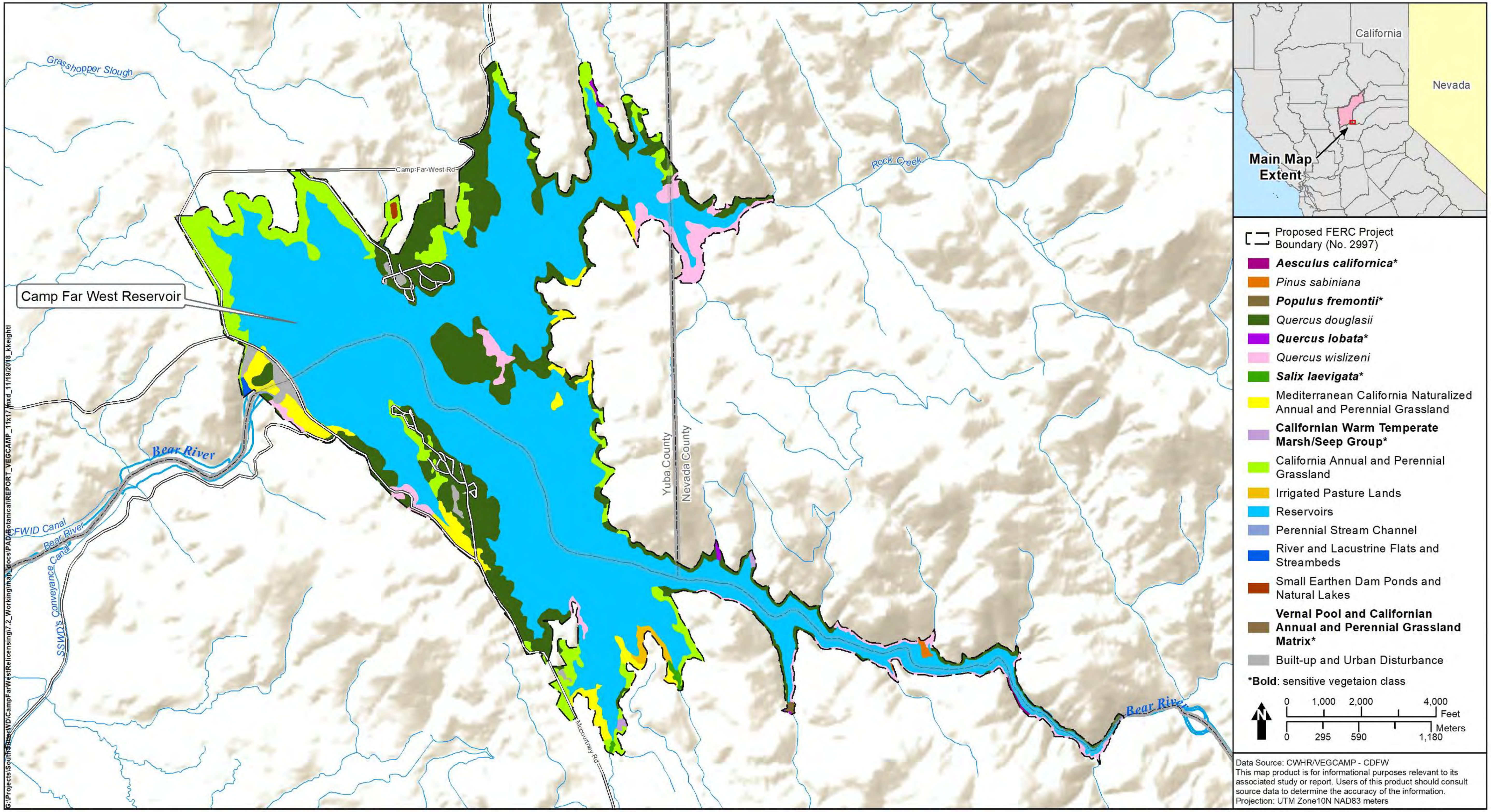

Figure 3.3.4-1. VegCAMP Classifications within the proposed FERC Project Boundary for the Camp Far West Hydroelectric Project.

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Tree-Dominated Habitats

Overall, tree-dominated habitats cover 555.90 ac of the proposed FERC Project Boundary. The seven VegCAMP tree-dominated habitats are *Aesculus californica*, *Pinus sabiniana*, *Populus fremontii*, *Quercus douglasii*, *Quercus lobata*, *Quercus wislizeni*, and *Salix laevigata*. A discussion of the tree-dominated habitats is provided below (CDFW 2018a, Sawyer et al. 2009).

- *Aesculus californica* (1.42 ac). California buckeye (*Aesculus californica*) dominates the tree layer, with California ash (*Fraxinus dipetala*), foothill pine (*Pinus sabiniana*), and holly leaved cherry (*Prunus ilicifolia*) also present. Within this vegetation type there is often a developed shrub layer and a sparse and grassy understory. VegCAMP identified *Aesculus californica* in the furthest southeast portion of the proposed FERC Project Boundary (Figure 3.3.4-1). This vegetation type is a Sensitive Natural Community with a ranking of S3.
- *Pinus sabiniana* (2.66 ac). Foothill pine is the dominant species in the tree canopy, but often co-occurs with California buckeye, California black oak (*Quercus kelloggii*), and canyon live oak (*Quercus chrysolepis*). The canopy tends to be open to intermittent with a somewhat common shrub layer and sparse or grassy understory. *Pinus sabiniana* was identified at one location near the southeast corner of the proposed FERC Project Boundary (Figure 3.3.4-1).
- *Populus fremontii* (1.33 ac). This variable forest habitat includes Fremont's cottonwood (*Populus fremontii*), box elder (*Acer negundo*), western sycamore (*Platanus racemosa*), red willow (*Salix laevigata*) and other species in lesser quantities. Each of the three strata are variable in openness and density. *Populus fremontii* was identified at one location near the southeast corner of the proposed FERC Project Boundary down a short arm of the reservoir (Figure 3.3.4-1). This vegetation type is a Sensitive Natural Community with a ranking of S3.
- *Quercus douglasii* (452.60 ac). *Quercus douglasii* is dominated by California blue oak in the tree layer with some co-occurrence with California buckeye, foothill pine, valley oak (*Quercus lobata*), and interior live oak (*Quercus wislizeni*). The canopy can be savannah like to dense with a low to moderately developed shrub layer and seasonally present herb layer. *Quercus douglasii* can be found throughout the proposed FERC Project Boundary and is the most common terrestrial vegetation classification (Figure 3.3.4-1).
- *Quercus lobata* (2.99 ac). The tree layer includes valley oak with some box elder, western sycamore, Fremont's cottonwood, and California black oak. The canopy has a variable understory of shrubs and herbs. Within the proposed FERC Project Boundary, *Quercus lobata* occurs in an isolated area near the Nevada, Placer, and Yuba County border (Figure 3.3.4-1). This vegetation type is a Sensitive Natural Community with a ranking of S3.
- *Quercus wislizeni* (91.55 ac). Interior live oak, California buckeye, foothill pine, and California black oak all occur in the tree layer. The canopy cover, shrub cover, and herbaceous layers are all variable within this vegetation community. *Quercus wislizeni* is the second most common tree-dominated habitat, occurring in isolated pockets

throughout the proposed FERC Project Boundary, but the largest concentration is located in the northeastern corner (Figure 3.3.4-1).

- Salix laevigata (3.35 ac). Generally dominated by red willow in the tree layer, this community includes various other tree species including, but not limited to, box elder and white alder (*Alnus rhombifolia*). These woodlands tend to have a moderately developed shrub layer and a variable understory. *Salix laevigata* within the proposed FERC Project Boundary is located in two narrow riparian crevices on the southern-most portion of the reservoir (Figure 3.3.4-1). This vegetation type is a Sensitive Natural Community with a ranking of S3.

Herbaceous Habitats

Herbaceous habitats cover 324.04 ac of the area within the proposed FERC Project Boundary, with California Annual and Perennial Grassland as the dominant habitat type. A discussion of herbaceous habitats is provided below (CDFW 2018a, Sawyer et al. 2009).

- California Annual and Perennial Grassland (231.43 ac). California annual and perennial grasslands are generally dominated by non-native species such as small quaking grass (*Briza minor*), foxtail chess (*Bromus madritensis* ssp. *madritensis*), crane's bill geranium (*Geranium molle*), and hairy hawkbit (*Leontodon saxatilis*) at varying covers with some assemblages of other species including, but not limited to common fiddleneck (*Amsinckia menziesii*) and western buttercup (*Ranunculus occidentalis* var. *occidentalis*). Areas of low grass density occur in isolated patches allowing for a non-grassy herbaceous layer to develop. Perennial species consisting of goose grass (*Galium aparine*), shiny peppergrass (*Lepidium nitidum*), and bulbous blue grass (*Poa bulbosa*), and others can also occur in patches. These types of grasslands are present in most areas of the proposed FERC Project Boundary (Figure 3.3.4-1).
- California Warm Temperate Marsh/Seep Group (283.00 ac). California Warm Temperate Marsh/Seeps are characterized by a mixture of sedges (*Carex* spp.), rushes (*Juncus* spp.), as well as some instances of seep monkey flower (*Erythranthe guttata*), deergrass (*Muhlenbergia rigens*), and beardless wildrye (*Elymus triticoides*). Within the proposed FERC Project Boundary, these types of marshes and seeps occur in two narrow riparian crevices on the southeast portion of the reservoir (Figure 3.3.4-1). This vegetation type is a Sensitive Natural Community with a ranking of S2.
- Irrigated Pasture Lands (9.00 ac). Irrigated pasture lands are typically dominated by a random assemblage of non-native species including, but not limited to, slender wild oat (*Avena barbata*), Italian thistle (*Carduus pycnocephalus* ssp. *pycnocephalus*), greenstem filaree (*Erodium moschatum*), and cutleaf plantain (*Plantago coronopus*). The one location of this type of habitat within the proposed FERC Project Boundary is at the southern boundary of the reservoir just east of McCourtney Road (Figure 3.3.4-
- Mediterranean California Naturalized Annual and Perennial Grassland (80.78 ac). Mediterranean California Naturalized Annual and Perennial Grasslands are generally dominated by various non-native grass species including, but not limited to slender oat, poverty brome (*Bromus sterilis*), and bristly dogtail grass (*Cynosurus echinatus*)

Additionally, non-grassy herbaceous species can also co-dominate including, but not limited to, black mustard (*Brassica nigra*), common groundsel (*Senecio vulgaris*), yellow star-thistle (*Centaurea solstitialis*), and narrowleaf plantain (*Plantago lanceolata*). These types of grasslands are present in multiple areas of the proposed FERC Project Boundary with the exception of regions of the Project east of the Nevada and Yuba County longitudinal border (Figure 3.3.4-1).

Other Habitats

Other habitats cover 1,781.96 ac of the area within the proposed FERC Project Boundary, with Reservoir as the dominant habitat type. A discussion of other habitats is provided below (CDFW 2018a).

- <u>Built-Up and Urban Disturbance</u> (27.81 ac). Built-Up and Urban Disturbance cover types apply to landscapes that are dominated by urban structures, residential units, or other developed land use elements such as highways, city parks, dams, etc. Within the proposed FERC Project Boundary, urban lands occur in the northwest portion of the Project (Figure 3.3.4-1).
- <u>Perennial Stream Channels</u> (0.84 ac). Perennial Stream Channels are labeled in VegCAMP mapping as areas of perennially flowing channels, instream bars, and either mostly or completely unvegetated intermittent stream channels. Within the proposed FERC Project Boundary, perennial stream channels can be found downstream of the Camp Far West Dam at the west end of the Project and at the furthest southeast edge (Figure 3.3.4-1).
- <u>Reservoir</u> (1,749.61 ac). This cover type is composed of all open water contained by the reservoir boundaries. This is the most common classification type within the proposed FERC Project Boundary (Figure 3.3.4-1).
- <u>River and Lacustrine Flats and Streambeds</u> (1.73 ac). River and Lacustrine Flats and Streambeds are typically composed of tributaries of major water bodies and contain a high degree of riparian and/or wetland vegetation cover. Within the proposed FERC Project Boundary this habitat occurs downstream of the Camp Far West Dam at the west end of the Project (Figure 3.3.4-1).
- <u>Small Earthen Dam Ponds and Natural Lakes</u> (1.58 ac). Small Earthen Dam Ponds and Natural Lakes is a cover type typically associated with small freshwater lacustrine systems that are either completely natural or only have earthen banks with no permanent or impermeable structures that control hydrology. Within the proposed FERC Project Boundary, this habitat is found north of the reservoir surrounded by a large patch of grassland (Figure 3.3.4-1).
- <u>Vernal Pool & Californian Annual and Perennial Grassland Matrix</u> (0.39 ac). Vernal Pool & Californian Annual and Perennial Grassland Matrix habitat is composed of vernal pools with a semi-impermeable layer allowing for water to pond for an intermittent period of time. These habitats are typically surrounded by grasslands. This habitat is

found at the northwest corner of the proposed FERC Project Boundary. This vegetation type is a Sensitive Natural Community with a ranking of S2.

3.3.4.1.2 Special-Status Plants

Both documented and potentially occurring special-status plants are described below based on the results of queries to the CDFW's CNDDB (CDFW 2018b); USFWS' Information, Planning, and Conservation System (IPaC) Trust Resources Report for Nevada, Placer and Yuba counties (USFWS 2018a); the CNPS' Inventory of Rare and Endangered Plants database (CNPS 2018); and the Camp Far West Project's Biological Assessment (Sycamore Associates 2013a). Database queries included all United States Geological Survey (USGS) 1:24,000 topographic quadrangles that include the proposed FERC Project Boundary and the surrounding quadrangles. Quadrangles containing the proposed FERC Project Boundary include Camp Far West and Wolf. Quadrangles immediately adjacent to the proposed Project Boundary quadrangles include Auburn, Browns Valley, Gold Hill, Grass Valley, Lake Combie, Lincoln, Rough and Ready, Sheridan, Smartsville, and Wheatland.

Table 3.3.4-2 lists the 14 special-status plants known to occur or with the potential to occur in the proposed Project Boundary, six of which are known from the proposed Project Boundary or quadrangles containing the proposed FERC Project Boundary.

Table 3.3.4-2. Special-status plants known or with the potential to occur in the Camp Far West Hydroelectric Project Vicinity.

Scientific Name/Common Name	Status[1]	Blooming Period[2]	Habitat Characteristics[2]	Potential	Rationale
FOUND WITHIN CAMP FAR WEST AND WOLF QUARDRANGLES (PROPOSED PROJECT BOUNDARY)					
Azolla microphylla/ Mexican mosquito fern	4.2	August	Ponded areas and slow moving water in marshes and swamps; 98 - 328 ft	Present	One occurrence found in Seep 3, which was located along the NSRA shoreline (Sycamore Associates 2013a)
Clarkia biloba ssp. *brandegeeae/* Brandegee's clarkia	4.2	May–July	Chaparral, cismontane woodland, and lower montane coniferous forests, often in roadcuts; 245 - 3,000 ft	Present	Two occurrences along the south side of 'riverine' reach of the reservoir (Sycamore Associates 2013a)
Lilium humboldtii ssp. *humboldtii/* Humboldt lily	4.2	May–August	Openings in chaparral, cismontane woodland, and lower montane coniferous forest; 295 - 4,200 ft	Yes	Suitable habitat is present in the FERC Project Boundary
Wolffia brasiliensis/ Brazilian watermeal	2B.3	April and December	Shallow freshwater marshes and swamps; 65 - 330 ft	Yes	Suitable habitat is present in the FERC Project Boundary

Table 3.3.4-2. (continued)

Scientific Name/Common Name	Status[1]	Blooming Period[2]	Habitat Characteristics[2]	Potential	Rationale
FOUND WITHIN CAMP FAR WEST AND WOLF QUARDRANGLES (PROPOSED PROJECT BOUNDARY) (cont.)					
Brodiaea sierrae/ Sierra foothills brodiaea	4.3	May–August	Usually found in serpentine or gabbro soils in chaparral, cismontane woodland, and lower montane coniferous forest; 160 - 3,215 ft	Present	One occurrence along south side of 'riverine' reach of reservoir (Sycamore Associates 2013a)
Subtotal	5				
FOUND WITHIN AUBURN, BROWNS VALLEY, GOLD HILL, GRASS VALLEY, LAKE COMBIE, LINCOLN, ROUGH AND READY, SHERIDAN, SMARTSVILLE, AND WHEATLAND QUARDRANGLES (OUTSIDE PROPOSED PROJECT BOUNDARY)					
Allium jepsonii/ Jepson's onion	1B.2	April–August	Serpentine or volcanic soils in chaparral, cismontane woodland, and lower montane coniferous forest; 980 - 4,330 ft	No	No serpentine or volcanic soils are present in the FERC Project Boundary
Allium sanbornii var. *sanbornii/* Sanborn's onion	4.2	May–September	Usually serpentine or gravelly soils in chaparral, cismontane woodland, and lower montane coniferous forest; 850 - 4,955 ft	No	No serpentine soils are present in the FERC Project Boundary
Balsamorhiza macrolepis/ Big-scale balsamroot	1B.2	March–June	Occasionally in serpentine soils in chaparral, cismontane woodland, and grasslands; 295 - 5,100 ft	No	No serpentine soils are present in the FERC Project Boundary
Fritillaria eastwoodiae/ Butte County fritillary	3.2	March–June	Sometimes serpentine soils in chaparral, cismontane woodland, and lower montane coniferous forest; 160 - 4,920 ft	Yes	Suitable habitat is present in the FERC Project Boundary
Juncus leiospermus var. *ahartii/* Ahart's dwarf rush	1B.2	March–May	Mesic soils in grasslands; 95 - 750 ft	Yes	Suitable habitat is present in the FERC Project Boundary.
Plagiobothrys glyptocarpus var. *modestus/* Cedar Crest popcornflower	3	April–June	Cismontane woodland and mesic grasslands; 2,850 - 2,855 ft	Yes	Suitable habitat is present in the FERC Project Boundary.
Rhynchospora capitellata/ Brownish beaked-rush	2B.2	July–August	Mesic soils in meadows, seeps, marshes, swamps, and montane coniferous forests; 145 - 6,560 ft	Yes	Suitable habitat is present in the FERC Project Boundary.
Sidalcea gigantea/ Giant checkerbloom	4.3	(January–June) July–October	Meadows and seeps of montane coniferous forests; 2,195 - 6,400 ft	Yes	Suitable habitat is present in the FERC Project Boundary.

Table 3.3.4-2. (continued)

Scientific Name/Common Name	Status[1]	Blooming Period[2]	Habitat Characteristics[2]	Potential	Rationale
FOUND WITHIN AUBURN, BROWNS VALLEY, GOLD HILL, GRASS VALLEY, LAKE COMBIE, LINCOLN, ROUGH AND READY, SHERIDAN, SMARTSVILLE, AND WHEATLAND QUARDRANGLES (OUTSIDE PROPOSED PROJECT BOUNDARY) (cont.)					
Sidalcea stipularis/ Scadden Flat checkerbloom	1B.1, SE	July–August	Montane freshwater marshes and swamps; 2,295 - 2,395 ft	Yes	Suitable habitat is present in the FERC Project Boundary.
Subtotal	*9*				
Total	**14**				

[1] Status (CDFW 2018a; CNPS 2018)
SE = State Endangered
California Rare Plant Rank
1B Plants Rare, Threatened, or Endangered in California and elsewhere
2B Plants Rare, Threatened, or Endangered in California, but more common elsewhere
3 Plants about which we need more information - review list
4 Plants of limited distribution - watch list
.1 Seriously threatened in California (over 80% of occurrences threatened; high degree and immediacy of threat)
.2 Moderately threatened in California (20–80% of occurrences threatened; moderate degree and immediacy of threat)
.3 Not very threatened in California (<20% of occurrences threatened; low degree and immediacy of threat or no current threats known)
[2] Source: CNPS 2018

Special-Status Plants and Non-Native Invasive Plants Study

SSWD conducted a special-status plant and NNIP Study (Study 4.1, *Special-Status Plants and Non-Native Invasive Plants*) within a designated study area inside the existing FERC project Boundary, including background literature reviews, desktop analyses, and field investigations.

The study area consisted of four specific areas: 1) the North Shore Recreation Area (NSRA); 2) the SSRA; 3) the Camp Far West Dam and associated dikes and Spillway; and 4) the Camp Far West Dam Powerhouse, for a total of 505 ac. These are the areas where SSWD's Project O&M activities or Project-related recreation could affect special-status plants or spread NNIP.

The study was conducted consistent with Section 6.0 of the *Special-Status Plants and Non-Native Invasive Plant Study Plan* that was filed with FERC on January 9, 2017. This study was conducted in conjunction with SSWD's relicensing Study 5.1, *ESA-Listed Plants*, and Study 5.2, *ESA-Listed Wildlife – Valley Elderberry Longhorn Beetle.* Additional information describing NNIP surveys and results is provided below in Section 3.3.4.1.3.

Before starting field surveys, SWWD identified and mapped known occurrences of special-status plants within the Study Area and prepared field maps for use by field survey teams. The maps included aerial imagery, Project features, and known special-status plant and NNIP occurrences. The maps were used for guidance purpose only; during the study, all special-status plant species and NNIP occurrences were mapped.

Field surveys were conducted from April 2017 through July 2017. Survey timing was planned based on known bloom times and herbarium collection dates. SSWD's surveyors conducted special-status plant surveys and NNIP surveys as outlined in the "Botanical Survey" section of the CDFW's *Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Natural Communities* (CDFG 2009). Surveys were comprehensive over the entire study area, except for areas deemed to be unsafe (e.g., due to steep, unstable terrain) by the field team, using systematic field techniques to ensure thorough coverage, with additional efforts focused in habitats with a higher probability of supporting special-status plants (e.g., serpentine outcrops) and NNIP. Surveys were floristic in nature, documenting all species observed; taxonomy and nomenclature were based on *The Jepson Manual* (Baldwin et al. 2012).

Following field surveys, SSWD developed GIS maps depicting NNIP occurrences, Project facilities, features, and specific Project-related impacts (e.g., dispersed use camping) and other related information collected during the study. Field data were subject to QA/QC procedures, including spot-checks of transcription and comparison of GIS maps with field notes to verify locations of mapped occurrences.

The final step of the study, SSWD's Project Operations Staff Consultation, was completed on March 15, 2018.

There were 206 plant species identified during the 2017 surveys (see Attachment 3.3.4A); 94 were native species. No special-status plant species were identified in the study area. However five occurrences of special-status plants were identified during 2013 surveys by SSWD, all in the proposed Project Boundary. These species are described below.

Mexican Mosquito Fern (*Azolla microphylla*)[7]

Mexican mosquito fern is a small, floating green plant with simple roots; plants are often 0.5-1 inch wide with small, alternate, overlapping leaves and dichotomous (forked branches of equal size) branching. Leaves are divided into two lobes: (1) a smaller floating upper lobe 0.7 mm long, papillose (small rounded projections) on the upper surface, the largest hairs on upper (dorsal) leaf lobes thick, 2–3 celled; and (2) a lower lobe that is larger, and variously described as submerged or floating. Plants may be green or red in color. Sporocarps (fruiting bodies) occur in pairs in the leaf axils of older plants. The species is usually found growing in ponds and slow streams at elevations less than 3,937 ft (Jepson Flora Project 2017; B.C. Ministry of Environment 2016).

SSWD located one occurrence of Mexican mosquito fern that was found in Seep 3, which is located along the NSRA shoreline (Sycamore Associates 2013a).

[7] Photograph found at: http://www.env.gov.bc.ca/wld/documents/recovery/rcvrystrat/mexican_mosquito_fern_rcvry_strat240708.pdf (B.C. Ministry of Environment 2016).

Brandegee's Clarkia (*Clarkia biloba* ssp. *brandegeeae*)

Brandegee's clarkia is a small (less than 3.5 ft tall) herbaceous annual with an erect stem. The leaves of Brandegee's clarkia are about 0.75 to 2.4 in. long, narrow, and have pinnate veins emanating from the mid-vein. Its pink to purple flowers (sometimes tinged with red) are widely rotate with wedge-shaped petals. A diagnostic taxonomic character for Brandegee's clarkia is the length of the petal lobes, which are generally less than one fifth the length of the entire petal. It is generally found growing in the Sierra Nevada foothill woodlands at elevations ranging from 1,260 to 4,495 ft (Jepson Flora Project 2017).

SSWD located two occurrences along the south side of the Bear River reach of the reservoir (Sycamore Associates 2013a).

Sierra Foothills Brodiaea (*Brodiaea sierrae*)

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Sierra foothills brodiaea is a perennial bulbiferous herb that typically grows at elevations from 591-3,100 ft. This species is usually found in serpentinite or gabbroic habitats. It has also been observed in the following habitat types: chaparral; cismontane woodland; and lower montane coniferous forest. This species typically grows in soils derived from basic and ultramafic intrusive rocks. The species has one to 10 linear to narrow lanceolate basal leaves. The species is potentially threatened by vehicles, road maintenance, road widening, development, urbanization, horticultural collecting, and hydrological alterations (CNPS 2018; Jepson Flora Project 2017).

SSWD located one occurrence of Sierra foothills brodiaea along the south side of the riverine reach of reservoir (Sycamore Associates 2013a).

3.3.4.1.3 Non-Native Invasive Plants

Both known and potential NNIP occurrences are listed in Table 3.3.4-3, based on the 2017 NNIP study (described below), BA for Camp Far West (Sycamore Associates 2013a), the CalWeedMapper Database (Cal-IPC 2018a), and collection records of plants in the Camp Far West Region with CDFA rankings (CCH 2018).

Table 3.3.4-3 lists the 42 NNIPs known to occur or with the potential to occur in the Project Vicinity, 11 of which are known to occur in the proposed Project boundary.

Table 3.3.4-3. NNIP known to occur or potentially occurring in the Camp Far West Hydroelectric Project Vicinity.

Common Name/ Scientific Name	CDFA[1] Status	Flowering Period	Elevation(ft)	Habitat
KNOWN TO OCCUR WITHIN THE PROPOSED FERC PROJECT BOUNDARY				
Barbed goatgrass *(Aegilops triuncialis)*	B	May-Aug	Below 3,300	Disturbed sites, cultivated fields, roadsides
Cheatgrass (*Bromus tectorum*)	-	May-Aug	Below 3,400	Open and disturbed areas
Italian thistle *(Carduus pycnocephalus* ssp. *pycnocephalus)*	B	May-Jul	Below 3,300	Roadsides, pastures, waste areas
Maltaese starthistle (*Centaurea melitensis*)	C	Apr-Jul	Below 2,200	Disturbed fields and open woodland
Yellow starthistle *(Centaurea solstitialis)*	C	Jun-Dec	Below 4,300	Pastures, roadsides, disturbed grassland or woodland
Rush skeletonweed *(Chondrilla juncea)*	A	May-Dec	Below 2,000	Disturbed areas
Bindweed (*Convolvulus arvensis*)	C	Mar-Oct	Below 2,610	Roadsides and open areas
Bermudagrass *(Cynodon dactylon)*	C	Jun-Aug	Below 3,000	Disturbed areas
Medusahead (*Elymus caput-medusae*)	C	Apr-Jul	Below 2,000	Disturbed areas
Klamathweed *(Hypericum perforatum)*	C	Jun-Sep	Below 5,000	Rangeland areas, pastures, fields, roadsides, forest clearings, burned areas
Scarlet sesban (*Sesbania punicea*)	B	Jun-Sep	Below 600	Along streams, lake shores, other moist sites, and roadsides
Subtotal	*11*			
NOT KNOWN TO OCCUR WITHIN THE PROPOSED FERC PROJECT BOUNDARY				
Russian knapweed *(Acroptilon repens)*	A	May-Sept	Below 6,200	Fields, roadsides, cultivated ground, disturbed areas
Camelthorn *(Alhagi maurorum)*	A	Jun-Aug	Below 1,640	Agricultural areas, riverbanks
Alligatorweed *(Alternanthera philoxeroides)*	A	Jun-Oct	Below 700	Shallow water, wet soils, ditches, marshes, pond margins, slow-moving watercourse
Capeweed *(Arctotheca calendula)*	A	Mar-Jun	Below 820	Disturbed sites
Plumeless thistle *(Carduus acanthoides)*	A	May-Aug	Below 4,300	Roadsides, pastures, waste areas
Musk thistle *(Carduus nutans)*	A	Jun-Jul	330-4,000	Roadsides, pastures, waste areas
Slenderflower thistle *(Carduus tenuiflorus)*	C	May-Jul	Below 3,300	Disturbed sites, roadsides, pastures, annual grasslands, waste areas
Woolly distaff thistle *(Carthamus lanatus)*	B	July-Aug	Below 3,600	Disturbed sites
Purple starthistle *(Centaurea calcitrapa)*	B	Jul-Oct	Below 3,300	Disturbed areas
Diffuse knapweed *(Centaurea diffusa)*	A	Jun-Sep	Below 7,600	Fields, roadsides
Spotted knapweed *(Centaurea stoebe* ssp. *micranthos)*	A	July-Aug	Below 8,500	Open disturbed sites, grasslands, forested areas, roadsides
Squarrose knapweed *(Centaurea virgata* var. *squarrosa)*	A	Jun-Aug	Below 4,600	Degraded rangelands
Canada thistle *(Cirisum arvense)*	B	Jun-Sep	Below 5,900	Disturbed areas
Artichoke thistle *(Cynara cardunculus)*	B	Apr-Jul	Below 1,640	Disturbed sites, open sites in grasslands, pasture, chaparral, riparian areas, abandoned agricultural fields

Table 3.3.4-3. (continued)

Common Name/ Scientific Name	CDFA[1] Status	Flowering Period	Elevation(ft)	Habitat
NOT KNOWN TO OCCUR WITHIN THE PROPOSED FERC PROJECT BOUNDARY (cont.)				
Scotch broom *(Cytisus scoparius)*	C	Mar-Jun	Below 3,300	Disturbed areas
Water hyacinth *(Eichhornia crassipes)*	C	Jun-Oct	Below 650	Ponds, sloughs, waterways
Oblong spurge *(Euphorbia oblongata)*	B	Apr-Aug	Below 3,300	Waste areas, disturbed sites, roadsides, fields
Leafy spurge *(Euphorbia virgate)*	A	Jun-Sep	Below 4,600	Waste areas, disturbed sites, roadsides, fields
Japanese knotweed *(Fallopia japonica)*	B	Jul-Oct	Below 3,300	Disturbed moist sites, roadsides, and riparian and wetland areas, upland sites where water tables are shallow
Giant knotweed *(Fallopia sachalinensis)*	B	Jul-Oct	Below 1,640	Disturbed moist sites, roadsides, and riparian and wetland areas
French broom *(Genista monspessulana)*	C	Mar-May	Below 1,600	Disturbed areas
Hydrilla *(Hydrilla verticillata)*	A	Jun-Aug	Below 650	Ditches, canals, ponds, reservoirs, lakes
Dyer's woad *(Isatis tinctoria)*	B	Apr-Jun	Below 3,300	Roadsides, fields, disturbed sites
Hairy whitetop *(Lepidium appelianum)*	B	Apr-Oct	Below 6,600	Disturbed open sites, fields, pastures
Lense-podded whitetop *(Lepidium chalepense)*	B	Apr-Aug	Below 5,000	Disturbed open sites, fields, pastures
White-top *(Lepidium draba)*	B	Apr-Aug	Below 5,000	Disturbed, generally saline soils, fields
Dalmation toadflax *(Linaria genistifolia* ssp. *dalmatica)*	A	May-Sep	Below 3,300	Disturbed places, pastures, fields
Purple loosestrife *(Lythrum salicaria)*	B	Jun-Sep	Below 5,300	Seasonal wetlands, ditches, cultivated fields
Scotch thistle *(Onopordum acanthium)*	A	Jul-Sep	Below 5,300	Disturbed areas
Tansy ragwort *(Senecio jacobaea)*	B	Jul-Sep	Below 5,000	Disturbed sites, waste places, roadsides, fields
Gorse *(Ulex europaeus)*	B	Nov-Jul	Below 1,300	Disturbed areas
Subtotal	*31*			
Total	**42**			

Sources: Cal-IPC 2018a; CDFA 2018, CCH 2018, and Jepson Flora Project 2017.
[1] CDFA 2018
A: eradication, containment, rejection, or other holding action at the state-county level is mandated
B: eradication, containment, control, or other holding action is at the discretion of the commissioner
C: no state action is required except to retard the speed of spreading

As described above, SSWD conducted a special-status plants and NNIP study within the defined study area that included background literature reviews, desktop analyses, and field investigations. Components of the study specific to NNIP, including the results, are provided below.

Field surveys were conducted from April 2017 through July 2017 to document NNIP in the study area. The following information was collected when NNIP were documented within the study area:

- Digital photographs, if needed, to describe the occurrence
- For those species where "quantitative" data was required, if a plant population was estimated to cover an area greater than 0.1 ac, or if the occurrence was linear (e.g., as along a road) and greater than 100 ft long, surveyors delineated the approximate occurrence boundary, or end-points in the case of a linear occurrence, using a handheld GPS with an accuracy of at least 50 ft. When occurrences were smaller than those dimensions, only a single central GPS point was taken to indicate the location of the occurrence. If a single GPS point was used to map an occurrence, the area of the NNIP population was estimated using one of two acreage classes: up to 0.01 ac, and 0.01 to 0.1 ac. The NNIP cover of the occurrence was characterized as either concentrated or diffuse
- NNIP indicated with the descriptor "qualitative" were described more generally. These species tend to produce large or diffuse populations that may be unwieldy to map in detail. These "qualitative" species were mapped using a single GPS point near the center of the occurrence to indicate an occurrence. The area of the infestation was estimated into one of four acreage classes: up to 0.1 ac, 0.1-0.25 ac, 0.25-4.0 ac, and greater than 4 ac. The NNIP cover of the occurrence was characterized as either concentrated or diffuse
- Estimated distance to nearest Project facility, feature, or Project-related activity
- Activities observed in the vicinity of the NNIP population that have a potential to spread NNIP
- Estimated phenology and descriptions of reproductive state of that invasive occurrence

There were 206 plant species identified during the surveys. Of the plant species found, a total of 94 are native and a total of 102 are non-native. Eleven of the non-native species are currently considered invasive (see Attachment 3.3.4A).

The 2017 survey found 10 NNIP species (the 11th NNIP species was located prior to the study in a section of the proposed Project Boundary outside of the study area), comprising 487 occurrences (see Attachment 3.3.4B, Figures 3.3.4B-1 to 11 for maps and Attachment 3.3.4C for a table of all NNIP occurrences), within the proposed Project Boundary, including the following: 11 occurrences of barbed goatgrass (*Aegilops triuncialis*), 2 occurrences of cheatgrass (*Bromus tectorum*), 137 occurrences of Italian thistle (*Carduus pycnocephalus* ssp. *pycnocephalus*), 6 occurrences of Maltese starthistle (*Centaurea melitensis*), 73 occurrences of yellow starthistle (*Centaurea solstitialis*), 31 occurrences of rush skeletonweed (*Chondrilla juncea*), 1 occurrence of bindweed (*Convolvulus arvensis*), 25 occurrences of Bermudagrass (*Cynodon dactylon*), 81 occurrences of Medusahead (*Elymus caput-medusae*), and 120 occurrences of Klamathweed (*Hypericum perforatum*). One additional NNIP species, scarlet sesban (*Sesbania punicea*) has been recorded by a private collector at the southern margin of the reservoir (CCH 2018).

Each of the 11 NNIP species found in the proposed Project Boundary is discussed in detail below.

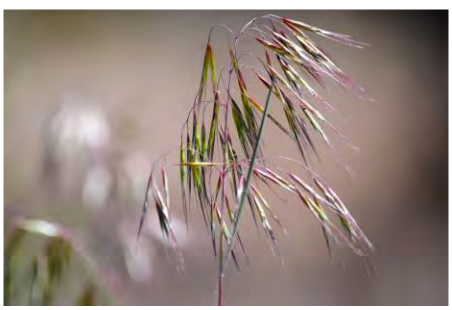
Barbed Goatgrass *(Aegilops triuncialis)*

Barbed goatgrass is an annual, which primarily infests rangelands, pastures, grasslands, oak woodlands, and rarely, chaparral, throughout parts of California that are north of San Francisco and Modesto (Jepson Flora Project 2017). Prevention is the key in dealing with the species, because once it becomes established, controlling it is very difficult. Barbed goatgrass spread occurs only by seed dispersal, which are dormant for two or more years, and seeds may be transported on hair, fur, wool, shoes or clothes (DiTomaso and Healy 2007).

Recommended treatments for the control of barbed goatgrass include hand-pulling, mowing, burning and selected herbicides; however, mowing and burning treatments are difficult to implement in a forested setting. Nonselective herbicides, such as glyphosate, or grass-specific herbicides, such as fluazifop (Envoy II) or clethodim (Fusilade), may be applied to control infestations and should be applied in a way that minimizes the damage to native vegetation (Aigner and Woerly 2010). There are currently no biological controls for barbed goatgrass (CDFA 2018).

SSWD found 11 occurrences of barbed goatgrass, all within the NSRA. Most of these occurrences were mapped as discrete points or population lines, covering at most 20 sq ft. One population was mapped as widespread between the water line and campgrounds.

Cheatgrass (*Bromus tectorum*)



Cheatgrass is an annual that occurs throughout California (Jepson Flora Project 2017). Cheatgrass reproduces by seed, dispersing short distances by wind, animals, or on the clothing of humans. Long-distance dispersal is facilitated through recreational, agricultural, and construction activities, especially in areas of soil disturbance or overgrazing (Cal-IPC 2018a). Cheatgrass has the potential to increase the frequency and spread of wildfire in certain communities. Increased fire frequency may contribute to potential habitat conversion, as shrubs and trees killed from fire are often unable to regenerate (DiTomaso and Healy 2007).

The favored treatment methods for cheatgrass are mowing and burning; both can be effective to reduce seed production. However, with both methods, treatment timing is sensitive. Mowing within a week after flower initiation can reduce seed production and burning should occur before spikelets break apart. Glyphosate and other readily available herbicides have also been used to effectively control populations (DiTomaso and Healy 2007).

Cheatgrass has limited distribution in the study area. SSWD found 2 occurrences, both in the southern most portion of the NSRA, in the grassy portions of the campground area outside the drip line of oak trees.

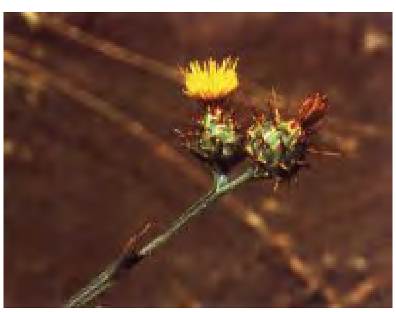
Italian Thistle *(Carduus pycnocephalus* ssp. *pycnocephalus)*

Italian thistle is an annual occurring throughout California (Jepson Flora Project 2017). Occurrences can reach nearly 100 percent cover in some areas and inhibit the recruitment and survivorship of native plant species. Plants are considered to spread aggressively by seed, which fall near the parent plant, but can travel long distances by wind, water, birds, small mammals and human activities. Seeds can persist for 7 to 10 years and germinate under drought conditions (DiTomaso and Healy 2007).

Recommended treatment strategies for Italian thistle include mowing and burning. Mowing 2 to 4 days after flowering starts is an effective way to prevent seed production; however, removal of basal portions of the plant is recommended because flower buds easily regenerate. Burning can help remove dense stands of mature Italian thistle, but is not very effective at removing plants still in the basal rosette stage (DiTomaso and Healy 2007). Clopyralid, picloram and triclopyr are common herbicides for thistles. With repeated use, Italian thistle generally shows herbicide resistance to 2, 4-D or MCPA. Grazing sheep and goats can also be effective in controlling thistle (CABI 2015).

SSWD found 137 occurrences of Italian thistle distributed throughout the entire study area within the proposed Project Boundary. It is found typically within the dripline of large trees and adjacent to buildings and paved areas.

Maltese Starthistle (*Centaurea melitensis*)[8]



Maltese starthistle is an annual occurring throughout California, but is generally more prevalent in the southern half of the state (Jepson Flora Project 2017). It is primarily found in disturbed sites, but also known to move into annual grasslands. When this species forms dense stands, it displaces native vegetation and animals, in addition to increasing soil erosion and reducing water percolation. Maltese starthistle reproduces by seed; an individual plant can produce up to 60 or more seeds per flower head and up to 100 or more flower heads (up to 6,000 seeds per plant). Seeds fall near the parent plant and are dispersed by wind, human activities, animals, water and soil movement (DiTomaso and Healy 2007).

[8] Photograph found at http://www.cal-ipc.org/?s=Maltese+Starthistle (Cal-IPC undated).

Recommended treatments for Maltese starthistle are not well documented, but the control methods recommended for yellow starthistle are assumed to be effective at control of Maltese thistle (DiTomaso and Healy 2007; CDFA 2018).

SSWD found 6 occurrences of Maltese starthistle, all within the NSRA. All occurrences of Maltese starthistle were mapped as discreet patches of approximately 5 to 20 sq ft in size.

Yellow Starthistle *(Centaurea solstitialis)*

Yellow starthistle is an annual occurring throughout California, but is generally more prevalent in the northern half of the state (Jepson Flora Project 2017). It is highly competitive and will typically develop into very dense stands, displacing native vegetation in otherwise natural areas. This species is a prolific seed producer, producing seeds at levels of 10,000 per square meter, which remain viable in soil for 3 or more years. Seeds can be transported by human vectors, including the movement of contaminated hay and infested equipment or vehicle transport. Some seeds are dispersed by wind, and birds and mammals after ingestion (DiTomaso and Healy 2007).

Recommended treatment methods include grazing, mowing and burning, all of which can prevent seed production and control infestations. However, all methods are recommended as annual treatments, ranging over a period of 2 to 3 years or more. Like those treatments described for other NNIPs, the effectiveness of the treatment is dependent upon accurate timing. Grazing is recommended when the plants have developed flowering stems, but before the spiny heads develop. Mowing is most effective when plants just begin to bloom, and it is recommended that plants are cut below the height of the lowest branches. Burning is recommended after the plants have dried, but before seed is produced. Regardless of the treatment, vigilant monitoring is recommended to curb subsequent infestations. In addition to mechanical treatments, all species of starthistle are highly susceptible to the herbicide cloppyralid (CDFA 2018).

SSWD found 73 occurrences of yellow starthistle distributed throughout the entire study area within the proposed Project Boundary. It is found typically adjacent to buildings and paved areas or other areas of relatively high disturbance.

Rush Skeletonweed *(Chondrilla juncea)*

Rush skeletonweed is an herbaceous perennial or biennial that is localized to several regions in California (North Sierra foothills, South San Francisco Bay, San Luis Obispo, etc.) but forms large dense populations where it does occur (Jepson Flora Project 2017). This species prefers habitat in disturbed areas, such as roadsides, croplands, pastures and residential areas. The species will tolerate a wide variety of conditions, but grows best on well-drained soils, cool winters and hot, dry summers without periods of prolonged drought. Seeds are primarily wind-dispersed, but may also be vectored by water, animals and human activity (DiTomaso and Healy 2007).

A combination of methods is necessary to effectively control skeletonweed. Hand-pulling can remove small occurrences, but all parts of the plant must be removed, bagged and thrown away to prevent re-sprouting. Mechanical tillage can effectively eliminate seedlings and older plants in the short-term. However, the plants will continue to persist, due to vegetative reproduction. Mechanical tillage is not always possible in a forested setting, since tillage would damage the roots of other plants in addition to skeletonweed. Very few herbicides are known to control skeletonweed and single treatments are ineffective. Of herbicides that are labeled for use in California, tank mixes of clopyralid and MCPA (2-methyl-4-chlorophenoxyacetic acid) or two 4-D have been shown to be more effective than any of those chemicals applied alone. Glyphosate helps to control rosettes. Three forms of biological control, the skeletonweed gall mite (*Eriophyes chondrillae*), skeletonweed gall midge (*Cystiphora schmidtii*) and skeletonweed rust (*Puccinia chondrillina*) have been shown to be successful in skeletonweed control and are all approved for use in California (CDFA 2018).

SSWD found 31 occurrences of skeletonweed scattered throughout the study area within the proposed Project Boundary. It was typically mapped as discrete clusters of variable sizes. A number of occurrences were noted to have been mowed, hiding the true extent of the population.

Bindweed (*Convolvulus arvensis*)

Bindweed is a perennial vine that occurs throughout California (Jepson Flora Project 2017). This species is known to completely carpet areas, which can inhibit native growth. It generally prefers open areas with high levels of disturbance and can be particularly damaging to grassland ecosystems. Bindweed is a serious agriculture weed that causes damages to cereal, bean, and potato crops. It also is a vector for several viruses that kill tomatoes and potatoes. This species is spread by seed and deep rhizomes (DiTomaso and Healy 2007).

Hand removal of rhizomes is recommended for the control of bindweed in small areas. For large areas, tilling or disking is recommended and exposes rhizomes to sun-drying or freezing, or summer solarization in moist soils. There are no biological controls of bindweed authorized for California (DiTomaso and Healy 2007). Chemical control of bindweed can be achieved with the use of Dicamba in the fall, Glyphosate and/or Metsulfuron during the peak bloom, or 2, 4-D in early fall or during the bud stage. Application of a wetting agent can increase the effectiveness of the control. However, chemical control is reduced in effectiveness during drought and multiple treatments will likely be needed to control bindweed (CDFA 2018).

SSWD found one occurrence of bindweed (an 800 - sq ft patch) just northwest of the Camp Far West dam, within the proposed Project Boundary.

Bermudagrass (***Cynodon dactylon)***

Bermudagrass is a perennial herb that occurs throughout California (Jepson Flora Project 2017). The species is known to form extensive networks of creeping rhizomes and stolons. The species can form dense ground covering mats, which inhibit native vegetation and fragment habitat. Bermudagrass favors disturbed sites, gardens, agronomic crops, orchards, turf, landscaped and forested areas. It prefers moist soil types in irrigated areas, or areas that receive some warm seasonal moisture (CDFA 2018). The species can be spread vegetatively and by seed. Long distance dispersal may be achieved via contaminated hay, livestock feed, soil movement, and transport of mowing equipment and vehicles (Bossard et al. 2000).

Hand removal of rhizomes and stolons is recommended treatment for the control of Bermudagrass in small areas. For large areas, tilling or disking is recommended and exposes rhizomes to sun-drying or freezing, or summer solarization in moist soils. Herbicide application in the summer to mid-fall before plant dormancy can be effective (CDFA 2018). Weaker growth of Bermudagrass can be achieved by increasing shade from tall shrubs and trees and then repeated hand pulling for complete removal. Covering the Bermudagrass with black or clear plastic for 6 to 8 week periods have proven effective during the summer months on south and southwest facing slopes and flat areas. Grass-selective herbicides are most effective in early spring. Non-selective herbicides are most effective in the late summer. Other herbicides will simply suppress Bermudagrass, but may harm desirable vegetation (Cudney et al. 2014).

SSWD found 26 occurrences of Bermudagrass throughout the study area in the proposed Project Boundary. It was typically mapped in patches in disturbed areas near roads and along the Camp Far West Reservoir margin.

Medusahead (*Elymus caput-medusae*)

Medusahead is an annual occurring throughout northern California (Jepson Flora Project 2017). Medusahead is unpalatable to livestock, except during the early growth stages. Senesced individuals form dense layers of litter that decompose slowly, creating fuel for wildfire and altering moisture characteristics in the soil. This species tends to colonize disturbed sites, including grassland, oak woodland and agronomic fields. A prolific seed producer, seeds are dispersed locally via wind and water, and achieve long distance dispersal through various human activities, and the movement of contaminated soil, clinging to the feet and fur of animals (DiTomaso and Healy 2007).

The recommended treatment for the control of Medusahead is burning and disking/plowing. A slow, hot burn, applied when other vegetation has dried and Medusahead seeds have not yet matured, can reduce infestations. Alternately, disking or plowing before seeds set can be an effective method to reduce stands (CDFA 2018). The application of foliar herbicides and soil active compounds can be effective, if applied with good coverage (Stannard et al. 2010).

SSWD found 83 occurrences of Medusahead throughout the study area in the proposed Project Boundary. These were typically mapped as discrete patches along roads or as widespread populations within grassland habitats.

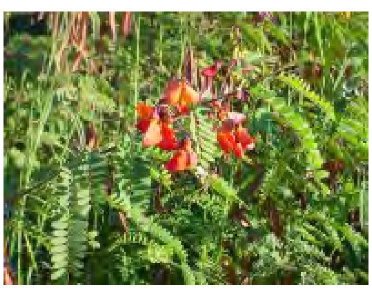
Klamathweed *(Hypericum perforatum)*

Klamathweed is a perennial herb found in the northern Sierra Mountain and foothills region of California (Jepson Flora Project 2017). Klamathweed spreads aggressively by rhizomatous growth and through seed dispersal, with seeds remaining viable for up to 10 years. Known long-distance vectors include vehicle tires and other heavy equipment, while wind, water and soil movement provide short-distance dispersal (CDFA 2018).

The recommended treatment for the control of Klamathweed is mowing, which can reduce seed production. A new or small infestation of Klamathweed can be hand-pulled; however, repeated pulls are necessary for complete eradication. However, plants can propagate from the rhizomes (CDFA 2018). Systematic herbicide application in the spring can be effective (DiTomaso and Healy 2007).

SSWD found 120 occurrences of Klamathweed scattered throughout the entire study area in the proposed Project Boundary.

Scarlet Sesban (*Sesbania punicea*)[9]



Scarlet sesban typically grows along streams, lake shores, other moist sites, roadsides, and the species is often cultivated as ornamental (Jepson Flora Project 2017). Scarlet sesban grows rapidly and forms dense stands that can limit access to riparian areas. This species is known to displace native vegetation used by wildlife and contributes to bank erosion and flooding (Cal-IPC 2018b).

Recommended treatments for the control of scarlet sesban include hand-pulling, mowing, burning and selected herbicides; however, mowing and burning treatments are difficult to implement in a forested setting, such as the Project Area. Cutting scarlet sesban to ground level in spring before it flowers will reduce the number of seeds produced and will deplete the plant's energy reserves (DiTomaso and Kyser 2013). Nonselective herbicides, such as glyphosate, may be applied to control infestations and should be applied when the plants are growing rapidly. Selective herbicides may also be used, such as Triclopyr, and in cut stump treatments, the

9 Photograph found at http://www.cal-ipc.org/plants/profile/sesbania-punicea-profile/ (Cal-IPC undated).

herbicide should be applied immediately after cutting. There are currently no USDA-approved biological controls for scarlet sesban (DiTomaso and Kyser 2013).

According to CCH (2018), scarlet sesban was observed in 2013 along the southern margin of the Camp Far West Reservoir. This occurrence is believed to be inside the proposed Project Boundary.

3.3.4.2 Wildlife Resources

3.3.4.2.1 Wildlife Habitat

Based on the vegetation classifications described in Section 3.3.4.1.1, SSWD classified wildlife habitats in the proposed FERC Project Boundary using CDFW's California Wildlife Habitat Relationships (CWHR) system, Version 9.0 (CDFW 2015b). Table 3.3.4-4 presents the eight CWHR habitat types identified in the proposed FERC Project Boundary (CDFW 2015b). The two most common habitat types present are Lacustrine and Annual Grassland, followed by Blue Oak Woodland and then the remaining 5 habitat types

Table 3.3.4-4. Wildlife habitat types in the proposed FERC Project Boundary.

CWHR Types	Acres	Percentage
Annual Grassland	324.04	12.16
Barren	4.00	0.15
Blue Oak Woodland	452.60	17.00
Blue Oak-Foothill Pine	82.09	3.06
Montane Hardwood	35.05	1.32
Mixed Chaparral	2.29	0.08
Urban	12.22	0.50
Lacustrine	1,749.61	65.72
8 CWHR Types	**2,661.90**	**100**

Source: CDFW 2015b

In addition to classifying wildlife habitat, the CWHR model predicts wildlife use based on habitat type, age class, size class, canopy closure or cover, and occurrence of specific habitat elements (e.g., natural or manmade features such as cliffs, springs, or transmission lines) that may influence thermal cover, forage, prey availability, nesting, escape cover, and breeding.

This analysis indicates that the proposed FERC Project Boundary supports a diversity of wildlife habitats and associated wildlife species. Using the identified habitat types and the CWHR system, SSWD identified 28 special-status terrestrial vertebrate wildlife species that potentially may occur within the proposed FERC Project Boundary (CDFW 2015b). These species include 1 reptile, 21 birds, and 6 mammals (see Table 3.3.4-5).

Although CWHR-generated lists are a useful tool for predicting general species occurrence, they should be interpreted cautiously because errors of omission (e.g., excluding a species that is present) and commission (e.g., including a species that is absent) are likely when this broad-scale model is used for localized applications.

3.3.4.2.2 Special-status Wildlife Species

Table 3.3.4-5 presents information on the special-status wildlife species that occur, or have the potential to occur, in the proposed Project Boundary. Along with CWHR, CDFW's CNDDB was used as the initial source to identify previously reported occurrences of special-status species and sensitive habitats in the Project Vicinity (CDFW 2018b). Two other sources were the Camp Far West BA (Sycamore Associates 2013a) and the USFWS' IPaC Trust Resource Report (USFWS 2018a). Potential occurrences of special-status wildlife species and their corresponding temporal and spatial information were also derived from a query of the CWHR database (CDFW 2015b). Habitat types known to occur within the Project Area (listed in Table 3.3.4-4) were used as the search criteria within CWHR (CDFW 2015b). Descriptions of suitable habitat types were synthesized from species accounts found online at NatureServe® (2017) and the CWHR life history database. Temporal data provided in Table 3.3.4-5 correspond to the seasonal occurrence of the species. Spatial data correspond to the habitat types typically supporting each species. Additional sources of information were queried for potentially occurring special-status species. These additional sources included CDFW's *State and Federally Listed Endangered and Threatened Animals of California* (CDFW 2017), and *List of State Fully Protected Animals* (CDFW undated). Table 3.3.4-5 includes 30 wildlife species: 1 reptile, 23 birds, and 6 mammals.

Table 3.3.4-5. Special-Status wildlife species (i.e., reptiles, birds, and mammals) occurring or potentially occurring in the Camp Far West Hydroelectric Project Area.

Common Name/ Scientific Name	Status[1]	Suitable Habitat Type	Temporal and Spatial Distribution[2]	Occurrence in Project Area	Known From Project
REPTILES					
Coast horned lizard *(Phrynosoma blainvillii)*	SSC	Utilization of a variety of habitats, including scrubland, grassland, coniferous woods, and broadleaf woodlands; typically it is found in areas with sandy soil, scattered shrubs, and ant colonies, such as along the edges of arroyo bottoms or dirt roads.	Yearlong: AGS, BOP, BOW, MCH	Project Vicinity: Potentially occur within suitable habitat.	There are no documented occurrences of coast horned lizard on the Project, but suitable habitat exists (Sycamore Associates 2013a).
BIRDS					
Tricolored blackbird *(Agelaius tricolor)*	SSC, SE	Fresh-water marshes of cattails, tule (*Schoenoplectus acutus*), and sedges. Nests in vegetation of marshes or thickets, sometimes nests on the ground. Historically strongly tied to emergent marshes; in recent decades much nesting has shifted to non-native vegetation.	Yearlong: AGS, URB	Project Vicinity: Potentially occur within suitable habitat.	No, and no suitable nesting habitat was observed during BA surveys (Sycamore Associates 2013a).
Grasshopper sparrow *(Ammodramus savannarum)*	SSC	Prefer grasslands of intermediate height for breeding and are often associated with clumped vegetation interspersed with patches of bare ground.	Summer: AGS	Project Vicinity: Camp Far West.	No, and no suitable nesting habitat was observed during BA surveys (Sycamore Associates 2013a).
Golden eagle *(Aquila chrysaetos)*	BGEPA, FP	Generally open country, in prairies, arctic and alpine tundra, open wooded country, and barren areas, especially in hilly or mountainous regions.	Yearlong: AGS, BAR, BOP, BOW, MHW, MCH, URB	The species was identified as having the potential to occur within the Project Vicinity (CDFW 2018b).	Yes, there were six observations during 2017 special-status raptor surveys.
Short-eared owl *(Asio flammeus)*	SSC	Broad expanses of open land with low vegetation for nesting and foraging are required.	Yearlong: AGS, URB Winter: BOP, BOW, MCH	Project Vicinity: Potentially occur within suitable habitat.	No
Long-eared owl *(Asio otus)*	SSC	Riparian bottomland forest with over story of willows (*Salix* spp.) and cottonwoods (*Populus fremontii*); riparian forest along stream corridors (often dominated by live oak trees). Wooded areas with dense vegetation needed for roosting and nesting, adjacent open areas needed for hunting.	Yearlong: AGS, BOP, BOW, MCH, MHW	Project Vicinity: Potentially occur within suitable habitat.	No, and no suitable nesting habitat was observed during BA surveys (Sycamore Associates 2013a).
Burrowing owl *(Athene cunicularia)*	SSC	Open grasslands, especially prairie, plains, and savanna, sometimes in open areas near human installations.	Yearlong: AGS, BAR, BOW, MCH, URB	Project Vicinity: Potentially occur within suitable habitat.	Yes, one individual was seen in 2018 near NSRA.
Redhead *(Aythya americana)*	SSC	Open water on lakes, ponds, and reservoirs.	Winter: LAC	Project Vicinity: Potentially occur within suitable habitat.	No

Table 3.3.4-5. (continued)

Common Name/ Scientific Name	Status[1]	Suitable Habitat Type	Temporal and Spatial Distribution[2]	Occurrence in Project Area	Known From Project
BIRDS (cont.)					
Swainson's hawk *(Buteo swainsoni)*	ST	Breeds in grasslands with scattered trees, juniper-sage flats, riparian areas, savannahs and agricultural or ranch (CDFW 2015b).	Summer: AGS, BAR, BOP, BOW, MCH, MHW, URB	This species was found adjacent to the Project Vicinity within the Nicolaus, Sheridan, Wheatland and Verona quads (CDFW 2018b).	Yes, three individuals were observed during special-status raptor surveys in 2017.
Vaux's swift *(Chaetura vauxi)*	SSC	Found in mature forests, but also forages and migrates over open country.	Summer: BOP, LAC, MCH, MHW, URB	Project Vicinity: Potentially occur within suitable habitat.	No
Black tern *(Chlidonias niger)*	SSC	Marshes, along sloughs, rivers, lakeshores, and impoundments, or in wet meadows.	Summer: LAC	Project Vicinity: Potentially occur within suitable habitat.	No
Northern harrier *(Circus hudsonius)*	SSC	Marshes, meadows, grasslands, and cultivated fields.	Yearlong: AGS, BAR, BOP, BOW, LAC, URB Winter: MCH	Project Vicinity: Wheatland, Camp Far West.	Yes, a single individual was seen flying over the grassland area of the NSRA during 2017 surveys.
Olive-sided flycatcher *(Contopus cooperi)*	SSC	Non-breeding habitat includes a variety of forest, woodland, and open areas with scattered trees, especially where tall dead snags are present. Primary habitat is mature, evergreen montane forest. Birds breed in various forest and woodland habitats.	Migrant: BOP Summer: MCH, MHW	Project Vicinity: Potentially occur within suitable habitat.	No
Black swift *(Cypseloides niger)*	SSC	Nests in moist crevices or caves, or on cliffs near waterfalls in deep canyons. Forages widely over many habitats.	Summer: AGS, BAR, BOP, BOW, LAC, MCH, MHW, URB	Project Vicinity: Potentially occur within suitable habitat.	No
White-tailed kite *(Elanus leucurus)*	FP	Savanna, open woodland, marshes, partially cleared lands and cultivated fields, mostly in lowland situations.	Yearlong: AGS, BAR, BOP, BOW, MCH, URB	Project Vicinity: Potentially occur within suitable habitat.	This species was observed during BA surveys (Sycamore Associates 2013a).
Common loon *(Gavia immer)*	SSC	Lakes containing both shallow and deep water.	Winter: LAC	Project Vicinity: Potentially occur within suitable habitat.	No

Table 3.3.4-5. (continued)

Common Name/ Scientific Name	Status[1]	Suitable Habitat Type	Temporal and Spatial Distribution[2]	Occurrence in Project Area	Known From Project
BIRDS (cont.)					
Bald eagle *(Haliaeetus leucocephalus)*	BGEPA, SE, FP	Breeding habitat usually includes areas close to coastal areas, bays, rivers, lakes, or other bodies of water that reflect the general availability of primary food sources. Preferentially roosts in conifers or other sheltered sites in winter in some areas.	Yearlong: AGS, BAR, BOP, BOW, LAC, MHW, Winter: MCH	The species is known to occur within the Project Vicinity (Sycamore Associates 2013a)	Two active bald eagle nests were documented on the Project during 2017 surveys, as well as some inactive nests. A total of 47 bald eagle occurrences were documented on the Project during 2017 surveys.
Loggerhead shrike *(Lanius ludovicianus)*	SSC	Open country with scattered trees and shrubs, savanna, desert scrub, and, occasionally, open woodland; often perches on poles, wires or fence posts	Yearlong: AGS, BOP, BOW, URB	Project Vicinity: Potentially occur within suitable habitat	No
California black rail (*Laterallus jamaicensis coturniculus*)	ST, FP	Inhabits freshwater marshes, wet meadows and shallow margins of saltwater marshes bordering larger bays.	Yearlong: LAC	The species was found within the Project Vicinity in the Camp Far West and Wolf quads (CDFW 2018b).	Neither the species nor suitable habitat was observed during BA surveys (Sycamore Associates 2013a)
American white pelican *(Pelecanus erythrorhynchos)*	SSC	Rivers, lakes, reservoirs, estuaries, bays, marshes; sometimes inshore marine habitats.	Summer: BAR Yearlong: LAC	Project Vicinity: Potentially occur within suitable habitat	This species was observed during BA surveys (Sycamore Associates 2013a)
Purple martin *(Progne subis)*	SSC	A wide variety of open and partly open situations, frequently near water or around towns.	Summer: AGS, BOP, BOW, LAC, MHW, URB	Project Vicinity: Potentially occur within suitable habitat	No
Bank swallow *(Riparia riparia)*	ST	Colonial nester; nests primarily in riparian and other lowland habitats west of the desert.	Summer: AGS, BAR, LAC, URB Migrant: MCH	This species was found near the Project Vicinity, within the Camp Far West, Nicolaus and Verona quads (CDFW 2018b).	Neither species nor suitable habitat was observed during BA surveys (Sycamore Associates 2013a)
Yellow warbler *(Setophaga petechial)*	SSC	Open scrub, second-growth woodland, thickets, farmlands, and gardens, especially near water; riparian woodlands, especially of willows, in the west.	Summer: BOP, BOW, MCH, MHW, URB	Project Vicinity: Camp Far West	Neither species nor suitable habitat was observed during BA surveys (Sycamore Associates 2013a)
Yellow-headed blackbird *(Xanthocephalus xanthocephalus)*	SSC	Fresh-water marshes of cattail, tule, or bulrushes. Nests in wet grasses, reeds, cattails. Also in open cultivated lands, pastures and fields.	Yearlong: LAC Summer: AGS	Project Vicinity: Potentially occur within suitable habitat	No

Table 3.3.4-5. (continued)

Common Name/ Scientific Name	Status[1]	Suitable Habitat Type	Temporal and Spatial Distribution[2]	Occurrence in Project Area	Known From Project
MAMMALS					
Pallid bat *(Antrozous pallidus)*	SSC	Arid deserts and grasslands, often near rocky outcrops and water. Less abundant in evergreen and mixed conifer woodland. Usually roosts in rock crevice or building, less often in cave, tree hollow, mine, etc.	Yearlong: AGS, BAR, BOP, BOW, MCH, MHC, URB	Project Vicinity: Potentially occur within suitable habitat.	No
Townsend's big-eared bat *(Corynorhinus townsendii)*	SSC	Maternity and hibernation colonies typically are in caves and mine tunnels. Prefers relatively cold places for hibernation, often near entrances and in well-ventilated areas.	Summer: AGS Yearlong: BAR, BOP, BOW, MCH, MHW, URB	Project Vicinity: Potentially occur within suitable habitat.	Neither species nor suitable habitat was observed during BA surveys (Sycamore Associates 2013a).
Spotted bat *(Euderma maculatum)*	SSC	Possibly occupies coniferous stands in summer and migrates to lower elevations in late summer/early fall.	Yearlong: AGS, BOP, BOW, URB	Project Vicinity: Potentially occur within suitable habitat.	No
Western mastiff bat *(Eumops perotis)*	SSC	Roosts in crevices and shallow caves on the sides of cliffs and rock walls, and occasionally buildings. Roosts usually high above ground with unobstructed approach. Most roosts are not used throughout the year. May alternate between different day roosts.	Yearlong: AGS, BAR, BOP, BOW, MCH, MHW, URB	Project Vicinity: Potentially occur within suitable habitat.	No
Western red bat *(Lasiurus blossevillii)*	SSC	Roosts in foliage, forages in open areas (sea level up through mixed conifer forests).	Yearlong: AGS, BOP, BOW, URB Summer: LAC, MCH, MHW	Project Vicinity: Potentially occur within suitable habitat.	Neither species nor suitable habitat was observed during BA surveys (Sycamore Associates 2013a).
American badger *(Taxidea taxus)*	SSC	Prefers open areas and may also frequent brushlands with little groundcover. When inactive, occupies underground burrow.	Yearlong: AGS, BAR, BOP, BOW, MCH, MHW	Project Vicinity: Potentially occur within suitable habitat.	No
Total	**30**				

Source: CDFW 2018b

[1] Status:
- BGEPA = Bald and Golden Eagle Protection Act
- SSC = California Species of Special Concern (CDFW 2018d)
- ST = State Threatened
- FP = Fully Protected
- SE = State Endangered

[2] CWHR Habitat Types:
- AGS = Annual Grass
- BAR = Barren
- BOP = Blue Oak Foothill Pine
- BOW = Blue Oak Woodland
- LAC = Agriculture Ponds, Water Features, General Water (i.e., lakes, ponds, reservoirs, diversion impoundments)
- MCH = Mixed Chaparral
- MHW = Montane Hardwood
- URB = Urban

Each of the 22 wildlife species with the potential to occur in the proposed Project Boundary that did not have further study done is discussed in detail below.

Coast Horned Lizard (*Phrynosoma blainvillii*)

The coast horned lizard is designated as SSC (CDFW 2018b). The coast horned lizard may be found along the Sierra Nevada foothills up to an elevation of 4,000 ft from Butte County south to Kern County. Habitat types occupied by the coast horned lizard include valley foothill hardwood, conifer, riparian and annual grasslands. This species will often burrow into loose sandy soil to escape from predators and extreme heat, or utilize logs, rocks, mammal burrows or crevices during periods of inactivity and winter hibernation (Zeiner et al. 1988 – 1990).

Based on information available from Zeiner et al. (1988 – 1990), habitat for coast horned lizard is present in the Project area, and as a result, this species may occur. SSWD's query of the CNDDB revealed no occurrences of coast horned lizard within the FERC Project Boundary.

Tricolored Blackbird (*Agelaius tricolor*)

The tricolored blackbird is designated as a SSC and SE (CDFW 2018b). A highly gregarious species, the tricolored blackbird can be found roosting and foraging in flocks. Colonies can sometimes be found within short distances of one another (NatureServe 2017). This species can be found in herbaceous wetland areas, as well as cropland and hedgerow habitats. Tricolored blackbirds are known to breed in fresh-water marshes, consisting of cattails (*Typha* sp.), tule (*Schoenoplectus acutus*), bulrushes and sedges (*Carex* sp.) (NatureServe 2017). In addition to insects, tricolored blackbirds feed on seeds and grain in the fall and winter months.

As described in Section 3.3.4.3.1, wetland habitat is minimal within the proposed Project Boundary. Eleven emergent wetlands were identified on the reservoir margin and are influenced by groundwater and dry season hydrology inputs, with some surface water dependency (Sycamore Associates 2013b). Additionally, no cropland habitat is located within the Project Boundary. The CNDDB search found occurrences of tricolored blackbird in the vicinity of State Route 65 south of the Project, but no occurrences in 5 mi of the Project. According to Sycamore Associates (2013a), no suitable nesting habitat was observed during BA surveys.

Grasshopper Sparrow (*Ammodramus savannarum*)

The grasshopper sparrow is designated as SSC (CDFW 2018b). The grasshopper sparrow prefers grassland habitat, but can also be found in old fields, savannahs and shortgrass prairies. During breeding season, clumped vegetation of intermediate height, interspersed in grasslands is required (NatureServe 2017). They are an uncommon and local summer resident in foothills and lowlands west of the Cascade-Sierra Nevada crest from Mendocino and Trinity County's south to San Diego County (Zeiner et al. 1988 – 1990). They arrive at nesting areas between March and June in eastern Washington, central Nevada and southern California. Departure for the wintering grounds in central California, southern Arizona and south through Mexico and Central America occurs in mid-September. The grasshopper sparrow eats insects, other small invertebrates, grain and seeds that are picked up from the ground (NatureServe 2017).

While grasshopper sparrow may occur within the Project Area, it is not known to breed or nest within the proposed Project Boundary. Additionally, according to Sycamore Associates (2013a), no suitable nesting habitat was observed during BA surveys, nor was any seen during relicensing studies.

Short-eared Owl (*Asio flammeus*)

The short-eared owl is designated as a SSC (CDFW 2018b). According to Zeiner et al. (1988 – 1990), the short-eared owl inhabits open areas nearly absent of trees, such as annual grasslands, prairies, dunes, meadows, irrigated lands, and saline and fresh emergent wetlands. Nests are depressions on dry ground that are lined with grasses, forbs, sticks and feathers, and concealed by surrounding grasses and shrubs. This species is known to breed in the coastal areas of Del Norte and Humboldt counties, the San Francisco Bay Delta, northeastern Modoc plateau, east side of the Sierra Nevada between Lake Tahoe and Inyo counties, as well as the San Joaquin Valley. The short-eared owl migrates from breeding areas in September or October to wintering areas in the Central Valley, western Sierra Nevada foothills, and along the California coast. Numbers have declined over most of the range because of destruction and fragmentation of grassland and wetland habitats, and grazing (Zeiner et al. 1988-1990).

While short-eared owl may occur within the Project Area, it is not known to breed or nest within the proposed FERC Project Boundary.

Long-eared Owl (*Asio otus*)

The long-eared owl is designated as a SSC (CDFW 2018b). In California, this species can be found from the Sierra Nevada foothills up to dense conifer stands at higher elevations. For roosting and nesting, long-eared owls require dense riparian and live oak thickets that contain densely canopied trees (Zeiner et al. 1988-1990). Resident populations in California have been declining since the 1940s, especially in southern California (Grinnell and Miller 1944; Remsen 1978, as cited by Zeiner et al. 1988-1990). While specific reasons for their decline is unknown, habitat fragmentation of riparian habitat and live oak groves are thought to be major factors. The long-eared owl hunts in open areas for voles and other rodents (Zeiner et al. 1988-1990).

Due to their use of a wide variety of habitats, long-eared owl has the potential to occur within or adjacent to the Project. However, no occurrences of this species have been reported. Additionally, according to Sycamore Associates (2013a), no suitable nesting habitat was observed during BA surveys.

Burrowing Owl (*Athene cunicularia*)

The burrowing owl is a SSC (CDFW 2018b). A small ground dwelling owl, its habitat is associated with open grassland, open lots near human habitation, and along roadsides. Within California, the breeding range of burrowing owl includes the northeastern plateau, Central Valley, San Joaquin Valley, Imperial Valley, Mojave and Colorado deserts, the southwest corner of San Diego County, and in a few coastal counties between Los Angeles and San Francisco. Burrowing owls nest in abandoned burrows dug by small mammals, such as ground squirrels

(*Spermophilus* spp.), as well as larger mammals, such as foxes (*Vulpes* spp.) and badgers (*Taxidea taxus*). If burrows are unavailable, burrowing owls may dig their own in soft soil, or utilize pipes, culverts and/or nest boxes (Zeiner et al. 1988-1990).

One burrowing owl was seen in 2018 near the NSRA. No nesting burrowing owls have been reported on the Project.

Redhead *(Aythya americana*)

The redhead is designated as SSC (CDFW 2018b). The redhead is uncommon to locally common during the winter months from Modoc County to Mono County in eastern California in lacustrine waters, where it is a common breeder during the summer months. It can also be found in the Central Valley, central California foothills and coastal lowlands and along the coast from Monterey County to Ventura County during the winter months. Breeding also occurs locally in the Central Valley, coastal Southern California and eastern Kern County (Zeiner et al. 1988 – 1990). Its habitat includes large marshes, lakes, lagoons, rivers and bays. Nesting sites can be found in dense bulrush or cattail stands that are interspersed with small areas of open water (NatureServe 2017). This species is known to lay eggs in the nest of other redheads and other duck species, as well as nests of Northern harriers (Woodin and Michot 2002). Necessary foraging habitat includes large freshwater marshes with persistent emergent vegetation (NatureServe 2017). Redheads dive for food primarily eating leaves, stems, seeds and tubers of aquatic plants with smaller amounts of aquatic insects (Zeiner et al. 1988 – 1990).

Redheads may occur in the Project, but there are no reports of this species.

Vaux's Swift (*Chaetura vauxi*)

The Vaux's swift is designated as a SSC (CDFW 2018b). The Vaux's swift can be found in mature forests, but also forages and migrates over open country (NatureServe 2017). The species prefers late seral stages of coniferous and mixed deciduous/coniferous forest and is more abundant in old-growth areas than younger stands (NatureServe 2017). The multi-layered broken overstory of old-growth forest may provide easier access to aerial insects than closed, continuous canopies of younger forests (NatureServer 2017). Nests are normally found in large-diameter hollow trees, broken-top trees, or stumps. The Vaux's swift usually locates the nest near to the bottom of the nesting cavity (NatureServer 2017).

Though Vaux's swift could potentially occur on the Project, there is no appropriate old growth forest habitat.

Black Tern (*Chlidonias niger*)

Black tern is designated as a SSC (CDFW 2018b). The black tern breeds from British Columbia south to central California. Black tern can be found in fresh emergent wetlands, moist grasslands and agricultural fields. Within California, black tern are common migrants and breeders on wetlands of the northeastern plateau and in Central Valley rice farms, which serve as surrogate habitat, due to the loss of wetlands through agricultural development. Natural lakes that experience little fluctuation in water surface elevation and have fresh emergent wetlands or marsh habitat provide nesting and foraging habitat, as well. Such lakes include Lake Tahoe and Eagle Lake. Nests are built on floating vegetation located in shallow water close to open water in stands of emergent vegetation. The black tern forages by hovering above wet meadows and fresh emergent wetlands. Insects are caught in the air and plucked from water and vegetation surfaces. They will also plunge into the water for tadpoles, crayfish, small fish and small mollusks (Zeiner et al. 1988-1990).

While the black tern was predicted to occur within the Project vicinity, it is not known to nest within the proposed FERC Project Boundary. Furthermore, no occurrences of black tern have been reported within or adjacent to the FERC Project Boundary. The absence of black tern is likely due to a lack of suitable nesting habitat (i.e. fresh emergent wetlands or water bodies that experience little fluctuation in water surface elevation) within or adjacent to the proposed Project.

Northern Harrier (*Circus hudsonius*)

The Northern harrier is designated as a SSC (CDFW 2018b). In California, the Northern harrier ranges from sea level up to 5,700 ft and can be found in the Central Valley and Sierra Nevada. Suitable habitat for this species includes meadows, grasslands, open rangelands, desert sinks, and fresh and saltwater emergent wetlands (Zeiner et al. 1988 – 1990). According to NatureServe (2017), Northern harrier may also be found in wheat fields, ungrazed or lightly grazed pastures, and some croplands (alfalfa, grain, sugar beets [*Beta* spp.], tomatoes [*Solanum* spp.] and melons [*Benincasa* spp., *Citrullus* spp., *Cucumis* spp., *Momordica* spp.]). Nesting habitat includes shrubby vegetation along the edges of marshes, emergent wetlands or along rivers and lakes. They have been known to nest in grasslands, grain fields or on sagebrush (*Artemisia* spp.) flats several miles from water. Nests are constructed of a large mound of sticks in wet areas, or a smaller cup of grasses in drier areas (Zeiner et al. 1988 – 1990).

During SSWD's special-status raptor study, a single individual was seen flying over the NSRA during 2017.

Olive-sided Flycatcher (*Contopus cooperi*)

The olive-sided flycatcher is a SSC (CDFW 2018b). This species is a common to uncommon summer resident in a wide variety of forest and woodland habitats below 9,000 ft throughout California. It is not found in the deserts, the Central Valley and other lowland valleys and basins (Zeiner et al. 1988 – 1990). The olive-sided flycatcher will breed at forest edges and openings such as meadows and ponds (Audubon 2018). Nests are made of twigs, rootlets and lichens placed out near the tip of horizontal branches of trees. Its winter habitat is also forest edges and clearings where tall trees or snags are present (Altman and Sallabanks 2000). These flycatchers forage primarily by hovering or sallying forward, concentrating on prey via aerial attack. This bird is a passive searcher as well as an active pursuer. Its diet consists of mostly flying insects, with a fondness for wild honeybees and other Hymenoptera (NatureServe 2017).

Due to their affinity towards woodland habitats, olive-sided flycatcher has the potential to occur within or adjacent to Project. However, no occurrences of this species have been reported.

Black Swift (*Cypseloides niger*)

The black swift is designated as a SSC (CDFW 2018b). The black swift breeds locally in the Sierra Nevada and Cascade Range (Zeiner et al. 1988 – 1990). The breeding populations in the United States make long migrations to their winter range in Central America. Nests are built of mud, mosses and algae in a cup-like structure in moist locations, behind or next to waterfalls, and wet cliffs with an unobstructed flight path. These birds feed on insects that are caught in the air, often at great heights, and can be seen foraging with other swifts at the leading edges of rainstorms (NatureServe 2017).

There is no appropriate nesting habitat on the Project, though the species may be an occasional visitor.

White-tailed Kite (*Elanus leucurus*)

The white-tailed kite is designated as a FP bird (CDFW 2018b). The white-tailed kite is a common to uncommon, yearlong resident in the Sierra Nevada foothills and adjacent valley lowlands within California. The species has increased in numbers and extended its range in recent decades (Zeiner et al. 1988-1990).

The white-tailed kite feeds mostly on voles and other small, diurnal mammals, and occasionally on birds, insects, reptiles, and amphibians. They forage in undisturbed, open grasslands, meadows, farmlands, and emergent wetlands. Trees with dense canopies provide cover, and nests are usually placed near the top of dense oaks, willows, or other tree stands near foraging areas. Breeding occurs from February to October, with the peak from May to August. The average clutch is composed of four to five eggs, and the incubation period is about 28 days. Young fledge in 35 to 40 days after hatching. The female incubates eggs and broods young exclusively, while the male supplies her with food (Zeiner et al. 1988-1990).

According to Sycamore Associates (2013a), white-tailed kite was observed during BA surveys within the proposed Project Boundary.

Common Loon (*Gavia immer*)

The common loon is designated as a SSC (CDFW 2018b). The common loon breeds on remote freshwater lakes with both shallow and deep, clear water, in the northern United States and Canada (NatureServe 2017). From May to September, the common loon can be seen in estuarine and subtidal marine habitats along the California coast, but are uncommon on large, deep lakes in valley and foothills throughout the state (Zeiner et al. 1988 – 1990). Northeastern California is considered to be within the historic breeding range of this species. Courtship begins shortly after territory reoccupation and involves shared displays, including simultaneous swimming, head posturing and short dives. Many times, a nesting pair will reuse the same site the following year. Nests are nearly always built at the water's edge in a quiet, protected hidden area and made of aquatic and terrestrial vegetation. Both the male and female build the nest together over the course of a week in May or early June. In winter and during migration, they can be found on lakes, rivers, estuaries and coastlines. Some individuals will overwinter in inland lakes and rivers. Up to 80 percent of their diet is fish, while the remaining 20 percent consists of crustaceans and aquatic plants (Zeiner et al. 1988 – 1990).

While Camp Far West Reservoir is a deep freshwater lake, the proposed Project Boundary is not within either the current or historic breeding range of the common loon. Furthermore, no occurrences of common loon or nesting have been reported within or adjacent to the FERC Project Boundary.

Loggerhead Shrike (*Lanius ludovicianus*)

The loggerhead shrike is designated as a SSC (CDFW 2018b). It is a common resident and winter visitor in lowland and foothills throughout California. This species' prefers habitats that include open-canopied valley foothill hardwood, valley foothill hardwood-conifer, valley foothill riparian, pinyon-juniper (*Juniperus* spp.), juniper, desert riparian and Joshua tree (*Yucca brevifolia*) habitats (Zeiner et al. 1988-1990). Loggerhead shrike may often be found perched on poles, wires or fenceposts.

Due to their use of a wide variety of habitats, loggerhead shrike has the potential to occur within or adjacent to the proposed Project Boundary. However, no occurrences of this species have been reported.

California Black Rail (*Laterallus jamaicensis coturniculus*)

The California black rail is designated as a ST and FP species (CDFW 2018b). California black rail are rarely seen, scarce, yearlong residents of saline, brackish, and fresh emergent wetlands in the San Francisco Bay area, Sacramento-San Joaquin Delta, coastal southern California at Morro Bay and a few other locations, the Salton Sea, and lower Colorado River area. Formerly a local resident in coastal wetlands from Santa Barbara Co. to San Diego Co.; reported to still winter there rarely. In freshwater wetlands, this species is usually found in bulrushes and cattails. The species typically inhabits the high wetland zones near the upper limit, not in low wetland areas with considerable annual and/or daily fluctuations in water levels (Zeiner et al. 1988-1990). California black rail nests are typically concealed in dense vegetation, near the upper limits of flooding. The species builds a deep, loose cup, at ground level or elevated several inches.

California black rail was found within the Project vicinity in the Camp Far West and Wolf quadrangles (CDFW 2018b). According to Sycamore Associates (2013a), neither California black rail nor suitable habitat was observed during BA surveys.

American White Pelican (*Pelecanus erythrorhynchos*)

The American white pelican is designated as a SSC (CDFW 2018b). Its habitat includes rivers, lakes, reservoirs, estuaries, bays, and open marshes (NatureServe 2017). Nesting sites require flat or gently sloped topography, without shrubs or other obstructions that would impede taking flight, are free of human disturbances and usually have loose earth suitable for constructing nest-mounds (Zeiner et al. 1988 – 1990). According to Zeiner et al. (1988 – 1990) and NatureServe (2017), this species currently nests at large lakes in the Klamath Basin of Northern California. Outside of nesting season (i.e., April to August), migrant flocks are often seen throughout California.

While the Project area does contain a large body of water (Camp Far West Reservoir) that may provide suitable habitat for American white pelicans, this area is outside of any known breeding areas for this species (Shuford and Gardali 2008). According to Sycamore Associates (2013a), American white pelican was observed during BA surveys within the FERC Project Boundary. Occurrences of American white pelicans in the Project area are likely related to migratory flocks moving between nesting habitat in the Klamath Basin and wintering habitat elsewhere in California.

Purple Martin (*Progne subis*)

The purple martin is designated as a SSC (CDFW 2018b). It is a long distance migrant, arriving in California from South America in late March and departing by late September. This species is described by Zeiner et al. (1988 – 1990) as an uncommon to rare local summer resident of various wooded, low-elevation habitats comprised of montane hardwood, valley foothill and montane hardwood-conifer, and riparian habitats. Purple martin also occurs in coniferous habitats including closed-cone pine-cypress, ponderosa pine, Douglas-fir and redwood (*Sequioia sempervirens*). These habitats vary structurally and may be old growth, multi-layered or open, and may also have snags. Purple martin most often nest in old woodpecker cavities found in tall, old, isolated trees or snags in open forests or woodlands. However, they may utilize man-made structures, such as bridges and culverts for nesting.

Due to their use of a wide variety of habitats, purple martin has the potential to occur within or adjacent to the proposed Project Boundary. However, no occurrences of this species have been reported.

Bank Swallow (*Riparia riparia*)

The bank swallow is designated as ST (CDFW 2018b). Bank swallows are neotropical migrants that arrive in California from South America in early March to breed. In July and August, bank swallows begin their migration back to South America. During the breeding period in California, they form nesting colonies that can range from 10 to 1,500 individuals, but most known colonies have 100 to 200 nesting pairs. Nests are constructed by digging small burrows into vertical banks, bluffs and cliffs made of fine-textured or sandy soils, and are located in riparian habitat along rivers, ponds lakes and the ocean. According to the CDFW (CDFG 2005b), the range of the bank swallow has been reduced by 50 percent since 1900. Bank stabilization projects (use of rip-rap) and channelization of rivers have been identified as the greatest factor in the reduction of this species range.

SSWD's CWHR search identified suitable nesting habitat as occurring within the proposed Project Boundary. However, according to Sycamore Associates (2013a), neither bank swallow nor suitable habitat was observed during BA surveys.

Yellow Warbler (*Setophaga petechia*)

The yellow warbler is designated as a SSC (CDFW 2018b). The yellow warbler is a migrant, found in California between April and October. Yellow warblers construct nests 2-16 ft above ground in riparian deciduous habitat along the western slope of the Sierra Nevada. These riparian deciduous habitats are comprised of cottonwoods, willows, alders, and other small trees and shrubs found in low, open-canopy woodland. This species breeds in montane shrubbery in open conifer forests. Territory occupied by yellow warbler usually contains tall trees for singing and foraging, and heavy brush in the understory for nesting (Zeiner et al. 1988-1990). Forage consists mostly of insects and spiders taken from the upper canopy of deciduous trees and shrubs. Yellow warblers have also been known to eat berries (Zeiner et al. 1988-1990). Brood parasitism by brown-headed cowbirds (*Molothrus ater*) is thought to be a major cause of population decline in lowland localities in recent decades.

Due to their affinity towards riparian deciduous habitat, yellow warbler has the potential to occur within or adjacent to the FERC Project Boundary. However, no occurrences of this species have been reported.

Yellow-headed Blackbird (*Xanthocephalus xanthocephalus*)

The yellow-headed blackbird is designated as a SSC (CDFW 2018b). This species breeds commonly, but locally, in fresh-water marshes of cattail, tule (*Schoenoplectus* sp.) or bulrush east of the Cascade Range and Sierra Nevada (Zeiner et al. 1988 – 1990). Nests are basketlike structures of wet grasses, reeds and cattails woven around stems. Nests are placed within a male's territory and always overhanging the water (Twedt and Crawford 1995). During migration and winter, open, cultivated lands, pastures and fields are used. The yellow-headed blackbird feeds on insects, seeds and grain in fields, on muddy ground near water or at the water's surface during breeding season (NatureServe 2017), while foraging outside of the breeding season takes place in upland areas, eating grains and weed seeds (Twedt and Crawford 1995).

While yellow-headed blackbird was predicted to occur within the Project vicinity, it is not known to breed or nest within the FERC Project Boundary.

American Badger (*Taxidea taxus*)

The American badger is designated as a SSC species (CDFW 2018b). An uncommon, but permanent, resident found throughout most of California, except in the North Coast area (Zeiner et al. 1988-1990), the American badger is found most abundantly in drier open stages of most shrub, forest, and herbaceous habitats, with friable soils. This species' diet consists mostly of rodents: rats (*Rattus* spp.), mice, chipmunks, pocket gophers (*Geomyidae* family), and ground squirrels. The American badger will also take some reptiles, insects, earthworms, eggs, birds, and carrion as prey items when ground squirrel populations are low (NatureServe 2017). Seasonal dietary shifts in response to prey availability have been observed.

There are no reports of badgers in the proposed Project Boundary, though there is suitable habitat. However, Project O&M would not alter suitable habitat, so activities would only impact badgers by way of temporary disturbance.

3.3.4.2.3 Special-Status Bat Study

In September 2015, SSWD evaluated all Project recreation facilities[10] within the NSRA and SSRA for evidence of bat activity. At each location, SSWD surveyed the exterior and interior of buildings for active bat roosts and signs of historic use via the presence of guano and staining resulting from urine and body oils. Any observed bat use (i.e., not just special-status bats, but all bat species) was documented on a standard data sheet, photographed and the location was recorded with a GPS unit. Table 3.3.4-6 summarizes the Project recreation facilities that were included in the survey.

Table 3.3.4-6. List of Project facilities and recreation facilities that were surveyed by SSWD in September 2015 for evidence of bat use and results of the survey.

Project Facility	Access Point	Signs of Bat Use
CAMP FAR WEST – SOUTH SHORE RECREATION AREA		
Store	Small hole in wall	Staining – possibly from birds
Restroom 1	Open entrance doors, eaves, corrugated roof	None
Storage shed	Garage door, eaves, holes in screens	Some staining – possibly from birds
Restroom 2	Open entrance doors, holes in roof	Staining – possibly from birds
Restroom 3	Open entrance doors, corrugated roof	None
Restroom 4	Open entrance doors, holes in screens, corrugated roof	None
CAMP FAR WEST – NORTH SHORE RECREATION AREA		
Store	None	None [1]
Restroom 1	Open entrance doors, holes in screens, corrugated roof	None
Restroom 2	Open entrance doors, holes in screens, corrugated roof	None
Restroom 3	None	None [1]
Restroom 4	Open entrance doors, holes in screens, corrugated roof	Staining – possibly from birds
Old snack bar	Walls – several holes, eaves	None
ADDITIONAL STRUCTURES		
1967 bridge – Camp Far West Road	Deck	None[2]

[1] Not applicable.
[2] Observed during 2017 surveys.

The following types of bat roosts were considered during SSWD's survey:

- Maternity Roosts. A maternity roost is a man-made or natural structure that provides protection from the elements and predators, and provides the correct thermal environment for young rearing. Maternity roosts tend to be warmer in temperature because breeding females need to maintain a high metabolism to aid in lactation. Juvenile bats need to keep warm to maintain a metabolic rate that allows for rapid growth. Maternity roost thermal

[10] The Camp Far West Powerhouse was not accessible during the survey, but was included in the 2017 acoustic and emergence surveys.

requirements are species dependent but generally remains between 70°F and 90°F, however big-eared bat nursery roosts have been discovered in sites where ambient temperatures are as low as 60°F. Species that form large colonies can be found raising young in mines with ambient temperatures as low as 56°F, but often prefer 66°F or higher (Tuttle and Taylor 1998).

- Day Roosts. A day roost is a man-made or natural structure where bats are able to spend the non-active period of the day resting or in torpor, depending on weather conditions. Day roosts provide shelter from the elements and safety from predators (Tuttle and Taylor 1998).
- Night Roost. A night roost is a man-made or natural structure where bats may rest between foraging bouts, digest prey, escape from predators, shelter from weather, and possibly for social purposes. Night roosts are typically sites or structures that retain heat to aid the bat in maintaining the higher metabolism necessary for digestion (Tuttle and Taylor 1998).
- Winter Hibernacula. These are man-made or natural structures used by bats during colder winter months. During this time, bats enter torpor, receiving nourishment from their fat storage gained during summer months. Many species will awaken for brief periods of time to stretch, but will resume torpor. Bats, such as the Townsend's big-eared bat, will hibernate for short periods of time and will often resume feeding behavior during warm winter spells. Airflow and temperature are key determinants in use of structures, such as tunnels and adits, as hibernacula. Temperatures within these roost sites are generally below 53°F at the onset of hibernation, and remain between 34°F and 50°F by midwinter. Structures that have a varying temperature regime allow bats to find suitable temperatures during warm or cold winters (Tuttle and Taylor 1998).

No bats were seen during the survey of Project facilities. The facilities may be suitable for roosting, though there was no presence of guano and the staining seen was most likely from birds. A few of the screens that cover exterior windows of several facilities were damaged, providing possible points of entry for bats. SSWD has not installed bat exclusionary devices on any Project facilities.

In addition to the evaluation of all Project recreation facilities within the NSRA and SSRA for evidence of bat activity described above, SSWD conducted an additional bat study (Study 4.3, *Special-Status Wildlife – Bats*) to identify the location of bats, including special-status bats, in relation to two facilities not surveyed during the reconnaissance survey described above. The study was conducted consistent with Section 6.0 of the *Special-status Wildlife – Bats Study Plan* that was filed with FERC on January 9, 2017.

The study area consisted of two sites – the Camp Far West Powerhouse and the non-Project Camp Far West Road Bridge over the Camp Far West spillway.

The study methods consisted of two primary steps: 1) nighttime emergence surveys including acoustic monitoring during the surveys; and 2) quality assurance/quality control (QA/QC) review. Each step is summarized below.

Nighttime emergence surveys performed at the Camp Far West Bridge were conducted on May 11 and August 11, 2017; and nighttime emergence surveys at the Camp Far West Powerhouse were conducted on May 12 and August 7, 2017. One additional night of unattended acoustic monitoring was performed overnight on August 2, 2017 at both locations. Each survey lasted at least one or two hours, beginning 30 minutes prior to sundown. Acoustic monitoring also occurred during these nighttime emergence surveys.

Before conducting the emergence surveys, observation points were identified where surveyors could view the majority of the facility and the most likely points of egress. The surveyors were positioned so that emerging bats would be silhouetted against the sky as they exited the roost.

During the nighttime emergence surveys, the surveyors performed the following activities or recorded the following information:

- Survey start/stop times;
- An Anabat SD1 bat detector system was deployed to identify the exact timing of bats emerging and was used to help differentiate between low- and high-frequency bat species;
- Surveyors identified and recorded obvious features of bats observed (e.g., fur color, ear size);
- Surveyors recorded numbers of bats and the location of where bats were observed emerging from. Tallies of emerging bats were recorded every few minutes or as natural breaks in bat activity allowed. If no bats were seen, observations continued until it was too dark to see emerging bats (approximately one-two hours);
- Field data was collected and recorded on a data sheet developed by the USFWS; and
- Analook computer software (most recent version available) was used to analyze the acoustic data collected by the Anabat SD1 system to identify bat species.

Bat activity is affected by weather, therefore nighttime emergence surveys were conducted on clear, calm and dry evenings when bats are active and there was good visibility. Conducting the emergence surveys during windy conditions was avoided.

Following the emergence surveys, SSWD performed a QA/QC review of all data, including maps, recordings, identifications, and sightings.

SSWD observed four bats during nighttime emergence surveys: two each night at the Camp Far West Powerhouse. No bats were observed at the Camp Far West Bridge. No bats were observed emerging from Project facilities; the four bats were seen flying overhead near the powerhouse.

Two species of bat were positively identified through acoustic monitoring: California myotis (*Myotis californicus*) and Mexican free-tailed bat (*Tadarida brasiliensis*). One additional bat species was also recorded and tentatively identified as a Western pipistrelle (*Pipistrellus hesperus*). A total of 18 bat calls were recorded over three surveys at locations around the Camp

Far West Powerhouse; one on May 12, 16 on August 2, and one on August 7, 2017. None of the above bat species have special-status designations.

A description of special-status bats species with the potential to occur on the Project, but not located during the study, is below.

Pallid bat *(Antrozous pallidus)*[11]

The Pallid bat is designated as a SSC (CDFW 2018b). The pallid bad is a medium sized bat, with adults weighing between 13 and 28 grams (g) and having a forearm length between 1.7 and 2.3 in. Distinguishing characteristics include large ears that measure about 1.0 in. long, a pale pelage, and a skunk-like odor (Western Bat Working Group [WBWG] 2017).

The range of pallid bat includes western North America, between the southern interior of British Columbia and the Mexican states of Queretaro and Jalisco, and as far east as Texas. Preferred habitats include low elevation (<6,000 ft) rocky arid deserts and canyonlands, shrub-steppe grasslands, karst formations and coniferous forests above 7,000 ft. Common roosts include crevices in rocky outcrops and cliffs, caves, mines, trees and various human structures, such as bridges, barns, porches and attics. Roosts may be occupied by one or hundreds of pallid bats. Pallid bats are opportunistic generalists that primarily glean insects from surfaces, but will also capture insects in flight. Mating occurs from October to February; one or two pups are born between late April and July and weaned in August (WBWG 2017).

Townsend's Big-Eared Bat *(Corynorhinus townsendii)*[12]

Townsend's big-eared bat is designated as a SSC (CDFW 2018b). The Townsend's big-eared bat is a medium sized bat, with adults weighing between 9 and 11g and having a forearm length between 1.5 and 1.8 in. Distinguishing characteristics include a prominent, bilateral nose lump and large ears that measure more than 1.0 in long (WBWG 2017).

This species is distributed from southern British Columbia south to central Mexico. Within the United States, Townsend's big-eared bats are found from the Great Plains west through the Rocky Mountains to the Pacific Coast. Preferred habitats include coniferous forests, mixed mesophytic forests, deserts, native prairies, riparian communities, active agricultural areas and coastal habitat types. Foraging occurs along edge habitats associated with streams and wooded habitats. Townsend's big-eared bats forage almost exclusively on moths, with lepidopterans making up more than 90 percent of its diet. This species is known to travel long distances while foraging and has been reported to move more than 93 mi in a single evening. Caves and

[11] Photo source: Geoff Gallice - https://www.flickr.com/photos/dejeuxx/4844640621/, CC BY 2.0, Wikimedia Commons
[12] Photo source: PD-USGov, exact author unknown - https://www.nps.gov/chis/learn/nature/townsends-bats.htm, Public Domain.

abandoned mines are primary roosting habitat, but roosts in buildings, bridges, rock crevices and hollow trees have been reported. Maternity colonies vary in size and can have a few individuals or several hundred. Mating occurs between October and February, and a single pup is born between May and June (WBWG 2017).

Spotted Bat (*Euderma maculatum*)[13]

Spotted bat is designated as a SSC (CDFW 2018b). The spotted bat is a medium-sized bat, with adults weighing between 13 and 20g and having a forearm length ranging from 1.8 to 2.0 in. They have a unique coloration that includes dorsal black fur with three white spots, a white ventral surface, and pink ears that can be almost 2 in. long (WBWG 2017).

This species is found throughout the western United States, including California. Habitats include: desert-scrub, pinyon-juniper woodland, ponderosa pine, mixed conifer forest, canyon bottoms, canyon rims, riparian areas, fields and open pastures. Foraging often occurs within 32 ft of the ground, but can occur as high as 164 ft and as low as 6 ft. Moths are the primary prey of spotted bats. Spotted bats are capable of long distance flight and in Arizona, are known to travel up to 50 mi in order to feed. Preferred roosts include cracks, crevices and caves that are often located high in prominent rock features. Generally, spotted bats are solitary, but occasionally, are found roosting or hibernating in small groups. Information regarding migration is lacking, but in Arizona, they are known to be active year-round. Breeding is thought to occur in late summer, and a single pup is born the following May or June (WBWG 2017).

Western Mastiff Bat *(Eumops perotis)*[14]

Western mastiff bat is designated as a SSC (CDFW 2018b). The western mastiff bat is the largest species of bat in North America, with adults weighing upwards of 65g and having a forearm length of 2.8 to 3.2 in. long. Size is this species' most distinguishing characteristic (WBWG 2017).

Western mastiff bats are primarily found in the southwestern United States from California east to western Texas, and as far north as southern Utah. They are found in a variety of habitats, including desert scrub, chaparral, oak woodland, ponderosa pine forests and high elevation meadows in mixed conifer forests. In California, western mastiff bats were thought to only occur below 1,200 ft, but recent surveys have found roosts as high as 4,600 ft. Roosts are generally high above the ground and allow an unobstructed drop at the roost opening of 10 ft or more. Suitable roosts include exfoliating rock slabs and crevices in large boulders and buildings.

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[13] Photo source: Paul Cryan , U.S. Geological Survey - http://gallery.usgs.gov/photos/03_28_2011_ydt2WJi77Q_03_28_2011_1, Public Domain.

[14] Photo source: M.Siders, Grand Staircase-Esclanate National Monument, Bureau of Land Management - http://www.ut.blm.gov/monument/wildlife-bats-free-tailed.php, Public Domain

Maternity colonies typically have fewer than 100 individuals. Western mastiff bats mate between late winter and early spring, and a single pup is born in early to mid-summer. Foraging occurs 100 to 200 ft above the ground and is typically along dry desert washes, floodplains, chaparral, oak woodland, open ponderosa pine forest, grassland and agricultural areas. Lepidoptera are primary forage for western mastiff bats, but beetles (*Coleoptera* family), crickets (*Gryllidae* family) and katydids (*Tettigoniidae* family) are also consumed (WBWG 2017).

Western Red Bat *(Lasiurus blossevillii)*[15]

Western red bat is designated as a SSC (CDFW 2018b). The western red bat is small to medium sized bat that weigh between 10 and 15 g, has a forearm length between 1.5 and 1.6 in. and an ear length that is less than 0.5-in. Pelage is red with white patches at the shoulders, elbows and thumbs.

A widely distributed species, western red bat can be found in southern British Columbia, much of the western United States, Mexico, Central America, Argentina and Chile. Western red bats are often solitary and roost primarily among foliage of trees or shrubs adjacent to streams, open fields, and occasionally, in urban areas. Cave roosting has been documented at Carlsbad Caverns in southeastern New Mexico. This species migrates in groups and forages in close proximity with one another. Males and females appear to occupy different summer ranges, as well as differ in the timing of migration. Winter behavior is poorly understood, but it is believed red bats occasionally wake from hibernation on warm days to feed. Mating occurs in late summer or early fall, and females postpone pregnancy until spring. Gestation is about 80-90 days, and up to five pups may be born (WBWG 2017).

The Project Area provides suitable travel corridors in the form of forest edge, trails, grassland and stream/river corridors that are well suited for foraging bat use. Project facilities and disturbances associated with Project recreation have the potential to affect special-status bats. Bats are sensitive to various disturbances and can be directly, or indirectly, affected by human activities at roost sites. These disturbances may directly or indirectly result in mortality, or abandonment of roosts. In the case of maternity roosts, disturbances can lead to abandonment and loss of juveniles. Since most species of bats roost communally, disturbances to roosts have the potential to affect anywhere from one to thousands of individuals. Bat mortality, whether it is directly or indirectly related to an activity, could threaten the long-term persistence of bats, especially since fecundity is low

3.3.4.2.4 Special-Status Raptor Study

SSWD conducted a special-status raptor study (Study 4.2, *Special-Status Wildlife – Raptors*) within the proposed Project Boundary that included background literature reviews, desktop analyses, and field investigations. The study was conducted consistent with Section 6.0 of the

[15] Photo source: United States National Park Service - http://www.nps.gov/sagu/naturescience/images/western_red_bat.jpg, Public Domain.

Special-status Wildlife – Raptors Study Plan that was filed with FERC on January 9, 2017. The study area encompassed the Camp Far West Reservoir.

The study consisted of the following three steps: 1) identify and map known raptor nest sites and other occurrences within the study area; 2) conduct surveys following specific protocols for bald eagle, golden eagle and Swainson's hawk; and 3) perform quality assurance/quality control (QA/QC) review. Each step is summarized below.

SSWD identified and mapped known occurrences of bald eagle, golden eagle and Swainson's hawk sightings, nests and roosts in the study area. The map was based on existing CWHR data, CNDDB data, discussions with wildlife biologists, discussions with Project Operations Staff, and incidental sightings by field staff during fieldwork on Camp Far West Reservoir.

Raptor surveys for the bald eagle consisted of winter surveys and nest surveys. Winter surveys were conducted in accordance with the *Protocol for Evaluating Bald Eagle Habitat and Populations in California* (Jackman and Jenkins 2004), and the nest surveys were conducted in accordance with the *Bald Eagle Breeding Survey Instructions* (CDFG 1999) and *Protocol for Evaluating Bald Eagle Habitat and Populations in California* (Jackman and Jenkins 2004). Nesting territories for bald eagles were checked at least three times during the nesting season (primarily February through July). Bald eagle surveys were conducted on December 20-22, 2016; January 16-18; February 15, 23-24; March 16; April 6, 25; May 2; and June 16, 2017.

SSWD conducted nesting golden eagle surveys according to the *Interim Golden Eagle Inventory and Monitoring; and Other Recommendations* (USFWS 2010) and *Protocol For Golden Eagle Occupancy, Reproduction, and Prey Population Assessment* (Driscoll 2010). Nesting territories for golden eagle surveys were checked four times during the nesting season (i.e., primarily February through July), with each survey spaced at least 30 days apart. Golden eagle surveys were conducted on January 18, February 1, March 8, April 6; and June 16, 2017.

SSWD conducted nesting Swainson's hawk surveys according to the *Recommended Timing and Methodology for Swainson's Hawk Nesting Surveys in California's Central Valley* (Swainson's Hawk Technical Advisory Committee [SHTAC] 2000). Swainson's hawk surveys were conducted on January 18, February 1, March 23, 31; April 6, 14, 18 and 28, 2017.

During the study, SSWD recorded any raptor sightings and nests observed looking inland within 0.25-mi from the edge of the shoreline at the Camp Far West Reservoir, photographed the nest, and recorded the location using GPS. Incidental sightings of other special-status raptors including northern harrier, short-eared owl, long-eared owl, and white-tailed kite were recorded when they were seen. If reasonably possible, SSWD made determinations as to whether the raptor nest was active or inactive during the survey year. Additionally, SSWD biologists recorded all bird species observations throughout the special-status raptor study, and these species are documented in Table 3.3.4-7.

Following completion of the study, SSWD performed a QA/QC review of all data, including maps and sightings. Of the 37 bird species recorded during this study, two are considered SSC- northern harrier and American white pelican- and nine are considered harvest species- Canada goose, American coot, mallard, snow goose, blue-winged teal, canvasback, greater white-fronted goose, common merganser, and American crow.

Table 3.3.4-7. Incidental bird species observed while conducting the Special-Status Raptor Study.

Common Name~	Scientific Name[1]	Status[2]
Red-tailed hawk	*Buteo jamaicensis*	--
Bald eagle	*Haliaeetus leucocephalus*	BGEPA, CE, FP
Canada goose	*Branta Canadensis*	Harvest
Turkey vulture	*Cathartes aura*	--
American kestrel	*Falco sparverius*	--
Steller's jay	*Cyanocitta stelleri*	--
Downy woodpecker	*Picoides pubescens*	--
Hairy woodpecker	*Picoides villosus*	--
Least grebe	*Tachybaptus dominicus*	--
Double-crested cormorant	*Phalacrocorax auritus*	--
American coot	*Fulica americana*	Harvest
Ruby-throated hummingbird	*Archilochus colubris*	--
Black-chinned hummingbird	*Archilochus alexandri*	--
Mallard	*Anas platyrhynchos*	Harvest
Yellow-billed magpie	*Pica nuttalli*	--
Killdeer	*Charadrius vociferus*	--
Snow goose	*Anser caerulescens*	Harvest
Great blue heron	*Ardea herodias*	--
Blue-winged teal	*Spatula discors*	Harvest
Canvasback	*Aythya valisineria*	Harvest
Northern harrier	*Circus hudsonius*	SSC
Swainson's hawk	*Buteo swainsoni*	CT
Greater white-fronted goose	*Anser albifrons*	Harvest
Sharp-shinned hawk	*Accipiter striatus*	--
Golden eagle	*Aquila chrysaetos*	BGEPA, FP
Western meadowlark	*Sturnella neglecta*	--
Western grebe	*Aechmophorus occidentalis*	--
Common merganser	*Mergus merganser*	Harvest
Belted kingfisher	*Megaceryle alcyon*	--
American avocet	*Recurvirostra americana*	--
Osprey	*Pandion haliaetus*	--
Green heron	*Butorides virescens*	--
American crow	*Corvus brachyrhynchos*	Harvest
Common raven	*Corvus corax*	--
Acorn woodpecker	*Melanerpes formicivorus*	--
American white pelican	*Pelecanus erythrorhynchos*	SSC
Anna's hummingbird	*Calypte anna*	--
Total	**37**	

[1] Taxonomy derived from California Birds Record Committee (2018).
[2] CDFW 2018c
BGEPA = Bald and Golden Eagle Protection Act
CE = California Endangered
FP = California Fully Protected
SSC = California Species of Special Concern
CT = California Threatened
Harvest = Harvest Species

Forty-seven bald eagle occurrences (including multiple bald eagles at the same site), six golden eagles, and three Swainson's hawks were observed during surveys. A map of these special-status raptor 2017 sightings within the FERC Project Boundary is included in Figure 3.3.4-2.

Two active bald eagle nests were found within the proposed Project Boundary in 2017. One nest is historic, previously found on the Bear River Arm of Camp Far West Reservoir in adjacent trees. It was previously documented in a 2013 report by Sycamore Associates. A second active bald eagle nest was found on the Rock Creek Arm of the reservoir, east of the NSRA boat ramp. Both active bald eagle nests and the three osprey (*Pandion haliaetus*) nests found within the FERC Project Boundary are identified on the map included in Figure 3.3.4-3. A great blue heron (*Ardea herodias*) rookery was also located in the SSRA, near the site location of the bald and golden eagles.

Additional information on the three special-status raptor species that were the focus of the surveys is below.

Golden Eagle (*Aquila chrysaetos*)[16]

The golden eagle is protected under the BGEPA and listed as a FP species (CDFW 2018b). It ranges from sea level up to 11,500 ft and can be found throughout California, except the center of the Central Valley (Zeiner et al. 1988-1990). Throughout the Sierra Nevada and foothills adjacent to the Central Valley, golden eagle may be found in sparse woodlands, grasslands, savannas, lower successional forest stages, and shrubland. Cliffs, large trees, and man-made structures (e.g., electric transmission towers) with a commanding view are used for nesting.

Swainson's Hawk (*Buteo swainsoni*)[17]

During SSWD's special-status raptor study, six occurrences of golden eagle were observed at Camp Far West Reservoir. None of these occurrences include nesting birds or evidence of nesting activities, nor are any known historically at the Project, which suggests that golden eagles are occasional visitors to the Project.

The Swainson's hawk is listed as ST species (CDFW 2018b). According to the last available California Swainson's Hawk Inventory (CDFG 2005a), Swainson's hawk inhabit the flat portions of California's Central Valley, lower elevation Great Basin in Northeastern California, Owen's Valley and portions of the Mojave Desert. Typical breeding habitat consists of trees within mature riparian forest, lone trees and oak groves, and mature roadside trees. It forages in native grasslands, lightly-grazed dryland pasture, and suitable grain or alfalfa (*Medicago sativa*) fields that are adjacent to nesting habitat. Historically, Swainson's hawks were found throughout California, except in the Sierra Nevada. The current range of Swainson's hawk, while similar to the historic range, has become fragmented and irregularly distributed. Yolo, San Joaquin and Sacramento counties are inhabited by 85 percent of the Central Valley breeding pairs (CDFG 1993). This concentration of breeding pairs is attributed to compatible land use practices (irrigated farmland, such as alfalfa). North and south of those three counties, the number of nesting pairs falls dramatically, which is likely due to incompatible crop-types such as cotton (*Gossypium* spp.), vineyards and orchards.

[16] Photo source: < https://gfp.sd.gov/outdoor-learning/bald-eagle-awareness-days/golden_eagle.aspx>.
[17] Photo source: Tony Hisgett - Flickr: Swainson's Hawk, CC BY 2.0, Wikimedia Commons

Furthermore, no significant foothill region breeding populations have been discovered (CDFG 1993).

During SSWD's special-status raptor study, three individuals were observed within the FERC Project Boundary, but no nests were observed. However, Swainson's hawk may nest in the vicinity of the Project given their affinity for the Central Valley.

Bald Eagle (*Haliaeetus leucocephalus*)[18]

The bald eagle is a SE and FP species and protected under the BGEPA (CDFW 2018b). The bald eagle is a large raptor with a wingspan between 6 and 8 ft and can weigh up to 14 pounds. They typically nest within 1 mi of water bodies. The bald eagle breeds and winters throughout California, except for the desert areas, and the number of breeding pairs known to be occupying territories in California is steadily growing (CDFW 2018c). Most breeding in the state occurs in the northern Sierra Nevada, Cascades, and north Coast Ranges. California's breeding population is resident year-round in most areas where the climate is relatively mild (Jurek 1988). Between mid-October and December, migratory birds from areas north and northeast of California arrive in the state. Wintering populations remain through March or early April. Breeding generally occurs from February to July, but can be initiated as early as January via courtship, pair bonding, and territory establishment. The breeding season normally ends around August 31, as the fledglings are no longer attached to their nest area. According to the CDFW (2018c), California's winter population appears to be at least stable, although varying from year to year, exceeding 1,000 birds some winters. The results of Midwinter Bald Eagle Surveys conducted from 1986-2005 estimates a 1.2 percent increase in California's wintering bald eagle population.

During SSWD's 2017 special-status raptor study, 47 bald eagles (including multiple birds at the same site), were observed during surveys within the FERC Project Boundary. Additionally, two active bald eagle nests were found within the proposed Project Boundary. One nest is historic, previously found on the Bear River Arm of Camp Far West Reservoir in adjacent trees (Sycamore Associates 2013a). A second active bald eagle nest was found on the Rock Creek Arm of the reservoir, east of the NSRA boat ramp.

[18] Photo source: Pacific Southwest Region USFWS from Sacramento, US - A lone Bald eagle, Public Domain.

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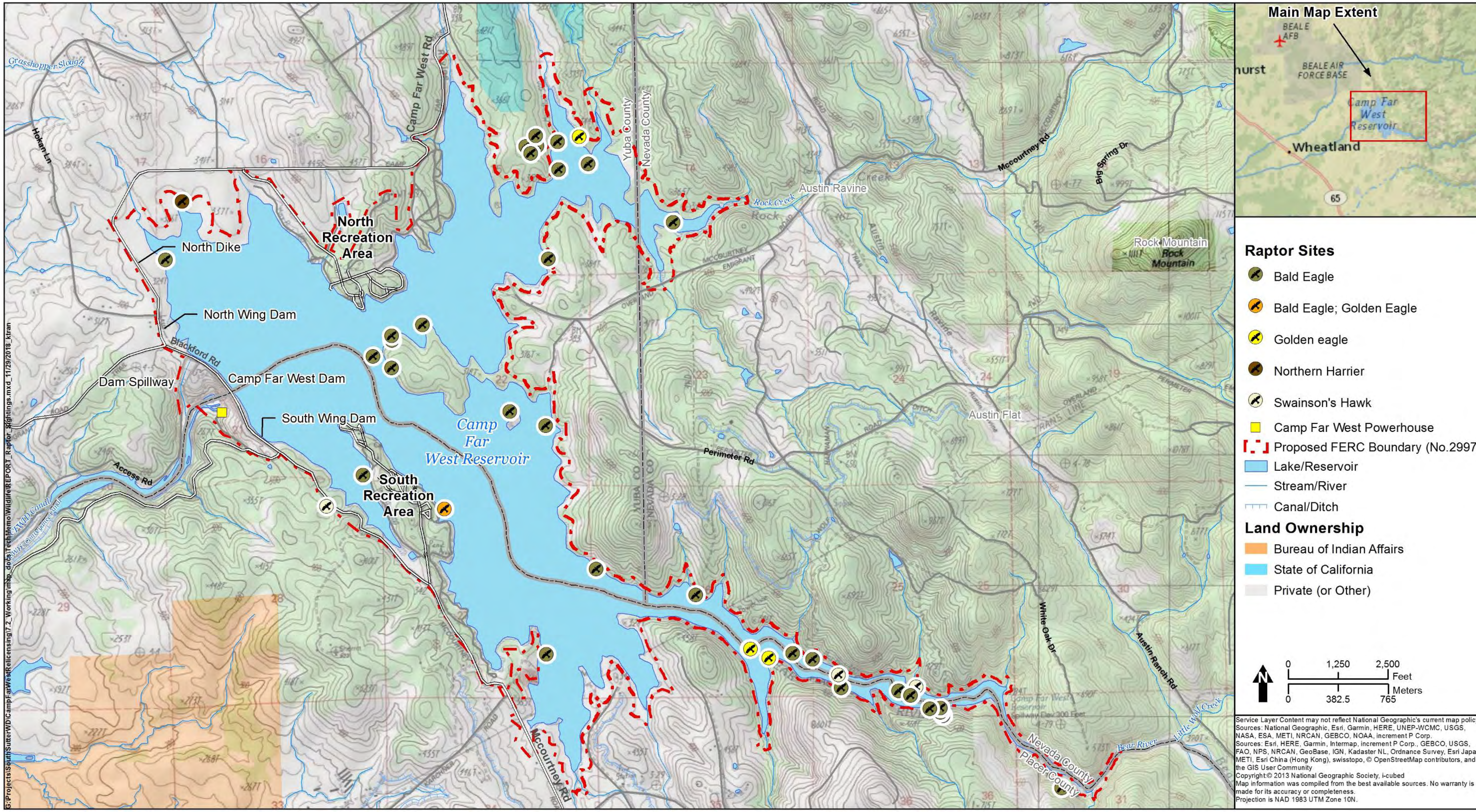

Figure 3.3.4-2. Special-status raptor 2017 sightings within the proposed Project Boundary.

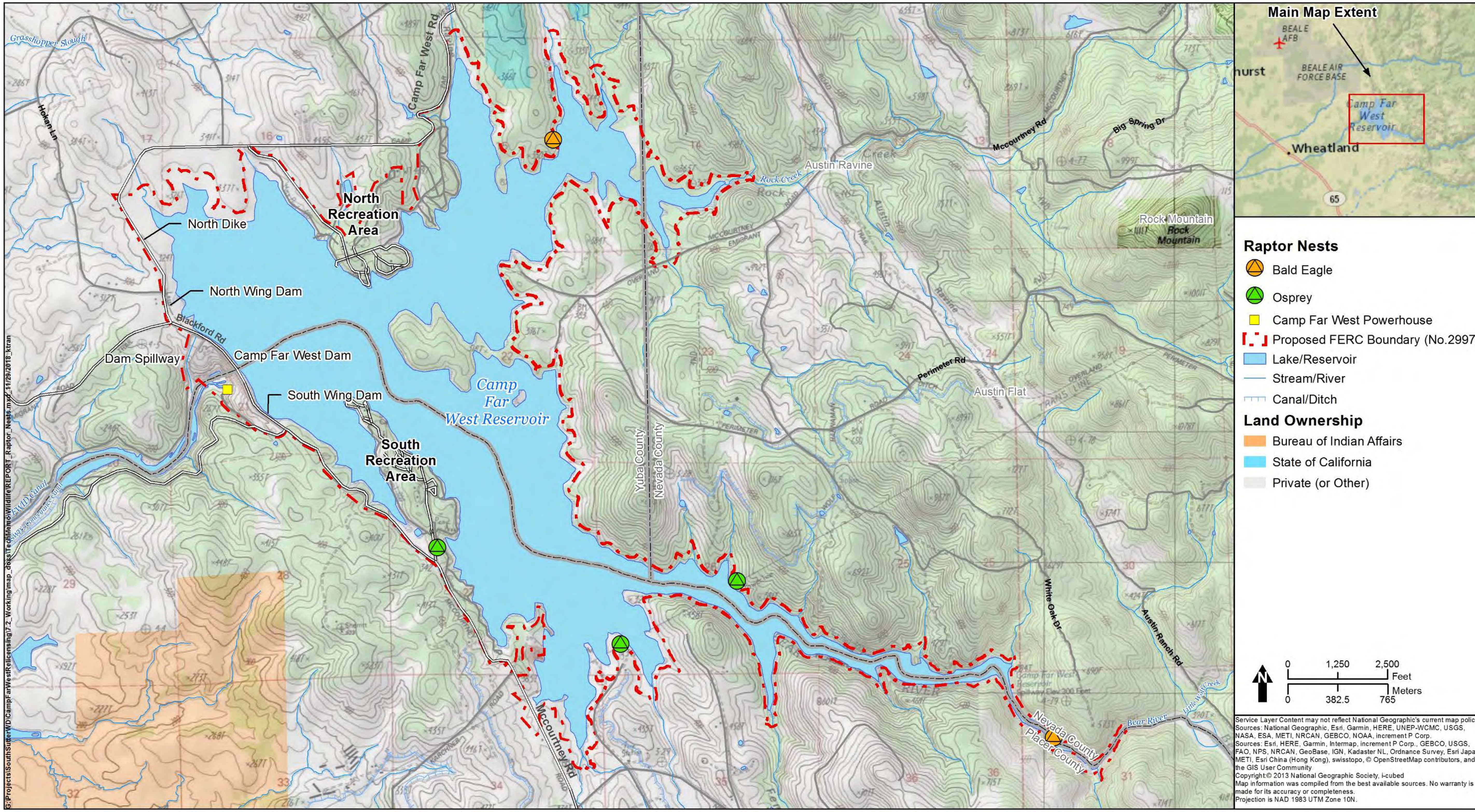

Figure 3.3.4-3. Active bald eagle nests and osprey nests found within the proposed Project Boundary.

3.3.4.2.4 Commercially-Valuable Wildlife Species

One amphibian, 34 birds, and 21 mammal species that have been designated as commercially valuable by the CDFW have the potential to occur within the proposed FERC Project Boundary (CDFW 2018b). Table 3.3.4-8 lists these species and includes temporal and spatial information and descriptions of suitable habitat used by each of the species. CWHR system habitat types listed in Table 3.3.4-4 were used to obtain temporal and spatial information for each species (CDFW 2018b). Descriptions of suitable habitat types were synthesized from species accounts found online at NatureServe (2017) and the CDFW's CWHR life history database (CDFW 2015b).

Table 3.3.4-8. Commercially-valuable wildlife species occurring or potentially occurring in the Camp Far West Hydroelectric proposed Project Boundary.

Common Name/ Scientific Name	Suitable Habitat Type	Temporal and Spatial Distribution[1]	Known From Project
AMPHIBIANS			
American bullfrog (*Lithobates catesbeianus*)	Ponds, swamps, lakes, reservoirs, marshes, brackish ponds. May disperse from water in wet weather and sometimes are found in temporary waters hundreds of meters from permanent water. Non-native.	Yearlong: AGS, BOP, BOW, LAC, MCH, MHW, URB	Located at multiple places on the Project.
BIRDS			
Chukar *(Alectoris chukar)*	Rocky hillsides, mountain slopes with grassy vegetation, open and flat desert with sparse grasses, and barren plateaus. Non-native.	Yearlong: AGS	Potentially occur within suitable habitat.
Wood duck *(Aix sponsa)*	Inland waters near woodlands such as swamps and marshes.	Yearlong: BOP, BOW, LAC, MHW, URB	Potentially occur within suitable habitat.
Northern pintail *(Anas acuta)*	Lakes, rivers, marshes and ponds in grasslands, barrens, dry tundra, open boreal forest, or cultivated fields. Most breeding associated with seasonal and semi-permanent wetlands.	Yearlong: AGS, LAC, URB Winter- LAC	Potentially occur within suitable habitat.
American wigeon *(Anas americana)*	Open water on lakes, ponds, reservoirs and backwaters.	Yearlong: AGS, LAC, URB	Potentially occur within suitable habitat.
Northern shoveler *(Anas clypeata)*	Open water on lakes, ponds and reservoirs.	Yearlong: AGS, LAC	Potentially occur within suitable habitat.
Green-winged teal *(Anas crecca)*	Open water on lakes, ponds, reservoirs and in marshes.	Yearlong: AGS Winter- LAC, URB	Potentially occur within suitable habitat.
Cinnamon teal *(Anas cyanoptera)*	Shallow open water on lakes, ponds, reservoirs and in marshes.	Yearlong: AGS, LAC	Potentially occur within suitable habitat.
Blue-winged teal *(Anas discors)*	Open water on lakes, ponds, reservoirs and in marshes.	Summer: AGS Yearlong- LAC	Potentially occur within suitable habitat.
Eurasian wigeon *(Anas penelope)*	Winters primarily in freshwater (marshes, lakes) and brackish situations in coastal areas, but migrates extensively through inland regions; occurs in shallow water and fields and meadows.	Winter: AGS, LAC, URB	Potentially occur within suitable habitat.
Mallard *(Anas platyrhynchos)*	Primarily shallow waters such as ponds, lakes, marshes, and flooded fields.	Yearlong: AGS, LAC, URB	Observed on Camp Far West Reservoir.
Gadwall *(Anas strepera)*	Open water on lakes, ponds, reservoirs and backwaters.	Yearlong: AGS, LAC	Potentially occur within suitable habitat.
Greater white-fronted goose[2] *(Anser albifrons)*	Wetlands, grain fields, grassy fields, marshes, lakes and ponds. Breeds on arctic tundra on edge of marshes, lakes, sloughs, rivers.	Winter: AGS, LAC	Observed on Camp Far West Reservoir.
Lesser scaup *(Aythya affinis)*	Open water on lakes, ponds and reservoirs.	Summer: AGS Yearlong: LAC	Potentially occur within suitable habitat.
Redhead[3] *(Aythya americana)*	Open water on lakes, ponds and reservoirs.	Winter: LAC	Potentially occur within suitable habitat.
Ring-necked duck *(Aythya collaris)*	Open water on lakes, ponds, and reservoirs.	Yearlong: LAC	Potentially occur within suitable habitat.
Greater scaup *(Aythya marila)*	Open water and on emergent wetlands. Breeds primarily in tundra and northern borders of the taiga.	Winter: LAC	Potentially occur within suitable habitat.

Table 3.3.4-8. (continued)

Common Name/ Scientific Name	Suitable Habitat Type	Temporal and Spatial Distribution[1]	Occurrence in Project Area
BIRDS (cont.)			
Canvasback *(Aythya valisineria)*	Open water on lakes, ponds, reservoirs, and marshes.	Winter: LAC	Potentially occur within suitable habitat.
Canada goose *(Branta canadensis)*	Overhead while migrating, marshes with tall grass and sedges near water.	Yearlong: AGS, LAC, URB	Observed on Camp Far West Reservoir.
Bufflehead *(Bucephala albeola)*	Lakes, ponds, rivers and seacoasts. Breeds in tree cavities in mixed coniferous-deciduous woodland near lakes and ponds.	Yearlong: LAC	Potentially occur within suitable habitat.
Common goldeneye *(Bucephala clangula)*	Open water on lakes, ponds and reservoirs.	Winter: LAC	Potentially occur within suitable habitat.
California quail[2] *(Callipepla californica)*	Lower elevations and transition zone of mixed conifer forest between 1,200 and 7,000 ft elevation.	Yearlong: AGS, BOP, BOW, MCH, MHW, URB	Potentially occur within suitable habitat.
Snow goose *(Chen caerulescens)*	Freshwater wetlands, wet prairies and extensive sandbars, foraging in pastures, cultivated lands and flooded fields.	Winter: AGS, LAC	Observed on Camp Far West Reservoir.
Ross's goose *(Chen rossii)*	Marshy lakes, wet prairies, foraging in grassy areas, pastures and cultivated fields.	Winter: AGS, LAC	Potentially occur within suitable habitat.
Band-tailed pigeon *(Columba fasciata)*	Lower elevations and transition zone of mixed conifer forest between 1,200 and 5,500 ft elevation.	Winter: BOP, BOW, MCH Yearlong: MHW, URB	Potentially occur within suitable habitat.
American crow *(Corvus brachyrhynchos)*	Open and partly open country: agricultural lands, suburban areas, orchards, and tidal flats.	Yearlong: AGS, BOP, BOW, LAC, MHW, URB	Observed at recreation areas.
American coot *(Fulica americana)*	Open water areas, along lake shores and stream edges, and in marshes.	Winter: AGS Yearlong: LAC, URB	Observed on Camp Far West Reservoir.
Common gallinule *(Gallinula galeata)*	Freshwater marshes, canals, quiet rivers, lakes, ponds, mangroves, primarily in areas of emergent vegetation and grassy borders. Nests usually among marsh plants over water, occasionally in shrub in or near water.	Yearlong: LAC, URB	Potentially occur within suitable habitat.
Wild turkey *(Meleagris gallopavo)*	Pinyon-Juniper woodlands. Non-native.	Yearlong: AGS, BOP, BOW, MCH, MHW	Potentially occur within suitable habitat.
Hooded merganser *(Mergus cucullatus)*	Open water on lakes, ponds and reservoirs.	Winter: LAC, URB	Potentially occur within suitable habitat.
Common merganser *(Mergus merganser)*	Open water on lakes, ponds and reservoirs.	Yearlong: LAC Winter: URB	Potentially occur within suitable habitat.
Red-breasted merganser *(Mergus serrator)*	Open water on lakes, ponds and reservoirs.	Winter: LAC	Potentially occur within suitable habitat.
Ruddy duck *(Oxyura jamaicensis)*	Open water on lakes, ponds, reservoirs and Marshes.	Yearlong: LAC	Potentially occur within suitable habitat.
Ring-necked pheasant *(Phasianus colchicus)*	Open country (especially cultivated areas, scrubby wastes, open woodland and edges of woods), grassy steppe, desert oases, riverside thickets, swamps and open mountain forest. Non-native.	Yearlong: AGS, BOP, MCH, URB	Potentially occur within suitable habitat.
Mourning dove *(Zenaida macroura)*	Lower elevations and transition zone of mixed conifer forest between 1,200 and 5,500 ft elevation.	Yearlong: AGS, BOP, BOW, MCH, MHW, URB	Observed at recreation areas.

Table 3.3.4-8. (continued)

Common Name/ Scientific Name	Suitable Habitat Type	Temporal and Spatial Distribution[1]	Occurrence in Project Area
MAMMALS			
Coyote *(Canis latrans)*	Wide range of habitats in its extensive range, from open prairies of the west to the heavily forested areas of the Northeast; sometimes found in cities.	Yearlong: AGS, BAR, BOP, BOW, MCH, MHW, URB	Potentially occur within suitable habitat.
American beaver *(Castor canadensis)*	Readily occupy artificial ponds, reservoirs, and canals, if food is available.	Yearlong: AGS, BOW, LAC	Potentially occur within suitable habitat.
Virginia opossum *(Didelphis virginiana)*	Very adaptable; may be found in most habitats. Prefers wooded riparian habitats. Also in suburban areas. Abandoned burrows, buildings, hollow logs, and tree cavities are generally used for den sites.	Yearlong: AGS, BOP, BOW, MCH, MHW, URB	Potentially occur within suitable habitat.
Bobcat *(Felis rufus)*	Various habitats including deciduous-coniferous woodlands and forest edge, hardwood forests, swamps, forested river bottomlands, brushlands, deserts, mountains, and other areas with thick undergrowth.	Yearlong: AGS, BOP, BOW, MCH, MHW	Potentially occur within suitable habitat.
Black-tailed jackrabbit[3] *(Lepus californicus)*	Open plains, fields, and deserts; open country with scattered thickets or patches of shrubs.	Yearlong: AGS, BOP, BOW, MCH, MHW, URB	Potentially occur within suitable habitat.
Striped skunk *(Mephitis mephitis)*	Semi-open country with woodland and meadows interspersed, brushy areas, bottomland woods. Frequently found in suburban areas.	Yearlong: AGS, BOP, BOW, MCH, MHW, URB	Potentially occur within suitable habitat.
Long-tailed weasel *(Mustela frenata)*	Wide variety of habitats, usually near water. Favored habitats include brushland and open woodlands, field edges, riparian grasslands, swamps, and marshes.	Yearlong: AGS, BOP, BOW, MCH, MHW, URB	Potentially occur within suitable habitat.
American mink *(Mustela vison)*	Favors forested permanent or semi-permanent wetlands with abundant cover, marshes, and riparian zones.	Yearlong: LAC	Potentially occur within suitable habitat.
Mule deer *(Odocoileus hemionus)*	Early to intermediate successional stages of most forest, woodland, and brush habitats interspersed with herbaceous openings, dense brush or tree thickets, riparian areas, and abundant edge.	Yearlong: AGS, BOP, BOW, MCH, MHW, URB	Observed at Camp Far West Reservoir.
Common muskrat *(Ondatra zibethicus)*	Fresh or brackish marshes, lakes, ponds, swamps, and other bodies of slow-moving water. Rare or absent in artificial impoundments with fluctuating water levels.	Yearlong: LAC	Potentially occur within suitable habitat.
Raccoon *(Procyon lotor)*	Various habitats; usually in moist situations, often along streams and shorelines.	Yearlong: AGS, BOP, BOW, LAC, MCH, MHW, URB	Potentially occur within suitable habitat.
Western gray squirrel *(Sciurus griseus)*	Dependent upon mature stands of mixed conifer and oak habitats, closely associated with oaks.	Yearlong: BOP, BOW, MCH, MHW	Potentially occur within suitable habitat.
Western spotted skunk[2] *(Spilogale gracilis)*	Brushy canyons, rocky outcrops (rimrock) on hillsides and walls of canyons. When inactive or bearing young, occupies den in rocks, burrow, hollow log, brush pile, or under building,	Yearlong: AGS, BOP, BOW, MCH, MHW, URB	Potentially occur within suitable habitat.
Audubon's cottontail *(Sylvilagus audubonii)*	Various habitats; dry uplands as well as low valleys and canyons. May inhabit open grasslands, brushlands, edges of foothill woodlands, willow thickets, sometimes in cultivated fields or under buildings.	Yearlong: AGS, BOP, BOW, MCH, URB	Potentially occur within suitable habitat.
Wild pig *(Sus scrofa)*	Densely forested mountainous terrain, brushlands, dry ridges, swamps; sometimes in fields, marshes. Often in mixed hardwood forest with permanent water source. Seasonal changes in habitat use are linked to food availability. Non-native	Yearlong: AGS, BOP, BOW, MCH, MHW	Potentially occur within suitable habitat.

Table 3.3.4-8. (continued)

Common Name/ Scientific Name	Suitable Habitat Type	Temporal and Spatial Distribution[3]	Occurrence in Project Area
MAMMALS (cont.)			
Brush rabbit[2] *(Sylvilagus bachmani)*	Dense scrub and brushy edges of habitats, chaparral, and cactus. Also brushy areas on sand dunes and in bramble thickets. Usually near dense vegetative cover. Seldom uses burrows.	Yearlong: AGS, BOP, BOW, MCH, MHW	Potentially occur within suitable habitat.
Douglas' squirrel *(Tamiasciurus douglasii)*	Coniferous forests, in upper pine belt and in fir, spruce, and hemlock forests.	Yearlong: MHW	Potentially occur within suitable habitat.
American badger[3] *(Taxidea taxus)*	Prefers open areas and may also frequent brushlands with little groundcover. When inactive, occupies underground burrow.	Yearlong: AGS, BAR, BOP, BOW, MCH, MHW	Potentially occur within suitable habitat.
Gray fox *(Urocyon cinereoargenteus)*	Often found in woodland and shrubland in rough, broken country.	Yearlong: AGS, BOP, BOW, MCH, MHW, URB	Potentially occur within suitable habitat.
Black bear *(Ursus americanus)*	Occur in fairly dense, mature stands of many forest habitats mostly above 3,000 ft elevation, and feed in a variety of habitats including brushy stands of forest, valley foothill riparian and wet meadows.	Yearlong: AGS, BOP, MCH, MHW Summer: LAC	Potentially occur within suitable habitat.
Red fox[2] *(Vulpes vulpes)*	Various open and semi-open habitats. Usually avoids dense forest, although open woodlands frequently are used.	Yearlong: AGS, BAR, MCH	Potentially occur within suitable habitat.
Total	**56**		

Sources: CDFW 2015b; NatureServe 2017

[1] CWHR Habitat Types:
- AGS = Annual Grass
- BAR = Barren
- BOP = Blue Oak Foothill Pine
- BOW = Blue Oak Woodland
- LAC = Agriculture Ponds, Water Features, General Water (i.e., lakes, ponds, reservoirs, diversion impoundments)
- MCH = Mixed Chaparral
- MHW = Montane Hardwood
- URB = Urban

[2] Subspecies designated as special-status

[3] Species designated as special-status

Of the commercially-valuable (i.e., harvestable) species that are known to occur or have the potential to occur in the proposed Project Boundary, eight are also designated as special-status wildlife species (Table 3.3.4-8). According to the CDFW (2015b), the special-status designation of six of those species is assigned to subspecies, and they are unlikely to occur within the proposed Project Boundary, as the Project is outside the subspecies' range. These subspecies include: tule greater white-fronted goose (*Anser albifrons elgasi*) (SSC); Catalina California quail (*Callipepla californica catalinensis*) (SSC); San Diego black-tailed jackrabbit (*Lepus californicus bennettii*) (SSC); Sierra Nevada red fox (*Vulpes necator*) (ST); Channel Islands spotted skunk (*Spilogale gracilis amphiala*) (SSC); and riparian brush rabbit (*Sylvilagus bachmani riparius*) (FE and SE). The two remaining commercially-valuable species that have also been given a special-status designation are redhead (*Aythya americana*) (SSC) and American badger (*Taxidea taxus*) (SSC) (CDFW 2015b), which have the potential to occur within the Project Area.

SSWD does not allow hunting within the proposed Project Boundary.

Mule Deer

California mule (*Odocoileus hemionus californicus*) and black-tailed deer (*Odocoileus hemionus columbianus*) are among the most visible and widespread species found in most habitats throughout California. Deer are California's most popular game mammal, with most hunting opportunities occurring on public lands (CDFG 1998). Deer are free-ranging animals whose habitat requirements can result in conflicts with humans. Deer are an integral component in the food chain from their role as grazers to prey species to California's top carnivores. Deer inhabit about 70 percent of California's wildlands in a variety of habitats (CDFW 2015c). Approximately 50 percent of the deer range is public land administered by the federal government and 45 percent of the range is privately-owned (CDFG 1998). The deer population in California has fallen in the years between 1991 and 2014 from approximately 850,000 to approximately 450,000 (CDFW 2015c).

The deer living in the Project Area were classified as part of the Camp Beale Herd in 1952 and included in the 1983 Mother Lode Deer Herd Management Plan (CDFG 1983). Both subspecies inhabit and are considered residents in the area and do not migrate like other herds in California. The Mother Lode Deer Herd occupies approximately 3,660 sq mi over an elevation range from sea level to 3,000 ft in the foothills of the Sierra Nevada.

In the past forty years, CDFW has developed and updated deer management strategies in California. In 1976, CDFG developed *A Plan for California Deer* (CDFG 1976). The primary goal of the plan was to restore deer populations to the record high numbers of the 1960s, and the plan included habitat and management goals for deer populations by herd units. In the plan, 79 deer herd plans were identified with separate management objectives for each herd and plans were completed and implemented by the mid-1980s. The herd units were based primarily on administrative boundaries (e.g., county lines, regional boundaries, and roads), deer behavior (i.e., migratory or resident), and subspecies (i.e., mule deer or black-tailed deer) (CDFW 2015c). The Mother Lode Deer Herd Management Plan, one of the 79 separate plans, was completed in July 1983.

At the end of a meeting in January 1997 and at the request of the California Fish and Game Commission, CDFG, the Forest Service, and the USDOI, Bureau of Land Management concluded with a collective recommendation that an overall assessment of deer populations and deer habitat conditions was needed to help identify key problems on an area-by-area basis. In 1998, CDFG combined the 45 hunt zones in California into 11 Deer Assessment Units based on similarities in habitat and environmental and ecological factors rather than the artificial boundaries of the hunt zones. The Central Sierra Deer Assessment Units covers the area of the Project and includes about 10,500 sq mi from the Feather River drainage south to Yosemite National Park. The reported deer herd in the area in 1998 was between 50,000 to 90,000 (CDFG 1998).

In March of 2015, the California Deer Conservation and Management Plan was developed by the CDFW. To determine how changing conditions may be impacting deer, the CDFW planned to assess habitat conditions and populations based on population data and current habitat assessments. A goal of the 2015 California Deer Conservation and Management Plan is to develop Deer Conservation Units (DCU) by taking a landscape level approach to deer planning categorizing California deer herd units into 10 DCUs. The Project is located on the boundary of the Sierra Nevada and Central Valley DCUs. The development of the Sierra Nevada DCU was scheduled for November 2015 and implementation for March 2016. The development of the Central Valley DCU was in March 2016 and was to be implemented in July 2016, but there is no updated information about this plan (CDFW 2015c).

3.3.4.3 Wetlands, Riparian, and Littoral Habitats of the Project Area

USFWS' National Wetlands Inventory (NWI) maps (USFWS 2018b) show the distribution, extent, and types of Palustrine and Riverine wetlands, and Lacustrine littoral zones within the FERC Project Boundary and downstream. However, NWI maps are based on aerial imagery and are typically not verified by ground surveys. A jurisdictional delineation was performed by Sycamore and Associates in 2013 (Sycamore Associates 2013b) in the proposed five foot raise around the reservoir south east edge. Information from these field efforts is discussed below.

Figure 3.3.4-4, contains a map showing NWI-mapped wetlands, riparian, and littoral habitats within the proposed Project Boundary.

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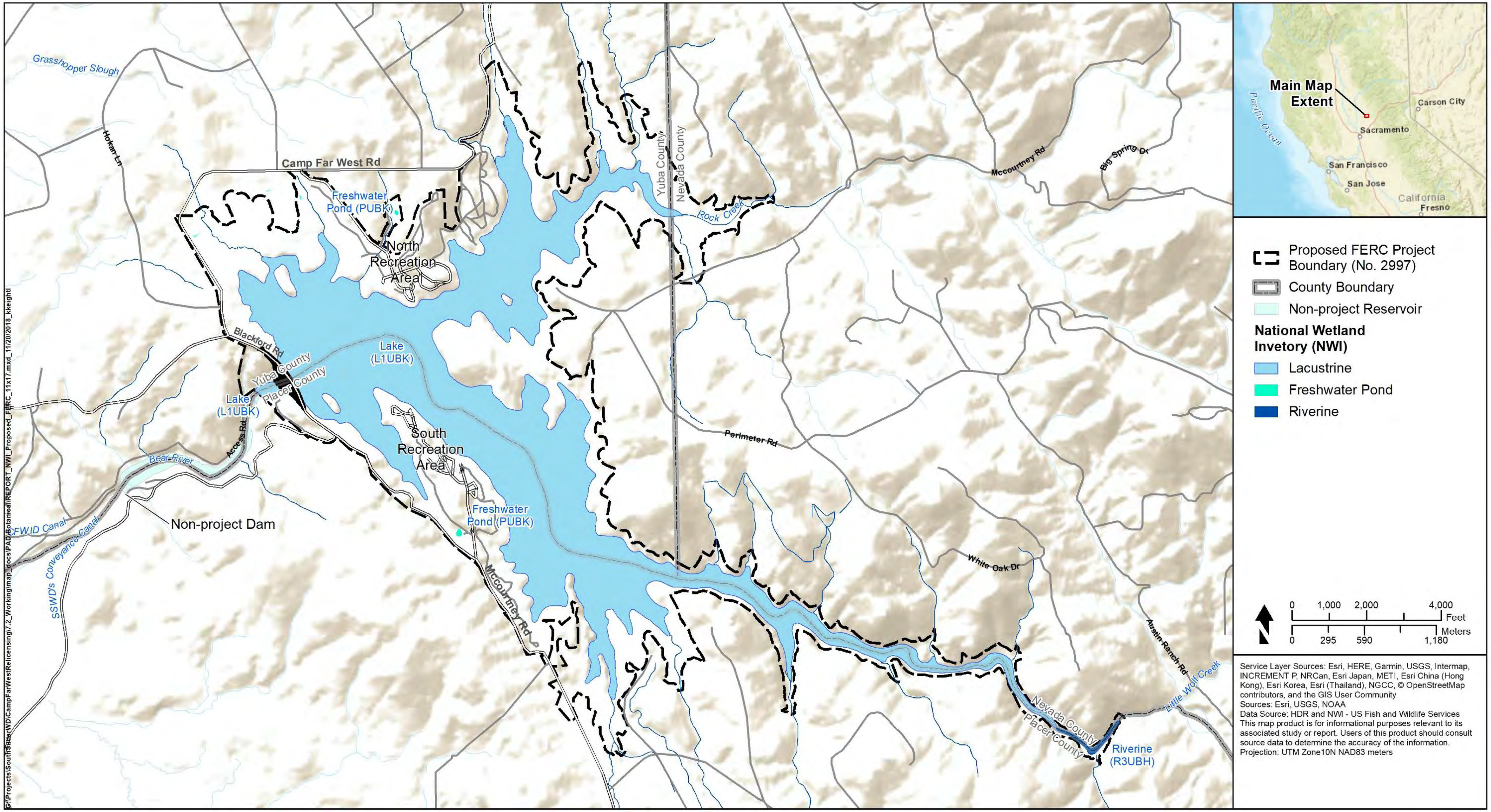

Figure 3.3.4-4. NWI-mapped wetlands, riparian, and littoral habitats within the proposed Camp Far West Hydroelectric Project Boundary.

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3.3.4.3.1 Wetlands

Wetlands are transitional lands that occur between uplands and aquatic systems. However, wetlands also may include certain shallow aquatic areas and are more accurately defined according to the following attributes (Cowardin et al. 1979):

- at least periodically, the land supports predominantly hydrophytes (i.e., vegetation associated with moist soil conditions);
- the substrate is predominantly un-drained hydric soil (i.e., soil characterized by anaerobic conditions); and
- the substrate is non-soil (i.e., boulder, bedrock or similar substrate) and is saturated with water or covered by shallow water at some time during the growing season of each year.

Areas of deep, permanent water are not included under the definition of wetland. Ponds, swamps, marshes, bogs, springs, fens, and wet meadows are examples of wetlands.

All wetlands discussed in this section are categorized as Palustrine, Riverine, or Lacustrine by Cowardin et al. (1979). Eight major classes of Palustrine wetlands have been described, and one of these is found within the proposed Project Boundary (Figure 3.3.4-4). Additionally, seven major classes of Riverine wetlands have been described, and one of these is found within the proposed Project Boundary. Nine classes of Lacustrine wetlands have been described, and one of these occurs within the proposed FERC Project Boundary.

The three NWI wetland classes that may be found in the proposed Project Boundary are listed in Table 3.3.4-9. This table also provides the total linear ft of the three NWI-mapped wetland classes within the proposed Project Boundary. Following Table 3.3.4-9, more detailed descriptions of the three defined NWI wetland classes are provided, including their known occurrence within the proposed Project Boundary, based on mapping of wetland types by NWI.

Table 3.3.4-9. NWI palustrine, riverine, and lacustrine wetland classes within the proposed Camp Far West proposed FERC Project Boundary.

Type	Definition	Acres
RIVERINE UNCONSOLIDATED BOTTOM		
R3UBH	Riverine upper perennial, unconsolidated bottom, permanently flooded	69.56
PALUSTRINE UNCONSOLIDATED BOTTOM		
PUBK	Palustrine, unconsolidated bottom, artificially flooded	0.79
LACUSTRINE UNCONSOLIDATED BOTTOM		
L1UBK	Lacustrine limnetic, unconsolidated bottom, artificially flooded	1,202.4
Totals	--	**1,272.75**

Source: USFWS 2018b

Riverine Unconsolidated Bottom (RUB)

Riverine unconsolidated bottom wetlands are characterized by 25 percent or more exposed sand, gravel, or small stones, and 30 percent or less vegetative cover contained within an open conduit either naturally or artificially created which periodically or continuously contains moving water (Cowardin et al. 1979). NWI mapped RUB wetlands cover approximately 69.56 ac within the proposed Project Boundary (Table 3.3.4-9), and occurs at one location: on the southern tip of Camp Far West Reservoir just north of Little Wolf Creek (Figure 3.3.4-4).

Palustrine Unconsolidated Bottom (PUB)

Palustrine unconsolidated bottom wetlands are characterized by 25 percent or more exposed sand, gravel, or small stones, and 30 percent or less vegetative cover in nontidal wetlands dominated by trees, shrubs, and persistent emergents (Cowardin et al. 1979). NWI mapped PUB wetlands cover approximately 0.79 ac within the proposed Project Boundary (Table 3.3.4-9), and occurs at two locations: one occurrence is roughly centered between Camp Far West Road and the NSRA, the second occurrence is settled between McCourtney Road and west of the turnoff for the SSRA (Figure 3.3.4-14).

Lacustrine Unconsolidated Bottom (LUB)

Lacustrine unconsolidated bottom wetlands are characterized by 25 percent or more exposed sand, gravel, or small stones, and 30 percent or less vegetative cover in permanently flooded lakes and reservoirs (Cowardin et al. 1979). NWI mapped Lacustrine wetlands cover approximately 1,202.4 ac within the proposed Project Boundary (Table 3.3.4-9), and occurs at two locations: one small area downstream of the Camp Far West Dam and Camp Far West Reservoir (Figure 3.3.4-14).

3.3.4.3.2 Additional Information for Wetlands

<u>2013 Wetland Delineation</u>

A formal Army Corps of Engineers' wetland delineation was performed for the entirety of the Camp Far West Reservoir in 2013, which identified 5 seasonal wetlands (0.077-ac), 10 seasonal wetland swales (0.22-ac), 9 seeps (0.457-ac), 11 emergent wetlands (1.018 ac), 6 irrigated wetlands (1.484 ac) and 1 scrub-shrub wetland (0.236-ac). None of the identified wetlands were determined to be caused by or receiving water from the reservoir or any other Project-related sources (Sycamore Associates 2013b).

The seasonal wetlands were scattered around the margin of the reservoir, but their water was provided by runoff during the rainy season. Three of the wetlands were in ditches related to ground disturbance. Plant species located in the seasonal wetlands included dallisgrass (*Paspalum dilatatum*), dock (*Rumex* spp.), Italian ryegrass (*Festuca perennis*), and English plantain (*Plantago lanceolata*), all non-native species. There were hydric soils present (Sycamore Associates 2013b).

The ten seasonal swales were also scattered around the reservoir margin and derived their water from surface runoff. The most common plant species in the swales included spiny-fruit buttercup (*Ranunculus muricatus*), common toad rush (*Juncus bufonius*), Italian ryegrass, whitetip clover (*Trifolium variegatum*), beardstyle (*Pogogyne* spp.), water chickweed (*Montia fontana*), and Buenos Aires buttercup (*Ranunculus bonariensis* var. *trisepalus*). Hydric soils were located at the swale sites (Sycamore Associates 2013b).

The nine seeps were all groundwater-dependent and scattered around the reservoir margins. They were dominated by perennial rushes (*Juncus* spp.) and pennyroyal (*Mentha pulegium*), as well as annuals such as seep-spring monkeyflower and Italian ryegrass. Hydric soils were also present (Sycamore Associates 2013b).

The eleven emergent wetlands on the reservoir margin are influenced by groundwater and dry season hydrology inputs, with some surface water dependency. Sedges (*Carex* spp.), longstem spikerush (*Eleocharis macrostachya*), small mannagrass (*Glyceria declinata*), rushes, and pennyroyal were the most common vegetation at these sites. Indicators for hydric soils were located at the emergent wetlands (Sycamore Associates 2013b).

All of the irrigated wetlands receive water from non-Project sources, including the Wolf Hannaman Ditch, rural residence and livestock pastures and a Nevada Irrigation District ditch. These areas would not be wetlands without the presence of water from man-made irrigation (Sycamore Associates 2013b).

Finally, the scrub-shrub wetland is located near Lakeview Lane on the southernmost arm of the Camp Far West Reservoir. Willows (*Salix* spp.) and Himalayan blackberry (*Rubus armeniacus*) makeup the majority of the vegetation. Water may be provided by a retention pond just uphill of the site (Sycamore Associates 2013b).

<u>2018 Aquatic Resources Delineation</u>
An aquatic resources delineation was performed for the north western portion of the existing FERC Project Boundary in 2018 for the Spillway Modification. (South Sutter District 2018). A total of 83 aquatic features, comprising 4.40 ac (3.35 ac are inside the proposed Project Boundary), were detected during the delineation and are itemized in Table 3.3.4-10 below.

Table 3.3.4-10. Aquatic resources located during 2018 delineation.

Feature Class	Number of Features	Acreage
Ephemeral channel	1	0.02
Intermittent channel	1	0.09
Reservoir	5	0.80
Seasonal swale	19	0.37
Seasonal wetland	2	0.09
Seep	22	0.93
Spillway	1	1.15
Vernal pool	32	0.95
Total	**83**	**4.40**

The location of these features, and the associated survey area, within the proposed Project Boundary is depicted on Figure 3.3.4-5.

Each of these features is described in detail below.

Figure 3.3.4-5. Aquatic resources located during 2018 delineation.

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Ephemeral Channel

Ephemeral features have flowing water for only a short duration after precipitation in a normal year. The beds of ephemeral streams are located above the water table year round; therefore, groundwater is not a source of water for these features, and runoff from rainfall and snowmelt are the primary water sources. Given the short hydroperiod, the vegetation within the ephemeral channel in the survey area is characteristic of the surrounding grasslands. The ephemeral channel is a mix of scoured, unvegetated channel segments and segments characterized by herbaceous vegetation similar to the surrounding grasslands. There were 0.02-ac located during aquatic resources delineation, including 0.001-ac in the proposed Project Boundary.

Intermittent Channel

Intermittent channels have flowing water during portions of the year when groundwater provides water for stream flow. Runoff from rainfall is a supplemental source of water for stream flows. During the dry months, these features typically do not have flowing water. The intermittent channel in the survey area is fed by a mix of an upstream, off-site impoundment and on-site seeps (groundwater). Like the ephemeral channel, some portions of the intermittent channel are scoured bare by water movement. Other portions of the channel support herbaceous vegetation such as seaside barley (*Hordeum marinum*), Carter's buttercup (*Ranunculus bonariensis*), and coyote thistle (*Eryngium* sp.). There were 0.09-ac located during aquatic resources delineation, including 0.056-ac in the proposed Project Boundary.

Reservoir

Reservoir habitat in the survey area includes Camp Far West Reservoir, which is a wide and shallow man-made storage reservoir that is impounded by Camp Far West dam. At the time of surveys, the reservoir elevation was at full pool and was spilling. Camp Far West Reservoir's shoreline is predominantly bare soil or rock. Sparse willows and cottonwoods are scattered along the shoreline, while the groundcover consists of invasive weeds consistent with species found in annual grasslands. There were 0.80-ac located during aquatic resources delineation, all inside the proposed Project Boundary.

Seasonal Swale

Seasonal swales in the survey area are defined as linear drainage features that fall somewhere between ephemeral channel and wetland. These linear features support hydrophytic vegetation similar to that found in vernal pools and seep features in the survey area. Most of the swales are adjacent to and associated with the drainage of other aquatic features in the survey area. There were 0.37-ac located during aquatic resources delineation, including 0.183-ac inside the proposed Project Boundary.

Seasonal Wetland

Seasonal wetlands in the survey area are features located adjacent to linear channels or the reservoir, and function as a floodplain. Hydrologically, seasonal wetlands in the survey area differ from vernal pools and seeps (described below) because seasonal wetlands are dependent on adjacent features. Vegetatively, seasonal wetlands are similar to other wetland features, with the exception of the wetland bordering the northern portion of the reservoir, which is covered in a dense layer of woody debris and does not support plant cover. There were 0.09-ac located during aquatic resources delineation, including 0.088-ac inside the proposed Project Boundary.

Seep

Seeps differ from vernal pools in the survey area by having different topography, water source, and vegetation. For example, seeps in the survey area are located on slopes and are not depressional like vernal pools. Because of this, the hydrology of seeps is not driven by surface water flow from rainwater. Instead, the seeps are fed solely by groundwater. Plant species associated with seeps are slightly different from vernal pools and include rush (*Juncus* spp.), spike rush (*Eleocharis macrostachya*), rabbit's-foot grass (*Polypogon monspeliensis*), seep monkey flower (*Mimulus guttatus*), dallis grass (*Paspalum dilatatum*), and dock (*Rumex* spp.). There were 0.93-ac located during aquatic resources delineation, including 0.486-ac inside the proposed Project Boundary.

Spillway

This feature is characterized by the rock spillway associated with the existing dam. The area is devoid of vegetation, has sheer rock slopes on either side, and experiences perennial flows contingent on the release volumes from the reservoir. There were 1.144 ac located during aquatic resources delineation, all inside the proposed Project Boundary.

Vernal Pool

Vernal pools are areas that are ephemerally wet as a result of the accumulation of surface water flow from rainwater in depressional areas. Several vernal pools are scattered throughout the grassland portions of the survey area, as well as along the edges of roads and the reservoir. These features are dominated by low-growing hydrophytic vegetation and seasonal hydrology. Species observed during surveys include seaside barley, annual hairgrass (*Deschampsia danthonioides*), Italian ryegrass, spike rush, Carter's buttercup, watercress (*Nasturtium officianale*), coyote thistle, and fiddle dock (*Rumex pulcher*). There were 0.95-ac located during aquatic resources delineation, including 0.590-ac inside the proposed Project Boundary. Discussion of ESA-listed species that live in vernal pools is included in Section 3.3.5.

3.3.4.3.3 Wetlands Downstream of Camp Far West Dam

The NWI identified the following 12 wetland classes on the Bear River downstream of Camp Far West Reservoir to the confluence of the Feather River: L1UBK, PUBK, PABFx, PEM1A, PFOA, PFO1A, PSS1A, PSS/EM1C, R2UBH, R5UBF, R2USA, and R2USC (USFWS 2018b). Two of these wetland classes (L1UBK and PUBK) were also found within the proposed FERC Project Boundary. Table 3.3.4-11 includes a definition of each additional class of wetland found along the Bear River.

Table 3.3.4-11. NWI palustrine, riverine, and lacustrine wetland classes found along the Bear River from Camp Far West Dam to the Feather River.

Type	Definition
CAMP FAR WEST TO NON-PROJECT DIVERSION DAM	
Lacustrine Unconsolidated Bottom	
L1UBK	Lacustrine limnetic, unconsolidated bottom, artificially flooded
Palustrine Unconsolidated Bottom	
PUBK	Palustrine, unconsolidated bottom, artificially flooded
NON-PROJECT DIVERSION DAM TO FEATHER RIVER	
Lacustrine Unconsolidated Bottom	
L1UBK	Lacustrine limnetic, unconsolidated bottom, artificially flooded
Palustrine Aquatic Bed	
PABFx	Palustrine, aquatic bed, semi-permanently flooded
Palustrine Emergent	
PEM1A	Palustrine, emergent, persistent, temporary flooded
Palustrine Forested	
PFOA	Palustrine, forested, temporary flooded
PFO1A	Palustrine, broad-leafed deciduous forested, temporary flooded
Palustrine Scrub-Shrub	
PSS1A	Palustrine, scrub-shrub, broad-leafed deciduous, temporary flooded
PSS/EM1C	Palustrine, scrub-shrub, emergent, persistent, seasonally flooded
Palustrine Unconsolidated Bottom	
PUBK	Palustrine, unconsolidated bottom, artificially flooded
Riverine Unconsolidated Bottom	
R2UBH	Riverine, lower perennial, unconsolidated bottom, permanently flooded
R5UBF	Riverine, unknown perennial, unconsolidated bottom, semi-permanently flooded
Riverine Unconsolidated Shore	
R2USA	Riverine, lower perennial, unconsolidated shore, temporary flooded
R2USC	Riverine, lower perennial, unconsolidated shore, seasonally flooded

Source: USFWS 2018b

3.3.4.3.4 Riparian Habitat Within the Camp Far West Reservoir

The term "riparian" applies to the vegetation and other biological resources "*…contiguous to and affected by surface and subsurface hydrologic features of perennial or intermittent lotic [rivers, streams, or drainage ways] and lentic [lakes] water bodies...*" (USFWS 1997). Although the term has traditionally been applied only to lotic systems, in the western U.S. "riparian" is also used to describe the distinctive vegetation associated with the moister conditions around lentic reservoirs. Wetlands and riparian areas may overlap (e.g., riparian wetlands), but not all riparian areas are wetlands and not all wetlands are riparian areas.

No riparian habitat was identified in the proposed FERC Project Boundary in the NWI (USFWS 2018b). A 2013 wetland delineation of Camp Far West identified riparian vegetation only on Rock Creek, upstream of the reservoir, where it would not be affected by water fluctuations. Vegetation in that area included white alder, California button willow (*Cephalanthus occidentalis*), Himalayan blackberry, and torrent sedge (*Carex nudata*). The area of the Bear River was specifically noted as having little to no riparian vegetation (Sycamore Associates 2013b).

3.3.4.3.5 Riparian Habitat Below Camp Far West Reservoir

As part of the instream flow study (Study 3.3 *Instream Flow Study*), HDR biologists created a riparian vegetation map in April 2018 at the two study sites that were selected along the lower Bear River (Figures 3.3.4-6 and 3.3.4-7). The limits of the mapping were set to approximately 50 ft outside of the instream flow markers and between the levee banks. For the purposes of this section, this creates a western and an eastern vegetation study area.

Vegetation was mapped in the field on an aerial photograph at a scale of 1 in. equals 250 ft (1″=250′). Where vegetation overlaps another type of mapping unit (e.g., a tree canopy over water or roads), the area was mapped according to the uppermost layer of vegetation. A minimum mapping unit of 0.01-ac was used when differentiating vegetation types. For each vegetation type observed in the field, species composition and percent cover were recorded on vegetation mapping data forms. Nomenclature of vegetation types generally followed that of the Manual of California Vegetation (Manual) (Sawyer et al. 2009). When a vegetation type was recorded that did not easily conform to a described vegetation type, a new name was created conforming to the general format of the Manual.

The vegetation mapping represents a snapshot of the riparian vegetation at two sites along the Bear River. Table 3.3.4-12 depicts the vegetation types mapped, whether they are dominated by native or non-native vegetation, and whether or not it is a riparian vegetation type.

Table 3.3.4-12. Vegetation types, origin, and riparian status in the Vegetation Study Area.

Vegetation Type	Vegetation Origin	Riparian Status
Agriculture	Non-Native	Not Riparian
Annual Brome Grasslands	Non-Native	Not Riparian
Arroyo Willow Thicket/Himalayan Blackberry Thicket	Native	Riparian
Bare Ground	N/A	Sometimes Riparian
Bermudagrass Thicket	Non-Native	Sometimes Riparian
Cobble Plain	N/A	Sometimes Riparian
Disturbed Coyote Bush Scrub	Native	Not Riparian
Disturbed Deer Grass Beds	Native	Riparian
Disturbed Hind's Walnut Stand	Native	Sometimes Riparian
Fremont Cottonwood-Boxelder Forest	Native	Riparian
Fremont Cottonwood Forest/Himalayan Blackberry Thicket	Native	Riparian
Giant Reed Thicket	Non-Native	Riparian
Himalayan Blackberry Thicket	Non-Native	Sometimes Riparian
Non-Native Woodland	Non-Native	Not Riparian
Open Water	N/A	Riparian
Partially Vegetated Channel	Native	Riparian
Ruderal Thicket	Non-Native	Sometimes Riparian
Sandbar Willow Thicket	Native	Riparian
Sandbar Willow Thicket (Mature Variant)	Native	Riparian
Valley Oak-Interior Live Oak Woodland	Native	Sometimes Riparian
Valley Oak-Interior Live Oak Woodland (Young Variant)	Native	Sometimes Riparian
Total	**21**	

One special-status plant species, Northern California black walnut (*Juglans hindsii*), a California Rare Plant Rank (CRPR) 1B.1 species, was observed primarily within an instream island surrounded by giant reed (*Arundo donax*) in the western vegetation study area. The walnuts were at sufficient cover to form their own vegetation type, called Disturbed Hind's Walnut Stand per the nomenclature of the Manual (Figures 3.3.4-6 and 3.3.4-7). The total number of individuals observed in this area was six. Approximately 10 to 15 additional Northern California black walnuts were observed mixed within the Valley Oak-Interior Live Oak Woodland on the southern bank of both vegetation study areas. No other special status plant species were observed during the surveys. Four NNIP species were observed, including; Bermudagrass, bull thistle (*Cirsium vulgare*), Italian thistle, and yellow starthistle.

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Figure 3.3.4-6. Riparian Habitat Map (western site).

Figure 3.3.4-7. Riparian Habitat Map (eastern site).

3.3.4.3.6 Littoral Habitat

In Lacustrine or lake systems, the littoral habitat corresponds to the shallow water area beginning at the lowest depth at which rooted aquatic plants can occur, regardless of whether plants are present. Cowardin et al. (1979) describes the littoral zone as the wetland habitats which extend to a depth of 6.6 ft below the low water line. Submerged bars, beaches, and flats are examples of littoral habitats. Emergent wetlands along the shallow edges of lakes are technically littoral, but are classified in the NWI system as Palustrine.

As stated above, 11 emergent wetlands on the reservoir margin were identified during wetland delineation. These are influenced by groundwater and dry season hydrology inputs, with some surface water dependency. Sedges, creeping spikerush, small mannagrass, rushes, and pennyroyal were the most common vegetation at these sites. Indicators for hydric soils were located at the emergent wetlands (Sycamore Associates 2013b).

3.3.4.4 Environmental Effects

This section discusses the potential terrestrial resources effects of SSWD's proposed Project, as described in Section 2.2 of this Exhibit E. As part of the Project relicensing, SSWD proposes a Pool Raise, modifications of existing recreation facilities, and modification of the existing Project boundary. SSWD proposes to include in the new license one measure related to terrestrial resources. Measure TR1 would require that within 1 year of license issuance SSWD develop in consultation with CDFW and USFWS and file with FERC for approval a Bald Eagle Management Plan.

3.3.4.4.1 Effects of Construction-Related Activities

The recreation construction will occur in already developed areas and may affect wildlife by way of temporary disturbance. No habitat will be modified. The known bald eagle nesting sites are not in the construction areas. Direct effects to special-status birds could result from disturbances that disrupt breeding birds or cause nest abandonment. Indirect effects could result from the reduction of perching, foraging, and potential nesting habitat.

Many of the recreation buildings have openings that bats can access to roost, though none were observed in 2015. However, if bats are roosting in the recreation buildings, their reconstruction would impact them. SSWD's proposed Project includes implementation of a *Bat Measure* (Measure TR2) to prevent future bat roosts from being disturbed. While current Project O&M activities are not known to disturb bat roosts, the plan would include the installation of humane exclusion measures at facilities that bats can access. Exclusion measures would be installed after fall migration has occurred and before bats return. SSWD would not install exclusion measures where day or night roosts occur at campground facilities that have been selected for replacement within five years of license issuance. At these locations, SSWD would implement a facilities design that is absent of suitable roosting features (i.e., sealed concrete structures lacking cavities or overhangs that may provide refuge to bats). Prior to installing bat exclusion measures, SSWD will conduct a daytime visual assessment and nighttime emergent survey at all Project facilities where exclusion devices are needed.

3.3.4.4.2 Effects of Proposed Project Operations and Maintenance

Some 161.24 ac will be inundated by the Pool Raise, as detailed in Table 3.3.4-13.

Table 3.3.4-13. Acreages of VegCAMP habitat inundated by Pool Raise.

Vegetation Type	Sensitive Natural Community	Acres to be covered by water
Aesculus californica	Y	0.36
Built-up and Urban Disturbance	N	1.07
California Annual and Perennial Grassland	N	42.74
Californian Warm Temperate Marsh/Seep Group	Y	0.61
Irrigated Pasture Lands	N	2.70
Mediterranean California naturalized annual and perennial grassland	N	11.00
Perennial Stream Channel	N	0.06
Pinus sabiniana	N	0.62
Populus fremontii	Y	0.18
Quercus douglasii	N	60.04
Quercus lobata	Y	0.36
Quercus wislizeni	N	15.93
Reservoirs	N	24.58
Salix laevigata	Y	0.99
	Total	**161.24**

Five of the vegetation types that will be partially inundated are Sensitive Natural Communities - *Aesculus californica*, California Warm Temperate Marsh/Seep Group, *Populus fremontii*, *Quercus lobata*, and *Salix laevigata*. Of these, all but *Quercus lobata*, are riparian or wetland/marsh habitat types, which may shift uphill with the change in water level. However, the *Aesculus californica* and *Quercus lobata*'s inundated area would likely result in the permanent loss of this bit of habitat. A total of 0.36-ac of the 1.42 ac of *Aesculus californica* will be inundated, representing a loss of 25 percent of the vegetation type within the proposed Project Boundary. There are 2.99 ac of *Quercus lobata* within the proposed Project Boundary and a loss of 0.36-ac would represent 12 percent of that total. However, the loss of 0.36 ac of this VegCAMP type represents a *de minimus* amount of the overall acreage within California, so it would not be a significant effect.

The Brandegee's clarkia occurrences are above the raise and impacts to hydrology, but the Sierra foothills brodiaea will at least be seasonally inundated, potentially leading to the loss of this occurrence. The seep identified containing Mexican mosquito fern will be covered by the rising reservoir, and the occurrence may be lost as its habitat includes ponds, but not larger reservoirs or lakes. However, both of these occurrences are small and the species are rated as Watchlist, either moderately or not very threatened in California, so they will not represent a significant effect on the species. None of the special-status populations are in the recreation areas, so recreation construction will not affect special-status plants.

Some occurrences of NNIP may also be inundated and drown due to the Pool Raise, but seeds from NNIP occurrences, along with pieces from species that spread vegetatively, may also be carried to new areas of the Project shoreline by the higher waterline. Additionally, there are hundreds of NNIP occurrences in the recreation areas, and construction there could spread NNIP both on and off the Project.

Raising the normal maximum surface elevation of the Camp Far West Reservoir would have a less than significant effect on wildlife resources, since the inundation area will be relatively small (a total of 161.24 ac), and effects on habitat overall will be minimal. Minor and localized reductions in the various habitat types bordering the reservoir could occur. These changes could affect individuals, but would not be expected to reduce the capability of the remaining habitat to support wildlife over the long-term. Inundation associated with raising the reservoir elevation could cause individuals to leave the immediate area; however, similar habitats types located adjacent to the inundation area are abundant, thus these effects would be localized and would not preclude wildlife from using the Project area. Additionally, individual animals that could be displaced during inundation should continue to use habitats along the new reservoir margins.

Raising the NMWSE of the Camp Far West Reservoir by 5 ft would result in the extended inundation along the shoreline of the reservoir that are only seasonally or never inundated under current conditions. In the area being inundated, 3.3 ac support herbaceous wetland, 0.2-ac support scrub-shrub wetland, and 1.53 ac support tree dominated riparian habitat. A total of 28 NWI mapped riverine features, comprising 6.44 ac, will be converted into lacustrine features by the Pool Raise. These NWI mapped features occur throughout the proposed FERC Project Boundary in narrow riparian crevices, particularly at the south eastern corner of the proposed FERC Project Boundary (Figure 3.3.4-4).

All of the wetlands mapped in 2018 occur at the north-west corner of the proposed FERC Project Boundary directly west of the North Recreation Area (Figure 3.3.4-5). A total of 14 of these wetlands, totaling 0.19-ac, will be inundated by the Pool Raise. These features are composed of the following components: 1 intermittent channel (0.04-ac); 5 seasonal swales (0.06-ac); 2 seasonal wetlands (0.03-ac) and 6 seeps (0.06-ac).

Some of the shallower inundated areas may continue to support or develop herbaceous or scrub-shrub wetland vegetation after raising the normal maximum surface elevation of the reservoir. Fringe riparian scrub may also develop along the new waterline; therefore, any loss of wetlands and riparian habitat may be temporary. The increase in the water elevation may enable herbaceous wetland vegetation to dominate on benches that currently support upland species.
There are no wetland or riparian resources in the area of recreation construction.

SSWD will obtain all necessary permits and approvals for the proposed changes to the normal maximum surface elevation of the Camp Far West Reservoir, including FERC's approval. Adherence to the terms and conditions of these permits and approvals would provide protection and mitigation for terrestrial resources. This would include mitigation for the loss of wetlands and waters due to the Pool Raise.

SSWD routinely clears vegetation in the immediate vicinity of Project structures, including the powerhouse, recreation areas, and Project access roads. Clearing is performed by mechanical and hand means (e.g., chain saws), and occurs only in those areas needed by SSWD to maintain the structure. SSWD also applies herbicides on an annual basis at Project Facilities supervised by a Qualified Applicator with direction of a licensed PCA. SSWD does not use ground-disturbing equipment for vegetation clearing. SSWD also removes hazard trees are necessary on the Project.

SSWD restricts vegetation management to areas where it is mandated by law and/or necessary to maintain facilities. Although the majority of vegetation is cleared from these locations, the total area affected represents a small portion of the overall Project.

No Project facilities are located in or around sensitive vegetation associations; the majority of managed vegetation is comprised of common plant communities and only a small proportion of their acreage is affected. SSWD will continue the current vegetation management efforts throughout the life of the Project, however, the effects are minor (less than significant) and site-specific.

The occurrences of special-status plants are along the riverine area (Bear River arm) of the reservoir and in seeps near the reservoir edge. All are outside of areas with Project O&M, though occasional recreation may occur in the general area. However, there were no signs of disturbance at the occurrences.

Project O&M in the area of NNIP occurrences includes mowing in the recreation areas around campsites, herbicide application on the dam face, and maintenance of Project roads. The other Project activity in the areas of NNIP occurrences is recreation, which is year-round at the NSRA and seasonal at the SSRA. The Project and associated O&M can promote the spread of NNIP, and the potential for NNIP to be spread into new areas both inside and outside of the Project. NNIP can be transported during Project activities, including into non-infested areas, on equipment, tires, and clothing. Areas that have been disturbed by Project activities are also easier for NNIP to invade than undisturbed areas. However, as described above, most Project activities that have the potential to spread NNIP are confined to areas around already developed Project facilities. Currently, these effects are not significant in and of themselves, but are potentially significant when combined with other reasonably foreseeable projects or activities that overlap or are adjacent to the Project area added to the effects of other public and private projects in the Project vicinity. SSWD will utilize Best Management Practices (BMP) for Project O&M to prevent the introduction and spread of NNIP and managing the most invasive species.

Project O&M has the potential to impact special-status wildlife by way of temporary disturbance and modification of habitat. Project O&M is kept to already developed areas, including the Powerhouse, roads, and recreation areas, and the work is done by hand and small mechanical implements, which limits the amount of disturbance to special-status wildlife. If any vegetation management requires removal of vegetation during nesting bird season, SSWB will conduct surveys and erect buffers to prevent impacts to nesting birds.

Project effects on bald eagles will be reduced to less than significant on the proposed Project through the implementation of a *Bald Eagle Management Plan* (TR1). As part of the plan, SSWD will implement a Limited Operating Period (LOP) for each occupied nest and will install water and land barriers and appropriate signage around known active bald eagle nests in order to delineate a buffer for the LOP. The buffer will also serve to restrict recreation activities in the vicinity of the nests.

The wetland resources associated with the Project have developed under the current conditions and were generally found to be stable. There was no observed evidence of any ongoing adverse effects to wetland resources due to Project operations. The wetlands associated with the Camp Far West Reservoir, and the downstream reach of the Bear River below the Camp Far West Dam were found to be healthy, and appeared to be in a state of equilibrium with the existing frequency, duration, and magnitude of inundation. The species richness and diversity of all wetland types observed in the study area generally reflect natural community expectations for this area. There are neither excessive nor insufficient water levels in the Camp Far West Reservoir or the downstream reach of the Bear River below Camp Far West Dam for a duration to cause any significant impact to the structure, composition, or function of the wetland communities that have developed within the study area.

SSWD identified potential stressors, which may or may not be Project induced, to the riparian habitat in Project affected reaches as NNIPs, changes in substrates from altered sediment, changes in flow timing and duration between With- and Without-Project flows, and reduced LWM recruitment. The potential effects of NNIPs are addressed below.

Changes in substrates, due to an altered sediment supply, have the potential to significantly affect the germination and distribution of riparian species due to the capillary fringe potential associated with various substrates. Capillary fringe is a zone immediately above the water table in which water is drawn upward into soil pores by forces of adhesion and surface tension. Finely textured soils tend to have greater capillary potential than coarser sands due to a wicking action that allows plant roots to use water in the soil above the ground-water depth. Capillary action is a key factor in supporting germination, as it allows plants access to water in the soils even as the water table drops (rootfollow) (Naiman et al. 2005). Larger substrates, such as cobble, boulder and bedrock, may not provide capillary action due to a reduced attraction between the substrate particles and the water molecules (Raven et al. 2005). According to literature sources, several woody riparian species found in the Project area are adapted to fine, medium and coarse soil textures rather than larger particles, such as gravels and cobbles. Changes in fine sediment input in Project-affected reaches downstream of the Camp Far West Reservoir, changes in substrate size, and effects from historical disturbances in the Bear River downstream of the Camp Far West Dam may affect the vegetative spread of Hind’s willow, which is the dominant woody riparian species along the downstream water margin. No changes of sediment transport due to the proposed Project are expected.

Changes in flow timing and inundation duration between With- and Without-Project flows may alter the distribution or abundance of woody riparian vegetation. The magnitude and frequency, and the seasonal and inter-annual timing of flows are important determinants in composition, turnover, and ecological functioning of riparian areas. The magnitude of flow can determine where seeds are distributed laterally in the channel. Some woody riparian vegetation, such as cottonwood seedlings, must be located within the floodprone zone close enough to the channel so that roots can reach ground water or capillary fringe during the growing season but enough above the base flow level in order to avoid being scoured out during high flows. The timing of peak flows may be critical to distribute riparian seeds as they are dispersed from the parent plants, so that they may be deposited in nursery sites adequate to support germination. Riparian vegetation is strongly influenced by prolonged periods of inundation, which create anoxic soil conditions and contribute to seed germination conditions. The duration and frequency of inundation influences lateral distribution of plant species in the channel, depending on a plant's anaerobic or drought tolerance and germination adaptations.

However, the riparian habitats within the Project-affected reaches appear healthy, based on the distribution of plants in the channel, the richness and vigor of the plants, and the full suite of age classes of woody riparian vegetation (i.e., indicates that germination is continuing to occur). NNIPs are considered a potential threat to the riparian areas. There is not currently evidence of a reduced functioning of the riparian communities. The topographic sequence, or lateral stratification, in the channel is within expected parameters in Project-affected reaches, with willows and younger (shorter) trees nearer the wetted channel or accessed by lower flows. This indicates an availability of water, either through flows, groundwater availability, and/or capillary fringe which supports successful recruitment; but also indicates vegetation may be removed by peak flow events. Willows have short rooting depths, and germinating seedlings need shallow root access to water; willows and younger trees were found near the low-flow wetted edge of most Project-affected reaches. More mature (taller) trees, as well as a greater abundance of cottonwoods, were observed in areas accessed by higher flows, generally farther from the wetted channel. Seedlings germinate in these areas following higher flows (Mahoney and Rood 1998) and grow to maturity without being scoured out of the channel, while still accessing water using deep root systems. In the Bear River downstream of the Camp Far West Dam, white alder and box elder provided canopy cover in the mid-ranges of flows, with rooting depths intermediate between willows and cottonwoods.

LWM has the potential to influence pool formation, increase shade and collect sediment and organic litter within streambeds (Benda and Litschert 2013). Field surveys indicate that in-channel LWM in the Project-affected reaches upstream of the Camp Far West Reservoir was typical of high gradient stream systems in the central Sierra Nevada, with the LWM stranded high, over boulders, having no apparent interaction with the stream flow. High flows can easily flush non-imbedded wood out of the channel, and the LWM pieces have little opportunity to influence channel morphology (Ruediger and Ward 1991).

Recruitment of LWM in valley streams tends to come from streamside riparian communities, as well as upstream locations, but the Bear River downstream of Camp Far West Dam is limited in the amount of late seral riparian vegetation that could potentially contribute large amounts of LWM. Wood from upstream locations may pass over Camp Far West Dam, but may be flushed through the system, or as field surveys indicate, much of the LWM may be deposited above floodprone widths. The LWM located above floodprone is unlikely to interact with the stream flow and typical of wood transported from higher areas in the watershed, in that it has been broken into smaller pieces (Seo et al. 2010). Additionally, LWM deposited on floodplains often decay more rapidly than in an anaerobic environments, resulting in the subsequent removal of LWM pieces from the system (Seo et al. 2010).

3.3.4.5 Unavoidable Adverse Effects

The proposed Project would have both short-term and long-term minor unavoidable impacts on terrestrial resources. However, none of these effects would be considered adverse to any of the resources.

The main effects to terrestrial resources would be from the Pool Raise, which will inundate an additional 5 ft above the NMWSE. One occurrence of a special-status plant species, Sierra foothills brodiaea, will most likely be drowned by the raise. Approximately 12.67 ac of NWI mapped riverine features will be converted into lacustrine feature by the Pool Raise, as well as one 0.004 ac wetland mapped in 2018. Additionally, 2.50 ac of Sensitive Natural Communities will be covered by water. Some spread of NNIP may also occur due to this Pool Raise.

Continued Project O&M and recreation use has the potential to contribute to the spread of NNIPs. However, many of these weeds are ubiquitous throughout the region, and Project activities would constitute a small piece of the vectors spreading NNIPs in the area.

Project O&M activities and recreation would have the potential to affect special-status wildlife species. However, these affects are considered to be minor. Additionally, two active bald eagle nests were found within the proposed Project Boundary - on the Bear River Arm and on the Rock Creek Arm of the reservoir, east of the NSRA boat ramp. The continued use of the Bear River arm nest and the presence of a second nest suggests that the Project is a benefit to bald eagles by providing valuable nesting habitat and wintering habitat. Further, SSWD's proposed Bald Eagle Management Plan would assure an additional level of protection.

Impacts to special-status wildlife resulting from Project O&M and construction would, in general, be short in duration and restricted to existing disturbed areas in recreation areas and near the existing spillway. Temporary impacts include noise and an increase in human presence. A small amount of Implementation of SSWD's proposed Bald Eagle Management Plan would reduce the effects of construction.

Project facilities could support a number of special-status bat species by providing man-made structures for roosting. SSWD's proposal to exclude bats from roosting in structures where human interaction occurs (e.g., public restrooms, powerhouses and other buildings) assure a reduction in the potential to disturb bat roosts.

3.3.4.6 List of Attachments

Attachment 3.3.4A SSWD's Complete Floristic List

Attachment 3.3.4B Map of NNIP Occurrences

Attachment 3.3.4C NNIP Data Table

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Attachment 3.3.4A

SSWD's Complete Floristic List

Species	Common Name	Native or NN or NNIP?	NSRA	SSRA	CFW Dam, Dikes, & Spillway	CFW Dam Powerhouse	Family
Achillea millefolium	thousand-leaved yarrow	Native		X	X	X	ASTERACEAE – SUNFLOWER FAMILY
Achyrachaena mollis	soft blow-wives	Native			X	X	ASTERACEAE – SUNFLOWER FAMILY
Aegilops triuncialis*	barbed goat grass	NNIP (High)	X				POACEAE – GRASS FAMILY
Aesculus californica	California buckeye	Native		X	X	X	SAPINDACEAE – SOAPBERRY FAMILY
Aira caryophyllea*	silver hair grass	NN	X	X			POACEAE – GRASS FAMILY
Alisma sp.	water plantain	Native		X			ALISMATACEAE – WATER–PLANTAIN FAMILY
Amsinckia intermedia	common fiddleneck	Native	X	X	X	X	BORAGINACEAE – BORAGE FAMILY
Amsinckia menziesii	common fiddleneck	Native		X			BORAGINACEAE – BORAGE FAMILY
Anthemis cotula*	mayweed	NN	X				ASTERACEAE – SUNFLOWER FAMILY
Artemisia douglasiana	mugwort	Native	X	X	X	X	ASTERACEAE – SUNFLOWER FAMILY
Avena barbata*	slender wild oat	NNIP (Moderate)	X	X	X	X	POACEAE – GRASS FAMILY
Avena fatua*	wild oat	NNIP (Moderate)	X	X	X	X	POACEAE – GRASS FAMILY
Baccharis pilularis ssp. consanguinea	coyote brush	Native	X	X	X	X	ASTERACEAE – SUNFLOWER FAMILY
Brassica nigra*	black mustard	NNIP (Moderate)		X	X	X	BRASSICACEAE – MUSTARD FAMILY
Brassica rapa*	field mustard	NNIP (Limited)			X	X	BRASSICACEAE – MUSTARD FAMILY
Briza maxima*	rattlesnake grass	NNIP (Limited)	X	X	X	X	POACEAE – GRASS FAMILY
Briza minor*	annual quaking grass	NN	X	X	X	X	POACEAE – GRASS FAMILY
Brodiaea elegans ssp. elegans	harvest brodiaea	Native		X			THEMIDACEAE – BRODIAEA FAMILY
Bromus diandrus*	ripgut grass	NNIP (Moderate)	X	X	X	X	POACEAE – GRASS FAMILY
Bromus hordeaceus*	soft chess	NNIP (Limited)	X	X	X	X	POACEAE – GRASS FAMILY
Bromus madritensis ssp. madritensis*	foxtail chess	NN	X	X	X	X	POACEAE – GRASS FAMILY
Bromus madritensis ssp. rubens*	red brome	NNIP (High)		X			POACEAE – GRASS FAMILY
Bromus sterilis*	poverty brome	NN		X			POACEAE – GRASS FAMILY
Calandrinia menziesii	red maids	Native	X	X			MONTIACEAE – MINER'S–LETTUCE FAMILY
Calochortus luteus	yellow mariposa-lily	Native	X	X	X		LILIACEAE – LILY FAMILY
Calystegia sp.	morning-glory	Native	X				CONVOLVULACEAE – MORNING–GLORY FAMILY
Canna sp.*	canna lily	NN	X				CANNABACEAE – HEMP FAMILY
Capsella bursa-pastoris*	shepherd's purse	NN	X				BRASSICACEAE – MUSTARD FAMILY
Cardamine oligosperma	few-flowered bitter-cress	Native	X				BRASSICACEAE – MUSTARD FAMILY
Carduus pycnocephalus ssp. pycnocephalus*	Italian thistle	NNIP (Moderate)	X	X	X	X	ASTERACEAE – SUNFLOWER FAMILY
Castilleja affinis ssp. affinis	related paintbrush	Native		X			OROBANCHACEAE – BROOM–RAPE FAMILY
Castilleja attenuata	valley tassels	Native			X	X	OROBANCHACEAE – BROOM–RAPE FAMILY
Castilleja campestris ssp. campestris	field paintbrush	Native	X				OROBANCHACEAE – BROOM–RAPE FAMILY
Castilleja lineariloba	linear-lobed paintbrush	Native	X	X			OROBANCHACEAE – BROOM–RAPE FAMILY
Ceanothus cuneatus var. cuneatus	buckbrush	Native	X	X	X		RHAMNACEAE – BUCKTHORN FAMILY
Centaurea melitensis*	Maltese star-thistle	NNIP (Moderate)	X	X			ASTERACEAE – SUNFLOWER FAMILY
Centaurea solstitialis*	yellow star-thistle	NNIP (High)	X	X	X	X	ASTERACEAE – SUNFLOWER FAMILY
Cephalanthus occidentalis	California button willow	Native	X	X			RUBIACEAE – COFFEE FAMILY
Cerastium glomeratum*	sticky mouse-ear chickweed	NN		X	X	X	CARYOPHYLLACEAE – PINK FAMILY
Chlorogalum pomeridianum var. pomeridianum	afternoon soap plant	Native	X	X			AGAVACEAE – AGAVE FAMILY
Chondrilla juncea*	skeleton weed	NN	X	X			ASTERACEAE – SUNFLOWER FAMILY
Cichorium intybus*	chicory	NN		X			ASTERACEAE – SUNFLOWER FAMILY
Cicuta maculata var. angustifolia	narrow-leaved spotted water-hemlock	Native	X				APIACEAE – CARROT FAMILY
Clarkia purpurea ssp. quadrivulnera	four-spot purple clarkia	Native		X			ONAGRACEAE – EVENING PRIMROSE FAMILY
Claytonia parviflora ssp. parviflora	small-flowered spring beauty	Native	X	X	X	X	MONTIACEAE – MINER'S–LETTUCE FAMILY
Claytonia perfoliata	miner's lettuce	Native	X	X			MONTIACEAE – MINER'S–LETTUCE FAMILY
Cordylanthus pilosus ssp. trifidus	tripartite hairy bird's-beak	Native	X	X			OROBANCHACEAE – BROOM–RAPE FAMILY
Cynodon dactylon*	bermuda grass	NNIP (Moderate)	X	X	X	X	POACEAE – GRASS FAMILY
Cynosurus echinatus*	bristly dogtail grass	NNIP (Moderate)	X	X			POACEAE – GRASS FAMILY
Cyperus eragrostis	lovegrass flatsedge	Native		X	X	X	CYPERACEAE – SEDGE FAMILY
Dactylis glomerata*	orchard grass	NNIP (Limited)		X			POACEAE – GRASS FAMILY

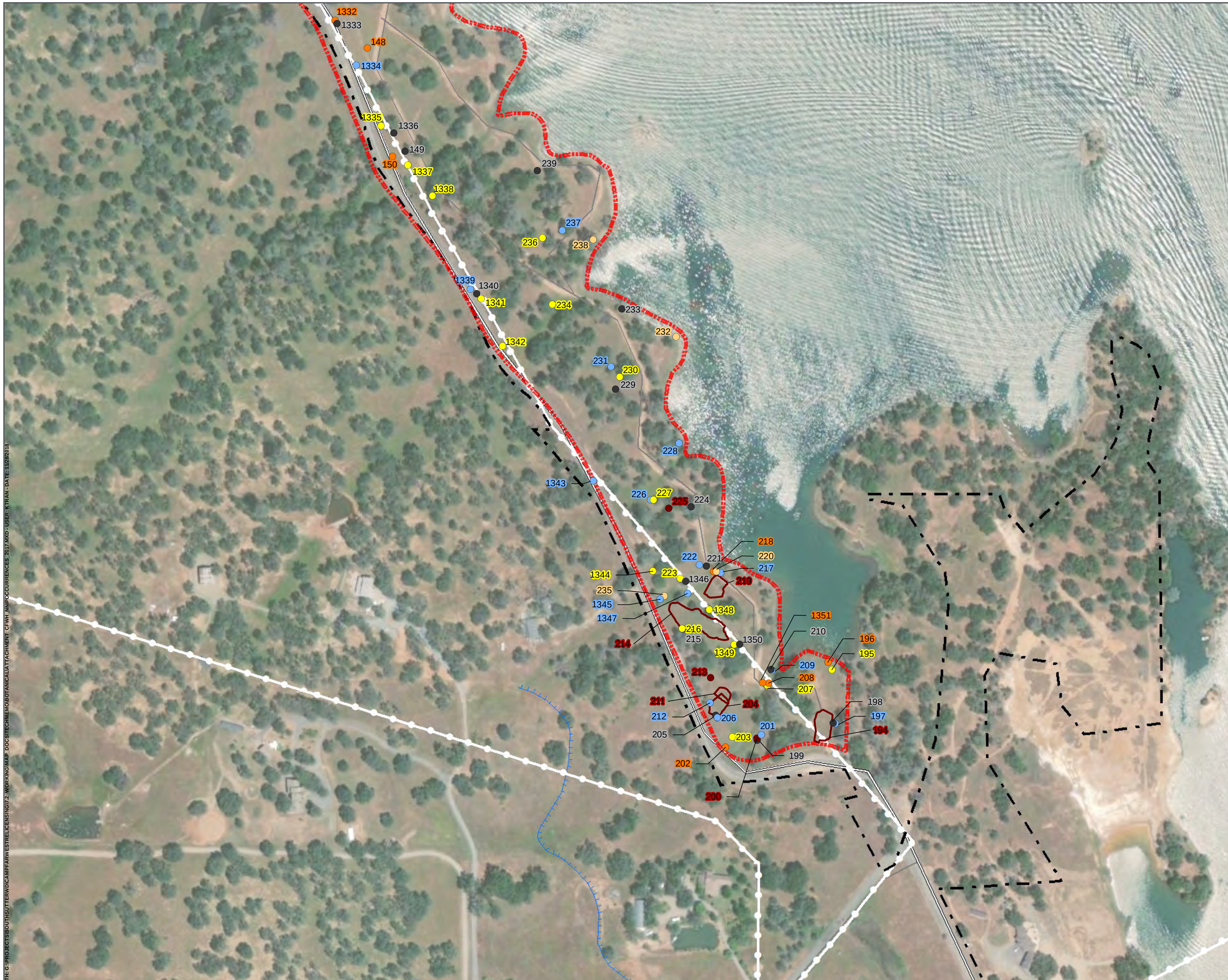
Species	Common Name	Native or NN or NNIP?	NSRA	SSRA	CFW Dam, Dikes, & Spillway	CFW Dam Powerhouse	Family
Daucus pusillus	small wild carrot	Native		X			APIACEAE – CARROT FAMILY
Delphinium variegatum ssp. variegatum	royal larkspur	Native	X				RANUNCULACEAE – BUTTERCUP FAMILY
Dichelostemma capitatum ssp. capitatum	blue dicks	Native	X				THEMIDACEAE – BRODIAEA FAMILY
Dichelostemma multiflorum	wild hyacinth	Native		X			THEMIDACEAE – BRODIAEA FAMILY
Dichelostemma volubile	twining brodiaea	Native	X	X			THEMIDACEAE – BRODIAEA FAMILY
Elymus caput-medusae*	medusa head	NNIP (High)	X	X	X	X	POACEAE – GRASS FAMILY
Erodium botrys*	long-beaked filaree	NN	X				GERANIACEAE – GERANIUM FAMILY
Erodium cicutarium*	redstem filaree	NNIP (Limited)	X	X	X	X	GERANIACEAE – GERANIUM FAMILY
Erodium moschatum*	greenstem filaree	NN		X			GERANIACEAE – GERANIUM FAMILY
Eryngium castrense	great valley coyote-thistle	Native		X			APIACEAE – CARROT FAMILY
Erythranthe guttata	red-dotted monkeyflower	Native	X	X	X	X	PHRYMACEAE – LOPSEED FAMILY
Eschscholzia lobbii	Lobb's poppy	Native	X	X			PAPAVERACEAE – POPPY FAMILY
Festuca myuros*	rattail sixweeks grass	NNIP (Moderate)	X	X	X		POACEAE – GRASS FAMILY
Festuca perennis*	rye grass	NNIP (Moderate)	X	X	X	X	POACEAE – GRASS FAMILY
Ficus carica*	edible fig	NNIP (Moderate)			X	X	MORACEAE – MULBERRY FAMILY
Foeniculum vulgare*	fennel	NNIP (High)		X	X	X	APIACEAE – CARROT FAMILY
Frangula californica ssp. tomentella	woolly haired California coffee berry	Native		X			RHAMNACEAE – BUCKTHORN FAMILY
Fraxinus latifolia	Oregon ash	Native		X			OLEACEAE – OLIVE FAMILY
Galium aparine	goose grass	Native		X	X		RUBIACEAE – COFFEE FAMILY
Galium divaricatum*	Lamarck's bedstraw	NN		X			RUBIACEAE – COFFEE FAMILY
Galium murale*	tiny bedstraw	NN		X			RUBIACEAE – COFFEE FAMILY
Galium parisiense*	wall bedstraw	NN	X				RUBIACEAE – COFFEE FAMILY
Geranium dissectum*	dissected geranium	NNIP (Limited)	X	X	X	X	GERANIACEAE – GERANIUM FAMILY
Geranium molle*	soft geranium	NN	X	X	X	X	GERANIACEAE – GERANIUM FAMILY
Gnaphalium palustre	marsh cudweed	Native	X				ASTERACEAE – SUNFLOWER FAMILY
Gratiola ebracteata	bractless hedge-hyssop	Native	X		X		PLANTAGINACEAE – PLANTAIN FAMILY
Grindelia camporum	field gumplant	Native	X				ASTERACEAE – SUNFLOWER FAMILY
Hirschfeldia incana*	shortpod mustard	NNIP (Moderate)		X			BRASSICACEAE – MUSTARD FAMILY
Hordeum marinum ssp. gussoneanum*	Mediterranean barley	NN	X	X			POACEAE – GRASS FAMILY
Hordeum murinum ssp. leporinum*	hare barley	NN	X	X			POACEAE – GRASS FAMILY
Hypericum perforatum ssp. perforatum*	Klamathweed	NN	X	X	X	X	HYPERICACEAE – ST JOHN'S WORT FAMILY
Hypochaeris glabra*	smooth cat's-ear	NNIP (Limited)		X	X	X	ASTERACEAE – SUNFLOWER FAMILY
Hypochaeris radicata*	rough cat's-ear	NNIP (Moderate)	X			X	ASTERACEAE – SUNFLOWER FAMILY
Iris hartwegii	Hartweg's iris	Native	X				IRIDACEAE – IRIS FAMILY
Juncus balticus ssp. ater	Baltic rush	Native		X	X	X	JUNCACEAE – RUSH FAMILY
Juncus bufonius var. occidentalis	western toad rush	Native	X				JUNCACEAE – RUSH FAMILY
Juncus capitatus*	dwarf rush	NN	X	X			JUNCACEAE – RUSH FAMILY
Juncus tenuis	poverty rush	Native	X	X	X		JUNCACEAE – RUSH FAMILY
Juncus xiphioides	iris-leaved rush	Native	X				JUNCACEAE – RUSH FAMILY
Lamium amplexicaule*	henbit	NN	X				LAMIACEAE – MINT FAMILY
Layia fremontii	Fremont's layia	Native	X	X			ASTERACEAE – SUNFLOWER FAMILY
Lemna sp.	duckweed	Native	X				ARACEAE – ARUM FAMILY
Leontodon saxatilis*	hairy hawkbit	NN			X	X	ASTERACEAE – SUNFLOWER FAMILY
Lepidium campestre*	field peppergrass	NN		X			BRASSICACEAE – MUSTARD FAMILY
Lepidium nitidum	shining peppergrass	Native	X	X			BRASSICACEAE – MUSTARD FAMILY
Leptosiphon bicolor	bi-colored leptosiphon	Native	X				POLEMONIACEAE – PHLOX FAMILY
Leptosiphon ciliatus	whisker brush	Native	X				POLEMONIACEAE – PHLOX FAMILY
Leptosiphon filipes	thread leptosiphon	Native	X				POLEMONIACEAE – PHLOX FAMILY
Linum bienne*	bi-annual flax	NN	X	X			LINACEAE – FLAX FAMILY
Lithophragma bolanderi	Bolander's woodland star	Native			X	X	SAXIFRAGACEAE – SAXIFRAGE FAMILY
Ludwigia peploides ssp. montevidensis*	montevidean false loosestrife	NN	X	X			ONAGRACEAE – EVENING PRIMROSE FAMILY
Lupinus bicolor	miniature lupine	Native	X	X	X	X	FABACEAE – LEGUME FAMILY

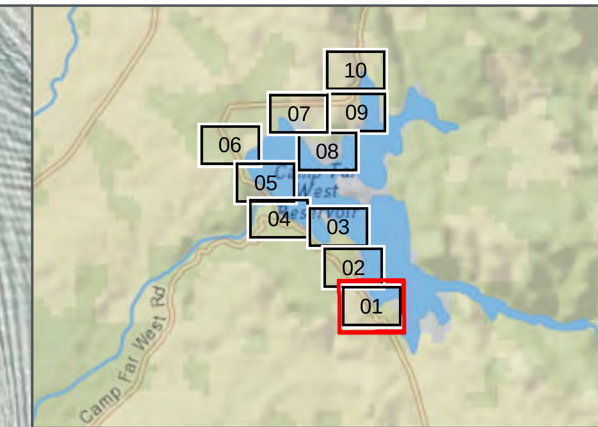
Species	Common Name	Native or NN or NNIP?	NSRA	SSRA	CFW Dam, Dikes, & Spillway	CFW Dam Powerhouse	Family
Lupinus nanus	little lupine	Native		X	X	X	FABACEAE – LEGUME FAMILY
Lysimachia arvensis*	scarlet pimpernel	NN	X	X	X	X	MYRSINACEAE – MYRSINE FAMILY
Madia exigua	small tarweed	Native			X	X	ASTERACEAE – SUNFLOWER FAMILY
Marrubium vulgare*	common horehound	NNIP (Limited)	X	X			LAMIACEAE – MINT FAMILY
Matricaria discoidea*	pineapple weed	Native	X	X	X		ASTERACEAE – SUNFLOWER FAMILY
Medicago arabica*	Arabian medick	NN		X			FABACEAE – LEGUME FAMILY
Medicago polymorpha*	variable burclover	NNIP (Limited)	X	X			FABACEAE – LEGUME FAMILY
Melilotus indicus*	indian sweetclover	NN			X	X	FABACEAE – LEGUME FAMILY
Mentha canadensis	Canadian cornmint	Native	X				LAMIACEAE – MINT FAMILY
Mentha pulegium*	pennyroyal	NNIP (Moderate)	X				LAMIACEAE – MINT FAMILY
Micropus californicus var. californicus	California cottontop	Native	X	X			ASTERACEAE – SUNFLOWER FAMILY
Microseris nutans	nodding microseris	Native	X				ASTERACEAE – SUNFLOWER FAMILY
Microsteris gracilis	slender microsteris	Native	X				POLEMONIACEAE – PHLOX FAMILY
Morus alba*	white mulberry	NN	X				MORACEAE – MULBERRY FAMILY
Nasturtium officinale	water cress	Native	X	X			BRASSICACEAE – MUSTARD FAMILY
Navarretia intertexta	intertwined navarretia	Native	X				POLEMONIACEAE – PHLOX FAMILY
Navarretia pubescens	downy navarretia	Native		X	X		POLEMONIACEAE – PHLOX FAMILY
Opuntia sp.	prickly-pear	NN			X		CACTACEAE – CACTUS FAMILY
Oxalis micrantha*	dwarf wood-sorrel	NN	X	X			OXALIDACEAE – OXALIS FAMILY
Parentucellia viscosa*	sticky parentucellia	NNIP (Limited)	X	X	X	X	OROBANCHACEAE – BROOM–RAPE FAMILY
Pellaea mucronata var. mucronata	bird's-foot fern	Native			X	X	PTERIDACEAE – BRAKE FAMILY
Pentagramma triangularis	goldback fern	Native	X	X	X	X	PTERIDACEAE – BRAKE FAMILY
Perideridia kelloggii	Kellogg's yampah	Native	X				APIACEAE – CARROT FAMILY
Petrorhagia dubia*	doubtful petrorhagia	NN	X	X	X	X	CARYOPHYLLACEAE – PINK FAMILY
Pinus sabiniana	ghost pine	Native	X	X	X	X	PINACEAE – PINE FAMILY
Plagiobothrys fulvus var. campestris	field popcornflower	Native	X				BORAGINACEAE – BORAGE FAMILY
Plagiobothrys greenei	Greene's spiny-nut popcornflower	Native			X	X	BORAGINACEAE – BORAGE FAMILY
Plagiobothrys nothofulvus	rusty popcornflower	Native	X	X	X	X	BORAGINACEAE – BORAGE FAMILY
Plagiobothrys stipitatus var. micranthus	small-flowered great valley popcornflower	Native		X			BORAGINACEAE – BORAGE FAMILY
Plagiobothrys tenellus	Pacific popcornflower	Native			X	X	BORAGINACEAE – BORAGE FAMILY
Plantago coronopus*	cleft-leaved plantain	NN	X	X			PLANTAGINACEAE – PLANTAIN FAMILY
Plantago erecta	erect plantain	Native	X	X			PLANTAGINACEAE – PLANTAIN FAMILY
Plantago lanceolata*	English plantain	NNIP (Limited)	X	X	X		PLANTAGINACEAE – PLANTAIN FAMILY
Plantago major*	common plantain	NN	X		X	X	PLANTAGINACEAE – PLANTAIN FAMILY
Poa bulbosa*	bulbous blue grass	NN	X				POACEAE – GRASS FAMILY
Polypogon interruptus*	ditch beard grass	NN			X		POACEAE – GRASS FAMILY
Populus fremontii ssp. fremontii	fremont cottonwood	Native	X	X			SALICACEAE – WILLOW FAMILY
Portulaca oleracea*	purslane	NN	X	X			PORTULACACEAE – PURSLANE FAMILY
Potamogeton diversifolius	diverse-leaved pondweed	Native		X			POTAMOGETONACEAE – PONDWEED FAMILY
Psilocarphus brevissimus var. brevissimus	dwarf woolly-marbles	Native		X			ASTERACEAE – SUNFLOWER FAMILY
Quercus douglasii	blue oak	Native	X	X	X	X	FAGACEAE – OAK FAMILY
Quercus lobata	valley oak	Native	X	X	X	X	FAGACEAE – OAK FAMILY
Quercus wislizeni var. wislizeni	interior live oak	Native	X	X	X	X	FAGACEAE – OAK FAMILY
Ranunculus aquatilis var. aquatilis	water buttercup	Native	X		X	X	RANUNCULACEAE – BUTTERCUP FAMILY
Ranunculus hebecarpus	pubescent-fruited buttercup	Native		X			RANUNCULACEAE – BUTTERCUP FAMILY
Ranunculus muricatus*	sharp-point buttercup	NN	X	X	X	X	RANUNCULACEAE – BUTTERCUP FAMILY
Ranunculus occidentalis var. occidentalis	western buttercup	Native	X				RANUNCULACEAE – BUTTERCUP FAMILY
Raphanus raphanistrum*	jointed charlock	NN			X	X	BRASSICACEAE – MUSTARD FAMILY
Robinia pseudoacacia*	black locust	NNIP (Limited)			X	X	FABACEAE – LEGUME FAMILY
Rosa californica	California rose	Native			X	X	ROSACEAE – ROSE FAMILY
Rubus armeniacus*	Himalayan blackberry	NNIP (High)	X	X	X	X	ROSACEAE – ROSE FAMILY

Species	Common Name	Native or NN or NNIP?	NSRA	SSRA	CFW Dam, Dikes, & Spillway	CFW Dam Powerhouse	Family
Rumex crispus*	curly dock	NNIP (Limited)	X	X	X	X	POLYGONACEAE – BUCKWHEAT FAMILY
Rumex pulcher*	fiddle dock	NN			X	X	POLYGONACEAE – BUCKWHEAT FAMILY
Salix exigua var. exigua	narrow-leaved willow	Native	X		X	X	SALICACEAE – WILLOW FAMILY
Salix lasiolepis	arroyo willow	Native			X	X	SALICACEAE – WILLOW FAMILY
Sambucus nigra ssp. caerulea	blue elderberry	Native			X	X	ADOXACEAE – MUSKROOT FAMILY
Sanicula bipinnatifida	purple sanicle	Native	X				APIACEAE – CARROT FAMILY
Sanicula crassicaulis	thick-stemmed sanicula	Native	X	X			APIACEAE – CARROT FAMILY
Schoenoplectus californicus	California bulrush	Native	X				CYPERACEAE – SEDGE FAMILY
Selaginella hansenii	Hansen's spike-moss	Native		X			SELAGINELLACEAE – SPIKE–MOSS FAMILY
Senecio vulgaris*	common groundsel	NN	X	X	X	X	ASTERACEAE – SUNFLOWER FAMILY
Sesbania punicea*	scarlet sesban	NNIP (High)	X	X			FABACEAE – LEGUME FAMILY
Sherardia arvensis*	field madder	NN		X			RUBIACEAE – COFFEE FAMILY
Silene gallica*	small-flower catchfly	NN	X	X	X	X	CARYOPHYLLACEAE – PINK FAMILY
Silybum marianum*	blessed milk thistle	NNIP (Limited)	X	X			ASTERACEAE – SUNFLOWER FAMILY
Sisymbrium officinale*	hedge mustard	NN	X	X			BRASSICACEAE – MUSTARD FAMILY
Soliva sessilis*	sessile-leaved soliva	NN		X			ASTERACEAE – SUNFLOWER FAMILY
Sonchus asper ssp. asper*	prickly sow thistle	NN	X	X			ASTERACEAE – SUNFLOWER FAMILY
Spergula arvensis*	starwort	NN	X				CARYOPHYLLACEAE – PINK FAMILY
Spergularia rubra*	red sand-spurrey	NN			X		CARYOPHYLLACEAE – PINK FAMILY
Spiranthes porrifolia	leek-leaved ladies tresses	Native	X				ORCHIDACEAE – ORCHID FAMILY
Stellaria media*	common chickweed	NN	X	X			CARYOPHYLLACEAE – PINK FAMILY
Stellaria nitens	shining chickweed	Native		X			CARYOPHYLLACEAE – PINK FAMILY
Stipa lemmonii var. lemmonii	Lemmon's needle grass	Native	X				POACEAE – GRASS FAMILY
Taraxacum officinale*	common dandelion	NN	X	X	X		ASTERACEAE – SUNFLOWER FAMILY
Torilis arvensis*	tall sock-destroyer	NNIP (Moderate)	X	X	X	X	APIACEAE – CARROT FAMILY
Toxicodendron diversilobum	western poison oak	Native	X	X	X	X	ANACARDIACEAE – SUMAC FAMILY
Trifolium angustifolium*	narrow-leaved clover	NN	X				FABACEAE – LEGUME FAMILY
Trifolium campestre*	hop clover	NN		X	X	X	FABACEAE – LEGUME FAMILY
Trifolium depauperatum var. depauperatum	dwarf sack clover	Native	X		X		FABACEAE – LEGUME FAMILY
Trifolium dubium*	little hop clover	NN	X	X			FABACEAE – LEGUME FAMILY
Trifolium glomeratum*	clustered clover	NN	X	X			FABACEAE – LEGUME FAMILY
Trifolium hirtum*	rose clover	NNIP (Moderate)	X	X	X	X	FABACEAE – LEGUME FAMILY
Trifolium repens*	white clover	NN	X				FABACEAE – LEGUME FAMILY
Trifolium subterraneum*	subterranean clover	NN	X	X			FABACEAE – LEGUME FAMILY
Trifolium tomentosum*	woolly clover	NN			X	X	FABACEAE – LEGUME FAMILY
Trifolium variegatum	variagated clover	Native	X				FABACEAE – LEGUME FAMILY
Trifolium willdenovii	tomcat clover	Native			X	X	FABACEAE – LEGUME FAMILY
Triphysaria eriantha ssp. eriantha	butter-and-eggs	Native	X	X	X		OROBANCHACEAE – BROOM–RAPE FAMILY
Triphysaria pusilla	small owl's-clover	Native		X			OROBANCHACEAE – BROOM–RAPE FAMILY
Triteleia hyacinthina	hyacinth triplet lily	Native	X	X	X	X	THEMIDACEAE – BRODIAEA FAMILY
Triteleia ixioides	corn lily-like triplet lily	Native			X	X	THEMIDACEAE – BRODIAEA FAMILY
Triteleia laxa	loose triplet lily	Native	X	X	X	X	THEMIDACEAE – BRODIAEA FAMILY
Typha angustifolia*	narrow-leaved cattail	NN	X	X	X	X	TYPHACEAE – CATTAIL FAMILY
Urtica urens*	dwarf nettle	NN	X				URTICACEAE – NETTLE FAMILY
Valerianella locusta*	locust corn salad	NN	X		X		VALERIANACEAE – VALERIAN FAMILY
Verbena litoralis*	seashore vervain	NN		X	X	X	VERBENACEAE – VERVAIN FAMILY
Veronica persica*	Persian speedwell	NN	X				PLANTAGINACEAE – PLANTAIN FAMILY
Vicia hirsuta*	hairy vetch	NN		X	X	X	FABACEAE – LEGUME FAMILY
Vicia sativa*	garden vetch	NN	X	X	X	X	FABACEAE – LEGUME FAMILY
Vicia villosa*	hairy vetch	NN	X	X	X	X	FABACEAE – LEGUME FAMILY
Vitis californica	California wild grape	Native			X	X	VITACEAE – GRAPE FAMILY
Xanthium strumarium	cocklebur	Native		X			ASTERACEAE – SUNFLOWER FAMILY

Attachment 3.3.4B

Maps of NNIP Occurrences





Project Features

Proposed FERC Boundary (No.2997)

Non-Project Features

Transmission Line

Base Map

Study Area

County Line

Major Road

Minor Road

Canal/Ditch

Non-native Plant Species (NNIP)

Carduus pycnocephalus (CARPYC)

Centaurea solstitialis (CENSOL)

Chondrilla juncea (CHOJUN)

Cynodon dactylon (CYNDAC)

Elymus caput-medusae (ELYCAP)

Hypericum perforatum (HYPPER)

Chondrilla juncea (CHOJUN)

N

0 150 300 600 Feet

0 45 90 180 Meters

NON-NATIVE INVASIVE PLANT SPECIES
CAMP FAR WEST HYDROELECTRIC PROJECT
FERC NO. 2997

Data Sources: Base Map - ArcGIS Online Streaming Layer (Imagery); Ferc Boundary - Yuba and Placer Counties GIS; Land Ownership - Yuba and Placer Counties CD-Data; Botanical Survey Area, Non-native Plant Species - HDR. Map information was compiled from the best available sources. No warranty is made for its accuracy or completeness.

Map Prepared by: HDR | © 2018 South Sutter Water District

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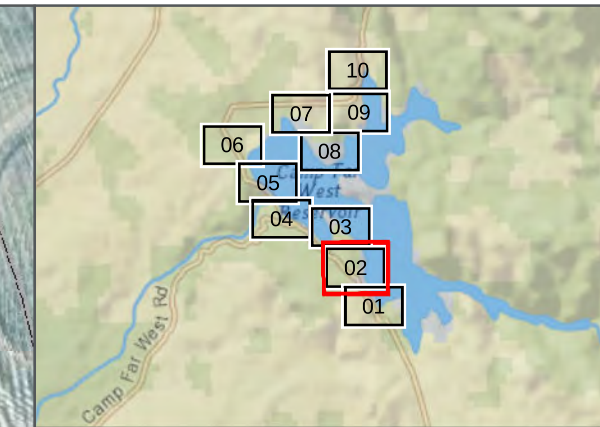

Project Features

Proposed FERC Boundary (No.2997)

Non-Project Features

Transmission Line

Base Map

Study Area

County Line

Major Road

Minor Road

Non-native Plant Species (NNIP)

Carduus pycnocephalus (CARPYC)

Centaurea solstitialis (CENSOL)

Cynodon dactylon (CYNDAC)

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Hypericum perforatum (HYPPER)

Elymus caput-medusae (ELYCAP)

N

0 150 300 600 Feet

0 45 90 180 Meters

NON-NATIVE INVASIVE PLANT SPECIES
CAMP FAR WEST HYDROELECTRIC PROJECT
FERC NO. 2997

Data Sources: Base Map - ArcGIS Online Streaming Layer (Imagery); Ferc Boundary - Yuba and Placer Counties GIS; Land Ownership - Yuba and Placer Counties CD-Data; Botanical Survey Area, Non-native Plant Species - HDR. Map information was compiled from the best available sources. No warranty is made for its accuracy or completeness.

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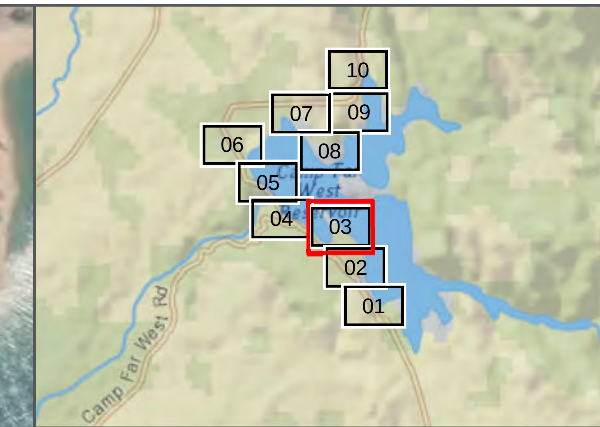

Project Features

Proposed FERC Boundary (No.2997)

Non-Project Features

Transmission Line

Base Map

Study Area

County Line

Major Road

Minor Road

Non-native Plant Species (NNIP)

Carduus pycnocephalus (CARPYC)

Elymus caput-medusae (ELYCAP)

Hypericum perforatum (HYPPER)

Carduus pycnocephalus (CARPYC)

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Centaurea solstitialis (CENSOL)

Elymus caput-medusae (ELYCAP)

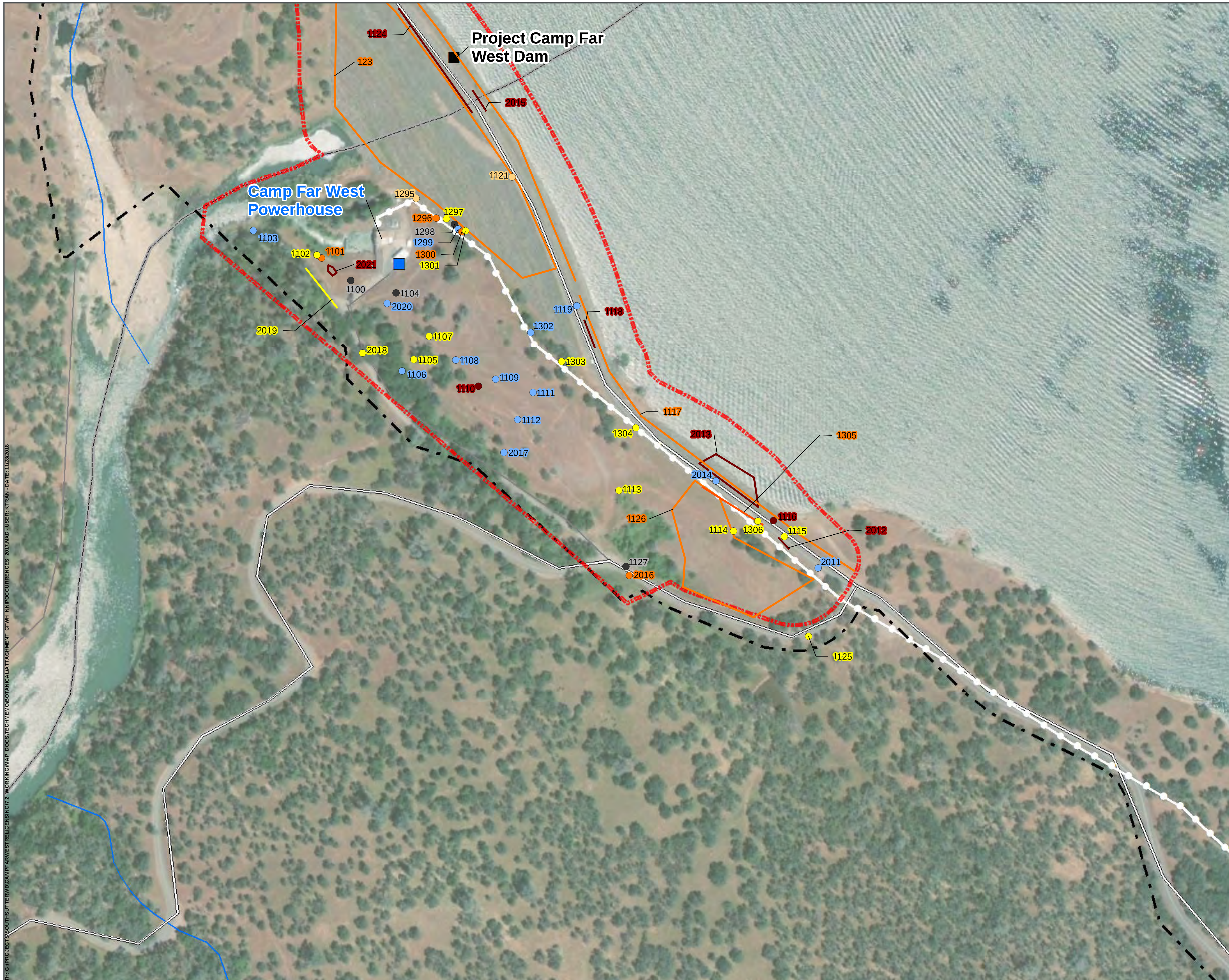
Hypericum perforatum (HYPPER)

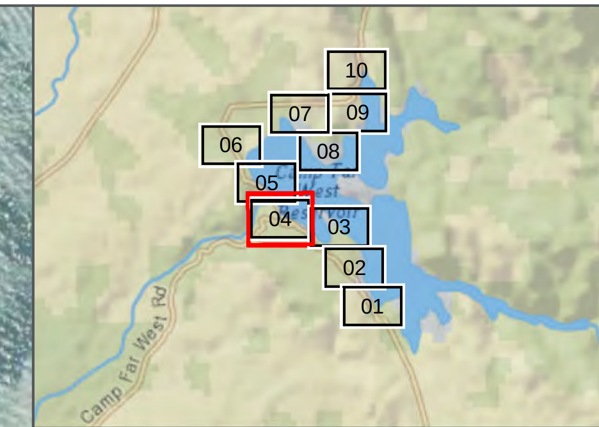
0 150 300 600 Feet

0 45 90 180 Meters

NON-NATIVE INVASIVE PLANT SPECIES
CAMP FAR WEST HYDROELECTRIC PROJECT
FERC NO. 2997

Data Sources: Base Map - ArcGIS Online Streaming Layer (Imagery); Ferc Boundary - Yuba and Placer Counties GIS; Land Ownership - Yuba and Placer Counties CD-Data; Botanical Survey Area, Non-native Plant Species - HDR. Map information was compiled from the best available sources. No warranty is made for its accuracy or completeness.





Project Features

- Proposed FERC Boundary (No.2997)
- Dam
- PowerHouse

Non-Project Features

- Transmission Line

Base Map

- Study Area
- County Line
- Major Road
- Minor Road
- StreamRiver

Non-native Plant Species (NNIP)

- *Carduus pycnocephalus* (CARPYC)
- *Centaurea solstitialis* (CENSOL)
- *Chondrilla juncea* (CHOJUN)
- *Cynodon dactylon* (CYNDAC)
- *Elymus caput-medusae* (ELYCAP)
- *Hypericum perforatum* (HYPPER)
- *Carduus pycnocephalus* (CARPYC)
- *Centaurea solstitialis* (CENSOL)
- *Chondrilla juncea* (CHOJUN)
- *Centaurea solstitialis* (CENSOL)
- *Chondrilla juncea* (CHOJUN)

0 150 300 600 Feet
0 45 90 180 Meters

NON-NATIVE INVASIVE PLANT SPECIES
CAMP FAR WEST HYDROELECTRIC PROJECT
FERC NO. 2997

Data Sources: Base Map - ArcGIS Online Streaming Layer (Imagery); Ferc Boundary - Yuba and Placer Counties GIS; Land Ownership - Yuba and Placer Counties CD-Data; Botanical Survey Area, Non-native Plant Species - HDR. Map information was compiled from the best available sources. No warranty is made for its accuracy or completeness.

NON-NATIVE INVASIVE PLANT SPECIES
CAMP FAR WEST HYDROELECTRIC PROJECT
FERC NO. 2997

Data Sources: Base Map - ArcGIS Online Streaming Layer (Imagery); Ferc Boundary - Yuba and Placer Counties GIS; Land Ownership - Yuba and Placer Counties CD-Data; Botanical Survey Area, Non-native Plant Species - HDR. Map information was compiled from the best available sources. No warranty is made for its accuracy or completeness.

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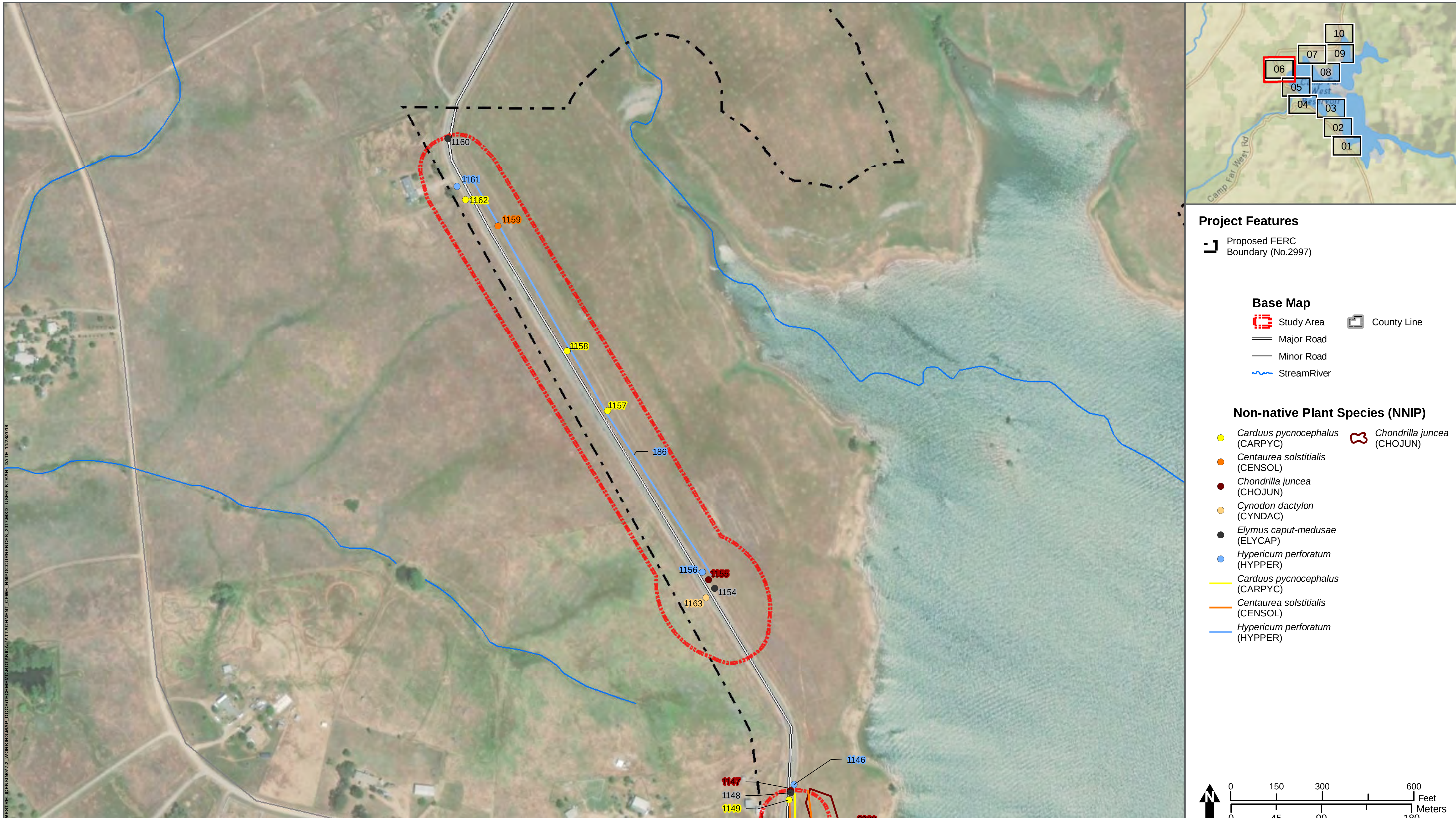

NON-NATIVE INVASIVE PLANT SPECIES
CAMP FAR WEST HYDROELECTRIC PROJECT
FERC NO. 2997

Data Sources: Base Map - ArcGIS Online Streaming Layer (Imagery); Ferc Boundary - Yuba and Placer Counties GIS; Land Ownership - Yuba and Placer Counties CD-Data; Botanical Survey Area, Non-native Plant Species - HDR. Map information was compiled from the best available sources. No warranty is made for its accuracy or completeness.

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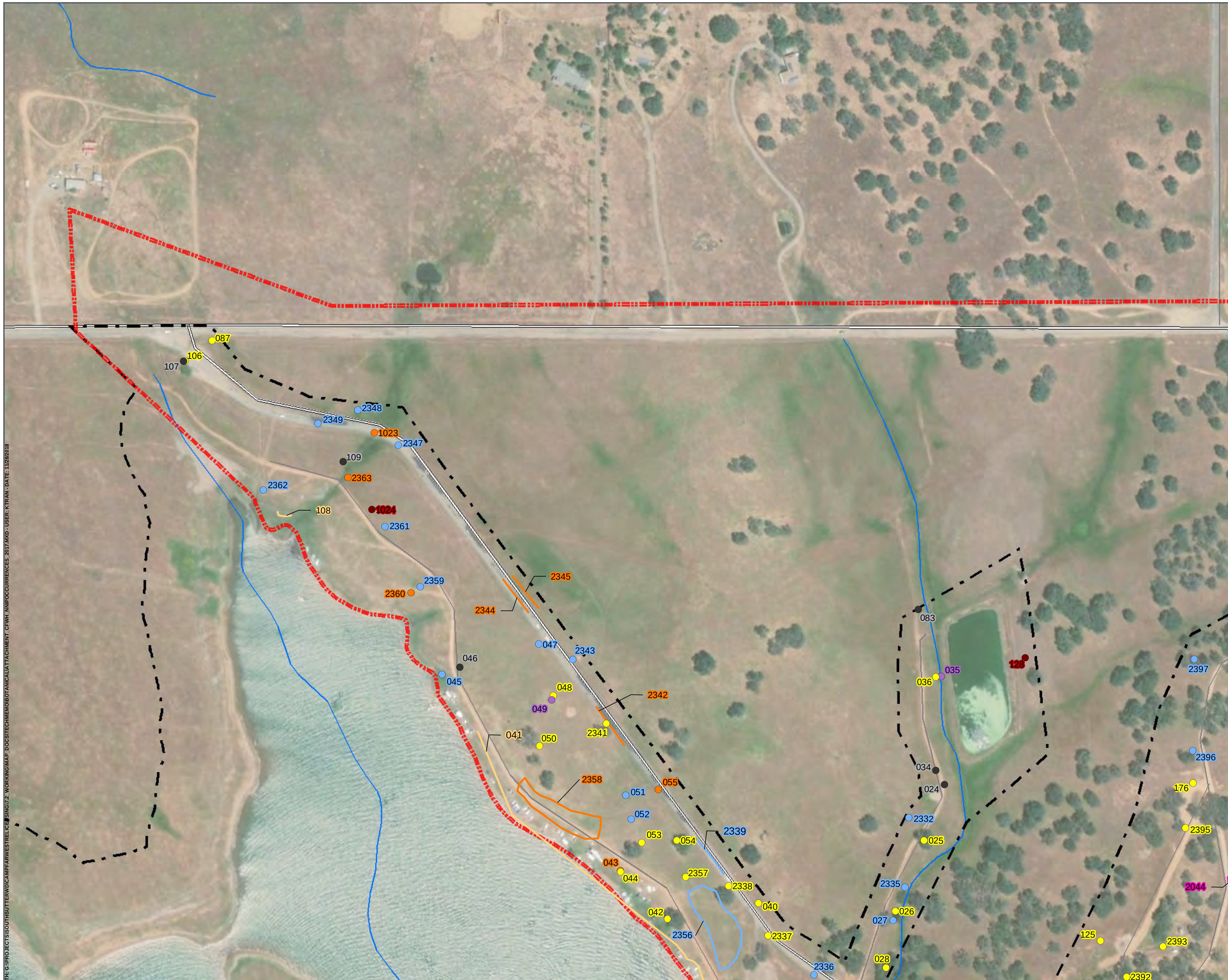
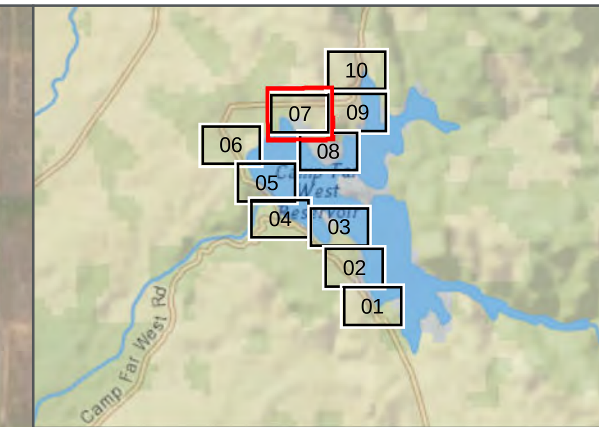




Project Features

Proposed FERC Boundary (No.2997)

Base Map

- Study Area
- County Line
- Major Road
- Minor Road
- StreamRiver

Non-native Plant Species (NNIP)

- *Carduus pycnocephalus* (CARPYC)
- *Centaurea melitensis* (CENMEL)
- *Centaurea solstitialis* (CENSOL)
- *Chondrilla juncea* (CHOJUN)
- *Elymus caput-medusae* (ELYCAP)
- *Hypericum perforatum* (HYPPER)
- *Aegilops triuncialis* (AEGTRI)
- *Centaurea solstitialis* (CENSOL)
- *Cynodon dactylon* (CYNDAC)
- *Hypericum perforatum* (HYPPER)
- *Centaurea solstitialis* (CENSOL)
- *Hypericum perforatum* (HYPPER)

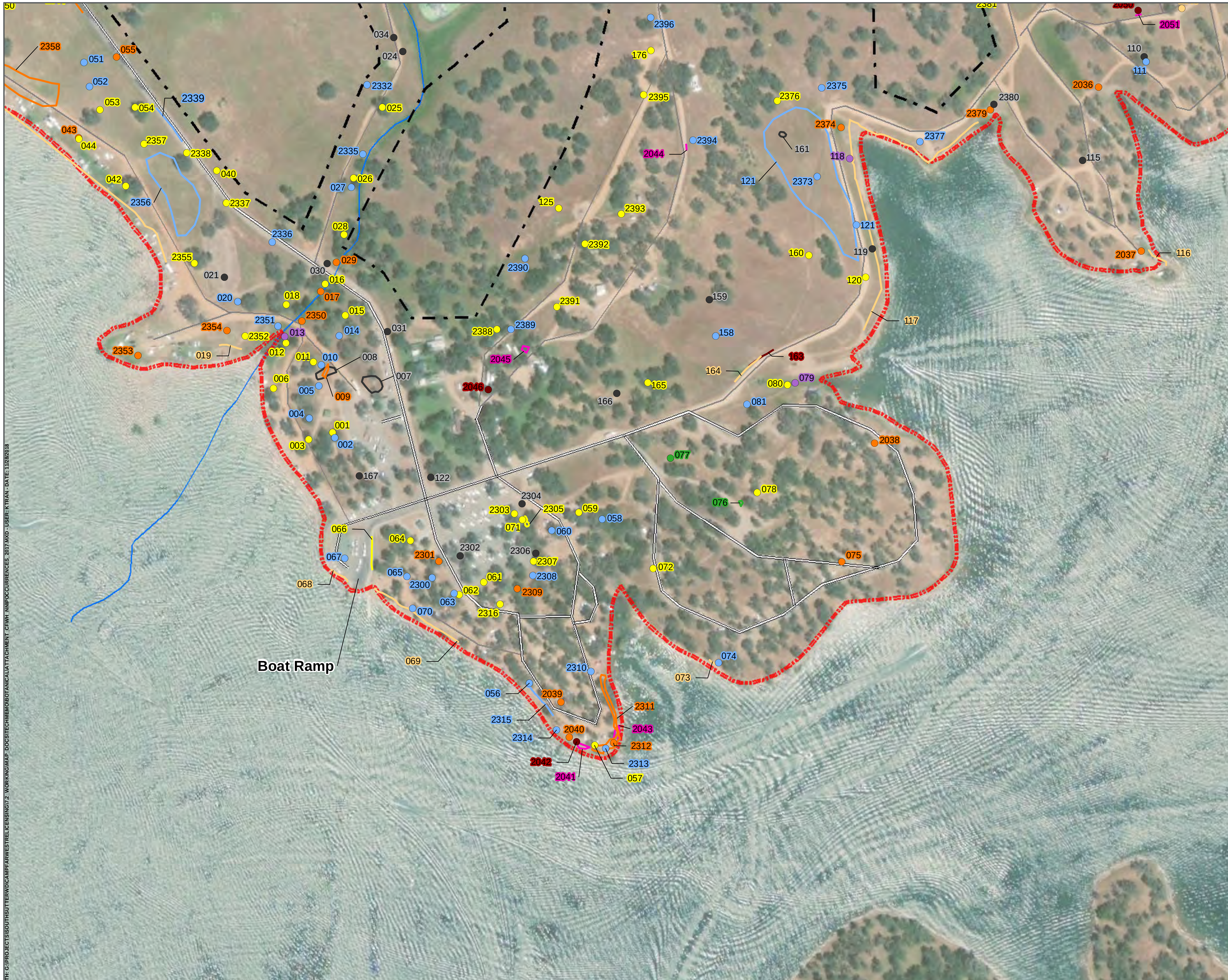
N

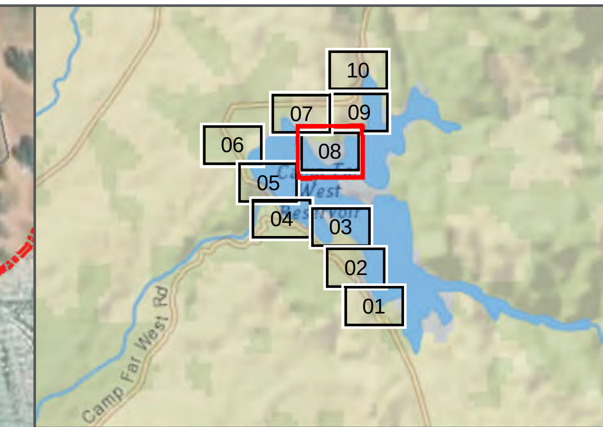
0 150 300 600 Feet

0 45 90 180 Meters

NON-NATIVE INVASIVE PLANT SPECIES
CAMP FAR WEST HYDROELECTRIC PROJECT
FERC NO. 2997

Data Sources: Base Map - ArcGIS Online Streaming Layer (Imagery); Ferc Boundary - Yuba and Placer Counties GIS; Land Ownership - Yuba and Placer Counties CD-Data; Botanical Survey Area, Non-native Plant Species - HDR. Map information was compiled from the best available sources. No warranty is made for its accuracy or completeness.





Project Features

Proposed FERC Boundary (No.2997)

Base Map

- Study Area
- County Line
- Major Road
- Minor Road
- StreamRiver

Non-native Plant Species (NNIP)

- *Bromus tectorum* (BROTEC)
- *Carduus pycnocephalus* (CARPYC)
- *Centaurea melitensis* (CENMEL)
- *Centaurea solstitialis* (CENSOL)
- *Chondrilla juncea* (CHOJUN)
- *Cynodon dactylon* (CYNDAC)
- *Elymus caput-medusae* (ELYCAP)
- *Hypericum perforatum* (HYPPER)
- *Aegilops triuncialis* (AEGTRI)
- *Carduus pycnocephalus* (CARPYC)
- *Centaurea solstitialis* (CENSOL)
- *Chondrilla juncea* (CHOJUN)
- *Cynodon dactylon* (CYNDAC)
- *Hypericum perforatum* (HYPPER)
- *Aegilops triuncialis* (AEGTRI)
- *Bromus tectorum* (BROTEC)
- *Carduus pycnocephalus* (CARPYC)
- *Centaurea solstitialis* (CENSOL)
- *Elymus caput-medusae* (ELYCAP)
- *Hypericum perforatum* (HYPPER)

N

0 150 300 600 Feet

0 45 90 180 Meters

NON-NATIVE INVASIVE PLANT SPECIES
CAMP FAR WEST HYDROELECTRIC PROJECT
FERC NO. 2997

Data Sources: Base Map - ArcGIS Online Streaming Layer (Imagery); Ferc Boundary - Yuba and Placer Counties GIS; Land Ownership - Yuba and Placer Counties CD-Data; Botanical Survey Area, Non-native Plant Species - HDR. Map information was compiled from the best available sources. No warranty is made for its accuracy or completeness.

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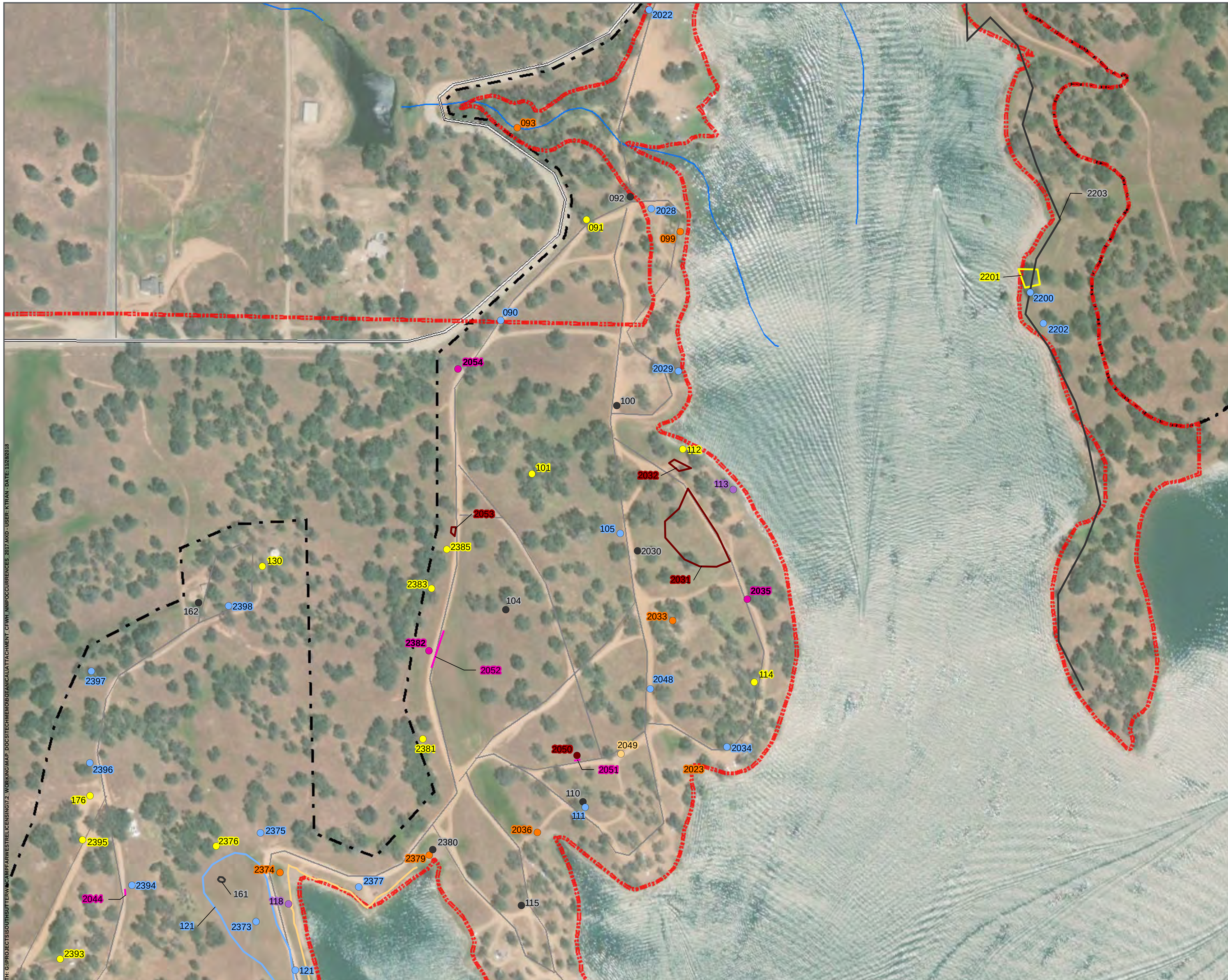

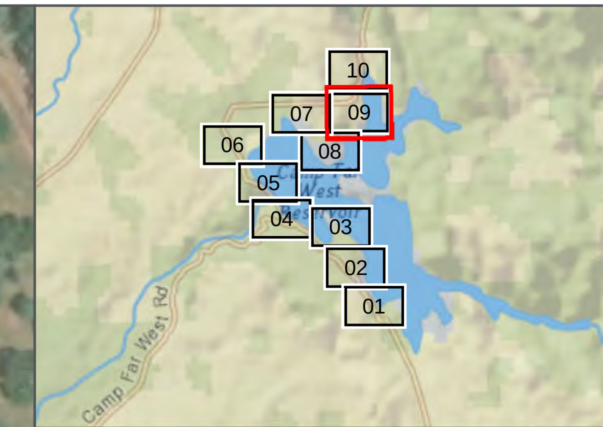

Project Features

Proposed FERC Boundary (No.2997)

Base Map

Study Area
County Line
Major Road
Minor Road
StreamRiver

Non-native Plant Species (NNIP)

Aegilops triuncialis (AEGTRI)
Carduus pycnocephalus (CARPYC)
Centaurea melitensis (CENMEL)
Centaurea solstitialis (CENSOL)
Chondrilla juncea (CHOJUN)
Cynodon dactylon (CYNDAC)
Elymus caput-medusae (ELYCAP)
Hypericum perforatum (HYPPER)
Aegilops triuncialis (AEGTRI)
Cynodon dactylon (CYNDAC)
Elymus caput-medusae (ELYCAP)
Carduus pycnocephalus (CARPYC)
Chondrilla juncea (CHOJUN)
Elymus caput-medusae (ELYCAP)
Hypericum perforatum (HYPPER)

N

0 150 300 600 Feet
0 45 90 180 Meters

NON-NATIVE INVASIVE PLANT SPECIES
CAMP FAR WEST HYDROELECTRIC PROJECT
FERC NO. 2997

Data Sources: Base Map - ArcGIS Online Streaming Layer (Imagery); Ferc Boundary - Yuba and Placer Counties GIS; Land Ownership - Yuba and Placer Counties CD-Data; Botanical Survey Area, Non-native Plant Species - HDR. Map information was compiled from the best available sources. No warranty is made for its accuracy or completeness.

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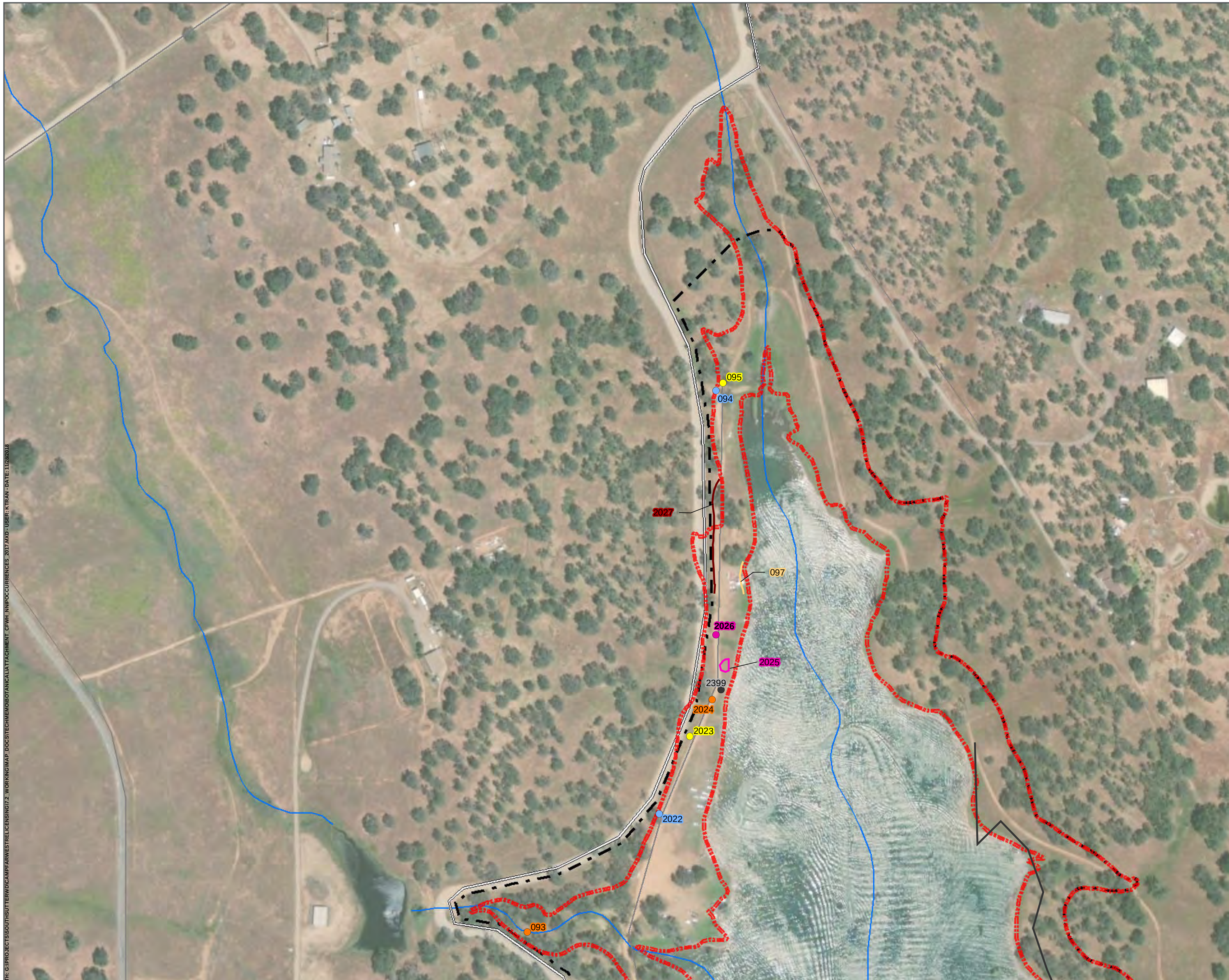

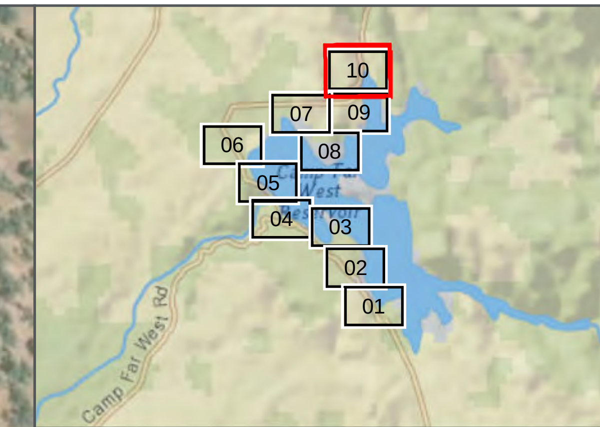

Project Features

Proposed FERC Boundary (No.2997)

Base Map

- Study Area
- County Line
- Major Road
- Minor Road
- StreamRiver

Non-native Plant Species (NNIP)

- *Aegilops triuncialis* (AEGTRI)
- *Carduus pycnocephalus* (CARPYC)
- *Centaurea solstitialis* (CENSOL)
- *Elymus caput-medusae* (ELYCAP)
- *Hypericum perforatum* (HYPPER)
- *Chondrilla juncea* (CHOJUN)
- *Cynodon dactylon* (CYNDAC)
- *Elymus caput-medusae* (ELYCAP)
- *Aegilops triuncialis* (AEGTRI)

0 150 300 600 Feet
0 45 90 180 Meters

NON-NATIVE INVASIVE PLANT SPECIES
CAMP FAR WEST HYDROELECTRIC PROJECT
FERC NO. 2997

Data Sources: Base Map - ArcGIS Online Streaming Layer (Imagery); Ferc Boundary - Yuba and Placer Counties GIS; Land Ownership - Yuba and Placer Counties CD-Data; Botanical Survey Area, Non-native Plant Species - HDR. Map information was compiled from the best available sources. No warranty is made for its accuracy or completeness.

Attachment 3.3.4C

NNIP Data Table

NNIP Species Code	Occurrence Number	Discrete / Widespread (D / W)	Concentrated / Diffuse (C / D)	Percent Cover (%)	Percent Phenology (Vegetative | Flower | Fruit | Senescent) (V | Flw | Frt | S)	Description	AREA
barbed goatgrass (*Aegilops triuncialis*)	2025	D	D	15	100 Flw	heavy rec use in area; from access road edge to OHWM; diffuse throughout; may extend beyond polygon.	NSRA
	2026	D	C	30	100 Flw	2 ft. x 2 ft. Small patch near seep at access road edge; heavy rec use.	NSRA
	2035	D	C	<1	100 Flw	small patch at piont, heavy rec use, rock outcrop adjacent.	NSRA
	2041	D	D	5	100 Flw	polygon has been mowed; small stature plants; heavy rec use.	NSRA
	2043	W	D	5	100 V	At OHWM and up into campsites; rec use throughout.	NSRA
	2044	D	D	<1	100 Flw	along access road, incorporated private area of campground.	NSRA
	2045	D	C	15	100 Flw	private mowed area into rec but facility uses area may be more widespread but because of mowing unable to see extent.	NSRA
	2051	D	C	5	100 Flw	1 ft. x 7 ft. Small patch along road; growing w/ CHOJUN 2050.	NSRA
	2052	D	C	5	100 Flw	1 ft. x 20 ft. narrow swath along road; heavy rec; both sides.	NSRA
	2054	D	C	5	100 Flw	1 ft. x 2 ft. small patch along road; heavy rec use.	NSRA
	2382	D	C	2	100 Frt/Dead	2 ft. x 2 ft. 3 individual plants.	NSRA
cheatgrass (*Bromus tectorum*)	076	D	C	10	75 Flw 25 V	5 ft. x 5 ft. growing around oak tree within shade/drip line adjacent to bathroom	NSRA
	077	D	D	2	75 Flw 25 V	throughout grass area of campground, within full sun areas, not under oaks	NSRA
	001	D	D	5	100 V	camping/ parking lot/restrooom	NSRA
	003	D	C	<1	100 V	camping/ parking lot/restrooom, clustered under oak	NSRA
	006	D	D	5	100 V	fairly larger number near shoreline, under oaks, rec disturbance	NSRA
	011	D	C	<1	100 V	under oak tree in grassy area with heavy rec use	NSRA
	012	D	C	5	100 V	under oak tree at water edge with heavy rec use	NSRA
	015	W	D	5	100 V	patches under every oak on hillslope, heavy rec use	NSRA
	016	D	C	5	100 V	patch at edge of drainage from under road, some rec use	NSRA
	018	W	D	<1	100 V	patches under every oak in area, rec use common	NSRA
	023	D	C	5	100 V	under oaks and around roads in shage in grassy area, roads, rec use, grazing	NSRA

NNIP Species Code	Occurrence Number	Discrete / Widespread (D / W)	Concentrated / Diffuse (C / D)	Percent Cover (%)	Percent Phenology (Vegetative | Flower | Fruit | Senescent) (V | Flw | Frt | S)	Description	AREA
	025	D	C	<1	100 V	3 plants, under oak in grassy area with rec use, road and cattle grazing	NSRA
	026	D	C	<1	100 V	more under oad and rec use, grazing and road	NSRA
	028	D	C	<1	100 V	under additional oaks near road; cattle grazing, rec use	NSRA
	032	D	C	20	100 V	5 ft. x 30 ft. adjacent to ditch, disturbed area	NSRA
	036	D	C	50	100 V	10 ft. x 10 ft.surrounding raised manhole, adjacent to waste pond	NSRA
	038	D	D	10	100 V	20 ft. x 10 ft. growing around rock outcrop	NSRA
	039	W	D	10	100 V	40 ft. x 40 ft. growing around oak tree within shade/drip line	NSRA
	040	D	D	5	100 V	10 ft. x 20 ft. parallel to paved access road and ditch	NSRA
	042	D	C	30	100 V	20 ft. x 30 ft. growing around oak tree within shade/drip line	NSRA
	044	D	C	25	95 V 5 Flw	3 ft. x 8 ft. rock outcrop in day use area	NSRA
	048	D	D	5	100 V	20 ft. x 20 ft. near snag and rock outcrop	NSRA
	050	D	C	10	100 V	growing around most oak in grassland within drip/shade	NSRA
	053	D	D	15	50 Flw 50 V	growing around most oak in grassland within drip/shade	NSRA
	054	D	C	5	100 V	growing around most oak in grassland within drip/shade	NSRA
	057	D	C	50	100 V	5 ft. s 5 ft. growing around most oak in grassland within drip/shade	NSRA
	059	D	C	100	100 V	1 ft. x 2 ft. at base of oak, within campground	NSRA
	061	D	C	100	100 V	edge of campground, adjacent to asphault parking lot	NSRA
	062	W	C	15	100 V	under oaks and adjacent to asphault parking lot	NSRA
	064	W	D	10	100 V	in camprgound, adjacent to boak ramp and restroom bldg.	NSRA
	066	W	C	30	100 V	2 ft. x 150 ft. adjacent to sidewalk leading to boatramp, in landscape area within rocks and along ramp edges	NSRA
	071	W	C	5	100 V	small strip in asphalt parking lot, within other islands in parking lot	NSRA
	072	D	D	10	100 V	rock outcrops throughout campground, concentrated patches but otherwise diffuse, also growing at base of oak trees in shade/drip line	NSRA
	078	D	C	25	100 V	4 ft. x 10 ft. adjacent to restroom building	NSRA
	080	D	C	5	90 V 10 Flw	both sides of drainage	NSRA

NNIP Species Code	Occurrence Number	Discrete / Widespread (D / W)	Concentrated / Diffuse (C / D)	Percent Cover (%)	Percent Phenology (Vegetative | Flower | Fruit | Senescent) (V | Flw | Frt | S)	Description	AREA
	082	D	C	1	100 V	under large oaks shade/drip, at top of grassy hill, growing with another similar thistle.	NSRA
	085	D	C	5	95 V 5 Flw	growing around rock outcrop and dead tree and stumps	NSRA
	087	D	C	5	100 V	at wire fence on rock outcrop and between barbed fence and outside project road	NSRA
	091	D	C	40	100 V	single point for entire area; within dripline of most oaks; denser patches at some oaks	NSRA
	095	D	C	2	100 V	on edges of dirt road and uder oaks to end of path; patchy throughout area	NSRA
	101	D	C	5	100 V	in oak stand, within drip lines at base of most oaks	NSRA
	106	D	C	10	100 V	at edge of entrance gate to NSRA, along landscape bolders and edge of road; rock outcrops and drainages.	NSRA
	112	D	C	15	100 V	10 ft. x 5 ft. associated with ground squirrel burrows	NSRA
	114	D	C	20	90 V 10 Flw	15 ft. x 15 ft. under drip line of oaks	NSRA
	120	D	C	15	90 V 10 Flw	20 ft. x 10 ft. rock outcrop on edge of dirt road	NSRA
	125	D	C	5	90 V 10 Flw	burn pile area; within dripline of oaks in open areas; concentrated patches	NSRA
	130	D	D	2	100 V	under tree dripline of oaks adjacent to tank	NSRA
	147	W	C	5	5 V 95 Flw	mostly under trees or disturbed mounds/piles; common throughout grassland; grazing; can be thick in patches	SSRA
	155	D	C	60	5 V 95 Flw	Thick patch near reservoir edge in area with CARPYC, CENSOL; rec use	SSRA
	156	W	C	25	5 V 95 Flw	present under oaks at point and most oaks in view; concentrated patches with same rec use disturbance	SSRA
	160	D	C	30	90 V 10 Flw	within oak woodland dripline of trees,	NSRA
	165	D	C	1	90 V 10 Flw	under blue oak in dripline/shade	NSRA
	168	D	C	2	90 V 10 Flw	under blue oak in dripline/shade	NSRA
	171	D	C	5	80 V 20 Flw	along paved portion of road btwn road and barbed fence; adjacent ot culvert; 40x20	NSRA
	176	D	C	7	80 V 20 Flw	incorporation waste area from campground	NSRA
	179	W	D	75	100 Frt	Extended population via line, along road	DAM
	195	D	C	2	80 V 20 Flw	concentrated patches under blue oak trees and along reservoir edge	SSRA

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Italian thistle (*Carduus pycnocephalus* ssp. *pycnocephalus*)	203	C	D	2	70 V 30 Flw	concentrated patches throughout area; adjacent to drainage and CFW Road	SSRA
	207	D	C	2	70 V 30 Flw	concentrated patches adj to drainage on both sides and under oaks	SSRA
	216	W	D	5	80 V 20 Flw	diffuse throughout grassland; concentrated patches	SSRA
	223	D	C	<1	80 V 20 Flw	concentrated patches under oaks and in middle of meadow	SSRA
	227	D	C	<1	90 V 10 Flw	concentrated patches under oaks and random individualsin middle of meadow and at CFW Road edge	SSRA
	230	D	C	5	60 V 40 Flw	within drip line of large oak trees in concentrated patches	SSRA
	234	W	D	5	80 V 20 Flw	concentrated patches, but diffuse throughout	SSRA
	236	D	C	1	70 V 30 Flw	concentrated patches within oak tree drip lines	SSRA
	242	D	C	5	60V 40 Flw	under trees	SSRA
	243	D	C	5	60V 40 Flw	concentrated under trees	SSRA
	245	D	C	8	50 V 50 Flw	under large group of oaks	SSRA
	248	D	C	2	50 V 50 Flw	under trees near road	SSRA
	251	D	C	5	60 V 40 Flw	another occurrence concentrated under oaks	SSRA
	252	D	C	5	50 V 50 Flw	under oaks near road	SSRA
	257	D	C	4	50 V 50 Flw	along opposite side of road under trees	SSRA
	258	D	C	5	50 V 50 Flw	near shoreline under trees, opposite of boat ramp	SSRA
	260	D	C	1	30 V 70 Flw	small patch under trees near to shoreline	SSRA
	263	D	C	5	50 V 50 Flw	another patch under trees near shoreline	SSRA
	264	D	C	6	60 V 40 Flw	concentrated under band of oaks	SSRA
	267	D	C	4	50 V 50 Flw	larger patch under oaks near shoreline	SSRA
	269	W	D	2	70 V 30 Flw	spread throughout oaks in area near shoreline	SSRA
	273	D	C	2	60 V 40 Flw	small patch under trees near to shoreline	SSRA
	274	D	C	1	50 V 50 Flw	under trees near shore	SSRA
	275	D	C	1	70 V 30 Flw	small patch in open at shoreline	SSRA
	278	D	C	1	50 V 50 Flw	under trees near shore	SSRA
	279	D	C	1	50 V 50 Flw	under trees near shore	SSRA
	280	D	C	3	60 V 40 Flw	patches under tree and in open near road	SSRA
	282	D	C	5	50 V 50 Flw	small patch under oak tree	SSRA
	283	D	C	5	60 V 40 Flw	small patch in open near trails	SSRA
	284	D	C	1	50 V 50 Flw	under a large oak	SSRA
	285	W	D	10	70 V 30 Flw	spread along a trail, mostly under trees	SSRA
	289	D	C	1	60 V 40 Flw	small patch under oaks	SSRA
	290	D	C	1	60 V 40 Flw	little patch under small oak	SSRA
	294	W	D	2	70 V 30 Flw	spread throughout grassland between t-line and road	SSRA

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	296	D	C	5	60 V 40 Flw	patch under larger patch of oaks	SSRA
	1102	D	D	5	50 V 50 Flw	Along hill slope	PH
	1107	W	D	30	50 V 50 Flw	20' x 20'	DAM
	1113	D	D	10	50 V 50 Flw	20' X 20'; under tree, around rocks	DAM
	1114	W	D	10	50 V 50 Flw	10' X 10'	DAM
	1115	W	D	5	50 V 50 Flw	10' X 50'+; along roadside	DAM
	1122	W	D	10	50 V 50 Flw	5' x entire roadway; continues down dam face	DAM
	1125	W	D	5	50 V 50 Flw	Along dam access road	DAM
	1133	D	C	10	90 V 10 Flw	Rock outcrops on east side of bridge; concentrated patches throughout fenced off area north of road	DAM
	1140	D	C	20	80 V 20 Flw	Densely concentrated population in rock outcrop, south side of road and west of bridge	DAM
	1149	D	C	3	70 V 30 Flw	CFW Road, east side, adjacent to barbed fence and other side of fence (towards reservoir); none found towards the reservoir	DAM
	1150	D	C	2	75 V 25 Flw	In rock outcrops, close to edge of water	DAM
	1157	D	C	<1	90 V 10 Flw	1' x 3'; discrete patch	DAM
	1158	W	D	1	75 V 25 Flw	Concentrated patches, widespread throughout from this point towards curve in road	DAM
	1162	C	D	<1	90 V 10 Flw	Concentrated patches, diffuse throughout	DAM
	1297	D	D	10	50 V 50 Flw	At the base of the dam, approx 100 feet from the Power House	PH
	1301	D	C	1	100 V	Throughout lower field; Hydro station	PH
	1303	D	D	1	100 V	near small seasonal drainage	DAM
	1304	W	D	5	100 V	hillslope adjacent to the dam	DAM
	1306	D	C	5	100 V	small 10x10 population adjacent to McCourtney Road	DAM
	1318	W	C	50	50 V 50 Flw	Adjacent to TL and under drip line of oaks	SSRA
	1321	D	D	15	50 V 50 Flw	Small 5x5 patch under TL	SSRA
	1323	D	D	5	50 V 50 Flw	Small 5x5 patch under TL and within open ELYCAP area	SSRA
	1325	D	D	10	50 V 50 Flw	10x10 patch under the dripline of oaks and adjacent to small stock pond	SSRA
	1330	D	D	15	50 V 50 Flw	large 30x20 population at the intersection of McCourtney Road and SSRA entrance	SSRA
	1331	D	D	10	50 V 50 Flw	very large population 80x10 just south of intersection of McCourtney Road and SSRA entrance	SSRA
	1335	W	D	10	100% S	large 25x25 population adjacent to McCourtney Road	SSRA

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	1337	D	D	10	100% S	adjacent to McCourtney Road	SSRA
	1338	D	D	5	100% S	adjacent to McCourtney Road	SSRA
	1341	D	D	5	100% S	adjacent to McCourtney Road	SSRA
	1342	D	D	5	100% S	adjacent to McCourtney Road	SSRA
	1344	D	D	10	100 V	small 5x5 population under the dripline of oaks	SSRA
	1348	D	C	15	50 V 50 Flw	large 10x20 population directly under the TL	SSRA
	1349	W	D	40	50 V 50 Flw	Very large 70x30 population under the dripline of oaks	SSRA
	2018	D	C	30	100 S	50 ft. x 50 ft. larger dead, seeded population under oak near road.	DAM
	2019	W	D	20	100 Frt/S	160 ft. line, in ditch along road, x 1 ft.	PH
	2023	D	C	<1	100 Frt/S	2 ft. x 2 ft. Sm patch @ road outcrop @ access road edge; heavy rec use; extends along road.	NSRA
	2047	W	C	20-40	100 Flw/S	under all oaks in shade line - little rec use in area	NSRA
	2201	W	C	60	100 Flw	concentrated under shoreline oak trees	NSRA
	2303	D	D	5	100 S	5 ft. x 5 ft.	NSRA
	2305	D	D	15	100 Frt/S	24.88 square meters.	NSRA
	2307	D	D	10	100 Frt/S	5 ft. x 5 ft.	NSRA
	2316	D	C	20	50 Frt 50 S	10 ft. x 10 ft. under oak.	NSRA
	2318	D	D	20	50 Frt 50 S	5 ft. x 5 ft.	NSRA
	2322	D	C	50	50 Frt 50 Dead	10 ft. x 4 ft.	NSRA
	2324	D	C	50	50 Frt 50 Dead	30.3 meter line along fenceline	NSRA
	2328	D	C	15	100 Frt	30 ft. x 30 ft. Under oak tree.	NSRA
	2330	D	C	5	100 Frt	5 ft. x 5 ft. Under oak tree.	NSRA
	2331	D	C	30	100 Frt/Dead	30 ft. x 30 ft.	NSRA
	2334	D	C	20	100 Frt/Dead	25 ft. x 25 ft.	NSRA
	2337	D	D	10	100 Frt/Dead	10 ft. x 10 ft.	NSRA
	2338	D	C	35	100 Frt/Dead	20 ft. x 20 ft.	NSRA
	2340	D	C	30	100 Frt/Dead	30 ft. x 30 ft. Under 3 oaks.	NSRA
	2341	D	D	15	100 Frt/Dead	20 ft. x 20 ft.	NSRA
	2352	D	D	1	100 Frt/Dead	10 ft. x 10 ft. 1 plant.	NSRA
	2355	D	C	20	100 Frt/Dead	20 ft. x 15 ft. Under oak.	NSRA
	2357	D	D	5	100 Frt/Dead	30 ft. x 10 ft.	NSRA
	2366	D	C	--	100 Frt/Dead	33.66 meters along road, in patches.	NSRA
	2367	D	C	50	100 Frt/Dead	20 ft. x 20 ft. Under oaks.	NSRA
	2368	D	C	50	100 Frt/Dead	20 ft. x 20 ft. Under oaks.	NSRA
	2371	D	C	--	100 Frt/Dead	25.19 meters along road in patches.	NSRA
	2376	D	C	25	100 Frt/Dead	25 ft. x 25 ft.	NSRA
	2381	D	C	5	100 Frt/Dead	30 ft. x 10 ft. Under oaks - small populations.	NSRA
	2383	D	C	5	100 Frt/Dead	10 ft. x 10 ft. ~ 10 individuals.	NSRA
	2385	D	C	15	100 Frt/Dead	25 ft. x 25 ft. ~ 50 individuals.	NSRA
	2387	D	C	15	100 Frt/Dead	50 ft. x 50 ft.	NSRA
	2388	D	C	10	100 Frt/Dead	1 ft. x 1 ft. 1 individual plant.	NSRA

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	2391	D	C	30	100 Frt/Dead	5 ft. x 5 ft.	NSRA
	2392	D	C	25	100 Frt/Dead	25 ft. x 20 ft.	NSRA
	2393	D	C	20	100 Frt/Dead	5 ft. x 20 ft. Along fence line, between oaks.	NSRA
	2395	D	C	90	100 Frt/Dead	2 ft. x 2 ft. ~ 3 individuals.	NSRA
Maltese starthistle (*Centaurea melitensis*)	035	D	D	20	100 V	5 ft. x 20 ft. at culvert near ditch, adj to waste pond, on both sides of culvert crossing	NSRA
	049	D	D	1	100 V	near snag and rock outcrop	NSRA
	079	D	C	10	100 V	both sides of drainage	NSRA
	113	D	C	15	100 V	5 ft. x 5 ft. at water line	NSRA
	118	D	C	5	100 V	discrete patches on edge of dirt oradk; mostly basal leaves	NSRA
	013	D	C	<1	100 V	scatterd at the waters edge, heavy rec use	NSRA
	009	D	C	<1	100 V	small patch in grassy area, heavy rec use	NSRA
	017	D	C	<1	100 V	small patch near small drainage, with rec use, <10 plants	NSRA
	029	D	C	<1	100 V	small patch just below road and above drainage in grassland, grazing, rec use, road	NSRA
	043	D	C	5	100 V	5 ft. x 5 ft. rock outcrop in day use area	NSRA
	055	D	C	?	100 V	early veg (basal veg only seen), adjacent to paved road	NSRA
	075	D	C	2	100 V	at edge of paved campground, diffuse throughout ditch at edge of road	NSRA
	093	D	C	5	100 V	2 ft. x 5 ft. next to drainage; localized in one spot; several patches along creek edge	NSRA
	099	D	C	2	100 V	along edge or reservoir; diescret and concentrated patches between dirt road and reseroir edge.	NSRA
	123	W	D	80	50 V 50 Flw	6.1 ac. Remapped polygon, entire dam face.	DAM
	148	D	C	<1	100 V	small ptach near raised mond I ngrassland; evidence of grazing; roads, rec use; approx 50 plants	SSRA
	150	D	C	30	100 V	motly on side of fence next to road, but gegin to spread into rec area, roaduse, some CARPYC	SSRA
	154	D	C	<1	100 V	a few plants in patch near edge of reservoir in grassland; rec use	SSRA
	172	D	C	5	100 V	overlap with CARPYC171; larger area; previously mowed.	NSRA

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yellow starthistle (*Centaurea solstitialis*)	196	D	C	1	100 V	concentrated patches ; esp at edge of reservoir	SSRA
	202	C	D	50	50 V 50 Flw	btwn barbed fence and CFW Road	SSRA
	208	D	C	1	100 V	concentrated patches adj to drainage on both sides and under oaks	SSRA
	218	D	C	<1	100 V	concentrated patches; along drainage; also concentrated patches along edge of CFW Road	SSRA
	266	W	d	<1	100 V	scattered in an occurrence near shoreline	SSRA
	1023	D	C	5	100 V	culvert on lakeside of road; 5x5 area surroundingculvert	NSRA
	1101	D	C	1	100 V	Along hill slope	PH
	1105	W	D	75	50 V 50 Flw	Extended population via line, along road	DAM
	1117	W	D	20	50 V 50 Flw	2 ac along hillside, remapped old point.	DAM
	1118	W	D	25	50 V 50 Flw	Line 1,257 ft. extended point via line, along all road.	DAM
	1120	W	D	25	50 V 50 Flw	remapped/expanded via line	DAM
	1123	W	D	10	100 V	5' x entire roadway; continues down dam face	DAM
	1128	W	D	5	100 V	Along roadside - throughout west of bridge to bridge north side of road	DAM
	1131	W	D	20	100 V	From bridge going east along roadside, north of road	DAM
	1138	W	D	2	100 V	Dense patches along roadside on south side, east of bridge	DAM
	1142	C	D	10	100 V	Densely concentrated population in rock outcrop, south side of road and west of bridge, more along roadside, concentrated patches, widespread throughout	DAM
	1145	W	D	75	50 V 50 Flw	change to line; concentrated along access road; heavy rec use.	DAM
	1159	C	D	5	75 V 25 Flw	Concentrated patchfrom this point towards curve in the road	DAM
	1296	D	C	1	100 V	small concentrated patches between edge of reservoir and dirt road	NSRA
	1300	W	D	10	100 V	Found throughout the lowerfield adjacent to the Power House	PH
	1305	W	D	25	50 V 50 Flw	230 ft, remapped as a line	DAM
	1329	D	D	10	--	area at the junction of McCourtney road and SSRA entrance	SSRA
	1332	D	D	10	100 V	large 80x10 population along the roadside	SSRA
	1351	D	D	10	100 V	small 10x10 population under the drip line of oaks	SSRA
	2000	D	C	70	100 V	15 ft x 60 ft. Concentrated patch along roadside/fence	DAM

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	2004	W	D	20	100 V	10 ft. x 362 ft. Mapped via line, along back side of levee.	DAM
	2004	W	C	20	100 V	extend point into line - concentrated along access road.	DAM
	2007	W	D	10	100 V	lines 2 track/cow trail.	DAM
	2010	W	D	25	50 V 50 Flw	230 ft. x 2 ft.	DAM
	2016	D	D	16	50 V 50 Flw	50 ft. x 50 ft. small patch along road.	DAM
	2024	D	C	30	95 V 5 Flw	15 ft. x 15 ft. At rock outcrop; disturbed area; heavy rec use. ELYCAP throughout.	NSRA
	2033	D	C	50	100 V	Concentrated patch at backwater cove. ELYCAP surrounds heavy rec use.	NSRA
	2036	D	C	30	95 V 5 Flw	mixed with CENMEL, heavy rec use at backwater cove.	NSRA
	2037	D	C	40	100 V	concentrated patch, heavy rec use.	NSRA
	2038	D	C	20	100 V	patch at water and scattered throughout campsite, rec use.	NSRA
	2039	D	C	<1	95 V 5 Flw	2 ft. x 2 ft. Small patch in between mowed area and campsites; heavy rec use; all campsites mowed.	NSRA
	2040	D	C	15	100 V	extends around point ~ 20 ft. from OHWM. Diffuse, patchy; heavy rec use - area mowed; new CENSOL growth since mowing.	NSRA
	2301	D	D	3	50 Flw 50 Frt	80 ft. x 10 ft.	NSRA
	2309	D	D	5	50 Flw 50 Frt	5 ft. x 10 ft.	NSRA
	2311	D	C	20	50 Flw 50 Frt	20 ft. x 15 ft.	NSRA
	2312	W	C	30	50 Flw 50 Frt	213.6 square meters. In Ipad.	NSRA
	2325	D	C	25	50 Flw 50 Frt	16.4 meter line along fenceline.	NSRA
	2342	W	D	--	50 Flw 50 Frt	46.62 meter line along roadside	NSRA
	2344	W	D	--	50 Flw 50 Frt	41.08 meter line one side of entrance road.	NSRA
	2345	W	D	--	50 Flw 50 Frt	40.82 meter line other side of entrance road.	NSRA
	2350	W	C	50	50 Flw 50 Frt	80 ft. x 40 ft.	NSRA
	2353	D	C	40	50 Flw 50 Frt	10 ft. x 15 ft.	NSRA
	2354	D	D	10	50 Flw 50 Frt	40 ft. x 40 ft.	NSRA
	2358	W	C	40	50 Flw 50 Frt	1551 square meters.	NSRA
	2360	D	D	10	50 Flw 50 Frt	15 ft. x 10 ft.	NSRA
	2363	D	C	40	50 Flw 50 Frt	20 ft. x 20 ft.	NSRA
	2365	D	C	70	50 Flw 50 Frt	60 ft. x 10 ft. Along road.	NSRA
	2369	D	D	60	50 Flw 50 Frt	30 ft. x 30 ft.	NSRA
	2374	D	C	75	75 Flw 25 Frt	50 ft. x 30 ft.	NSRA
	2379	D	C	60	70 Flw 30 Frt	12 ft. x 5 ft.	NSRA

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rush skeletonweed (*Chondrilla juncea*)	128	D	C	1	100 V	concentrated patch in rock outcrop - approx 12 plants; no poly taken-GPS not woking; plants young, more plants possible at later date	NSRA
	163	D	C	5	100 V	diffuse; all vegetative; between road and drainage	NSRA
	170	W	D	20	100 V	extend/expand polygon - extends downslope to CFW road.	NSRA
	194	W	D	<1	100 V	417 square meters. southern most edge of project boundary; make shift boat ramp; approx 50 plants	SSRA
	200	C	D	<1	100 V	adjacent to ELYCAP199	SSRA
	204	D	C	2	100 V	diffuse population	SSRA
	211	D	C	2	100 V	possibly connects to CHOJUN204	SSRA
	213	D	D	<1	100 V	small concentrated pop; approx 12 plants	SSRA
	214	D	C	10	100 V	large pop	SSRA
	219	D	C	1	100 V	concentrated patches along road and drainage	SSRA
	225	D	C	<1	100 V	one plant visible: GPS'd, pulled out, and bagged to take with us; more plants visible, but only a point was taken	SSRA
	1024	D	C	1	100 V	rock outcrop in open grassland area used for grazing and canada goose community nest area	NSRA
	1110	W	D	2	100 V	5' X 10'	DAM
	1116	D	C	5	100 V	100'+; along roadside	DAM
	1124	W	D	10	100 Flw	~ 200 ft. extended via line x 2 ft.	DAM
	1126	W	D	20	100 Flw	Line 94 ft. Fence.	DAM
	1147	C	D	20	100 V	3 ft. x 5 ft. Concentrated patch adjacent to barbed wire fence on east side	DAM
	1155	D	C	<1	100 V	6 plants at edge of gravel/road side	DAM
	2002	D	C	10	25 Flw 75 V	5 ft. x 5 ft. 3 large individuals near boulder along fence.	DAM
	2003	W	D	6	100 V	Individuals spread throughout peninsula.	DAM
	2008	D	C	15	100 Flw	5 ft. x 5 ft. Small cluster near gate ~100 ft. from bridge.	DAM
	2012	W	D	5	100 V	2 ft. x 51 ft. Scattered through grass, mapped line.	DAM
	2013	W	D	10	100 V	Scattered in rocks along reservoir.	DAM
	2015	W	D	15	100 Flw	5 ft. x 100 ft. small line near metal outbox	DAM
	2021	D	D	5	100 Flw	small concentrated patch on parking flat	PH
	2027	D	D	15	100 V	along both sides of access road - more concentrated upslope side of wash, but extends to OHWM; heavy rec use.	NSRA
	2031	W	D	5	100 V	Patchy w/in poly; heavy rec use in area. Diffuse overall, concentrated patches.	NSRA

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	2032	D	C	5	100 V	Small area, diffuse. Heavy rec use.	NSRA
	2042	D	C	<1	100 V	1 plant. Single plant at rock outcrop - area previously mowed.	NSRA
	2046	D	C	<1	100 V	1 plant in mowed private area - may be more widespread	NSRA
	2050	D	C	<1	100 V	1 ft. x 1 ft. single plant growing w/ AEGTRI 2051.	NSRA
	2053	D	C	15	100 V	small patch; diffuse throughout; heavy use.	NSRA
	2327	D	C	5	100 Dead	50 ft. x 30 ft.	NSRA
bindweed (*Convolvulus arvensis*)	2001	W	D	30	100 Flw	8 ft x 100 ft. Woven throughout grass on roadside.	DAM
Bermudagrass (*Cynodon dactylon*)	019	W	D	<1	100 V	line along shoreline edge, rec use heavy	NSRA
	041	W	C	5	100 V	extend line along arm of reservoir.	NSRA
	068	D	C	100	100 V	at edge of road to boatramp, between road and waterline, between boat ramp and waterline	NSRA
	069	W	D	40	100 V	at edge of boatramp, throughout edge of campground to reservoir edge, at OHWM and below	NSRA
	073	D	C	7	100 V	along wateredge	NSRA
	097	D	C	25	100 V	in area at edge of water; open area with recreation; occurs along most of reservoir edge at OHWM and lower	NSRA
	108	D	D	2	100 V	adjacent to edge of reservoir at jetski cove and barbed wire boundary	NSRA
	116	D	C	10	100 V	reserved site; at water edge	NSRA
	117	D	C	5	100 V	edge of grassland	NSRA
	117	D	D	5	100 V	extend line around cove. High water and below.	NSRA
	151	W	C	<1	100 V	disturbed soil	SSRA
	157	W	D	60	100 V	rec use, veg management	SSRA
	164	D	C	7	100 V	drainage; both sides of road	NSRA
	220	D	C	<1	100 V	middle of dirt road	SSRA
	232	D	C	1	100 V	along water's edge w/ no other vegetation	SSRA
	235	D	C	5	100 V	areas surrounding drainage, associated with Carex sp. and large Juncus, curly doc	SSRA
	238	D	C	<1	100 V	competitors; near edge of water	SSRA
	250	W	C	<1	100 Fr	all along the shoreline in a thin band	SSRA
	1121	W	D	50	100 V	3' x 1000'+; along edge of entire road	DAM
	1129	D	C	10	95 V 5 Flw	Rock outcrops in fenced off area north side of road	DAM

NNIP Species Code	Occurrence Number	Discrete / Widespread (D / W)	Concentrated / Diffuse (C / D)	Percent Cover (%)	Percent Phenology (Vegetative | Flower | Fruit | Senescent) (V | Flw | Frt | S)	Description	AREA
	1139	W	D	5	50 V 50 Flw	Dense in rip-rap and slope east of bridge, south side of roadside	DAM
	1153	D	C	1	80 V 20 Flw	Along roadside at edge of asphalt	DAM
	1163	C	D	<1	90 V 10 Flw	At edge of asphalt of Camp Far West Road (west side); 1 foot wide at edge	DAM
	1295	D	D	30	100 V	At base of the dam, just beyond the powerhouse	DAM
	2049	D	C	<1	100 V	1 ft. x 1 ft. Small patch at access road edge; heavy rec in area.	NSRA
	007	D	D	<1	100 Flw	spread into grassy area near store and parking lot, rec disturbance	NSRA
	008	D	D	5	50 V 50 Flw	in grassy area with lots of rec use	NSRA
	021	W	D	20	50 V 50 Flw	rec use, roads, throughout grass area near rec site, grassy	NSRA
	024	W	D	20	50 V 50 Flw	large numbe rin grassland near old road and t-line, grazing	NSRA
	030	D	C	<1	100 Flw	small pacth (10 plants) road, grazing, rec use	NSRA
	031	D	C	<1	100 Flw	few plants on roadside, rec use, road use, grazing, grassy	NSRA
	034	W	D	22	50 V 50 Flw	in veg in center of road	NSRA
	046	W	D	32	50 Flw 50 V	throughout grassland, between dirt and paved road	NSRA
	083	W	D	15	50 V 50 Flw	widespread throughout grassland/slope area	NSRA
	086	W	D	2	80 V 20 Flw	throughout open grassland	NSRA
	088	W	D	5	80 V 20 Flw	throughout open grassland	NSRA
	092	W	D	2	70 V 30 Flw	single point for entire area; along side of dirt road of overflow camping	NSRA
	100	W	D	7	70 V 30 Flw	overflow camp dirt road intersection, in island where two roads meet.	NSRA
	103	W	D	2	70 V 30 Flw	diffuse overall with concentrated patches in openings of oaks	NSRA
	104	D	C	2	70 V 30 Flw	concentrated patches in open areas of oak woodland	NSRA
	107	D	C	50	60 V 40 Flw	concentrated patches throughout area	NSRA
	109	W	D	6	70 V 30 Flw	open grassland adjacent to drainage and below main road to NSRA	NSRA
	110	W	C	5	70 V 30 Flw	throughout grassland ; difffuse overall with concentrated patches	NSRA
	115	W	C	15	60 V 40 Flw	throughout grassland; generally widespread; concentrated intermittent patches	NSRA
	119	D	C	2	80 V 20 Flw	discrete patches in widspread area	NSRA
	122	D	C	2	80 V 20 Flw	rock outcrop in front of residental area and main NSRA access road	NSRA

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Medusahead (*Elymus caput-medusae*)	127	W	D	2	80 V 20 Flw	discrete patches throughout open grassland	NSRA
	145	W	D	25	100 Flw	rec area grassland along old roads/tracks; signs of grazing; widespread throughout area	SSRA
	149	W	D	10	100 Flw	continues into grassland of rec area; blue heron rookery nearby	SSRA
	153	W	D	10	100 Flw	in grassland of rec area, fairly heavy presence; some disturbance	SSRA
	159	W	D	1	70 V 30 Flw	concentrated patches in/near drainages	NSRA
	161	D	C	30	70 V 30 Flw	20 ft. x 30 ft. adjacent to drainage and oak stand in open grassland; discrete and concentrated patches	NSRA
	162	W	D	2	70 V 30 Flw	concentrated patches in widespread grassland; btwn oaks	NSRA
	166	D	C	5	70 V 30 Flw	concentrated patches in widespread grassland; btwn oaks	NSRA
	167	W	D	10	70 V 30 Flw	day use area adjacent oto boatramp	NSRA
	169	D	C	5	70 V 30 Flw	patchy, conentrated areas throughout grassland	NSRA
	175	W	D	2	70 V 30 Flw	concentrated patches in widespread grassland	NSRA
	198	C	D	1	70 V 30 Flw	concentrated patches; diffuse throughout	SSRA
	199	C	D	5	70 V 30 Flw	btwn line and interior oak and drainage; concentrated patches; diffuse throughout	SSRA
	205	W	D	10	70 V 30 Flw	concentrated patches throughout widespread grassland	SSRA
	210	D	D	5	70 V 30 Flw	concentrated patches; widesprread throughout	SSRA
	215	W	D	15	70 V 30 Flw	diffuse throughout grassland; possible camping area	SSRA
	221	W	D	5	70 V 30 Flw	meadow north of drainage and west of edge of reservoir; adjacent to dirt road	SSRA
	224	W	D	5	70 V 30 Flw	continuous from fence to edge of water with some concentrated patches	SSRA
	229	W	D	5	70 V 30 Flw	concentrated patches but widespread throughout meadow	SSRA
	233	D	C	10	70 V 30 Flw	concentrated patch between dirt road and edge of water. Also in concentrated patches in meadow between dirt road and fence on CFW Road	SSRA
	239	W	D	5	70 V 30 Flw	concentrated patches, diffuse throughout	SSRA
	241	D	C	10	70 V 30 Flw	concentrated patch under oaks	SSRA
	246	D	C	10	70 V 30 Flw	concentrated patch under oaks	SSRA
	247	W	D	5	70 V 30 Flw	concentrated patches, diffuse throughout area	SSRA
	253	W	D	5	70 V 30 Flw	more ELYCAP through area	SSRA
	255	W	D	5	70 V 30 Flw	more ELYCAP through area	SSRA

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	256	W	D	5	80 V 20 Flw	along roadside	SSRA
	261	W	D	10	70 V 30 Flw	spread throughout grasslands in areas	SSRA
	262	W	D	10	70 V 30 Flw	spread throughout grasslands in areas	SSRA
	268	W	D	10	70 V 30 Flw	spread throughout grasslands in area	SSRA
	270	D	C	1		small patch of grass	SSRA
	271	D	D	5	60 V 40 Flw	occurrence right near the tip of the recreation area	SSRA
	276	W	D	5	70 V 30 Flw	spread throughout open area along shoreline	SSRA
	277	D	C	1	70 V 30 Flw	concetrated under oaks	SSRA
	281	W	D	5	70 V 30 Flw	spread throughout open area along shoreline	SSRA
	286	W	D	5	70 V 30 Flw	spread throughout open area along shoreline	SSRA
	287	D	C	1	60 V 40 Flw	small patches under trees	SSRA
	288	W	D	5	70 V 30 Flw	spread throughout open area in interior grasslands	SSRA
	291	D	W	5	70 V 30 Flw	occurrence on interior along edge of rec area	SSRA
	292	W	D	5	70 V 30 Flw	spread under the transmission lines	SSRA
	293	W	D	2	70 V 30 Flw	spread throughout grasslands in area	SSRA
	1100	W	D	10	100 V	Throughout lower field; Hydro station	PH
	1104	W	D	5	100 V	Hill slope adjacent to dam	PH
	1127	W	D	10	100 V	Along dam access road	DAM
	1135	W	D	10	80 V 20 Flw	Entire area east of bridge and north of road	DAM
	1136	W	D	10	80 V 20 Flw	Concentrated patches, diffuse throughout, east and south of road	DAM
	1141	W	D	20	70 V 30 Flw	Densely concentrated population in rock outcrop, south side of road and west of bridge	DAM
	1144	W	D	30	100 V	CFW Road, west side, adjacent to residential; recently mowed along road	DAM
	1148	W	D	20	75 V 25 Flw	CFW Road, east side, adjacent to barbed fence and other side of fence (towards reservoir); all the way to the reservoir	DAM
	1154	W	D	10	75 V 25 Flw	Entire east side of Camp Far West Road	DAM
	1160	W	D	10	70 V 30 Flw	West side of Camp Far West Road (from curve)	DAM
	1298	W	D	15	100 V	widespread throughout grassland/slope area	PH
	1324	D	D	5	100 V	adjacent to stock pond	SSRA
	1326	D	D	10	80 V 20 Flw	large 100x20 area adjacent to stock pond	SSRA
	1333	D	D	5	80 V 20 Flw	along roadside, just south of McCourtney Road and SSRA entance intersection	SSRA

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	1336	D	D	5	80 V 20 Flw	adjacent to McCourtney Road	SSRA
	1340	D	D	15	80 V 20 Flw	adjacent to McCourtney Road	SSRA
	1346	W	D	30	80 V 20 Flw	large 50x20 area under the TL	SSRA
	1350	D	D	40	80 V 20 Flw	very large 120x70 area under the TL	SSRA
	2030	W	C	60	100 Flw	Clarkia revisit within population; nearby rec use.	NSRA
	2203	W	D	20	100 Frt	spread along shoreline.	NSRA
	2302	D	D	5	100 Frt	10 ft. x 10 ft.	NSRA
	2304	D	C	10	100 Frt	30 ft. x 10 ft.	NSRA
	2306	D	D	5	100 Frt	5 ft. x 10 ft.	NSRA
	2380	W	D	70	100 Frt/Dead	200 ft. x 100 ft.	NSRA
	2399	D	C	5	100 V	20 ft. x 20 ft. throughout area between water edge and road	NSRA
	002	D	C	<1	100 V	camping/ parking lot/restrooom, previous years blooms	NSRA
	004	D	C	<1	100 V	in grasses behind restroom, camping, fishing, rec. etc.	NSRA
	005	D	C	<1	100 V	in same field, same disturbances	NSRA
	010	D	C	<1	100 V	a few in small area of grass, heavy rec use	NSRA
	014	W	D	<1	100 V	scattered throughout grassy hillslope with heavy rec use	NSRA
	020	W	D	<1	100 V	scattered in grassy slope above small ????, <50 plants, rec use heavy, also old pavement	NSRA
	022	W	D	<1	100 V	scattered in grassy area across road from shoreline, rec use , grazing	NSRA
	027	D	C	<1	100 V	scattered in grassland and under oak, cattle grazing, rec use, road	NSRA
	033	W	D	20	100 V	throughout grassland, grazing	NSRA
	037	W	C	15	100 V	10 ft. x 20 ft. dead stocks, growing around rock outcrop	NSRA
	045	D	D	5	100 V	10 ft. x 20 ft. in ditch flowing into reservoir, backwater	NSRA
	047	W	D	5	100 V	throughout grassland area	NSRA
	051	W	D	10	100 V	growing throughout grassland, adjacent to culvert, grassy area	NSRA
	052	D	C	25	100 V	rock outcrop in distubed rec area	NSRA
	056	D	D	10	100 V	at campground, near campsites at edge of water	NSRA
	058	D	C	100	100 V	20 ft. x 5 ft. at campground, between oaks and throughout oak stand	NSRA
	060	D	C	100	100 V	edge of campground	NSRA
	063	W	D	100	100 V	groing within oak stand, adjacent to boat ramp area	NSRA
	065	W	D	50	100 V	in camprgound, adjacent to boak ramp and restroom bldg.	NSRA

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	067	D	C	50	100 V	2 ft. x 2 ft. in rock landscape at boat ramp	NSRA
	070	W	C	35	100 V	in dayuse area at waterline, between dirt road and waterline	NSRA
	074	W	C	5	100 V	throughout peninsula, concentrated patches throughout grassland	NSRA
	081	W	C	2	100 V	concentrated at mappped point to diffuse or no cover throughout campground	NSRA
	084	W	D	1	100 V	patchy and diffuse throughout grassland	NSRA
	089	D	C	5	100 V	5 ft. x 5 ft. small concentrated population	NSRA
	090	W	D	2	100 V	overflow camping area; dense patches along drainage edge, parking areas, dirt road edges	NSRA
	094	D	C	5	100 V	along campground dirt road at end of property; diffuse along road edge	NSRA
	1299	D	D	10	100 V	small 5x5 area at the base of the dam approx 100 feet from the Power House	PH
	102	W	C	8	100 V	adjacent ot CFW road and barbed wire fence border	NSRA
	105	D	C	3	100 V	along edge of access roadks; concentrated patches, diffuse overall. Open grassy areas in oak woodland	NSRA
	111	W	C	5	100 V	throughout grassland ; difffuse overall with concentrated patches	NSRA
	1320	D	C	20	100 V	15x15 area within a grove of oaks	SSRA
	121	W	D	1	100 V	concentrated patches at edge of road, widespread throughout	NSRA
	126	W	D	2	100 V	discrete patches throughout open grassland	NSRA
	1327	W	D	15	--	large 100x20 area between poles AO-14 and AO-13	SSRA
	129	W	D	1	100 V	underdripline of oak stand	NSRA
	1334	D	D	5	100 S	adjacent to McCourtney Road	SSRA
	1339	D	D	5	100 S	adjacent to McCourtney Road	SSRA
	1343	D	D	10	100 V	small 5x5 area adjacent to McCourtney Road	SSRA
	1345	D	D	10	100 V	small 5x5 area adjacent to McCourtney Road	SSRA
	146	W	D	30	100 V	in rec area grasslands along with ELYCAP and CARPYC; grazing	SSRA
	1347	D	D	2	100 V	large 40x20 area beneath TL	SSRA
	152	W	D	<1	100 V	more found in grassland of SSRA; grassland	SSRA
	158	W	D	1	100 V	grassy area; some concentrated patches; new growth in oak stand	NSRA
	173	D	C	5	100 V	overlap with CARPYC171; larger area; CENSOL 172.	NSRA

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Klamathweed (*Hypericum perforatum*)	174	D	C	10	95 V 5 Flw	rock outcrop in middle of grassland; concentrated patches in widespread area	NSRA
	197	D	C	<1	80 V 20 Flw	concentrated patched under pine treees	SSRA
	201	C	D	<1	100 V	adjacent to CHOJUN 200	SSRA
	206	D	C	1	90 V 10 Flw	concentrated patches throughout	SSRA
	209	D	C	<1	100 V	small concentated populations near drainage and edge of water	SSRA
	212	D	D	1	100 V	concentrated pacht but spreds diffusly throughout	SSRA
	217	D	C	1	90 V 10 Flw	concentrated patches at reservoir edge; in and around drainage	SSRA
	222	D	C	<1	80 V 20 Flw	concentrated patches in middle of meadow describedin ELYCAP 221 and below road and water's edge	SSRA
	226	D	C	1	95 V 5 Flw	concentrated patches in meadow on both sides of drainage and along CFW Road	SSRA
	228	D	C	<1	100 V	at water's edge in concentrated patches or individual plants; in meadow in small patches	SSRA
	231	D	C	2	80 V 20 Flw	concentrated patches; diffuse throughout meadow	SSRA
	237	D	C	<1	90 V 10 Flw	concentrated patches, diffuse throughout	SSRA
	240	D	C	<1	90 V 10 Flw	small patch in open grassland	SSRA
	244	D	C	<1	90 V 10 Flw	a few patches under oaks	SSRA
	249	W	D	2	80 V 20 Flw	strung along near roadside	SSRA
	254	D	C	<1	90 V 10 Flw	small patch under oaks	SSRA
	259	W	D	2	80 V 20 Flw	strung along near roadside	SSRA
	265	W	D	1	80 V 20 Flw	strung along near roadside	SSRA
	272	D	W	2	90 V 10 Flw	occurrence near tip of the rec area	SSRA
	295	W	D	1	80 V 20 Flw	spread along the road in rec area	SSRA
	1302	D	D	5	50 V 50 Flw	found along the hillslope adjacent to the Power House	PH
	1103	D	D	1	100 V	Near water	PH
	1106	D	C	5	100 V	10' x 10'	PH
	1108	D	C	10	100 V	5' x 5'	DAM
	1109	D	D	1	100 V	2' x 2'	DAM
	1111	D	C	20	50 V 50 Flw	5' X 5'	DAM
	1112	D	D	3	50 V 50 Flw	10' X 20'	DAM
	1119	D	C	5	50 V 50 Flw	5' x 50'+; along roadside	DAM
	1130	D	C	15	85 V 15 Flw	15 ft. x 5 ft. Along fenced area between bridge and gate north of road	DAM
	1132	D	C	30	95 V 5 Flw	2 ft. x 3 ft. Rock outcrop east of bridge, along roadside, north of road	DAM
	1134	W	D	5	95 V 5 Flw	Concentrated patches, diffuse throughout	DAM

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	1137	W	D	10	95 V 5 Flw	Concentrated patches, diffuse throughout, east and south of road; concentrated in rock outcrops	DAM
	1143	C	D	2	80 V 20 Flw	Concentrated patch near rock outcrop	DAM
	1146	W	D	5	70 V 30 Flw	CFW Road, east side, adjacent to barbed fence and other side of fence (towards reservoir); in concentrated patches, diffuse throughout; east side and other side of fence (towards reservoir)	DAM
	1151	D	C	5	75 V 25 Flw	At water's edge, in cove	DAM
	1152	D	C	2	75 V 25 Flw	Rock outcrops in fenced off area north side of road; concentrated patches in rock outcrop	DAM
	1156	D	C	2	70 V 30 Flw	Concentrated patches along roadside, widespread throughout	DAM
	1161	C	D	1	70 V 30 Flw	Concentrated patches, diffuse throughout	DAM
	2005	D	C	6	100 Flw	10 ft. x 10 ft. 6 individuals tucked in blackberry.	DAM
	2006	W	D	8	100 Flw	50 ft. x 100 ft. just on edge of project boundary.	DAM
	2009	D	C	10	100 Flw	6 ft. x 6 ft. 3 plants.	DAM
	2011	D	C	5	100 Flw	5 ft. x 5 ft. Small patch near tailrace and large rocks on road.	DAM
	2014	W	D	67	100 Flw	adjacent to the lake side of the road	DAM
	2017	D	C	5	100 Flw	10 ft. x 10 ft. 5 individuals on drop off.	DAM
	2020	D	C	15	100 Flw	~10 plants up access road to powerplant.	PH
	2022	W	C	50	100 Flw	10 ft. x 20 ft. Along access road, both sides. Rec use heavy in area. CENSOL other side of boundary fence.	NSRA
	2028	W	D	10	100 Flw	diffuse to concentrated throughout grasslands; heavy rec use.	NSRA
	2029	W	D	20	100 Flw	Throughout grassland; heavy rec use in area, mixed with ELYCAP.	NSRA
	2034	W	D	60	5 V 95 Flw	Entire hillslope covered. Heavy rec use. ELYCAP throughout.	NSRA
	2048	W	D	20-60	5 V 95 Flw	throughout all grasslands; heavy rec in area.	NSRA
	2200	W	D	40	100 Flw	50 ft x 300 ft	NSRA
	2202	W	D	50	100 Flw	30 ft x 300 ft. Occurs along majority of shoreline.	NSRA
	2300	D	D	2	50 Frt 50 S	80 ft. x 10 ft. Along parking lot on mower tracks.	NSRA
	2308	D	D	2	100 Frt/S	50 ft x. 30 ft.	NSRA
	2310	D	D	10	50 Flw 50 Frt	5 ft. x 5 ft.	NSRA
	2313	D	D	10	50 Frt 50 S	20 ft. x 20 ft.	NSRA

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	2314	D	D	5	50 Frt 50 S	15 ft. x 10 ft.	NSRA
	2315	D	D	15	50 Frt 50 S	38.94 meter long line.	NSRA
	2317	W	D	5	50 Frt 50 S	250 ft. x 60 ft.	NSRA
	2319	W	D	10	20 Flw 80 Frt	200 ft. x 150 ft.	NSRA
	2320	D	D	5	50 Frt 50 Dead	25 ft. x 30 ft.	NSRA
	2321	D	D	2	50 Frt 50 Dead	30 ft. x 30 ft.	NSRA
	2323	W	D	3	10 Flw 90 Frt/Dead	100 ft. x 10 ft. Along fenceline.	NSRA
	2326	D	D	1	50 Frt 50 Dead	100 ft. x 40 ft.	NSRA
	2329	D	D	5	100 Frt/Dead	60 ft. x 20 ft.	NSRA
	2332	D	D	2	100 Frt/Dead	40 ft. x 10 ft.	NSRA
	2333	W	D	10	100 Frt/Dead	300 ft. x 200 ft.	NSRA
	2335	D	D	2	100 Frt/Dead	100 ft. x 30 ft.	NSRA
	2336	D	D	2	100 Frt/Dead	30 ft. x 10 ft. Under/near oaks.	NSRA
	2339	D	D	3	100 Frt/Dead	41.14 meter line along roadside.	NSRA
	2343	D	D	2	100 Frt/Dead	25 ft. x 10 ft.	NSRA
	2346	D	D	2	100 Frt/Dead	60 ft. x 10 ft.	NSRA
	2347	D	D	1	100 Frt/Dead	100 ft. x 20 ft.	NSRA
	2348	D	D	5	100 Frt/Dead	20 ft. x 20 ft.	NSRA
	2349	D	D	10	100 Frt/Dead	10 ft. x 15 ft.	NSRA
	2351	D	D	5	100 Frt/Dead	20 ft. x 30 ft.	NSRA
	2356	D	D	5	100 Frt/Dead	2016 square meters.	NSRA
	2359	D	D	5	100 Frt/Dead	40 ft. x 40 ft.	NSRA
	2361	D	D	2	100 Frt/Dead	150 ft. x 50 ft.	NSRA
	2362	D	D	2	100 Frt/Dead	50 ft. x 50 ft.	NSRA
	2364	W	D	--	15 Flw 85 Frt/Dead	43.73 meters along road	NSRA
	2370	W	D	--	100 Frt/Dead	35.63 meters along road	NSRA
	2372	W	D	--	20 Flw 80 Frt/Dead	42.24 meters along road.	NSRA
	2373	W	D	10	100 Frt/Dead	0.5914 HA (hectares). Associated with HYPPER 121	NSRA
	2375	W	D	5	100 Frt/Dead	200 ft. x 75 ft.	NSRA
	2377	D	C	5	100 Frt/Dead	10 ft. x 10 ft. ~ 10 plants.	NSRA
	2378	W	D	15	100 Frt/Dead	0.7436 HA.	NSRA
	2384	W	D	<5	100 Frt/Dead	1213 square meters.	NSRA
	2386	W	D	<10	100 Frt/Dead	1703 square meters.	NSRA
	2389	D	C	75	100 Frt/Dead	120 ft. x 30 ft.	NSRA
	2390	D	C	60	100 Frt/Dead	35 ft. x 50 ft. Under oak.	NSRA
	2394	W	D	<5	100 Frt/Dead	50 ft. x 50 ft. Open areas adjacent to oaks into road.	NSRA
	2396	W	D	20	100 Frt/Dead	20 ft. x 15 ft. ~ 10 plants.	NSRA
	2397	W	D	10	100 Frt/Dead	30 ft. x 30 ft.	NSRA
	2398	W	D	15	100 Frt/Dead	30 ft. x 30 ft.	NSRA
	186	W	D	10	100 Flw	remapped extent as line along road.	DAM

3.3.5 Threatened and Endangered Species

This section discusses species listed as threatened or endangered species under the ESA, and refers to those species as ESA-listed. First, and immediately below, is a list of ESA-related terms used in this section. Section 3.3.5.1 describes SSWD's informal consultation with USFWS and NMFS regarding ESA-listed species. Section 3.3.5.2 describes SSWD's actions to identify threatened and endangered species and their designated Critical Habitats that could potentially be affected by the proposed Project. In addition, this section includes a life history of each ESA-listed species addressed in this Exhibit E, including: 1) status and critical habitat; 2) discussion of the recovery plan for the species, if one has been issued; 3) current and historical distribution; 4) life history and habitat requirements; 5) stressors and limiting factors, if known; 6) the results of any species-specific relicensing studies performed by SSWD; and 7) known occurrence in the Action Area. Section 3.3.5.3 describes the Environmental Baseline for ESA-listed species under USFWS' jurisdiction (i.e., plant, invertebrate and amphibian species). Section 3.3.5.4 addresses Project effects on ESA-listed species under USFWS' jurisdiction. Section 3.3.5.5 lists the attachments to this section of Exhibit E.

SSWD augmented existing, relevant, and reasonably available information regarding ESA-listed species with information from five studies: 1) Study 3.1, *Salmonid Redd Study*; 2) Study 3.2, *Stream Fish Study*; 3) Study 5.1, *ESA-Listed Plants Study*; 4) Study 5.2, *ESA-Listed Wildlife – VELB Study*; and 5) Study 5.3, *ESA Listed Amphibians – California Red-legged Frog Study*. These studies are complete and the information is discussed below or in other sections of this document.

ESA-related terms used in this section are:

- Action Agency. For the purpose of ESA, FERC is considered the Action Agency.
- Non-Federal Representative. On May 13, 2016, FERC designated SSWD as its non-federal representatives for purposes of informal consultation under Section 7 of the ESA.[1]
- Consultation. On May 13, 2016, FERC initiated informal consultation with the USFWS and NMFS.[1]
- Proposed Action. For the purpose of ESA, the Proposed Action includes issuance by FERC of a new license to SSWD for the proposed Project, as described in this Application for New License.
- Action Area. Under ESA, an action area is defined as "*all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action*" (50 C.F.R. § 402.02). Direct effects are defined as "*the direct or immediate effects of the project on the species or its habitat*" (USFWS and NMFS 1998). Indirect effects are defined as "*those that are caused by the Proposed Action and are later in time, but still are reasonably certain to occur*" (50 C.F.R. § 402.02). The downstream extent of the action area is defined as the point where effects to river flow and habitat availability associated with the Proposed Action are no longer measurable (NMFS 2012). The Action Area for this Proposed Action is the proposed FERC Project Boundary for

[1] FERC Accession Number 20160513-3015

ESA-listed plants, insects, and amphibians. The Action Area for this Proposed Action is the confluence of the Bear and Feather rivers when considering ESA-listed anadromous fish and habitats.

- Environmental Baseline. For the purpose of ESA, the Environmental Baseline includes the past and present impacts of all federal, state, or private activities, and other human activities in the action area, as well as the anticipated impacts of all proposed federal projects in the Action Area that have already undergone formal or early ESA Section 7 consultation, and the impacts of state or private actions that are contemporaneous with the consultation in process (50 C.F.R. § 402.02). The Environmental Baseline includes effects attributable to the existence of dams or diversions over which the Action Agency (i.e., FERC) has no discretion, and non-discretionary operations and maintenance. This Environmental Baseline includes the continued operation and maintenance of the non-Project diversion dam, approximately 1-mi downstream of Camp Far West Dam.

- Effects. Under Section 7(a)(2) of the ESA, the federal action agency that permits, licenses, funds, or otherwise authorizes an action must consult with the NMFS and the USFWS, as appropriate, to ensure that the action will not jeopardize the continued existence of any ESA-listed species or adversely modify ESA-designated critical habitat, unless the federal action agency determines the action will have no effect on ESA-listed species (16 U.S.C. § 1536(c)).

  If the federal agency determines the action may affect ESA-listed species or designated critical habitat, it is required to prepare a BA for the Section 7 process to determine whether the action is likely to: 1) adversely affect listed species or designated critical habitat; 2) jeopardize the continued existence of species that are proposed for listing;[2] or 3) adversely modify proposed critical habitat. After reviewing the BA, NMFS or USFWS determines whether formal consultation or a conference is necessary (50 C.F.R. § 402.02, 50 C.F.R. § 402.12).

  When a federal action agency determines, through a BA or other review, that its action is not likely to adversely affect a listed species or designated critical habitat, the action agency must request NMFS' or the USFWS', as appropriate, concurrence on its determination. A not likely to adversely affect determination is appropriate and warranted when the action agency concludes that all of the effects of the action on the species and its critical habitat are expected to be "*insignificant*," "*discountable*" or "*completely beneficial*." According to the USFWS' and NMFS' *Endangered Species Consultation Handbook, Procedures for Conducting Consultation and Conference Activities Under Section 7 of the Endangered Species Act* (USFWS and NMFS 1998):

  > [i]nsignificant effects relate to the size of the impact and should never reach the scale where take occurs. Discountable effects are those extremely unlikely to occur. Based on best judgment, a person would not: (1) be able to meaningfully measure, detect, or evaluate insignificant effects; or (2) expect discountable effects to occur.

[2] "*Jeopardize the continued existence of*" under the ESA is defined as "*to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of the species*." (50 C.F.R. § 402.02)

Further, page 4-32 of the ESA Consultation Handbook states that:

> The Services can evaluate only the Federal action proposed, not the action as the Services would like to see that action modified.

If NMFS or USFWS, as appropriate, does not concur with the action agency's determination of "not likely to adversely effect," the action agency must request formal consultation or a conference. Similarly, when the action agency determines, through a BA or other review, that its action is "likely to adversely affect" a listed species or designated critical habitat, the action agency must submit a request for formal consultation to the NMFS or the USFWS, as appropriate.

There is a designated 90-day period for formal consultation to take place and, after that, another 45-day period for NMFS or USFWS, as appropriate, to prepare a biological opinion (i.e., a BO, also referred to at times as a BiOp). The ESA does not allow extension of the consultation period beyond 150 days without the applicant's[3] consent (16 U.S.C. § 1536(b)(1)(B)).

The BO presents NMFS' or USFWS', as appropriate, determination as to whether or not the proposed action would be likely to jeopardize the species or adversely modify its critical habitat. If NMFS or USFWS, as appropriate, issues either a no jeopardy opinion or a jeopardy opinion that contains Reasonable and Prudent Alternatives (RPA), the BO may include an incidental take[4] statement. NMFS or USFWS, as appropriate, must anticipate the quantity of take that may result from the action and authorize such take with a statement that the ESA-listed species described in the incidental take statement will not be jeopardized. The incidental take statement must contain clear terms and conditions designed to reduce the effect of the anticipated take; these terms are binding on the action agency.

- Interrelated and Interdependent Actions. Interrelated actions are actions that are part of a larger action and depend on the larger action for their justification. Interdependent actions are actions having no independent utility apart from the proposed action. (50 C.F.R. § 402.02.) If a particular activity would not occur "*but for*" the occurrence of the proposed federal action, the effects of that action are interdependent and interrelated to the federal action, and the effects of that action are attributable to the federal action for consultation purposes. To the contrary, activities that would occur anyway, with or without the occurrence of the federal action at issue, are not interdependent or interrelated to the proposed federal action. The ESA Consultation Handbook (USFWS and NMFS 1998) further clarifies that if a project would exist independently of a proposed action, it cannot be considered "*interrelated*" or "*interdependent,*" even if the proposed action is required to bring the existing facility into compliance with federal law. SSWD would continue to utilize Camp Far West Reservoir and dam to provide water storage and irrigation deliveries if there was no hydroelectric generation, so those activities and the existence of those facilities are independent of the Proposed Action.

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[3] For this Project, the "*applicant*" is SSWD. For consultation regarding the DEIS or BA, the "applicant" is FERC.

[4] "*Take*" is defined under the ESA to mean "*harass, harm, pursue, hunt, shoot would, kill, trap, capture or collect, or attempt to engage in any such conduct*." (16 U.S.C. § 1532). "*Harm*" in the definition of "*take*" as used in the ESA means an act which actually kills or injures fish or wildlife. Such an act may include significant habitat modification or degradation which actually kills or injures fish or wildlife by significantly impairing essential behavioral patterns, including, breeding, spawning, rearing, migrating, feeding or sheltering (16 U.S.C. § 222.102).

3.3.5.1 Informal Consultation with USFWS and NMFS

Beginning in early 2008, over 10 months prior to filing its NOI and PAD, SSWD began to meet with Relicensing Participants to familiarize them with the Project and its operations, discuss process, identify issues, and, most importantly, to collaboratively develop study proposals, including for species listed as threatened and endangered under the ESA. Since that time, SSWD has held numerous meetings to discuss process and study methods and results. USFWS and NMFS were each specifically notified of and invited to each meeting, and both agencies have participated in some of the meetings during which ESA related items were discussed. NMFS indicated it views such meetings as "technical advisory meetings."

The following provides a summary of SSWD's informal consultation with NMFS and USFWS regarding ESA-listed species.

- Pre-Initiation of Informal Consultation under Section 7 of ESA
  - May 7, 2015. SSWD mailed to NMFS a PAD information questionnaire requesting existing, relevant and reasonably available information in NMFS's possession regarding the Project and potentially affected resources.
  - May 13, 2015. SSWD mailed to USFWS a PAD information questionnaire requesting existing, relevant and reasonably available information in NMFS's possession regarding the Project and potentially affected resources.
  - March 13, 2016. SSWD filed with FERC and distributed to NMFS and USFWS its NOI and PAD. The PAD described existing, relevant and reasonably available information regarding ESA-listed species and other potentially affected resources.
- Post-Initiation of Informal Consultation under Section 7 of ESA
  - May 13, 2016. FERC initiated informal consultation with the USFWS and NMFS under Section 7 of ESA, and designated SSWD as its non-federal representatives for purposes of informal consultation under Section 7.
  - June 27, 2016. SSWD hosted a Project site visit. All agencies were invited. USFWS participated.
  - June 27, 2016. SSWD held a joint agency and public meeting to provide agencies, Indian tribes and members of the public an opportunity to discuss the information in the PAD, discuss data and studies to be developed by SSWD, and express their views regarding resource issues that should be addressed in SSWD's application for new license. Both USFWS and NMFS participated.
  - August 25, 2016. USFWS requested a 60-day extension from the NOI/PAD comment filing deadline of August 27, 2016. FERC and SSWD agreed with the extension.

- August 25, 2016. NMFS filed with FERC comments on SSWD's PAD, including SSWD's proposed studies. With regards to ESA-listed species under NMFS's jurisdiction, NMFS requested that SSWD add sturgeon spp. to the list of species that could potentially occur in the Action Area and that SSWD address green sturgeon in its application. Further, NMFS requested that SSWD conduct two new studies: one related to fluvial processes and channel morphology for anadromous fishes and one related to exploring the feasibility of new coldwater delivery systems for anadromous fishes.

- September 7, 2016. USFWS filed with FERC comments on SSWD's PAD, including SSWD's proposed studies. With regards to ESA-listed species under USFWS's jurisdiction, USFWS requested that SSWD add CRLF to the list of species that could potentially occur in the Action Area, and recommended an alternative CRLF study to the one proposed by SSWD.

- October 12, 2016. SSWD filed with FERC a letter that provided: 1) SSWD's rationale for adopting, adopting with modification, or not adopting requested study modifications and new studies; and 2) detailed plans for each of the 14 studies that SSWD now proposed to conduct.

- November 21, 2016. To resolve any remaining disagreements on studies, SSWD invited NMFS, USFWS and other agencies, and NGOs to meet. USFWS participated. At the conclusion of the meeting, SSWD agreed to modify its October 12, 2016, study plans. SSWD understood that these agreements resolved any outstanding study disagreements with those parties, including USFWS that attend the November 21 meeting.

- December 20, 2016. NMFS filed a letter with FERC commenting on SSWD's October 12, 2016, letter and requesting a meeting with FERC "*to discuss ESA consultation procedures including developing a shared understanding of the environmental baseline, including related structures such as CFW diversion dam in the analysis of the Project's effects*."

- January 9, 2017. SSWD commented on NMFS's letter stating it would be pleased to meet with NMFS at its convenience.

- January 9, 2017. SSWD filed a letter with FERC with each of the 16 study plans, including those agreed to at the November 21, 2016 meeting, and advised FERC that SSWD was undertaking these studies to support the relicensing. Each study plan is posted on SSWD's Camp Far West Relicensing Website at www.sswdrelicensing.com. The studies included: 1) 2.1, Water Temperature Monitoring; 2) 2.2, Water Temperature Modeling; 3) 2.3, Water Quality; 4) 3.1, Salmonid Redd; 5) 3.2, Stream Fish Populations; 6) 3.3, Instream Flow; 7) 3.4, Benthic Macroinvertebrates; 8) 4.1, Special-status Plants and Non-native Invasive Plants; 9) 4.2, Special-status Wildlife – Raptors; 10) 4.3, Special-status Wildlife – Bats; 11) 5.1, ESA-listed Plants; 12) 5.2, ESA-listed Wildlife – Valley Elderberry Longhorn Beetle; 13) 5.3, ESA-listed Amphibians – California Red-legged Frog; 14) 6.1, Recreation Use and Visitor Survey Study; 15) 10.1, Cultural Resources; and 16) 11.1, Tribal Interests.

- January 24, 2017. FERC responded to NMFS's letter stating that FERC does not participate in pre-filing activities under the TLP, and that NMFS may file a formal dispute regarding SSWD's proposed studies if NMFS "sees fit to do so." NMFS did not file a formal dispute.
- 2017 and 2018. SSWD conducted the relicensing studies. Beginning in April 2018, SSWD made the data and results from the relicensing studies available on SSWD's relicensing website. As new study results became available, SSWD alerted NMFS, USFWS, other agencies and other interested parties of the new information via email.
- June 5, July 16, July 23, September 20, October 18, and November 15, 2018. SSWD met with agencies and other interested parties to discuss relicensing study results, Project operations, water temperature and instream flow models, and lower Bear River aquatic resources. USFWS participated in most of the meetings; NMFS participated in only the September 20 meeting.
- August 16 and November 9, 2018. SSWD met with agencies and other interested parties to discuss vegetation management, wildlife, and recreation. USFWS participated in the meetings.
- December 31, 2018. SSWD distributed its draft Application for New License to USFWS, NMFS, and other agencies for review and comment.

3.3.5.2 ESA-listed Species and Critical Habitats Considered

3.3.5.2.1 Screening for Potentially-Affected ESA-listed Species

On August 25, 2015, SSWD generated a list of ESA-listed species by using USFWS' on-line IPaC (USFWS 2015). The IPaC query included a user-defined polygon that encompassed the existing FERC Project Boundary plus the reach of the Bear River that extends from Camp Far West Dam downstream to the Feather River confluence, and a 1-mi wide buffer around this entire area.

The resulting list included 11 species, with two listed as endangered and nine listed as threatened under ESA: four invertebrates; one amphibian; one reptile; four fishes; and one bird. These were:

- Endangered:
  - Conservancy fairy shrimp (*Branchinecta conservatio*)
  - Vernal pool tadpole shrimp (*Lepidurus packardi*) and Critical Habitat
- Threatened:
  - Vernal pool fairy shrimp (*Branchinecta lynchi*) and Critical Habitat
  - California red-legged frog (*Rana draytonii*) and Critical Habitat
  - Western yellow-billed cuckoo (*Coccyzus americanus occidentalis*), Western U.S. Distinct Population Segment (DPS)
  - Steelhead (*Oncorhynchus mykiss*), California Central Valley (CV) DPS and Critical Habitat

- ➢ Delta smelt (*Hypomesus transpacificus*)
- ➢ Valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*)
- ➢ Giant garter snake (*Thamnophis gigas*)
- ➢ Chinook salmon (*O. tshawytscha*), CV spring-run Evolutionarily Significant Unit (ESU) and Critical Habitat.
- ➢ Green sturgeon (*Acipenser medirostris),* North American Southern DPS

No candidate species or species proposed for listing were identified in this query result. An updated IPaC review on March 1, 2018 generated no additional species to the list (USFWS 2018a, Attachment 3.3.5A).

Following its IPaC query, SSWD searched several additional sources to identify other ESA-listed species that are known or have the potential to occur within the Project Vicinity. For fish and wildlife, the information sources included CDFW's California Natural Diversity Database (CNDDB, CDFW 2018a), the California Wildlife Habitat Relationships (CWHR, CDFW 2014), Camp Far West Biological Assessment (Sycamore Environmental 2013) and NMFS' and USFWS' recovery plans. For plants, CNPS' Inventory of Rare Plants (CNPS 2018a) was also queried for the Project Vicinity plus an additional buffer of one USGS quadrangle. SSWD also searched for and reviewed relevant and readily available reports (e.g., BAs, EIRs and EISs) and Critical Habitat designations that pertain to the Project Vicinity.

These additional searched identified four ESA-listed plant species with the potential to occur in the Project Vicinity. These are:

- <u>Endangered</u>:
  - ➢ Hartweg's golden sunburst (*Pseudobahia bahiifolia*)
  - ➢ Pine Hill flannelbush (*Fremontodendron decumbens*)
  - ➢ Stebbins' morning-glory (*Calystegia stebbinsii*)
- <u>Threatened</u>:
  - ➢ Layne's ragwort (*Packera layneae*)

No candidate species or species proposed for listing were identified in this additional search.

SSWD eliminated seven species from further analysis. These species and the rationale for exclusion are described below.

- Delta smelt
- Pine Hill flannelbush
- Stebbins' morning-glory
- Layne's ragwort
- Conservancy fairy shrimp

- Giant garter snake
- Western yellow-billed cuckoo

SSWD eliminated from further consideration the Delta smelt because this species does not occur in or near the Project Vicinity. The species is endemic to the Sacramento-San Joaquin estuary and historically was documented to only occur in the Sacramento River upstream to the vicinity of Knights Landing (USFWS 2016).

Due to the soil characteristics of the Project site, SSWD eliminated from further consideration three plant species Pine Hill flannelbush, Stebbins' morning-glory and Layne's ragwort due to the complete lack of required clay, gabbro, or serpentine soils. Additionally, Layne's ragwort is found at elevations of approximately 1,000 ft and above (Jepson Interchange 2018), while the Project's maximum elevation is 320 ft. The nearest known population of Stebbin's morning-glory to the Project is 11 mi away. The Pine Hill flannelbush and Layne's ragwort are more than 20 mi away from the Project (CDFW 2018a).

Effects on Conservancy fairy shrimp were not analyzed due to the lack of playa-like large vernal pools, which are their sole known habitat, within the proposed Project Boundary.

Effects on giant garter snake were not analyzed because the Project is outside the known range for this species, as defined by the recovery units outlined in the USFWS' (2017a) *Recovery Plan for the Giant Garter Snake (Thamnophis gigas)*.

Finally, the western yellow-billed cuckoo was not analyzed because the Project is located approximately 10 mi east of the USFWS' defined range for this species (USFWS 2018b).

Based on SSWD's searches, a total of eight species, two endangered and six threatened, could potentially be affected by the Proposed Action. No candidate or proposed for listing species are potentially affected. Table 3.3.5-1 describes for each of these ESA-listed species: 1) a description of the species' habitat requirements; 2) known or potential occurrences in the Project Vicinity; and 3) references to any recovery plans or status reports pertaining to that species.

Table 3.3.5-1. ESA-Listed species occurring or potentially occurring in the Project Vicinity.

Common Name (Scientific Name)	Suitable Habitat Type	Known or Potential Occurrence in Project Vicinity	Status[1]	Status Reports and Recovery Plans Relevant to Project Vicinity
PLANTS				
Hartweg's golden sunburst (*Pseudobahia bahiifolia*)	Valley and foothill grassland, cismontane woodland (CNPS 2018).	Present in quads (Knights Ferry and Yuba City) adjacent to the Project Vicinity, (CNPS 2018).	FE, SE & CRPR 1B.1	None
INVERTEBRATES				
Valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*)	Occurs only in the Central Valley and adjacent foothills up to 3,000 ft elevation in association with blue elderberry (*Sambucus* spp.) (USFWS 2017b).	Fourteen occurrences found on CNDDB near Project Vicinity; four occurrences within Sheridan quad, seven within the Browns Valley quad, two in Lake Combie quad, and one in Wheatland quad (CDFW 2018a).	FT	Recovery Plan (USFWS 1984)

Table 3.3.5-1. (continued)

Common Name (Scientific Name)	Suitable Habitat Type	Known or Potential Occurrence in Project Vicinity	Status[1]	Status Reports and Recovery Plans Relevant to Project Vicinity
INVERTEBRATES (cont'd)				
Vernal pool fairy shrimp (*Branchinecta lynchi*)	Endemic to grasslands of the Central Valley, Central Coast Mountains, and South Coast Mountains, in rain-filled pools (CDFW 2014).	Reported on the USFWS IPaC Trust Report (USFWS 2018a)	FT	Recovery Plan (USFWS 2005a)
Vernal pool tadpole shrimp (*Lepidurus packardi*)	Inhabits vernal pools and swales in the Sacramento Valley containing clear to highly turbid water (CDFW 2014).	Reported on the USFWS IPaC Trust Report (USFWS 2018a)	FE	Recovery Plan (USFWS 2005a)
AMPHIBIANS				
California red-legged frog (*Rana draytonii*)	Suitable habitat is located in deep (>0.7 m), still or slow-moving water within dense, shrubby riparian and upland habitats (Jennings and Hayes 1994).	Reported on the USFWS IPaC Trust Report (USFWS 2018a)	FT	Recovery Plan (USFWS 2002)
FISH				
Steelhead, California Central Valley DPS (*Oncorhynchus mykiss*)	Spawning occurs within the Sacramento and San Joaquin rivers and their tributaries (NatureServe 2017). Habitat conditions are not suitable to support a self-sustaining population in the Bear River; intermittent spawning may occur during high flow years (NMFS 2014).	Reported on the USFWS IPac Trust Report (USFWS 2018a). Critical Habitat designated in lower Bear River up to the Camp Far West Diversion Dam (70 FR 52488)	FT	Status Report (Busby et al. 1996; Good et al. 2005; NMFS 1997, 1998) Restoration and Management Plan (CDFG 1991, 1993; 1996a) Recovery Plan (NMFS 2014)
Chinook salmon, Central Valley spring-run ESU (*Oncorhynchus tshawytscha*)	Spawning occurs within the Sacramento River and its tributaries. Habitat conditions in the Bear River are not suitable for Chinook salmon spawning (PFMC 2014).	Occurs in the Feather River. Critical Habitat designated in the lower ~5 mi of the Bear River for intermittent non-natal juvenile rearing (70 FR 52488).	FT & ST	Status Report (CDFG 1996b, 1998; Good et al. 2005; NMFS 1999) Restoration and Management Plan (CDFG 1991, 1993) Recovery Plan (NMFS 2014)
Green sturgeon, North American Southern DPS (*Acipenser medirostris*)	The Sacramento and Feather rivers currently host the only known spawning populations of the Southern DPS of North American green sturgeon (Poytress et al. 2010; Seezholtz et al. 2014).	NMFS (2009a) designated the lower Feather River critical habitat for the Southern DPS of North American green sturgeon. USFWS (1995) and Beamesderfer et al. (2004) state that green sturgeon have been recorded in the Bear River.	FT & ST	Recovery Plan (NMFS 2018) Status Report (NMFS 2015)

[1] Status Codes:

CRPR California Rare Plant Rank; 1B: Species considered rare, threatened or endangered in California and elsewhere.
1: Species seriously threatened in California

FE Endangered: Any species that is in danger of extinction throughout all or a significant portion of its range.
FT Threatened: Any species likely to become endangered within the near future.
SE Endangered: Listed as endangered under CESA.
ST Threatened: Listed as threatened under CESA.

As shown in Table 3.2.5-1, two of the ESA-listed species are also listed under the CESA: Hartweg's golden sunburst (SE); and CV spring-run Chinook salmon ESU (ST).

3.3.5.2.2 ESA Listed Species Life Histories

Hartweg's Golden Sunburst (FE)

Status and Critical Habitat

On February 6, 1997, USFWS listed Hartweg's golden sunburst as an endangered species under the ESA (Federal Register 62:5542). No Critical Habitat has been designated for this species.

Recovery Plan

No Recovery Plan for Hartweg's golden sunburst has been developed. On May 27, 2011, USFWS began a 5-year review of this species, which has not been completed (USFWS 2018c).

Current and Historical Distribution

This species is found only in the Central Valley of California, though the historic range may have gone from Yuba County south to Fresno County. However, the species was always restricted to local abundance. All of the 19 known remaining populations are located in the Friant region of Fresno and Madera counties and the La Grange region in Stanislaus County (USFWS 2010).

Life History and Habitat Requirements

Hartweg's golden sunburst is an annual herb (i.e. plant surviving for just one growing season) of the aster family. It is a small plant of about 2 to 8 in tall with linear leaves. Like many other asters, it has a sunflower-like flower head with yellow ray and disk flowers (Baldwin et. al 2012).

Hartweg's golden sunburst grows on grasslands, but almost always on the north/northeast side of Mima mounds, mounds of earth roughly 1 to 6 ft high and 10 to 100 ft in diameter at the base, interspersed with basins that may pond water in the rainy season. Soils are primarily shallow, well-drained, fine-textured soils (USFWS 2010).

Stressors and Limiting Factors

USFWS reports the primary threat to Hartweg's golden sunburst is the conversion of natural habitat to residential and agricultural development (62 FR 5542). In addition, the majority of occurrences are located on private lands where they receive little protection.

SSWD's Relicensing Study

SSWD conducted the *ESA-listed Plants Study* within a designated study area inside the existing FERC project Boundary, including background literature reviews, desktop analyses, and field investigations. The study area consisted of four specific areas: 1) the North Shore Recreation Area (NSRA); 2) the South Shore Recreation Area (SSRA); 3) the Camp Far West Dam and associated dikes and Spillway; and 4) the Camp Far West Powerhouse, for a total of 505 ac. These are the areas where SSWD's Project O&M activities or Project-related recreation could affect ESA-listed plant species.

This study was conducted in conjunction with SSWD's *Special-Status Plants and Non-Native Invasive Plant Study*, and *ESA-Listed Wildlife – Valley Elderberry Longhorn Beetle Study*.

Additional information describing Valley Elderberry Longhorn beetle surveys and results is provided below in Section 3.3.5.2.2.

Field surveys were conducted from April 2017 through July 2017. Survey timing was planned based on known bloom times and herbarium collection dates. SSWD's surveyors conducted special-status plant surveys and NNIP surveys as outlined in the "Botanical Survey" section of the CDFW's *Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Natural Communities* (CDFG 2009). Surveys were comprehensive over the entire study area, except for areas deemed to be unsafe (e.g., due to steep, unstable terrain) by the field team, using systematic field techniques to ensure thorough coverage, with additional efforts focused in habitats with a higher probability of supporting special-status plants (e.g., serpentine outcrops) and NNIP. Surveys were floristic in nature, documenting all species observed; taxonomy and nomenclature were based on *The Jepson Manual* (Baldwin et al. 2012).

Although 206 plant species were identified during floristic surveys (see Attachment 3.3.4A), no occurrences of Hartweg's golden sunburst were located.

Known Occurrences in Action Area

Hartweg's golden sunburst was not found in the Action Area during SSWD's studies, and SSWD is unaware of any recorded occurrence in the Action Area. Critical Habitat does not occur in the Action Area. No potential habitat (i.e., Mima mounds) for Hartweg's golden sunburst was observed during SSWD's relicensing surveys.

Valley Elderberry Longhorn Beetle (FT)

Status and Critical Habitat

On August 8, 1980, USFWS listed Valley Elderberry Longhorn Beetle (VELB) as a threatened species (45 FR 52803-52807). On February 14, 2007, the USFWS completed a 5-year review, which resulted in USFWS' recommendation that the species be de-listed. In October of 2012, USFWS began the process of reviewing the de-listing proposal, but it was withdrawn in September 2014 (USFWS 2018d).

Critical Habitat has been designated for the species, including the American River Parkway and Sacramento zones. The Project is outside of the Critical Habitat zones designated by USFWS, but portions of the Project fall within the potential range of the beetle (45 FR 52803). According to the USFWS Critical Habitat Mapper, the closest Critical Habitat designation lies 29.2 mi south of Camp Far West Reservoir along the American River (USFWS 2018d).

Recovery Plan

The USFWS issued a VELB Recovery Plan on August 28, 1984 (USFWS 1984). In 2017, USFWS published the Framework for Assessing Impacts to the Valley Elderberry Longhorn Beetle (*Desmocerus californicus dimorphus*) (USFWS 2017b). There is nothing specific in the VELB Recovery Plan (USFWS 1984) relating to the Project or the lower Bear River.

Current and Historical Distribution

VELB is one of two subspecies of *Desmocerus californicus*. The other subspecies, the California elderberry longhorn beetle (*Desmocerus californicus californicus*), is found primarily in coastal areas from Mendocino County to San Diego County and in the southern Sierra Nevada range. The range of the VELB extends throughout California's Central Valley from the valley floor to the lower foothills. Most of the recorded occurrences occur in suitable habitat below 500 ft in elevation. Historically, VELB ranged wherever the host plant, elderberry (*Sambucus* spp.), were present in Central valley riparian areas and some uplands (USFWS 2017b).

In the CNDDB search, VELB was found near the Project Vicinity in the Sheridan, Browns Valley, Lake Combie, and Wheatland quad. The nearest occurrence is approximately 10 mi southwest along the Bear River, downstream of Camp Far West Dam (CDFW 2018).

<u>Life History and Habitat Requirements</u>

The VELB is dependent on its host plant, elderberry plants, which is a common component of riparian corridors and adjacent upland areas in the Central Valley (USFWS 2017b). There are four stages of this species' life: egg, larva, pupa and adult. Females deposit eggs on or adjacent to the host elderberry. Egg production varies, and females have been observed to lay between 16 and 180 eggs. Eggs hatch within a few days of being deposited and larvae emerge. The larvae bore into the wood of the host plant and create a long feeding gallery in the pith of the elderberry stem. The larvae feed on the pith of the plant for 1 to 2 years. When a larva is ready to pupate, it chews an exit hole to the outside of the stem and then plugs it with frass.[5] The larva then retreats into the feeding gallery and constructs a pupal chamber from wood and frass. The larvae metamorphose between December and April; the pupal stage lasts about a month. The adult remains in the chamber for several weeks after metamorphous, and then emerges from the chamber through the exit hole (USFWS 2018d).

Adults generally emerge from late-March through June and are short-lived; however, most records for adults occur from late-April to mid-May. Adults feed on elderberry leaves and mate within the canopy (USFWS 2018d).

<u>Stressors and Limiting Factors</u>

The USFWS considers VELB, though wide-ranging, to be in long-term decline due to human activities that have resulted in widespread alteration and fragmentation of riparian habitats, and to a lesser extent, upland habitats, which support the beetle. The primary threats to the survival of the beetle include:

- Loss and alteration of habitat by agricultural conversion
- Overgrazing
- Levee construction
- Stream and river channelization
- Removal of riparian vegetation
- Rip-rapping of shoreline
- Non-native animals, such as the Argentine ant (*Linepithema humile*), which may eat the early phases of the beetle

[5] Frass is the debris or excrement produced by the insect.

- Recreational, industrial and urban development
- Non-native or invasive plant species, such as giant reed (*Arundo donax*), Himalayan blackberry (*Rubus armeniacus*), and fig (*Ficus carica*), may also negatively affect the health and vigor of the host plant for VELB

Indiscriminant insecticide and herbicide use in agricultural areas and along road right-of-ways may also be factors limiting the beetle's distribution. The age and quality of individual elderberry shrubs/trees and stands may also be a factor in its limited distribution because elderberry leaves and flowers are also the beetle's only food source (USFWS 2018d).

<u>SSWD's Relicensing Studies</u>
SSWD conducted the *ESA-Listed Wildlife – Valley Elderberry Longhorn Beetle Study* within a designated study area inside the existing FERC project Boundary, including background literature reviews, desktop analyses, and field investigations. The study area consisted of four specific areas: 1) the NSRA; 2) the SSRA; 3) the Camp Far West Dam and associated dikes and Spillway; and 4) the Camp Far West Dam Powerhouse, for a total of 505 ac. These are the areas where SSWD's Project O&M activities or Project-related recreation could affect ESA-listed plant species. The study was conducted in conjunction with SSWD's *Special-Status Plants and Non-Native Invasive Plant Study* and *ESA-Listed Plants Study*.

Before starting field surveys, SWWD found there were no known occurrences of VELB or elderberry shrubs within the study area. Field surveys were conducted from April 2017 through July 2017. Survey timing was planned based on known bloom times and herbarium collection dates. SSWD's surveyors conducted special-status plant surveys and NNIP surveys as outlined in the "Botanical Survey" section of the CDFW's *Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Natural Communities* (CDFG 2009). Surveys were comprehensive over the entire study area, except for areas deemed to be unsafe (e.g., due to steep, unstable terrain) by the field team, using systematic field techniques to ensure thorough coverage, with additional efforts focused in habitats with a higher probability of supporting special-status plants (e.g., serpentine outcrops) and NNIP. Surveys were floristic in nature, documenting all species observed; taxonomy and nomenclature were based on *The Jepson Manual* (Baldwin et al. 2012).

One elderberry shrub with two stems greater than one inch in diameter at ground height was identified during surveys in the area east of the dam face, on the shore of the reservoir (Figure 3.3.5-1). The largest stem was 15.2 inches at ground height, while the other was 1.8 inches at ground height. No VELB-sized exit holes were observed on the stems of the shrub, although there were holes in the stems (CDFW 2002). No VELB were observed at the time of the survey. A non-Project SMUD building is located approximately 20 ft upslope from the elderberry shrub. There was evidence of recreation in the area of the elderberry shrub, including pedestrian trails and litter. Recreationists were observed during relicensing studies fishing in the area. No Project O&M is conducted in the area.

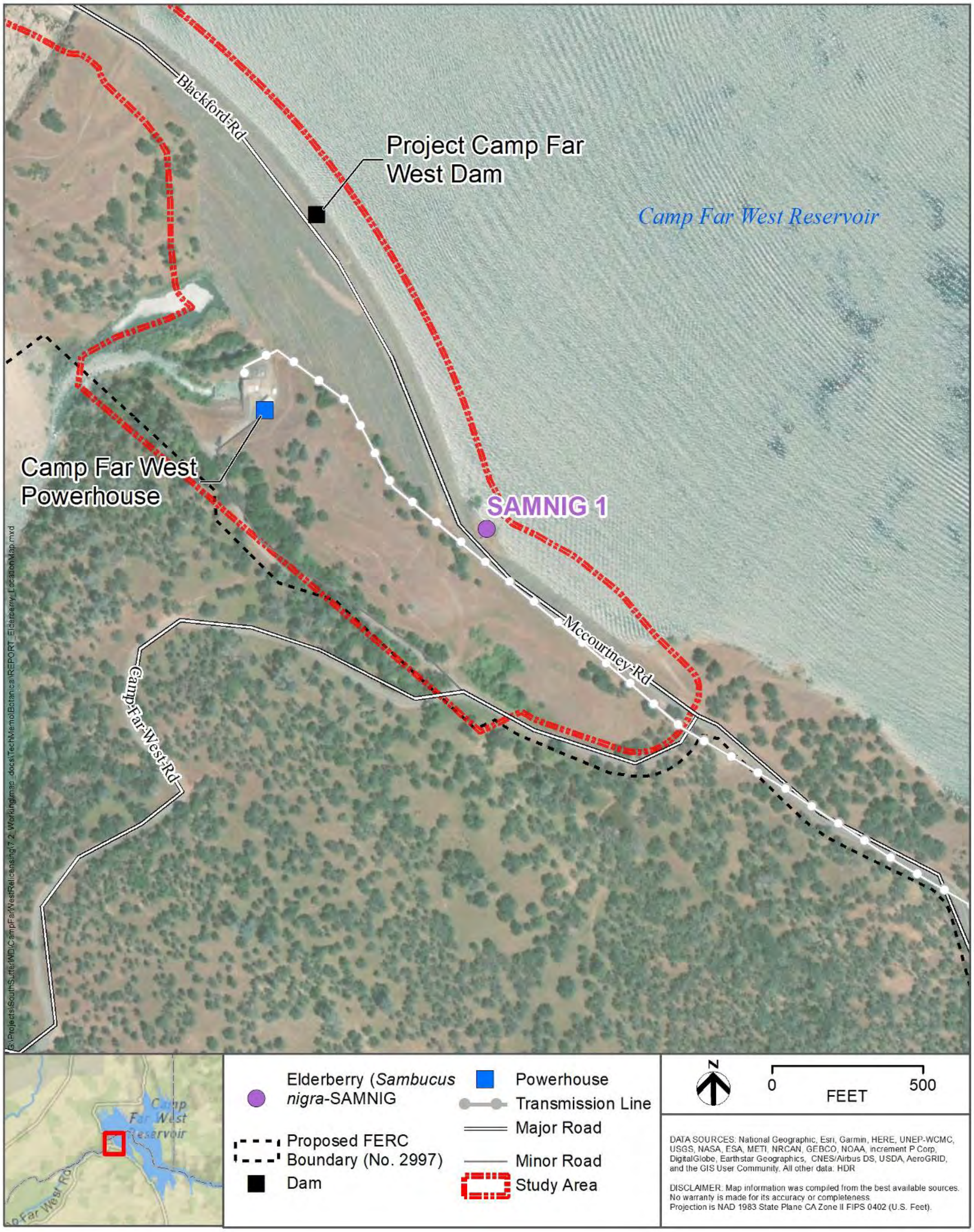

Figure 3.3.5-1. Location of elderberry occurrence within the study area.

Known Occurrences in Action Area
One elderberry shrub, with holes, was found in the Action Area during SSWD's relicensing studies. Critical Habitat for VELB does not occur in the Action Area. SSWD is unaware of any historic records of VELB or elderberry plant in the Action Area.

Vernal Pool Fairy Shrimp (FT) and Vernal Pool Tadpole Shrimp (FE)

Status and Critical Habitat
Vernal pool fairy shrimp and vernal pool tadpole shrimp were listed under the ESA on September 19, 1994 (59 FR 48136).

Critical Habitat for vernal pool fairy shrimp and vernal pool tadpole shrimp, along with other vernal pool species, was originally designated in a final rule on August 6, 2003 (68 FR 46684). The revised final rule for Critical Habitat was published on February 10, 2006, providing 35 Critical Habitat units for the vernal pool fairy shrimp, totaling 597,821 acres, and 18 Critical Habitat units for the vernal pool tadpole shrimp, totaling 228,785 acres (71 FR 7118). The closest units to the Project are approximately 4.3 mi away, just outside of Lincoln's Regional Airport for vernal pool fairy shrimp only, and 7.5 mi away, just outside of Beale Air Force Base for both species (USFWS 2018e).

Recovery Plan
The USFWS issued a Draft Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon in October 2004; the recovery plan was finalized on December 15, 2005 (USFWS 2005a). One of the objectives of the recovery plan is to delist the vernal pool fairy shrimp and vernal pool tadpole shrimp, primarily through habitat protection. Core areas of vernal pools were identified, including in Southwestern Sacramento Valley. These areas coincide with Critical Habitat for both species, with the closest core area to the Project approximately 4.3 mi away, just outside of Lincoln's Regional Airport. There is nothing specified for Project or the lower Bear River in the recovery plan (USFWS 2005a).

A 5-year review, initiated in 2006, concluded with a recommendation of no status change for vernal pool fairy shrimp or vernal pool tadpole shrimp (73 FR 11945). Another 5-year review was initiated on May 25, 2011 (76 FR 30377).

Current and Historical Distribution
The vernal pool fairy shrimp occurs in California from Shasta County south to Tulare County and in Jackson County, Oregon. Most of the known occurrences are on the eastern side of the Central Valley and in the central Coast Ranges, with disjunct populations in San Luis Obispo County, Santa Barbara County and Riverside County, California, and southern Oregon (Eng et al. 1990, Eriksen and Belk 1999). Although the species has a wide geographic range, populations are usually small. Extensive conversion of natural habitats for agriculture, urban development, landfills, and water supply/flood control projects has substantially diminished and fragmented the historical range. The long-term viability of populations may be associated with vernal pool complexes where there are suitable pools under different climatic conditions. The current distribution of the species includes small or isolated populations that are probably not viable (USFWS 2005a).

The vernal pool tadpole shrimp is currently distributed across the Central Valley of California and in the San Francisco Bay area. The species' distribution has been greatly reduced from historical times, as a result of widespread destruction and degradation of its vernal pool habitat. Vernal pool habitats in the Central Valley now represent only about 25 percent of their former area and remaining habitats are considerably more fragmented and isolated than during historical times (Holland 1998). Vernal pool tadpole shrimp are uncommon even where vernal pool habitats occur. Helm (1998) found vernal pool tadpole shrimp in only 17 percent of vernal pools sampled across 27 counties, and Sugnet (1993) found this species at only 11 percent of 3,092 locations.

In the Northwestern Sacramento Vernal Pool Region, vernal pool tadpole shrimp are found at the Stillwater Plains and in the vicinity of the City of Redding in Shasta County (USFWS 2005a).

In the Northeastern Sacramento Vernal Pool Region, vernal pool tadpole shrimp have been documented on private land in the vicinity of Chico in Butte County. They have also been documented in Tehama County at the Vina Plains Preserve, the Dales Lake Ecological Reserve and on California Department of Transportation land (USFWS 2005a).

The largest concentration of vernal pool tadpole shrimp occurrences are found in the Southeastern Sacramento Vernal Pool Region, where the species occurs on a number of public and private lands in Sacramento County. Vernal pool tadpole shrimp are also known to occur in a few locations in Yuba and Placer counties, including Beale Air Force Base (USFWS 2005a).

In the Solano-Colusa Vernal Pool Region, the vernal pool tadpole shrimp occurs in the vicinity of Jepson Prairie, Travis Air Force Base, near Montezuma in Solano County and in the Sacramento National Wildlife Refuge in Glenn County. In the San Joaquin Vernal Pool Region, vernal pool tadpole shrimp are known to occur in the Grasslands Ecological Area, on private land in Merced County and in a single location in both Tulare and Kings counties. In the Southern Sierra Foothills region, the species occurs at the Stone Corral Ecological Preserve in Tulare County, on ranchlands in eastern Merced County, at the Big Table Mountain Preserve in Fresno County and at a few locations in Stanislaus County. In the Central Coast Vernal Pool Region, the vernal pool tadpole shrimp is found on the San Francisco National Wildlife Refuge and private land in Alameda County (USFWS 2005a).

According to Placer County Natural Resources Report, the closest occurrence of the vernal pool fairy shrimp is approximately 5 mi southeast of Camp Far West Reservoir (Placer County 2004). However, the CNDDB search resulted in a total of 33 occurrences within the Project Vicinity. The closest occurrence is within 1 mi of the Bear River and approximately 1.6 mi to the west of the reservoir, just west of Camp Far West Road. This occurrence includes a series of vernal pools that provide suitable habitat for this species (CDFW 2018).

The CNDDB search resulted in a total of nine occurrences of vernal pool tadpole shrimp within the Project Vicinity. The closest of these is located approximately 4.8 mi northeast of Camp Far West reservoir, within Beale Air Force Base. Vernal pool tadpole shrimp was found in the Browns Valley, Sheridan, and Wheatland quadrangles (CDFW 2018).

Life History and Habitat Requirements

Fairy shrimp are generally restricted to seasonal aquatic habitats where predatory fish do not occur. Female fairy shrimp of all species carry their eggs in a ventral brood sac. The eggs either are dropped to the pool bottom or remain in the brood sac until the mother dies and sinks. When the pool dries, the eggs dry and remain dormant in the dry pool bed until rain and other environmental stimuli cause them to hatch. Resting fairy shrimp eggs are commonly referred to as cysts and capable of withstanding heat, cold and prolonged desiccation. When the pools refill, some, but not all, of the cysts may hatch. The cyst bank in the soil may contain cysts from several years of breeding (USFWS 2005a).

The vernal pool fairy shrimp occupies a variety of different vernal pool habitats, from small, clear, sandstone rock pools to large, turbid, alkaline, grassland valley floor pools (Eng et al. 1990, Helm 1998). Although the vernal pool fairy shrimp has been collected from large vernal pools, including one exceeding 25 ac in area (Eriksen and Belk 1999), it tends to occur primarily in smaller pools (Platenkamp 1998); most frequently found in pools measuring less than 0.05-ac in area (Gallagher 1996, Helm 1998) in grass or mud-bottomed swales or basalt depression pools in grasslands that have not been mowed. The vernal pool fairy shrimp typically occurs at elevations from 30 to 4,000 ft (Eng et al. 1990), although two sites in the Los Padres National Forest have been found to contain the species at an elevation of 5,600 ft. The vernal pool fairy shrimp has been collected at water temperatures as low as 4.5°C (Eriksen and Belk 1999) and has not been found in water temperatures above about 23°C (Helm 1998, Eriksen and Belk 1999). The species is typically found in pools with low to moderate amounts of salinity or total dissolved solids (Collie and Lathrop 1976, Keeley 1984, Syrdahl 1993). Vernal pools are mostly rain fed, resulting in low nutrient levels and dramatic daily fluctuations in pH, dissolved oxygen and carbon dioxide (Keeley and Zedler 1998). Although there are many observations of the environmental conditions where vernal pool fairy shrimp have been found, there have been no experimental studies investigating the specific habitat requirements of this species. Platenkamp (1998) found no significant differences in vernal pool fairy shrimp distribution between four different geomorphic surfaces studied at Beale Air Force Base.

Although the vernal pool tadpole shrimp is adapted to survive in seasonally available habitat, the species has a relatively long life span, compared to other vernal pool crustaceans. Helm (1998) found that the vernal pool tadpole shrimp lived significantly longer than any other species observed under the same conditions, except for the California fairy shrimp. Vernal pool tadpole shrimp continue growing throughout their lives, periodically molting their shells. These shells can often be found in vernal pools where vernal pool tadpole shrimp occur. Helm (1998) found that vernal pool tadpole shrimp took a minimum of 25 days to mature and the mean age at first reproduction was 54 days.

Stressors and Limiting Factors

The current status and continuing threat to the survival and recovery of vernal pool fairy shrimp and vernal pool tadpole shrimp is attributable to extensive loss of suitable habitat from agricultural conversion, urbanization and surface mining. Habitat loss also occurs as a result of changes to natural hydrology, introduction of invasive species, introduction of incompatible grazing regimes (e.g., insufficient grazing for prolonged periods), infrastructure development projects (e.g., roads, water storage and conveyance, utilities), recreational activities (e.g., off-highway vehicles and hiking), erosion, climatic and environmental change and contamination (USFWS 2005a).

<u>SSWD's Relicensing Study</u>

There were no specific studies done for vernal pool fairy shrimp and vernal pool tadpole shrimp. The BA done in 2013 for the Pool Raise identified no suitable habitat in the area to be inundated (Sycamore Associates 2013).

An aquatic resources delineation was performed for the north western portion of the existing FERC Project Boundary in 2018 for the Spillway Modification (SSWD 2018). A total of 83 aquatic features, comprising 4.40 ac (3.35 ac are within the proposed Project Boundary), were detected during the delineation, which was conducted in February 2018. Of the 3.35 ac, 0.95 ac were identified as vernal pools (8 distinct pools), which could provide suitable habitat for vernal pool crustaceans, specifically vernal pool tadpole shrimp and vernal pool fairy shrimp. There was no sign of disturbance to the vernal pools from Project O&M or recreation. Cattle graze throughout the area where the delineation was performed, and a section of barbed wire fence runs through one vernal pool near Camp Far West Road.

Figure 3.3.5-2 includes representative photos of the eight vernal pools, taken on February 19, 2018, while Figure 3.3.5-3 shows the location of aquatic resource features within the proposed Project Boundary mapped during the 2018 delineation.

Figure 3.3.5-2. Photographs of the eight distinct vernal pools identified during the 2018 delineation.

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Figure 3.3.5-3. Aquatic resources located during 2018 delineation.

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Known Occurrences in Action Area

Neither vernal pool fairy shrimp nor vernal pool tadpole shrimp have been reported to occur in the Action Area. Critical Habitat does not occur in the Action Area. However, 0.95 ac of vernal pools occur in the Action Area.

California Red-Legged Frog (FT)

Status and Critical Habitat

The California red-legged frog (CRLF) was listed as threatened on May 23, 1996 (61 FR 25813).

Critical habitat was originally designated for CRLF on March 13, 2001 and re-designated on April 13, 2006 (71 FR 19244). However, due to court challenges and questions about scientific validity, USFWS made a series of revisions to Critical Habitat for the CRLF. The final Critical Habitat designation was issued on March 17, 2010 (75 FR 12816).

The criteria for the CRLF critical habitat are: 1) suitable aquatic breeding habitat that holds water for a minimum of 20 weeks in all but the driest of years; 2) suitable aquatic non-breeding habitat that may not stay inundated as long as breeding habitat but provides shelter, foraging, predator avoidance, and aquatic dispersal of juvenile and adults; 3) upland habitat adjacent to or surrounding breeding and non-breeding aquatic and riparian habitat within 1 mi; and 4) dispersal habitat within and between occupied location within a minimum of 1 mi of each other (75 FR 12816). The closest Critical Habitat to the Project is approximately 24 mi away, just outside of Foresthill near Lake Clementine (USFWS 2018e).

Recovery Plan

A recovery plan has been developed for CRLF. Recovery criteria for this species include protection and management of suitable habitats within core areas, stable populations distributed within viable metapopulations, and re-establishment of at least one population within each core area where CRLF is currently absent (USFWS 2002). The nearest core area is Unit 2: Yuba River – South Fork Feather River Unit which is located approximately 23 mi to the north of the Proposed Action.

Current and Historical Distribution

The historical range of the CRLF extends through Pacific slope drainages from Shasta County, California, to Baja California, Mexico, including the Coast Ranges and the west slope of the Sierra Nevada Range at elevations below 4,000 ft. The current range of this species is greatly reduced, with most remaining populations occurring along the coast from Marin County to Ventura County. In the Sierra Nevada region, where the species was once widespread, there are only eight known extant populations of CRLF, most of which contain few adults (Shaffer et al. 2004; Tatarian and Tatarian 2010; 71 FR 19244).

There is one known CRLF population in Yuba County, one in Nevada County and one in the adjacent County of Butte (CDFW 2018).

There are no known recent verified or historical accounts of CRLF from the Project Vicinity. The nearest occurrence is located approximately 24.5 mi to the northeast of the Project in

Nevada County. The second closest is located approximately 26 mi north of the Project in Placer County (CDFW 2018).

An initial query of the CNDDB indicated no records of CRLF in the Project Vicinity. However, in February 2018, SSWD found the following statement in an unrelated FERC filing: "*In 2017, the USFWS found a California red-legged frog within 30 feet of a sewage pond at Camp Far West (FERC No. 2997) in Northern California and 3 potential California red-legged frogs in that pond*."[6] Upon further research, SSWD determined that there is an unprocessed data submission to CNDDB for CRLF from the Project area dated May 20, 2017. Although this record is noted as "unprocessed" by CNDDB, it is available on the CNDDB website. The record was reported by USFWS and indicates an adult CRLF in a small, seasonal impoundment (i.e., stock pond) on a drainage adjacent to the sewage treatment pond in the NSRA. The frog was briefly sighted before it leapt into the pond and was not observed again. The field work was a night-time site visit accompanied by SSWD's consultant, who did not witness the frog. There was no discussion of a CRLF detection during the site visit. However, subsequent details regarding the detection were provided to SSWD's consultant during a second site visit with USFWS on February 15, 2018, which indicated the detection did not rely on visual identifying features, which were inconclusive, or auditory features (i.e., the frog did not vocalize), but was instead based on distant olfaction (i.e., the species identification was presumed based on a smell before the frog was observed). Experienced herpetologists Mark Jennings, Senior Associate Ecologist and Herpetologist with Live Oak Associates, Inc., and Marc Hayes, Washington Department of Fish and Wildlife, who were asked separately to evaluate the account, each stated that the use of distant smells cannot be accepted for identification of CRLF without an independent test of this novel method. Therefore, SSWD considers the frog as "unidentified" following USFWS guidance (USFWS 2005b, page 15). Three "potential, unconfirmed CRLF" at the sewage treatment pond were also reported in the CNDDB submission, based on frogs with red eye-shine reflection different from the numerous American bullfrogs detected at the sewage pond during the May 20, 2017 survey. SSWD could find no accounts describing red eye-shine as indicative of CRLF.

Life History and Habitat Requirements

CRLF breeding occurs from late November to late April in ponds or in backwater pools or creeks. Egg masses are attached to emergent vegetation such as cattails (*Typha* spp.) and bulrushes (*Scirpus* spp.). Larvae remain in these aquatic habitats until metamorphosis. Increased siltation during the breeding season can cause asphyxiation of eggs and small larvae. Larvae typically metamorphose between July and September and most likely feed on algae (Jennings and Hayes 1994).

Outside of the breeding season, adults may disperse upstream, downstream, or upslope of breeding habitat to forage and seek sheltering habitat, which may consist of small-mammal burrows, leaf litter, and other moist sites in or near (i.e., up to 200 ft) from riparian areas (Jennings and Hayes 1994; 71 FR 19244). During wet periods, long distance dispersal of up to 1-mi may occur between aquatic habitats, including movement through upland habitats or

[6] FERC Accession Number 20180129-5298

ephemeral drainages (71 FR 19244). Seeps and springs in open grasslands can function as foraging habitat or refuges for wandering frogs (USFWS 1997).

CRLF is primarily associated with perennial ponds or pools and perennial or seasonal streams where water remains for a minimum of 20 weeks beginning in the spring (i.e., sufficiently long for breeding to occur and larvae to complete development) (Jennings and Hayes 1994, 71 FR 19244). Dense, shrubby riparian vegetation (e.g. willow [*Salix* spp.] and tule [*Schoenoplectus* spp.] species), and bank overhangs are important features of CRLF breeding habitat. Suitable aquatic habitats include natural and manmade ponds, backwaters within streams and creeks, marshes, lagoons and dune ponds. CRLF is not characteristically found in deep lacustrine habitats (e.g. deep lakes and reservoirs). A minimum water depth of 0.66-ft during the entire tadpole rearing season is required. Locations with the highest densities of CRLF exhibit dense emergent or shoreline riparian vegetation closely associated with moderately deep (greater than 2.3 ft), still, or slow-moving water. The types of vegetation that seem to provide the most suitable structure are willows, cattails and bulrushes at or close to the water level, which shade a substantial area of the water (Hayes and Jennings 1988). Another correlate to CRLF occurrence is the absence or near-absence of introduced predators, such as American bullfrog and predatory fish, particularly Centrarchids, which feed on the larvae at higher rates than native predatory species (Hayes and Jennings 1988), and mosquitofish. Hiding cover from predators may be provided by emergent vegetation, undercut banks and semi-submerged root wads (USFWS 2005b). Some habitats that are not suitable for breeding (e.g., shallow or short-seasonal wetlands, pools in intermittent streams, seeps and springs) may constitute habitats for aestivation, shelter, foraging, predator avoidance and juvenile dispersal.

The most comprehensive analysis of CRLF distribution and habitat use in the Sierra Nevada (Barry and Fellers 2013) suggests that historical CRLF habitat was associated with small, narrow, permanent or nearly permanent creeks near the headwaters, where small populations of CRLF occurred. Current available habitat in the species' range within the Sierra Nevada includes ponds of anthropogenic origin, including small instream impoundments (e.g., abandoned lumber mill ponds), excavated ponds, and mining tailing ponds.

Suitable upland habitat consists of all upland areas (riparian or otherwise) within 500 ft of the water's edge, but not further than the watershed boundary. This upland habitat is important in maintaining the integrity of CRLF aquatic/breeding habitat as land use activities adjacent to and upstream of suitable aquatic habitat greatly affect the quality of aquatic/breeding habitat downstream (Allen and Tennant 2000).

Suitable dispersal habitat consists of all upland and wetland habitat that connect two or more patches of suitable aquatic habitat within 1.25 mi of one another. Dispersal habitat must be at least 500 ft wide and free of barriers, such as heavily traveled roads (roads with more than 30 cars per hour), moderate to high-density urban or industrial developments and large reservoirs. The healthiest CRLF populations persist and flourish where suitable breeding and non-breeding habitats are interspersed throughout the landscape and are interconnected by un-fragmented dispersal habitat (Allen and Tennant 2000).

Stressors and Limiting Factors

According to the CRLF Recovery Plan (USFWS 2002), factors associated with declining populations of CRLF include degradation and loss of its habitat through: agriculture, urbanization, mining, overgrazing, recreation, timber harvesting, the introduction of non-native plants that affect the frog's habitat, impoundments, water diversions, degraded water quality, use of pesticides, and introduced predators (e.g., American bullfrog, crayfish [*Procambarus clarkii* and *Pacifastacus leniusculus*], and non-native predatory fish, such as smallmouth bass and mosquitofish). In an experiment, the presence of American bullfrog tadpoles significantly lowered survival of CRLF tadpoles to metamorphosis (Lawler et al. 1999), probably through competition.

SSWD's Relicensing Studies

To supplement existing information regarding CRLF within the Project Vicinity, SSWD conducted the *ESA Listed Amphibians – California Red-legged Frog Study*. SSWD conducted a desktop analysis site assessment of the area within 1-mi of the Project Boundary.

A total of 134 aquatic habitat locations potentially suitable for CRLF were identified and mapped within one-mi of the Project Boundary, using existing, publically available ESRI aerial imagery, reviewed at a scale of 1:1000 and compared to Google Earth imagery (dated May 17, 2017). Most of these features (i.e., 122 of the total) are constructed impoundments along drainages, or excavated ponds used to support livestock, hold irrigation water, or for undetermined purposes on private property. Based on available aerial imagery, 51 of these constructed ponds were classified as seasonal and 71 as semi-permanent to permanently flooded. Another 10 aquatic habitat locations were categorized as seasonal emergent wetlands, which were generally located on drainages supported by irrigation water, but without an apparent constructed dam or excavated basin. Aquatic habitat locations are largely concentrated northwest, east, and south of Camp Far West Reservoir. On the basis of apparently suitability hydrology, many of the aquatic habitats, particularly where supplemented by irrigation water, are evidently suitable habitat for CRLF as well as American bullfrog, and in most areas there are multiple suitable sites, which would facilitate dispersal of either species. The aerial imagery indicates that vegetation characteristics of the sites ranges from those with no apparent aquatic, emergent, or riparian vegetation to sites with dense areas of cattail and patches of riparian willows. The surrounding uplands include grazed annual grasslands and oak woodland, with low rolling hills, unlikely to pose a dispersal barrier.

Additional information was gathered by field reconnaissance and supplemental surveys for American bullfrogs (*Lithobates catesbeianus*) within the Project Boundary. Field reconnaissance was completed on June 29, 2017 at two sewage ponds associated with the NSRA and the SSRA, respectively, in accordance with USFWS (2005b) CRLF site assessment guidelines, and included completion of Habitat Site Assessment Data Sheets. Both ponds are perennial, have steeply sloped sides and undetermined depth, little or no associated emergent or overhanging vegetation, but a dense cover of duckweed (*Lemna* sp.) over part of each pond.

Surveys to listen for calls of American bullfrogs were completed at the two sewage ponds, followed by a walk around the perimeter of each pond and visual scan during which all adult and juvenile bullfrogs heard or seen were noted. These daytime surveys were completed on June 29, 2017, July 25, 2017, and August 3, 2017. Juvenile American bullfrogs were detected in numbers ranging from 24 to 39 at the SSRA sewage pond, but only 1 was detected at the NSRA sewage pond. On two of the surveys, adult male American bullfrogs (2 and 3, respectively) were heard at the NSRA sewage pond. No adult American bullfrogs were heard at the SSRA sewage pond during any of the surveys. In addition to these surveys, an informal nighttime survey looking for reflected eyeshine was conducted at the NSRA sewage pond on May 20, 2017 by USFWS and SSWD biologists. A total of 96 juvenile American bullfrogs were identified within the sewage pond, as well as three unidentified frogs.

Auditory surveys for American bullfrog were also performed at six locations in coves or "arms" of the reservoir on Camp Far West Reservoir on the same dates. No bullfrog calls were heard at any of the six survey locations on Camp Far West Reservoir.

Based on numerous aquatic habitats within 1-mi of the Project that meet the minimum criteria for CRLF breeding habitat and without the results of protocol level CRLF survey at all of these sites, most of which are on private land, CRLF must be assumed to occur within this area, regardless of the probability of an undiscovered population. The habitat assessment conducted by SSWD also indicates that sites suitable for American bullfrog are widespread and that this invasive species is almost certainly well established in the area. Aquatic habitats within the Project Boundary, which are limited to Camp Far West Reservoir itself, the two sewage ponds, and small, seasonal water bodies that do not meet the 20-week minimum criteria, are unlikely to support CRLF breeding. Non-breeding habitat use, such as during overland dispersal, is possible. High numbers of American bullfrogs within the sewage ponds may limit the use of these ponds for breeding and larval/ juvenile development due to predation and competition. The stock pond located near the NSRA may provide habitat for CRLF, however due to the proximity of the sewage pond, it is likely that American bullfrogs utilize this stock pond as dispersal habitat and seasonal aquatic use. The stock pond is also seasonal which may impact its availability for both CRLF and American bullfrog habitat (Figure 3.3.5-4). Cattle grazing may cause direct effects to CRLF through crushing and/ or disturbing egg masses, a reduction in emergent and riparian vegetation, and increased erosion within the watershed, resulting in the filling of pools suitable for CRLF breeding and aquatic habitat (USFWS 2002). However, cattle grazing has been shown to positively affect CRLF populations through the creation of stock ponds that provide habitat for CRLF where it did not occur previously (USFWS 2002). In such ponded habitat, grazing may help maintain habitat suitability by keeping ponds clear of emergent vegetation that may fill the ponds and make them unsuitable for CRLF (USFWS 2002). Recreational activity may affect CRLF in the Project Boundary through crushing of individuals, and harassment of individuals.

Figure 3.3.5-4. Stock pond near the North Shore Recreation Area sewage pond as shown when dry during an October 2017 site visit and when wet during a February 2018 site visit.

Known Occurrences in Action Area

SSWD is unaware of any verified accounts of CRLF occurring in the Action Area. Critical Habitat for CRLF does not occur in the Action Area

Steelhead, California Central Valley DPS (FT)

Status and Critical Habitat

On March 19, 1998 (63 FR 13347) NMFS listed the Central Valley DPS of steelhead as threatened, concluding that the risks to Central Valley (CV) steelhead had diminished since the completion of the 1996 status review based on a review of existing and recently implemented State conservation efforts and federal management programs (e.g., Central Valley Project Improvement Act Anadromous Fish Restoration Plan, CALFED Bay-Delta Program) that address key factors for the decline of this species. On January 5, 2006, NMFS reaffirmed the threatened status of the CV steelhead DPS (71 FR 834) and applied the DPS policy to the species because the resident and anadromous life forms of steelhead remain "markedly separated" as a consequence of physical, ecological and behavioral factors, and may therefore warrant delineation as a separate DPS (71 FR 834).

The DPS includes all naturally spawned anadromous *O. mykiss* populations below natural and man-made impassable barriers in the Sacramento and San Joaquin Rivers and their tributaries, excluding steelhead from San Francisco and San Pablo Bays and their tributaries (63 FR 13347). Two artificial propagation programs are considered to be part of the DPS-the Coleman National Fish Hatchery, and Feather River Fish Hatchery (FRFH) steelhead hatchery programs. NMFS determined that these artificially propagated stocks are no more divergent relative to the local natural populations than what would be expected between closely related natural populations within the DPS (71 FR 834).

On February 16, 2000 (65 FR 7764), NMFS published a final rule designating Critical Habitat for CV steelhead DPS. Critical habitat was designated to include all river reaches accessible to listed steelhead in the Sacramento and San Joaquin rivers and their tributaries in California.

NMFS proposed new Critical Habitat for CV steelhead on December 10, 2004 (69 FR 71880) and published a final rule designating Critical Habitat on September 2, 2005 (70 FR 52488). In the Bear River, NMFS designates CV steelhead Critical Habitat to include the area defined in the CALWATER Marysville Hydrologic Unit 5515 (i) Lower Bear River Hydrologic Sub-area 551510. Outlet(s) = Bear River (39.9398, –121.5790) upstream to endpoint(s) in Bear River (39.0421, –121.3319), which means the upstream extent is at the non-Project diversion dam (70 FR 52488).

During the investigation of whether to include the Bear River as part of the final rule, several statements were made by the Critical Habitat Analytical Review Team (CHART) that highlighted the Bear River was only marginally included as part of critical habitat. The ruling stated:

> The CHART originally evaluated the conservation value of HSA 551510, which contains the lower Bear River, as being low, and it was proposed for exclusion in the proposed critical habitat rule based on the results of the ESA section 4(b)(2) analysis conducted for that rulemaking.
>
> As a result of the revised 4(b)(2) analysis conducted for the final rule, however, this [lower Bear River] HSA watershed was considered to have a medium benefit of designation and a relatively high benefit of exclusion (ie., high cost relative to benefit), making it potentially subject to exclusion from the final designation.

While analyses suggested that the high cost and low benefit of including the Bear River as critical habitat was marginal, the CHART included it because other species (i.e. spring-run Chinook salmon) may use the lower Bear River for non-natal rearing and the overall potential was assumed to justify the high cost.

<u>Recovery Plan</u>

The Recovery Plan for Central Valley (CV) winter-run Chinook salmon (*Oncorhynchus tshawytscha*) Evolutionary Significant Unit (ESU), CV spring-run Chinook salmon (*O. tshawytscha*) ESU and CV steelhead (*O. mykiss*) Distinct Population Segment (DPS) (NMFS 2014) was published as a means to identify the actions that may be needed for the conservation and survival of these species. The Recovery Plan is a comprehensive document that serves as a road map for species recovery. The purpose of this Recovery Plan is to guide the implementation of species recovery by identifying and correcting threats to the species and ensuring viable CV Chinook salmon ESUs and the CV steelhead DPS.

The plan provides background history on the species, presents and justifies the recommended recovery strategy for each species including specific goals and objectives. Finally, the specific actions that should be taken to achieve recovery are presented. The ultimate goal is the delisting of the CV Chinook salmon ESUs and the CV steelhead DPS.

A key element of the Recovery Plan is the focus of actions on watersheds that can support viable populations of ESA-listed salmonids and contribute to meeting Diversity Group[7] requirements for distribution and redundancy. To assess their potential to contribute to species recovery in the diversity group, the Recovery Plan places watersheds into three categories based on their potential to support populations with low risk of extinction. The three categories are Core 1, Core 2, and Core 3. If the watershed has no potential to support populations with low risk of extinction, it is not placed into one of the three categories. In addition, the Recovery Plan lists stressors to the populations by watershed.

For the CV steelhead DPS, the Recovery Plan classifies the Bear River as a Core 3[8] stream and states that the Bear River does not provide suitable habitat for self-sustaining populations of anadromous salmonids, including CV steelhead DPS, and that any CV steelhead DPS that intermittently spawn in the Bear River during high flow years are likely strays from the FRFH. Moreover, in Appendix B of the Recovery Plan, NMFS (2014) states that: "..*warm water temperatures during the summer months likely preclude steelhead juvenile rearing in the Bear River."*

The plan lists the following Bear River-specific stressors:[9]

- Water temperature during specific times of the year (primarily during the CV steelhead adult immigration, embryo incubation, and juvenile outmigration periods – spring, summer, and fall)
- Flow conditions during all CV steelhead lifestages because the Bear River is a highly managed river. Flow-dependent habitat availability is a concern during spawning and juvenile rearing and emigration. Low flows during adult immigration are a concern with respect to attraction and migratory cues.
- Entrainment of CV steelhead at unscreened diversions.
- Physical habitat alteration, which can lead to CV steelhead spawning habitat reduction.
- Loss of natural river morphology as a result of the managed flow regime.
- Loss of riparian habitat and instream cover as a result of the managed flow regime and adjacent agricultural production.

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[7] The Recovery Plan identifies four diversity groups, which are geographic areas that NMFS believes have supported historical populations of the ESA-listed anadromous salmonid. The Bear River is in the Recovery Plan's Northern Sierra Nevada Diversity Group, which is "*composed of streams tributary to the Sacramento River from the east, from Antelope Creek to the Mokelumne River*" (NMFS 2014, p. 68).

[8] The Recovery Plan describes a Core 3 stream as in "*watersheds* [that] *have populations that are present on an intermittent basis and require straying from other nearby populations for their existence. These populations likely do not have the potential to meet the abundance criteria for moderate risk of extinction. Core 3 watersheds are important because, like Core 2 watersheds, they support populations that provide increased life history diversity to the ESU/DPS and are likely to buffer against local catastrophic occurrences that could affect other nearby populations. Dispersal connectivity between populations and genetic diversity may be enhanced by working to recover smaller Core 3 populations that serve as stepping stones for dispersal*."

[9] The Bear River Watershed Profile in the Recovery Plan begins on Page 49 in Appendix A and the Threats Matrix, which begins on Page C-94, in Attachment C to Appendix B, are the two main locations in the Recovery Plan for Bear River-specific stressors.

- Poor water quality primarily for CV steelhead embryo incubation and juvenile rearing and outmigration. Of particular concern are mercury from historic gold mining, and diazinon from agricultural runoff.

Additional stressors to the CV steelhead DPS listed in the Recovery Plan that are not specific to the Bear River but apply to the overall Northern Sierra Nevada Diversity Group include loss of floodplain habitat in the San Francisco Bay Delta, flow and water temperature issues in the Feather and Sacramento rivers, hatchery effects on genetic diversity, and predation of juvenile outmigrants.[10]

The Recovery Plan does not identify passage impediments in the Bear River as a stressor of high importance because, according to the Recovery Plan, Camp Far West Dam was constructed at the site of a natural historic barrier.[11]

Current and Historical Distribution

CV steelhead DPS historically ranged throughout accessible tributaries and headwaters of the Sacramento and San Joaquin rivers prior to major dam construction, water development, and other watershed disturbances. In the Bear River, historic population estimates do not exist for steelhead. USFWS (1998) states:

> Historically, the Bear River never supported substantial runs of salmon and steelhead as a consequence of its naturally intermittent hydrology and the occurrence of a natural rock barrier located a short distance upstream from Camp Far West Reservoir. This barrier prevented salmon and steelhead from ascending the Bear River to higher elevations where streamflows and water temperatures were more suitable. Thus, fish were restricted to the Sacramento Valley floor where environmental conditions were not always favorable. In years with favorable flows, the Bear River probably supported small runs of fall-run chinook salmon and steelhead, although run size estimates are not available.

CV steelhead DPS was not reported on the CNDDB search in or near the Project Vicinity (CDFW 2018).

Life History and Habitat Requirements

"Steelhead" is the name commonly applied to the anadromous form of the biological species *O. mykiss*. Steelhead exhibits perhaps the most complex suite of life-history traits of any species of Pacific salmonid. Members of this species can be anadromous or freshwater residents and, under some circumstances, members of one form can apparently yield offspring of another form.

Due to a lack of documentation of CV steelhead DPS occurring in the Bear River, there is no information on the life history of any CV steelhead DPS that may intermittently spawn there.

[10] The Northern Sierra Nevada Diversity Group stressor Matrix Results highlight the highest priority stressors for the Diversity Group that contains the Bear River starts on Page 4-135 in Appendix B of the Recovery Plan.
[11] As stated at page 4-135 in Appendix B, Section 4, of the Recovery Plan.

However, assuming that CV steelhead DPS that may spawn in the Bear River are likely FRFH-origin fish, recent studies in the lower Yuba River, another tributary to the Feather River, are likely representative of general life history conditions for steelhead that would have the potential to spawn in the Bear River, described below.

The Lower Yuba River Accord, River Management Team (RMT 2010; 2013) identified the period extending from August through March as encompassing the majority of the upstream migration and holding of adult CV steelhead DPS in the lower Yuba River. CV steelhead DPS adults typically spawn from December through April with peaks from January through March in small streams and tributaries where cool, well-oxygenated water is available year-round (Hallock et al. 1961; McEwan 2001). Based on all available information collected to date, the RMT (2013) recently identified the CV steelhead DPS spawning period in the lower Yuba River as extending from January through April, with embryo incubation extending into May. Juvenile CV steelhead DPS rearing in the lower Yuba River exhibits a variety of temporal periods. Some juvenile CV steelhead DPS may rear in the lower Yuba River for a short duration (i.e., up to a few months) whereas others may spend from 1 to 3 years rearing in the river. Review of available data indicates that emigration of CV steelhead DPS smolts 1 year old and older (yearling+) may extend from October through mid-April (RMT 2010; 2013).

Table 3.3.5-2. Life stage-specific periodicities for CV steelhead DPS in the Yuba River (shaded boxes indicate temporal utilization of the Yuba River, and assumed in this Exhibit E for the Bear River). Reproduced from Lower Yuba River Accord River Management Team (2013).

Life stage	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Adult Immigration & Holding												
Spawning												
Embryo Incubation												
Fry Rearing												
Juvenile Rearing												
Juvenile Downstream Movement												
Smolt (Yearling+) Emigration												

Female steelhead construct redds within a range of depths and velocities in suitable gravels, oftentimes in pool tailouts and heads of riffles. Steelhead eggs incubate in redds for 3 to 14 weeks prior to hatching, depending on water temperatures (Shapovalov and Taft 1954; Barnhart 1991). After hatching, alevins, newly spawned salmon or trout still carrying the yolk, remain in the gravel for an additional 2 to 5 weeks while absorbing their yolk sacs prior to emergence (Barnhart 1991). The entire egg incubation life stage encompasses the time adult CV steelhead DPS select a spawning site through the time when emergent fry exit the gravel (CALFED and YCWA 2005).

In general, it has been reported that after emergence, steelhead fry move to shallow-water, low-velocity habitats, such as stream margins and low gradient riffles, and will forage in open areas lacking instream cover (Hartman 1965; Everest et al. 1986; Fontaine 1988). As fry increase in size and their swimming abilities improve in late summer and fall, juvenile steelhead have been reported to increasingly use areas with cover and show a preference for higher velocity, deeper mid-channel areas near the thalweg (Hartman 1965; Everest and Chapman 1972; Fontaine 1988).

Juvenile steelhead have been reported to occupy a wide range of habitats, preferring deep pools as well as higher velocity rapid and cascade habitats (Bisson et al. 1982, 1988). During the winter period of inactivity, steelhead prefer low velocity pool habitats with large rocky substrate or woody debris for cover (Hartman 1965; Swales et al. 1986; Raleigh et al. 1984; Fontaine 1988). During periods of low temperatures and high flows associated with the winter months, juvenile steelhead seek refuge in interstitial spaces in cobble and boulder substrates (Bustard and Narver 1975; Everest et al. 1986).

Aside from cutthroat trout (*O. clarki*), steelhead is the only anadromous species of the genus *Oncorhynchus* in which adults can survive spawning and return to fresh water to spawn in subsequent years. Individuals that survive spawning return to sea between April and June (Mills and Fisher 1994). The frequency of repeat spawning is higher for females than for males (Ward and Slaney 1988; Meehan and Bjornn 1991; Behnke 1992). In the Sacramento River, Hallock (1989) reported that 14 percent of CV steelhead DPS returned to spawn a second time. In the lower Yuba River, Mitchell (2010) reports that, based on scale analysis, 2 of the 10 wild CV steelhead DPS were on their second spawning migration at the time of capture, as indicated by a spawning check between the first and second ocean growth zones.

<u>Stressors and Limiting Factors</u>
Major modifications to habitat in the Bear River result from water diversions during the irrigation season, historical hydraulic mining, and construction of Rollins Dam which caused a substantial reduction in downstream sediment transport. It is estimated that 125 million cubic meters (160 million cu yds) of mining sediment is stored in the lower Bear River. The high volume of mining sediment, as well as the restricting levees, has resulted in a shallow and deeply incised channel in the lower Bear River (NMFS 2014).

During high flow events, CV steelhead DPS are known to utilize the river for limited spawning. Because CV steelhead DPS spawning likely only occurs during wet years, existing flow conditions are likely adequate to support CV steelhead DPS embryo incubation. However, the current system of diversions in the Bear River watershed results in abnormal flow fluctuations, in contrast to historical natural seasonal flow variations (NMFS 2014).

The Bear River was reviewed for summer baseflows to consider whether additional flows would benefit steelhead and possibly improve water temperature. During a summer water transfer from July 2 to August 28, 2018, flows were increased to over 120 cfs, which is significantly greater than the 10 cfs baseflow. Stream temperature reduced by 2°C for one day and then climbed back to ambient conditions (over 26°C) over the next several days. At the time of the transfer, the Feather River remained over 20 times greater in discharge magnitude, with water temperature that was 5-6°C cooler. The results suggest that steelhead during the summer are able to utilize the Feather River for holding and that usage of the Bear River, regardless of added flow, is likely opportunistic based on ambient conditions.

<u>SSWD's Relicensing Studies</u>
In 2017, SSWD conducted Environmental DNA (eDNA) sampling at six locations between the non-Project diversion dam and the confluence with the Feather River. The eDNA sampling selectively targeted salmonids and sturgeon species including *O. mykiss*. Eleven of the 49 eDNA

samples collected were positive for *O. mykiss*. For further analysis of the study, see Section 3.3.3.1.3 in this Exhibit E.

In April, May and June 2018, SSWD conducted snorkel and seine surveys at three locations on the Bear River. Based on the snorkel surveys, *O. mykiss* represented less than two percent of the estimated total abundance in April and May, and no *O. mykiss* were observed in June. Only one *O. mykiss* parr was captured during all three seining events; in May accounted for 1.69% of the total catch. For further description of these studies, see Section 3.3.3.1.3 in this Exhibit E.

SSWD also conducted an analysis of habitat and water temperature as they pertain to steelhead life stages using output from temperature and instream flow models developed as part of relicensing studies. This analysis indicates that, while habitat for CV steelhead DPS is available for all life stages, temperatures generally preclude utilization of the available habitat for most months of the year. A detailed discussion of this analysis is provided in Section 3.3.3.1.3 of this Exhibit E. Provided below is a summary of habitat, temperature and flow analyses for CV steelhead DPS by lifestage to address potential conditions by period.

CV Steelhead DPS Adult Immigration and Holding

Adult immigration and staging may occur from August through March. Summer fish observations as part of 2018 Water Transfer Monitoring surveys on July 24 through 26 and August 29 through 31 did not document the presence of adult CV steelhead DPS in the entire lower Bear River. Yuba River Vaki data[12] does not specifically identify CV steelhead DPS, but the generalized life form *O. mykiss*, which can include resident or anadromous life histories. Data from 2017 in the Yuba River did not observe any *O. mykiss* passage event from November 2016 to February 2017, but 2018 data detected passage events March 2017 to September 2018. Again, these data do not corroborate steelhead passage, but show that *O. mykiss* passage overall can be variable.

Suitable steelhead salmon migration characteristics are not relatively complex to maintain. Primarily, adults need complete access to spawning grounds, without physical impairment due to obstacle or shallow water barrier. The lower Bear River maintains sufficient continuity for adult access to the spawning grounds and no instream barriers or impediments to passage were noted during any SSWD relicensing surveys (e.g., habitat mapping, redd mapping and fisheries sampling). Specific instream habitat models for this life stage were not developed by SSWD during its relicensing Instream Flow Study because of the general simplistic needs do not require advanced modeling to measure suitability.

The EPA (2003) also provides a temperature guideline of 18°C for migrating adult steelhead to ensure that adults are not stressed and any fecund females with potential eggs are not compromised due to excessively warm water. Water temperature analyses in Table 3.3.5-3 shows that adults returning from August through September may be exposed to warmer water

[12] Summarized Vaki data available online at: http://www.yubaaccordrmt.com/RMT%20Data/Forms/AllItems.aspx?RootFolder=%2fRMT%20Data%2fField%20Data%20Collection%20Updates&FolderCTID=&View=%7b1A7D3ED2-7710-46BB-BBAE-266745BCE474%7d

temperature outside of EPA guidelines, but conditions rapidly improve and are optimal from November through March. Wetter years expand the window of opportunity for returning adults, while drier years limit access due to temperature. These conditions are typical of any small watershed and would occur regardless of the Project.

Table 3.3.5-3. Percent of days per month where the base case stream temperature at four locations in the lower Bear River is less than EPA guidelines for specific life stages of steelhead. Temperatures are output from the water temperature model developed in Study 2.2, and are expressed as the 7 day average of the daily maxima (7DADM) in degrees Celsius. For each life stage, only months where utilization is expected are shown; life stage utilization periodicities are derived from steelhead utilization of the Yuba River. The number of days for each month in the period of record from which the temperature model was developed are shown in the bottom row.

Lower Bear River Location	Month											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
STEELHEAD SPAWNING/INCUBATION/EMERGENCE (EPA GUIDELINE: LESS THAN 13° C 7DADM)												
Below the non-Project diversion dam	100%	99%	74%	44%	18%							
Highway 65	99%	81%	54%	18%	0%							
Pleasant Grove Bridge gage	98%	74%	47%	11%	0%							
Highway 70	94%	69%	39%	7%	0%							
STEELHEAD CORE JUVENILE REARING (EPA GUIDELINE: LESS THAN 16° C 7DADM)												
Below the non-Project diversion dam	100%	100%	97%	93%	82%	43%	7%	0%	0%	2%	75%	100%
Highway 65	100%	98%	78%	63%	16%	0%	0%	0%	0%	8%	90%	100%
Pleasant Grove Bridge gage	100%	96%	74%	58%	8%	0%	0%	0%	0%	8%	87%	100%
Highway 70	100%	96%	72%	55%	5%	0%	0%	0%	0%	8%	90%	100%
STEELHEAD MIGRATION (EPA GUIDELINE: LESS THAN 18° C 7DADM)												
Below the non-Project diversion dam	100%	100%	100%					0%	0%	14%	96%	100%
Highway 65	100%	100%	90%					0%	0%	31%	100%	100%
Pleasant Grove Bridge gage	100%	100%	87%					0%	0%	27%	99%	100%
Highway 70	100%	100%	88%					0%	0%	30%	99%	100%
Number of Days included in Each Month's Analysis (WYs 1976 through 2014)	1,209	1,102	1,209	1,170	1,209	1,170	1,209	1,209	1,170	1,203	1,170	1,209

Key: Blue cells are 100% suitable water temperatures based on EPA guideline; green cells are 80% to 99% suitable; yellow cells are 70% to 79% suitable; orange cells are 60% to 69% suitable; and red cells are less than 60% suitable.

CV Steelhead DPS Spawning

Steelhead spawning can occur in the lower Bear River from January through April. Spawning surveys did not identify a single steelhead redd to further inform periodicity. SSWD's studies did show that the lower Bear River contains good quantities of salmonid spawning substrate and the overall capacity for spawning does not appear to be limited by gravel based on general activity observed of adult Chinook salmon spawners (i.e., opportunistic observation and carcass counts) and related spatial requirements. The EPA (2003) guidelines state that a cool 13°C is desired for suitable temperature during spawning. The guideline is relatively cold, especially for early spring in the lower Bear River, which begins to warm due to increased ambient temperatures. The low elevation of the lower Bear River does not benefit from a snowpack to extend cold water temperature and the relatively smaller reservoir is more rapidly warmed due to a lower thermal buffer.

During this period, the existing minimum flow requirement is 10 cfs from January through March and 25 cfs in April. At a flow of 10 cfs and based on the habitat-flow relationship, habitat would range from 2 to 5 percent of Max WUA and water temperature would remain within EPA guidelines 94 to 100 percent of the time in January and 69 to 99 percent in February. By March, water temperature begins to warm and temperature would remain within guidelines 39 to 74 percent of the time. In April, increased base flow results in habitat improving to a range of 13 to 17 percent of Max WUA, but temperature is within guidelines 7 to 44 percent of the time.

Steelhead spawning was not observed during any studies in the Bear River. Given the relatively low frequency of spawning, there does not appear to be any physical constraint of spawning habitat due to competition. Large amounts of spawning gravel occur throughout the lower Bear River. While there is not a large amount of spawning habitat available, the areas that are available are likely viable through early March. Water temperature becomes a limiting factor in April and May.

CV Steelhead DPS Egg Incubation

Egg incubation immediately follows spawning and generally requires 20 to 30 days to complete (Moyle 2002). Since spawning mainly occurs from January through April, egg incubation can then extend through May. SSWD's studies, as described above, show that steelhead spawning substrate has good permeability for egg incubation and there are extensive quality gravel beds extending throughout the lower reach.

SSWD's *Instream Flow Study* did not include a specific egg incubation model, but is encompassed as part of the overall spawning curve. Assuming that salmon are able to successfully spawn in suitable habitat and that sufficient water stage is maintained for covering redds, then the overall conditions for egg incubation are physically met for velocity, depth, and substrate habitat modeling.

The EPA (2003) guideline similarly maintain that 13°C is advised through spawning and egg incubation. This results in a similar scenario to spawning with generally suitable temperature in

January and February, marginal in March (i.e., 39% to 74% of the days suitable), and unsuitable conditions through most of May (i.e., 0 to 18%).

While the early window for egg incubation may be limited in some warmer, drier water years, it is anticipated that cooler, wetter years expand the opportunity for both spawning and incubation. The seasonal opportunity driven by precipitation and cooler weather is a strong factor that persisted prior to the Project and still influences the opportunistic steelhead production levels in the Bear River.

CV Steelhead DPS Fry Rearing

Young fish that have emerged from gravel incubation represent a fry lifestage. Fry rearing may occur April through July. SSWD’s studies, as described above, show that the lower Bear River contains good structural habitat for fry rearing. Instream flow modeling differentiates fry from juvenile fishes, because they are not strong swimmers and tend to occupy different habitat when compared to the more mature juvenile counterparts. The existing minimum flow requirement is 25 cfs April to June and 10 cfs all other months. At a flow of 10 cfs and based on the habitat-flow relationship, the existing minimum flow provides 100 percent of the maximum WUA at each of the Instream Flow Study Upstream and Downstream sites and at the USFWS Site. At 25 cfs, the percent of max WUA ranges from 89 to 92 percent. Therefore, habitat for fry rearing does not appear to be limited.

The EPA (2003) guidelines do not contain different prescriptions for fry or juvenile developmental stages and only officially identify juvenile rearing. Regardless, the EPA suggests that 16°C is an appropriate guideline for rearing salmonids of either fry or juvenile. Temperature conditions for fry in the lower Bear River are challenged. April offers the best suitability of 55 to 93 percent, with each month reducing. At the uppermost habitat below the non-Project diversion dam, temperature is 93 percent suitable in April and 82 percent in May. All other reaches are generally unsuitable from May through July, with minimal suitability at the most upstream habitat.

The lower Bear River is a relatively smaller watershed that warms considerably into summer months. While habitat is excellent for fry rearing, early to mid-summer rearing is constrained by water temperature. Prior to the Project, most of the lower Bear River would have become unsuitable and the only habitat that is suitable in April and May is due to the limited cold tailwater releases caused by impoundments. As described above, steelhead likely did not enter the upper the Bear River.

CV Steelhead DPS Juvenile Rearing

As fry mature, food prey items increase in size, swimming ability improves and the developmental stage transitions to juvenile. Juvenile fish are more robust, can handle quicker water and access a greater range of habitat when compared to fry. Juvenile fish may be present throughout the year. The existing minimum flow requirement from July through March is 10 cfs and it results in 63 to 88 percent of Max WUA, while the 25 cfs flow requirement April through June provides 78 to 95 percent of Max WUA.

As discussed for fry rearing, the EPA suggests that 16°C is an appropriate guideline for rearing salmonids (fry or juvenile developmental stages). Temperature conditions for rearing juveniles are good to excellent from November through March, begin to decline in April and are generally unsuitable June through October. Thermal conditions are not within EPA guidelines for year-round rearing by juveniles. A recent study by Verhille et al. (2016) showed that *O. mykiss* can show localized thermally plasticity that may result in viable survival at temperature of up to 23°C. Regardless, water temperature in the lower Bear River is generally unsuitable for summer rearing based on the EPA (2003) guidelines.

Smoltification

Smoltification is the process of a juvenile freshwater anadromous fish moving into saltwater. The process is a general physiological change that begins in freshwater and requires suitable water temperature to occur. A smolting steelhead generally has reared in freshwater for two or more years. Habitat requirements for fry or juvenile fishes as discussed above address what is needed during rearing, but water temperature during smoltification is suggested to be 14°C by EPA guidelines. Smoltification may occur between November and March, which generally are the cool months in the Bear River. Water temperature is generally greater than 90 percent suitable for all months except for March that ranges from 87 to 100 percent suitability. The lower Bear River provides both appropriate habitat and temperature for the smoltification process for steelhead.

<u>Known Occurrences in Action Area</u>
SSWD's identified *O. mykiss* in the lower Bear River, but no redds were observed. The Recovery Plan (NMFS 2014) states that the lower Bear River does not provide suitable habitat for steelhead due to warm summer water temperatures and that any CV steelhead DPS that intermittently spawn in the lower Bear River during high flow years are likely strays from the FRFH. The lower Bear River upstream to the non-Project diversion dam is was designated as Critical Habitat for CV steelhead DPS, while the CHART stated the high cost - low benefit of including the Bear River as Critical Habitat was marginal, and only included because other species may use the lower Bear River for non-natal rearing.

CV Spring-run Chinook Salmon ESU (FT)

<u>Status and Critical Habitat</u>
On September 16, 1999, NMFS listed the Central Valley ESU of Chinook salmon as threatened (64 FR 50394). On June 14, 2004, following a 5-year species status review, NMFS proposed that CV spring-run Chinook salmon ESU remain a threatened species based on the Biological Review Team's strong majority opinion that the CV spring-run Chinook salmon ESU is ‘‘likely to become endangered within the foreseeable future’’ due to the greatly reduced distribution of CV spring-run Chinook salmon ESU and hatchery influences on the natural population. On June 28, 2005, NMFS reaffirmed the threatened status of the CV spring-run Chinook salmon ESU, and included the FRFH spring-run Chinook salmon population as part of the CV spring-run Chinook salmon ESU (70 FR 37160).

Critical Habitat was designated for the CV spring-run Chinook salmon ESU on September 2, 2005 (70 FR 52488). The ESU for CV spring-run Chinook salmon ESU is defined as all naturally spawned populations of spring-run Chinook salmon ESU in the Sacramento River and its tributaries, including the FRFH population. In the Bear River, NMFS designates CV spring-run Chinook salmon ESU Critical Habitat to include the area defined in the CALWATER Marysville HU 5515, Lower Yuba River Hydrologic Sub-area 551510. Outlet(s) = Bear River (38.9398, -121.5790) upstream to endpoint(s) in: Bear River (38.9783, -121.5166), which means the upstream extent is approximately to RM 5 in the Bear River (70 FR 52488).

During the final ruling review, the CHART did not first see the Bear River as occupied habitat for CV spring-run Chinook salmon ESU. The CHART stated:

> The HSA watershed (551510) containing the lower Bear River was originally considered unoccupied by the CHART, and its conservation value was not rated.

The habitat was only included based on commenters suggestions that future habitat restoration may result in usable beneficial habitat. At the time of the ruling, the lower Bear River habitat was only marginal for CV spring-run Chinook salmon ESU, but the CHART determined inclusion of the habitat outweighed exclusion.

<u>Recovery Plan</u>

NMFS's 2014 Recovery Plan for Central Valley (CV) winter-run Chinook salmon (*Oncorhynchus tshawytscha*) Evolutionary Significant Unit (ESU), CV spring-run Chinook salmon (*O. tshawytscha*) ESU and CV steelhead (*O. mykiss*) Distinct Population Segment (DPS) is discussed above under CV steelhead DPS. For the CV winter-run and spring-run Chinook salmon ESUs, the Recovery Plan does not classify the Bear River as a Core 1, 2, or 3, stream, and does not list any Bear River-specific stressors. The Recovery Plan states that the Bear River does not provide suitable habitat for self-sustaining populations of anadromous salmonids. Moreover, USFWS (1999) states that "*temperatures are often at or above preferred ranges for Chinook salmon*." CV spring-run Chinook salmon ESU use of the lower Bear River is likely restricted to use by non-natal juveniles originating from the Feather or Yuba rivers during higher flow years.

<u>Current and Historical Distribution</u>

Section 305(b)(2) of the 1996 amendments to the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA) (16 USC 1801 et seq.) requires the identification of essential fish habitat (EFH) for federally managed fishery species and the implementation of measures to conserve and enhance this habitat. In the Mid-Pacific Region, the Pacific Fisheries Management Council designates EFH and NMFS approves the designation. EFH includes specifically identified waters and substrate necessary for fish spawning, breeding, feeding, or growth to maturity and covers a species' full life cycle (16 USC 1802(10)). EFH only applies to commercial fisheries. Chinook salmon habitat has been identified as Pacific salmon EFH in the Bear River upstream to Camp Far West Dam (PFMC 2014). EFH applies to all runs of Chinook salmon potentially present in the Bear River.

Four distinct runs of Chinook salmon spawn in the Sacramento-San Joaquin River system, with each run named for the season when the majority of the run enters freshwater as adults. Historically, spring-run Chinook salmon occurred in the headwaters of all major river systems in the Central Valley where natural barriers to migration were absent. Beginning in the 1880s, harvest, water development, construction of dams that prevented access to headwater areas, and habitat degradation significantly reduced the number and range of CV spring-run Chinook salmon ESU. Presently, Mill, Deer, and Butte creeks in the Sacramento River system support self-sustaining, persistent populations of CV spring-run Chinook salmon ESU (PFMC 2014).

The upper Sacramento, Yuba, and Feather rivers also are reported to support CV spring-run Chinook salmon ESU. However, these populations may be hybridized to some degree with fall-run Chinook salmon. CV spring-run Chinook salmon ESU acquired and maintained genetic integrity through reproductive (spatial-temporal) isolation from other CV Chinook salmon runs. However, construction of dams has prevented access to headwater areas and much of this historical reproductive isolation has been compromised, resulting in intermixed life history traits in many remaining habitats (PFMC 2014). USFWS (1998) states that historical use of the Bear River by Chinook salmon was limited by a natural barrier in the vicinity of Camp Far West Reservoir to the lower-elevation reaches on the valley floor, where natural regimes of temperature and flow likely restricted their use to years when suitable conditions existed.

<u>Life History and Habitat Requirements</u>

NMFS (2014) reports that the Bear River does not provide adequate physical habitat or suitable flow or water temperature conditions that could support self-sustaining anadromous salmonid populations. CV spring-run Chinook salmon ESU was not identified in NMFS (2014) Recovery Plan as a species that historically or currently exists in the Bear River. However, as previously mentioned, NMFS did designate Critical Habitat for CV spring-run Chinook salmon ESU in the lowest 5 mi of the Bear River for non-natal juvenile rearing (70 FR 52488). NMFS included the lower reach of the Bear River in the Critical Habitat designation, in part, because the habitat may serve as refugia from high water conditions and catastrophic events (70 FR 52488), which suggests that non-natal juvenile CV spring-run Chinook salmon ESU, presumably originating from the Feather River or Yuba River, may utilize the lower Bear River during high flow events. If non-natal juvenile CV spring-run Chinook salmon ESU primarily access the lower Bear River during high flow years, flow-dependent habitat in the lower Bear River would likely not be limiting during those periods.

CV spring-run Chinook salmon ESU fry generally emerge from the gravel from November to March (Moyle 2002). Most juvenile Chinook salmon emigrate from the lower Feather River within a few months of emergence. However, some CV spring-run Chinook salmon ESU juveniles reportedly rear for up to 15 months prior to emigrating (NMFS 2014). While non-natal juvenile CV spring-run Chinook salmon ESU may rear year-round, based on the generally unsuitable habitat conditions in the lower Bear River during the summer and fall, juveniles would likely only utilize the lower Bear River during the higher flow spring months.

Table 3.3.5-4. CV spring-run Chinook salmon ESU lifestage periodicity based on information presented for the Yuba River. CV spring-run Chinook salmon ESU do not occupy the Bear River, so a nearby surrogate basin was used for discussion.

CV Spring-run Chinook Salmon ESU Lifestage	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Adult Migration												
Adult Holding												
Spawning												
Embryo Incubation												
Juvenile Rearing and Downstream Movement												
Smolt (Yearling+) Emigration												

The CNDDB had no reports of the CV spring-run Chinook salmon ESU in the Project Vicinity (CDFW 2018). CV Spring-run Chinook salmon ESU are known to occur in the Feather and Yuba rivers. Adults in the Feather River migrate past the Bear River on return to their natal spawning grounds and juveniles outmigrate past the Bear River confluence as they move to the Delta.

<u>Stressors and Limiting Factors</u>

Although the Bear River historically supported fall-run Chinook salmon, CV spring-run Chinook salmon were apparently not present. This may be in part due to the fact that a natural waterfall blocked Chinook salmon in the vicinity of the present day Camp Far West Reservoir (Yoshiyama et al. 2001), which would have prevented CV spring-run Chinook salmon ESU from immigrating and spawning in their preferred habitats in the higher elevation reaches of Central Valley streams.

The Bear River was described as only marginal for CV spring-run Chinook salmon ESU during consideration of critical habitat designation. The only usage of the Bear River would be for non-natal rearing, which is a small portion of the overall life history of CV spring-run Chinook salmon ESU originating from the Feather or Yuba rivers. Flow in the lower Bear River is strongly influenced by upstream water released from the Feather and Yuba rivers, so the overall potential to manage or benefit non-natal rearing in the lower Bear River is low.

<u>SSWD's Relicensing Studies</u>

Given the low likelihood of occurrence in the lower Bear River of CV spring-run Chinook salmon ESU identified in the NMFS (2014) Recovery Plan, SSWD conducted no studies specifically focused on CV spring-run Chinook salmon ESU. However, SSWD conducted eDNA sampling in the lower Bear River in 2017, and the sampling targeted Chinook salmon. Chinook salmon were detected at 17 of the 49 samples collected, but eDNA does not allow for identification of run type.

SSWD also conducted an analysis of habitat and water temperature as they pertain to fall-run Chinook salmon life stages using output from temperature and instream flow models developed as part of relicensing studies. Many of the physical requirements for CV spring-run Chinook salmon ESU are similar to fall-run to allow for comparative assessment. Also, EPA water temperature guidelines are generally the same for spring- and fall-run Chinook and steelhead by lifestage, with additional consideration based on differences in periodicity. Analysis indicates that, while habitat for CV spring-run Chinook salmon ESU is available for all life stages, temperatures generally preclude utilization of the available habitat for most months of the year. Provided below is a summary of habitat, temperature and flow analyses for spring-run Chinook salmon ESU by lifestage to address potential conditions by period.

Adult Migration and Holding

CV spring-run Chinook salmon ESU return to their natal streams in spring and hold through the summer months prior to spawning. Their early return and relatively long riverine holding period are unique to the periodicity of this run of fish when compared to other runs like fall-run Chinook that quickly move intro freshwater in the fall (October) and spawn with minimal holding time. The long holding period make spring-run adults conspicuous and easier to view from the water's surface. Large schools of spring-run can be seen in nearby rivers including the Feather and Yuba rivers, where they occupy large stratified pools where deep cool water remains through summer months. Compared to the Feather and Yuba rivers, the lower Bear River is relatively small and does not offer large, deep, thermally stratified pools. Suitable temperature below 18°C may occur November through April, but May through September would generally have unsuitable water temperature.

Historical data did not suggest that CV spring-run Chinook salmon ESU ever occupied the Bear River, which is not surprising based on its size and low elevation. During all of the relicensing studies, there was not a single observation of an adult Chinook salmon between the months of March and August, which would be typical of adult holding. The Water Transfer Survey for fishes on July 24-26 and August 29-31, 2018 did not identify any adult Chinook salmon as well. All historic and recently collected information suggests that adult CV spring-run Chinook salmon ESU does not occupy the Bear River for reproduction.

CV Spring-Run Chinook Salmon ESU Spawning

CV spring-run Chinook salmon ESU spawning generally occurs relatively high in the watershed, near deepwater cold holding areas. Adults' early return in the spring allows for the run to move into the uppermost accessible stream habitat, where cooler water may occur. Then, spawning generally initiates in September through early October. The early potential spawning would be problematic in the lower Bear River where spawning temperature is outside of EPA (2003) guidelines and unsuitable for all of September and most of October (2% to 8% frequency of thermal suitability). Table 3.3.5-3 presents information for steelhead spawning, but temperature guidelines are the same for Chinook spawning, although periodicity is different.

Fall-run Chinook salmon often occur in the same watershed as CV spring-run Chinook salmon ESU, but typically spawn in mid-October through November and even into December. Fall-run

Chinook salmon gonads are ripe as they enter freshwater making them quick to spawn. They generally do not expend the energy to move higher in the watershed, where CV spring-run Chinook salmon ESU would occur. As a result, there is generally a spatial separation between fall- and spring-runs, even if a small period in October may temporally overlap between fall- and spring-run adult spawning. The separation maintains the genetic integrity of the runs. In the event that CV spring-run Chinook salmon ESU were to occupy and spawn in the lower Bear River, it would likely occur near the non-Project diversion dam, the furthest upstream accessible point in the lower Bear River. Spawning surveys and the results from habitat modeling showed that extensive physical spawning habitat and quality gravel is available throughout the lower Bear River and would not limit spawning. Historical information did not document any spawning and all relicensing studies did not observe any early spawning that would suggest CV spring-run Chinook salmon ESU activity.

CV Spring-Run Chinook Salmon ESU Embryo Incubation

CV spring-run Chinook salmon ESU adult presence or related spawning activity were not observed in the Bear River. As a result, there is little information to present regarding embryo or egg incubation. In the event that CV spring-run Chinook salmon ESU were to attempt spawning in September and October, the resultant embryo would have limited success because water temperature during this period exceed the EPA guidelines for embryo incubation. While temperature would be unsuitable, the presence of extensive spawning gravels with suitable permeability would not be a limiting factor. Regardless, any spawning or incubation is unlikely and any successful egg incubation result is even more unlikely due to unsuitable water temperature.

CV Spring-run Chinook Salmon ESU Rearing (Fry and Juvenile Lifestages)

CV spring-run juvenile Chinook salmon ESU have a complex early life history. Emergent fry are known to quickly begin moving downstream within hours of emergence from the gravel. Others hold for weeks and then begin the process of smoltification, which will result in moving out of their natal river as a subyearling. Finally, a select portion will oversummer for a year and migrate out as larger yearling. Each of these life history strategies spread out the potential risk of mortality and predation by varying the timing of rearing and outmigration. The potential for each of these life histories is contingent upon a surrounding suitable environment to allow for each option to occur. The lower Bear River does not offer suitable year-round habitat as a result of unsuitable water temperature and would not allow for any long-term rearing.

As fry and juveniles exit their natal streams from the Feather and Yuba rivers, they may move into the mouth of tributaries to hold and feed for relatively brief periods. Tributary confluences can offer slower or slack water for areas to feed and rest. Outmigrating CV spring-run Chinook salmon ESU may occupy these areas, which are classified as non-natal rearing habitat. The lower 5 mi of the Bear River is designated as critical habitat for CV spring-run Chinook salmon ESU for the purpose of non-natal rearing.

During SSWD’s Water Transfer Surveys, it was observed that the lower 1 mi of the Bear River may backwater as flow from the Feather River backs incoming flow from the Bear River. The resultant low velocity area may provide a brief, desirable area for juvenile outmigrants to occupy. Water temperature in the lower Bear River during late spring, summer, and fall months is likely too warm for juveniles outside of the mixing area from the cooler Feather River. During winter months, cooler temperature may allow for expanded usage as temperature becomes suitable. Habitat within the Bear River near the confluence of the Feather River is physically suitable for temporary usage by juveniles. The amount of backwatered habitat is primarily influenced by flow from the Feather River and less a result of Bear River flow management. The distant location also cannot be managed for temperature from Project water releases, as ambient temperature overwhelms any potentially cooler Project flow releases. Therefore, there is little management for CV spring-run Chinook salmon ESU that may utilize the confluence for non-natal rearing.

Smoltification

As described for CV steelhead DPS earlier, smoltification is a physiological change that occurs as juvenile salmonids move from freshwater to saltwater. CV spring-run Chinook salmon ESU are not expected to be present during any natal rearing activity, but may occur during non-natal rearing and occupation of the lower Bear River. Smoltification may occur from October through early May and the EPA provides a temperature guideline of 14°C during this period. The lower Bear River temperature is determined by ambient warming year-round and, therefore, may be unsuitable during late spring, summer, and fall months. Water temperature from November through March may be suitable and offer brief periods of usage for non-natal rearing.

<u>Known Occurrences in Action Area</u>
SSWD's identified Chinook salmon in the lower Bear River, but these are the fall-run phenotype. The Recovery Plan states that CV spring-run Chinook salmon ESU use of the lower Bear River is likely restricted to use by non-natal juveniles originating from the Feather or Yuba rivers during higher flow years. The lower 5 mi of the lower Bear River are designated as Critical Habitat for CV spring-run Chinook salmon ESU. As discussed above, the Bear River may provide intermittent habitat for non-natal rearing as is allowed by suitable water temperature dictated by ambient warming. The Bear River cannot manage for this usage through flow releases, but does offer potential opportunistic usage as temperature conditions allow.

North American Green Sturgeon Southern DPS (FT)

<u>Status and Critical Habitat</u>
The Southern DPS of North American green sturgeon was listed as a threatened species on April 7, 2006 (71 FR 17757) and includes the green sturgeon population spawning in the Sacramento River and utilizing the Sacramento-San Joaquin River Delta, and San Francisco Estuary. NMFS (2009b) *Draft Environmental Assessment for the Proposed Application of Protective Regulations Under Section 4(D) of the Endangered Species Act for the Threatened Southern Distinct Population Segment of North American Green Sturgeon* identified the loss of spawning habitat in the upper Sacramento River, and potentially in the Feather and Yuba rivers, due to migration barriers and instream alterations as threats to the survival of the Southern DPS of North American green sturgeon.

In August 2015, NMFS completed the 5-year status review of the Southern DPS of the North American green sturgeon. Based on the evaluation of new information generated since the last status review, NMFS (2015) does not suggest a significant change in the status of Southern DPS green sturgeon and has concluded that the "threatened" status continues to be applicable.

On October 9, 2009, NMFS (74 FR 52300) designated critical habitat for the Southern DPS of North American green sturgeon. In the Central Valley, designated critical habitat for green sturgeon includes the Sacramento River, lower Feather River, lower Yuba River, the Sacramento-San Joaquin River Delta, and San Francisco Estuary. NMFS (74 FR 52300) defined specific habitat areas in the Sacramento, Feather, and Yuba rivers in California to include riverine habitat from each river mouth upstream to and including the furthest known site of historic and/or current sighting or capture of North American green sturgeon, as long as the site is still accessible. No critical habitat for green sturgeon was designated in the Bear River.

Recovery Plan

The NMFS (2018) Recovery Plan focuses recovery efforts on conservation and expansion of freshwater and estuarine spawning and rearing habitats. Additionally, NMFS (2018) states that NMFS may refine the recovery criteria or revise or reprioritize recovery actions. For example, if indices of recruitment to the juvenile life stage do not show a net positive trend within 15 years after restoring adequate habitat in the Sacramento, Feather and Yuba rivers, then additional spawning and rearing habitat may be needed elsewhere or other activities that increase juvenile productivity may be needed. Watersheds that might have once provided spawning habitat based on historical conditions (i.e., Bear River, American River, and Russian River) could be considered. NMFS (2018) states that as a monitoring priority, the use of eDNA or other methods to monitor unoccupied rivers/non-spawning population rivers for the presence of green sturgeon, particularly during summer months, should be implemented. Priority rivers would be those more likely to have Southern DPS populations than Northern DPS populations (i.e., American, Bear, Russian, San Joaquin, Stanislaus, and Tuolumne rivers). NMFS (2018) lists this monitoring as a Priority 2, which is defined as research with potentially high management or recovery value.

Current and Historical Distribution

Green sturgeon exhibit a broad range along the Pacific Coast, and have been documented offshore from Ensenada, Mexico, to the Bering Sea. They are found in rivers from British Columbia to the Sacramento River (Moyle 2002). The Southern DPS of North American green sturgeon are anadromous, and are considered to be the most marine-oriented of the sturgeon species (Moyle 2002).

Limited data has been collected regarding the historical distribution of green sturgeon in the Sacramento-San Joaquin river basins. However, Adams et al. (2007) summarizes information that suggests that green sturgeon may have been distributed above the locations of present-day dams on the Sacramento and Feather rivers (Mora et al. 2009).

Currently, spawning populations of green sturgeon in North America are found in only three river systems: the Sacramento and Klamath rivers in California and the Rogue River in southern Oregon (NMFS 2009b). Green sturgeon have been intermittently observed in the lower Feather River, a tributary to the Sacramento River (Beamesderfer et al. 2007). According to NMFS

(2008), the presence of adult, and possibly sub-adult, green sturgeon within the lower Feather River has been confirmed by photographs, anglers' descriptions of fish catches (CDFG 2002), incidental sightings (DWR 2005), and occasional catches of green sturgeon reported by fishing guides (Beamesderfer et al. 2004).

Although adult green sturgeon occurrence in the Feather River has been previously documented, the use of rotary screw traps, artificial substrates, and larval nets deployed at multiple locations during early spring and through summer had failed to collect larval and juvenile green sturgeon (Seesholtz et al. 2003). Moreover, unspecific past reports of green sturgeon spawning (Wang 1986; USFWS 1995; CDFG 2002) have not been corroborated by observations of young fish or significant numbers of adults in focused sampling efforts (Niggemeyer and Duster 2003; Seesholtz et al. 2003; Beamesderfer et al. 2004). Due to a lack of corroborated documentation, NMFS concluded, in 2006, that an effective population of spawning green sturgeon did not exist in the lower Feather River (71 FR 17757). However, four fertilized green sturgeon eggs were collected near the Thermalito Afterbay Outlet on June 14, 2011, thus providing the first documentation of at least some successful spawning in the Feather River (Seesholtz et al. 2014).

The only evidence for the presence of green sturgeon in the lower Bear River is anecdotal and comes from personal communications with a game warden, a CDFG biologist, and a fishing guide (USFWS 1995). Presence of both green and white sturgeon was attributed to accounts of adult sturgeon periodically utilizing pools in the lower Bear River between Highway 70 and Highway 65 between 1989 and 1992, although none of the direct observations included green sturgeon specifically (USFWS 1995). Recent studies conducted by DWR utilizing Dual Frequency Identification Sonar (DIDSON) documented sturgeon (species undeterminable) presence in the lower 1 mi of the Bear River, but were unable to validate species (pers. comm., Seesholtz, A. 2018). Seesholtz provided brief summaries that stated 24 adult sturgeon (unknown species) were documented on March 28, 2017 within the lower one-mile portion of the Bear River. She also stated that her field team documented 37 adult sturgeon on March 19, 2018 within 1 mi upstream of the Bear River. No specific documentation of green sturgeon were made from any of the reports.

<u>Life History and Habitat Requirements</u>
Green sturgeon in the Sacramento River have been documented and studied more successfully than they have been on the Feather River. Green sturgeon adults in the Sacramento River begin their upstream spawning migrations into freshwater during late February. Spawning occurs between March and July, with peak spawning believed to occur between April and June (Adams et al. 2002). Poytress et al. (2011) conducted spawning surveys in the upper Sacramento River from early April through mid-June and temperatures ranged from 52.9°F to 60.1°F. Green sturgeon eggs identified on the Feather River in 2011 were collected at temperatures ranging from 60.8°F to 62.6°F (Seesholtz et al. 2014).

NMFS (2009a) reports that in the Sacramento River, adult green sturgeon prefer deep holes (≥ 5m depth) at the mouths of tributary streams, where they spawn and rest on the bottom. After spawning, the adults hold over in the upper Sacramento River between Red Bluff Diversion Dam (RBDD) and the Glen-Colusa Irrigation District (GCID) diversion until November (Klimley et al. 2007). Heublein et al. (2006, 2009) reported the presence of adults in the Sacramento River during the spring through the fall into the early winter months, holding in upstream locations before their emigration from the system later in the year. Green sturgeon downstream migration appears to be triggered by increased flows and decreasing water temperatures, and occurs rapidly once initiated (NMFS 2009a). Some adult green sturgeon leave the system immediately following their suspected spawning activity and re-enter the ocean in early summer (Heublein 2006). NMFS (2009a) states that green sturgeon larvae and juveniles are routinely observed in rotary screw traps at RBDD and the GCID diversion, indicating that spawning occurs upstream of both these sites.

It is believed that adult green sturgeon spawn every two to five years (Beamesderfer et al. 2007). Upon maturation of their gonadal tissue, but prior to ovulation or spermiation, the adult fish enter freshwater and migrate upriver to their spawning grounds (NMFS 2009a). Heublein et al. (2009) observed that green sturgeon enter San Francisco Bay in March and April and migrate rapidly up the Sacramento River. The fish lingered in the upper Sacramento River at the apex of their migration for 14 to 51 days, presumably engaged in spawning behavior, before moving back downriver (Heublein et al. 2009).

Green sturgeon spawning habitat preferences and requirements are not well documented. Eggs are likely broadcast and externally fertilized in relatively fast water and probably in depths greater than three meters (Moyle 2002). Preferred spawning substrate is likely large cobble where eggs settle into cracks, but spawning substrate can range from clean sand to bedrock (Moyle 2002). Spawning is believed to occur over substrates ranging from clean sand to bedrock, with preferences for cobble (Emmett et al. 1991; Moyle et al. 1995). Eggs likely adhere to substrates, or settle into crevices between substrates (Van Eenennaam et al. 2001; Deng et al. 2002).

Green sturgeon larvae hatch from fertilized eggs after approximately 169 hours of incubation at a water temperature of 59°F (Van Eenennaam et al. 2001; Deng et al. 2002), which is similar to the sympatric white sturgeon development rate (176 hours). Van Eenennaam et al. (2005) indicated that an optimum range of water temperatures for egg development was between 57.2°F and 62.6°F. Water temperatures over 73.4°F resulted in 100 percent mortality of fertilized eggs before hatching. Water temperatures above 68°F are reportedly lethal to green sturgeon embryos (Cech et al. 2000; Beamesderfer and Webb 2002).

A general timeline of green sturgeon development has been reproduced from NMFS (2016a) and is provided as Table 3.3.5-5. Developmental stage is given by size, and used to infer life-stage through the measured length of the fish. As indicated in the reproduced Table 3.3.5-5, there is considerable variability across categories, such as size or age at maturity (NMFS 2016a).

Table 3.3.5-5. A general timeline of Southern DPS of North American green sturgeon life history, from egg to adult, with length-at-life-stage information provided. Table reproduced from NMFS (2016a).

Timeline	Life-stage, Length-Age Relationship
Fertilization of eggs (spawning)	Spawning occurs primarily in deep water (>5m) pools[1] at very few select sites[2], predominantly in the Sacramento River, predominantly mid-April to mid-June[3].
144–192 hours (6-8 days) after fertilization of eggs	Newly hatched larvae emerge. Larvae are 12.6–14.5 mm long[4].
6 days post hatch	Nocturnal swim up, hide-by-day behavior observed[4].

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Table 3.3.5-5. (continued)

Timeline	Life-stage, Length-Age Relationship
10 days post hatch (dph)	Exogenous feeding begins around 10 dph[4]. Larvae begin to disperse downstream.
2 weeks old (approx)	Larvae appear in USFWS rotary screw traps at RBDD at lengths of 24–31 mm.
45 days post hatch	Larval to juvenile metamorphosis complete. Begin juvenile lifestage. Juveniles are 63–94 mm long.
45 days to 1.5 years	Juveniles migrate downstream and into the Delta or the estuary and rear to the subadult phase. Juveniles range in size from around 70 mm to 90 cm. Little information available about this lifestage.
1.5 to 4 years	Sometime between the ages of 1.5 to 4 years, juvenile green sturgeon migrate to sea for the first time, thereby entering the subadult phase. Subadults are 107 cm to 174[5] cm.
1.5 years to 15-17 years	After green sturgeon enter the ocean for the first time, they grow and develop, reaching maturity between 15–17 years old.*
15 to 17 years*	Green sturgeon reach sexual maturity and become adults, with males maturing around 120 cm and females maturing around 145 cm[6] (based on Nakamoto's Klamath River studies).
15 to 50+ years	Green sturgeon have a lifespan that can reach 50 or more years and can grow to a total length of over 2 meters.

References

1. Thomas et al. (2013); 2. Mora (unpub, UC Davis, as cited in NMFS 2016a); 3. Poytress et al. (2013); 4. Deng et al. (2002); 5. Heppell (2007); 6. Nakamoto et al. (1995) found that green sturgeon in the Klamath River might reach sexual maturity as early as 13 years for females and 9 years for males. *More research is needed to determine the typical age and size of green sturgeon at maturity (NMFS 2016a).

Stressors and Limiting Factors

The principal factor for the decline of green sturgeon reportedly comes from the reduction of green sturgeon spawning habitat to a limited area of the Sacramento River (70 FR 17391). Loss of historical spawning habitat can be attributed to the construction of migration barriers which block or impede green sturgeon access to spawning grounds. Although existing water storage dams only block access to about 9 percent of historically available green sturgeon habitat, Mora et al. (2009) suggest that the blocked areas historically contained relatively high amounts of spawning habitat because of their upstream position in the river system.

In addition, a substantial amount of what may have been historical spawning and rearing habitat in the Feather River upstream of Oroville Dam has also been lost (70 FR 17386). According to NMFS (2016b), multiple hydroelectric projects upstream of Oroville Reservoir would impede or block access to historical spawning and rearing grounds even if fish passage was provided past the Oroville facilities.

According to NMFS (2016b), water temperatures during the green sturgeon spawning and early juvenile development period are one of the most significant stressors affecting green sturgeon individuals in the lower Feather River. Water temperatures within potential spawning areas are within optimal ranges during a majority of the spawning and early rearing period from March through May, but are warmer in June, exceeding optimal levels that may result in egg and early juvenile mortalities or abnormalities (NMFS 2016a). Although the range of optimal water temperatures varies depending on month and WY type, NMFS determined that there appears to be at least as much suitable spawning habitat now as under pre-dam conditions, and water temperatures appear adequate to support reproduction, especially during wet and above normal WYs when green sturgeon production is known to be highest (NMFS 2016a).

SSWD's Relicensing Studies

In 2017, SSWD collected 50 water samples between the non-Project diversion dam and the confluence with the Feather River to be analyzed for eDNA, including green sturgeon. No green sturgeon were detected in the eDNA analysis. For further analysis of the study, see Section 3.3.3.1.3 in this Exhibit E.

Known Occurrences in Action Area

SSWD did not find any verified occurrences of North American green sturgeon in the Action Area, through general sturgeon observations have been recorded. SSWD's eDNA sampling did not find green sturgeon, and designated Critical Habitat for North American green sturgeon Southern DPS does not occur in the Action Area.

3.3.5.3 Environmental Effects

This section discusses the potential environmental effects of SSWD's proposed Project, as described in Section 2.2 of this Exhibit E. As part of the Project relicensing, SSWD proposes a Pool Raise, modifications of existing recreation facilities, and modification of the existing Project Boundary. The Proposed Action includes five measures, which are implement minimum instream flows (AR1), develop a Bald Eagle Management Plan (TR1), implement bat exclusion measures (TR2), implement the Recreation Facilities Plan (RR1), and implement Historic Properties Management Plan (CR1). The section is divided into the following areas: 1) deconstruction of the constituent components of the Proposed Action; 2) effects of continued Project O&M; and 3) effects of construction-related activities.

3.3.5.3.1 Deconstruction of the Constituent Components of the Proposed Action

SSWD's proposed Project, as described in Section 2.2 of this Exhibit E, includes a Pool Raise, modifications of existing recreation facilities, and modification of the existing Project Boundary. In addition, the Proposed Action includes five measures which are minimum instream flows (AR1), develop a Bald Eagle Management Plan (TR1), bat exclusion (TR2), implement the Recreation Facilities Plan (RR1), and implement Historic Properties Management Plan (CR1).

This section clearly identifies and geographically distinguishes the individual constituent components of the Proposed Action distinguishing between: 1) constituent components that will have no effect to ESA-listed species or their critical habitats; and 2) constituent components that may affect ESA-listed species or their critical habitats.

Proposed Action constituent components that will have no effect on ESA-Listed species or their critical habitats are generally legal (e.g., comply with a law) or administrative (e.g., filing of a plan), and those that require monitoring but do not include adaptive management (i.e., the plan does not include a change in Project operations that would be triggered by the monitoring results). FERC is not required to consult with USFWS or NMFS under Section 7 of the ESA on Proposed Action constituent components that FERC determines will have no effect.

Proposed Action constituent components that may affect ESA-listed species or their critical habitats are primarily related to flow, ground-disturbing activities, vegetation management, access, recreation, and the Pool Raise. FERC is required to consult with USFWS and NMFS under Section 7 of the ESA on Proposed Action constituent components that FERC determines may affect ESA-listed species. These constituent components are discussed below.

Normal O&M of Dam and Powerhouse, including Access for O&M

Normal O&M of Project facilities will continue to occur, including required O&M access to these facilities by Project personnel. Generally, the potential for normal O&M of such constructed facilities devoid of vegetation to affect ESA-listed species is limited. O&M-related access on the Project road could be a source of disturbance if ESA-listed species occur near the road.

Construction of the Pool Raise

The construction related to the Pool Raise and relocation of associated recreation facilities as part of the Proposed Action will not affect ESA-listed species. The construction is short-term and isolated to specific areas near Camp Far West Dam and the recreation facilities where ESA-listed species do not occur. ESA-listed fish in the lower Bear River will not be affected because minimum instream flows and water quality will not be changed during construction.

Vegetation Management

Vegetation management, including control of non-native invasive species and trimming or removing unwanted vegetation around Project facilities, will continue to occur and has the potential to affect ESA-listed plants and terrestrial wildlife, if these species occur in vegetation management locations.

Ongoing Recreational Use

Recreational use of Project recreational facilities will continue to occur. Recreational activities include shoreline fishing, hiking and trail use, boating, waterskiing, swimming, picnic day use, trail hiking, and nature/wildlife viewing. Such activities have the potential to affect ESA-listed species by increased human presence (e.g., trampling vegetation) or inadvertent or illegal introduction (e.g., escape of bait fish) of invasive species. General measures to limit impacts of recreational use on sensitive resources (e.g., signage) would also be protective of ESA-listed species, if present within the proposed Project boundary and areas downstream of Camp Far West Dam. The Proposed Action includes measure RR1, implement the *Recreation Facilities Plan*.

Capture of Sediment and Large Woody Material in Camp Far West Dam

Camp Far West Dam will continue to store water and capture sediment and large woody material that would otherwise move downstream. The general effects of reduced sediment and large woody debris in streams below other impoundments include changes in instream habitat structure, such as fewer pools and loss of spawning gravel, and indirect effects on riparian vegetation. However SSWD’s relicensing studies showed that there is available sediment of suitable size and quality for ESA-listed fish spawning and large woody material is present.

Minimum Instream Flows

The Proposed Action will continue to release minimum instream flows below Camp Far West Dam, as measured downstream of the non-Project diversion dam and described in measure AR1. The flows may be modified temporarily during operational emergencies or for water management, upon mutual agreement between SSWD and CDFW. Minimum flows have the potential to affect ESA-listed fish in the lower Bear River by changing the amount of available habitat and water temperature. These impacts are considered cumulative when considering the upstream water projects and the downstream non-Project diversion dam.

Additional Protection, Mitigation, and Enhancement Measures

The remaining three measures related to bats, bald eagles, and the implementation of the HPMP should not affect ESA-listed species in the Action Area. The management activities for bats and bald eagles do not occur where ESA-listed species occur or have the potential to occur (i.e., at Project facilities or on Camp Far West Reservoir). Implementation of the HPMP is not likely to occur in areas where ESA-listed species occur and if there was overlap consideration for the ESA-listed species would be made.

3.3.5.3.1 Effects Analysis

Hartweg's Golden Sunburst

Project O&M activities that have a potential to affect ESA-listed plants include ground-disturbing activities, recreation, and vegetation control, including the application of herbicides. Construction activities that have the potential to affect ESA-listed plants include the construction of recreation facilities and the modification of the existing spillway for the Pool Raise. As described above, SSWD studies did not find ESA-listed plants in the proposed FERC Project Boundary. Further, habitat for the ESA-listed species does not occur in the proposed FERC Project Boundary. Hartweg's golden sunburst grows on Mima mounds, which is not present within the proposed Project Boundary. For these reasons, SSWD concludes that the Proposed Action would have <u>no effect</u> on Hartweg's golden sunburst.

VELB

Field surveys conducted by SSWD located one elderberry plant in a non-riparian community, dominated by annual grasses and blue oak, in the area east of the dam face, on the shore of the reservoir (Figure 3.3.5-1). The largest stem was 15.2 inches at ground height, while the other was 1.8 inches at ground height. VELB indicators (i.e., boreholes) were not observed, although larger holes were present in the stems (CDFW 2002). Construction will not result in the loss of VELB habitat, the elderberry occurrence on the edge of the reservoir is not near any of the locations of proposed construction. Recreationists were observed during relicensing studies fishing in the area. No Project O&M or other Project-related activities occur in the area. The Pool Raise may inundate enough of this plant to drown it. However, since there are no conclusive signs that VELB utilize this habitat and one plant represents a *de minimis* portion of potential habitat for the species, SSWD concludes that the Proposed Action may affect, but is not likely to adversely affect VELB and will have no effect on VELB designated Critical Habitat.

Vernal Pool Fairy Shrimp and Vernal Pool Tadpole Shrimp

Suitable habitat for vernal pool fairy shrimp and vernal pool tadpole shrimp, in the form of small vernal pools, was identified within the northwestern corner of the proposed FERC Project Boundary. Project O&M and recreation does not occur in the vicinity of these vernal pools, except for vegetation management, both by hand trimming and herbicides, on the existing north berm. Three vernal pools were mapped along the base of this berm. However, vegetation management will be kept to the face of the berm only, and all herbicide application will be supervised by a Qualified Applicator with direction of a licensed PCA, avoiding impacts to the pools at the berm's base.

No vernal pools will be inundated by the Pool Raise. Other wetland features that will be inundated include 0.04-ac of intermittent channel, 0.06-ac of seasonal swale, 0.03-ac of seasonal wetland and 0.06-ac of seep. None of the features that will be inundated are potential habitat for vernal pool branchiopods.

Vernal pool fairy shrimp, and vernal pool tadpole shrimp do not occur in streams and therefore, have no potential to occur in stream reaches that may be affected by Project flows.

The proposed construction for the Pool Raise includes work in the existing spillway and a laydown area south of Blackford Road. There is no suitable vernal pool habitat for either species in these areas.

Additionally, there are no vernal pools in the recreation areas; therefore, the construction in these areas will not impact vernal pool fairy shrimp or vernal pool tadpole shrimp.

SSWD concluded that that the Proposed Action Project O&M may affect, but is not likely to adversely affect vernal pool fairy shrimp and vernal pool tadpole shrimp, and will have no effect on their designated Critical Habitats.

CRLF

Project O&M activities that have a potential to affect CRLF include ground-disturbing activities and vegetation control, particularly the application of herbicides, at non-aquatic and terrestrial areas where this species could occur within the proposed Project Boundary. Aquatic habitats within the Action Area include two sewage holding ponds and a seasonal stock pond in the NSRA. SSWD staff follow Regional Water Quality Control Board (RWQCB) requirements to treat algae within the sewage ponds with copper. In addition, aquatic vegetation in the ponds and around the pump stations is treated with Diquat. Vegetation spraying typically occurs in February, and again in summer. No other Project-related activities which could affect amphibians typically occur at the sewage ponds. SSWD does not apply herbicides or perform other O&M activities at the seasonal stock pond adjacent to the NSRA sewage pond.

Camp Far West Reservoir itself is not suitable habitat for CRLF. Accordingly, operations of the reservoir are unlikely to directly affect CRLF.

No aquatic habitats suitable for CRLF breeding will be affected by the Pool Raise. However, the pool raise will result in seasonal inundation from January to May of a narrow band of current terrestrial areas along the shoreline, some of which may be suitable for CRLF. Within this affected area, occasional use by CRLF (e.g., during dispersal from other areas) may be reduced as habitat is eliminated or altered. However, the Pool Raise would not preclude CRLF from using adjacent areas during seasonal inundation.

SSWD restricts vegetation removal to areas where it is mandated by law and/or necessary to maintain facilities, including the immediate vicinity of the powerhouse, recreation areas, and Project access road. However, vegetation management will be kept to Project facilities and roads only, and all herbicide application will be supervised by a Qualified Applicator with direction of a licensed PCA. SSWD does not use ground-disturbing equipment for vegetation clearing.

While the two sewage ponds where American bullfrogs were observed are part of the Project's recreation areas, the presence of American bullfrogs is not a function of the Project. Numerous semi-permanent to permanent ponds suitable for American bullfrogs occur on private property in the surrounding area, especially northwest, east, and south of Camp Far West Reservoir. The construction of the sewage holding ponds, which are associated with public recreation use, may therefore be regarded as a cumulative effect, without which American bullfrogs would still occur at other locations.

Construction may affect, but is not likely to adversely affect CRLF. No aquatic habitats suitable for CRLF breeding will be affected by construction of new Project facilities. However, construction of new recreation facilities could displace existing terrestrial habitats suitable for CRLF, including areas that may be used occasionally during dispersal. The potential for effects is limited because existing campgrounds and day-use picnic areas will be relocated into adjacent areas already used for recreation.

Therefore, SSWD concludes that the Proposed Action may affect, but is unlikely to adversely affect CRLF and its designated Critical Habitat.

CV Steelhead DPS

SSWD found no accounts of CV steelhead DPS in the lower Bear River including a recent CNDDB search. During SSWD's relicensing studies, *O. mykiss* were positively identified in 11 of 49 eDNA samples and in limited numbers during snorkel and seining efforts. These observations cannot differentiate between resident rainbow trout or steelhead life histories. SSWD also did not observed any CV steelhead DPS redds during surveys between January and March 2018, when CV steelhead DPS spawning would be expected.

SSWD considered potential effects of the Proposed Action on CV steelhead DPS Critical Habitat. The analysis shows that the Proposed Action would generally have a minimal effect on existing stream temperature (i.e. little or no change (+/- 5%) in the percent of days per month where 7DADM stream temperatures are cooler than the EPA guideline) in the lower Bear River for most life-stages in most months. However, from March through May, the Proposed Action results in increases between 6 percent (March) and 31 percent (May) in the percent of days where stream temperatures are warmer than the EPA guidelines for CV steelhead DPS spawning, incubation, and emergence periodicities. In May through July, the days below the EPA guideline for CV steelhead DPS juvenile rearing increases between 9% (May) and 39% (June). This beneficial effect only exists in the portion of the lower Bear River between the non-Project diversion dam and Highway 65, a distance of about 5 mi; from Highway 65 downstream to the confluence with the Feather River, there is little to no change in stream temperatures between the Proposed Action and the environmental baseline. A detailed discussion of SSWD's analysis is provided in Section 3.3.3.2.

SSWD did not do specific analysis related to flows required to achieve 80% (or higher) of the maximum WUA for CV steelhead DPS lifestages because the required flows in all months amplify the negative impacts to the Proposed Action. Instead, SSWD evaluated flows (based on 80% maximum WUA for CV fall-run Chinook salmon) which is discussed in detail in Section 3.3.3.1.3. In general, this analysis showed moderate decreases in stream temperature in most reaches of the lower Bear River in February and March, which are beneficial to all life-stages of CV steelhead DPS. However, from April through November, the WUA-based flow schedule generally produces increased stream temperatures throughout the lower Bear River, which are detrimental to all life-stages of CV steelhead DPS. While there are periods of increased physical modeled habitat, these modeled areas are not usable when considering temperature, which is a limiting factor.

SSWD also analyzed the impacts to water supply deliveries, power generation, and overall reservoir operation when considering higher instream flows. The flow schedule required to achieve 80 percent of the maximum WUA for CV fall-run Chinook salmon increases the annual release to the river by nearly 28,000 ac-ft compared to the Proposed Action. The additional water released to the river reduces the amount of water available for water supply delivery, but also requires an increase in the reservoir's carryover target of 15,000 ac-ft in an attempt to prevent the reservoir from reaching deadpool. The combination of the additional flow and higher carryover target reduces deliveries to SSWD in all years and results in an annual average reduction of 10,000 ac-ft of water supply delivery to CFWID and SSWD (a 10% reduction). Despite the changes to the carryover target, the reservoir still reached deadpool in six of 39 modeled years (15%), as opposed to only 1 year in the Proposed Action. This flow schedule typically results in lower reservoir elevations, which leads to an annual average decrease in power generation of 865 MWh (a 4% decrease).

As discussed in Section 3.3.3.1.3, the results of SSWD's spawning gravel investigation showed that gravels and intragravel conditions suitable for salmonid spawning are present in a variety of habitats throughout the lower Bear River, both within the low flow active channel (LFAC) and the bank-full channel. Gravels within the LFAC are readily available for spawning salmonids. Gravels outside of the LFAC but within the bank-full channel serve two potential functions: those in close proximity to the LFAC become available to spawning salmonids during regular rises in flows resulting from winter rainfall events, while those located further outside the LFAC serve as stores of gravel available for redistribution to the LFAC at bank-full and greater discharges. The broad distribution of suitable gravels, when viewed in conjunction with the distribution of CV fall-run Chinook salmon redds observed during surveys, indicate that current Project operations are not adversely affecting salmonid spawning habitat quantity or quality in the lower Bear River.

Construction related activities will have no effect on CV steelhead DPS or its designated critical habitat in the lower Bear River. Minimum flows will be maintained throughout construction and be released in a manner consistent with current Project operations. Any potential water quality impacts would be confined to the reservoir and permits related to construction will have appropriate mitigation requirements.

Considering the lack of historical evidence and minimal observations by SSWD of CV steelhead DPS in the lower Bear River, the incrementally positive impacts to water temperature from the Proposed Action, and the availability and quality of spawning gravels in the lower Bear River, SSWD concludes that the Proposed Action may affect, but is unlikely to adversely affect CV steelhead DPS and its critical habitat.

CV Spring-run Chinook Salmon ESU

The lower Bear River is identified as critical habitat for CV spring-run Chinook salmon from its confluence with the Feather River to its confluence with Dry Creek, approximately 5 RM. NMFS (2014) acknowledges that conditions and habitat within the lower Bear River are not suitable for supporting a self-maintaining population of CV spring-run Chinook salmon, but that the portion of the lower Bear River designated as Critical Habitat may serve, during high flow periods in the Feather River, as non-natal rearing refugia for juvenile CV Spring-run Chinook salmon originating from the Feather or Yuba rivers. Opportunistic usage of non-natal habitat does not result in specific management actions or lead to an increased potential for Project effect on the species. The Proposed Action will not have any effect on existing conditions in the lower 5 mi of the Bear River, especially water temperature, which reaches equilibrium well upstream of this Critical Habitat area. In addition, recent investigations by SSWD of conditions in the lower Bear River at elevated flows (125 cfs versus 10 cfs) during a water transfer suggested that the confluence was significantly influenced by Feather River conditions and that the Bear River showed little positive flow, was generally backwatered (for up to 1 mi upstream), and that conditions that may attract migrating salmonids were minimal in the Bear River.

Construction related activities will have no effect on CV Spring-run Chinook salmon or its designated critical habitat in the lower Bear River. Minimum flows will be maintained throughout construction and be released in a manner consistent with current Project operations. Any potential water quality impacts would be confined to the reservoir and permits related to construction will have appropriate mitigation requirements.

Therefore, SSWD concludes that the Proposed Action may affect, but is unlikely to adversely affect CV spring-run Chinook salmon and its designated critical habitat.

Southern DPS of North American Green Sturgeon

No critical habitat for green sturgeon was designated in the lower Bear River. Little evidence exists that green sturgeon utilize the lower Bear River. Reported accounts generally do not confirm species (e.g., white or green sturgeon), but rather report generalized observations or are the result of angler harvest. Anglers are only allowed to harvest white sturgeon, which are not protected.

Construction related activities will have no effect on green sturgeon that may occur in the lower Bear River. Minimum flows will be maintained throughout construction and be released in a manner consistent with current project operations. Any potential water quality impacts would be confined to the reservoir and permits related to construction will have appropriate mitigation requirements.

Green sturgeon (adults or juveniles) may utilize the lower few mi of the Bear River. Typically, flow conditions in the Bear and Feather rivers, cause backwatering (e.g., no positive flow) of the Bear River that results in deeper, slower moving water, which may improve conditions for green sturgeon. SSWD found that increasing summertime flows from 10 cfs to about 125 cfs during a water transfer still allowed for this backwater effect in the lower one mi of the Bear River. Depending on flow conditions in the Bear River, green sturgeon could move upstream as far as the non-Project diversion dam. The ability of green sturgeon to access the upper 15 mi of the lower Bear River is impacted by flows below the non-Project diversion dam and natural barriers (e.g., beaver dams, giant cane grass blockages, and vertical barriers). There is little effect from the proposed Project on water temperature as it relates to green sturgeon in the lower Bear River because water temperatures reach equilibrium about five mi downstream of the non-Project diversion dam and the proposed project will incrementally decrease water temperatures for the upper five mi of the lower Bear River. The proposed Project does not alter the current flow regime in the lower Bear River except that the Pool Raise increases the ability for Camp Far West Reservoir to store water, which will change the timing and magnitude of spill events. The timing and magnitude of spills is also directly affected by the release of water into the Bear River by upstream water users and not an effect of the Project. These spill events are when green sturgeon are most likely to access the river.

Considering the lack of evidence for green sturgeon presence in the lower Bear River, non-Project effects on green sturgeon (e.g., natural barriers, ambient water temperature, and upstream flows), and minimal changes to flows in the lower Bear River due to the proposed Project, SSWD concludes the Proposed Action may affect, but is unlikely to adversely affect the Southern DPS of North American green sturgeon and its designated critical habitat.

3.3.5.4 Aggregate Effects

The Proposed Action would have no effect on Hartweg's Golden Sunburst and vernal pool fairy shrimp. The aggregate effect of the Proposed Action and other actions in the watershed are described below.

3.3.5.4.1 Vernal Pool Tadpole Shrimp

While there are no direct effects on vernal pool tadpole shrimp from the Proposed Action, cattle are allowed to graze freely in the area where vernal pools are located. Cattle grazing could impact these habitats and the ESA-listed species if they are present.

3.3.5.4.2 CRLF

One impact to CRLF with the potential to occur within the Project is from American bullfrogs introduced from outside of the Project and unrelated to the Proposed Action. The two sewage ponds located within the FERC boundary provide habitat for American bullfrogs, which are present currently. However, it is likely that other nearby water features also have American bullfrog present. SSWD's relicensing study identified 134 aquatic habitat locations potentially suitable for CRLF within one-mi of the Project Boundary. Most of these features (i.e., 122 of the total) are constructed impoundments along drainages, or excavated ponds used to support livestock, hold irrigation water, or for undetermined purposes on private property. Aquatic habitat locations are largely concentrated northwest, east, and south of Camp Far West Reservoir. On the basis of apparently suitability hydrology, many of the aquatic habitats, particularly where supplemented by irrigation water, are potentially suitable habitat for CRLF and American bullfrog, and in most areas there are multiple suitable sites, which would facilitate dispersal of either species, including into the Project boundary independent of the Proposed Action.

3.3.5.4.3 CV Steelhead DPS, CV spring-run Chinook Salmon ESU, and Southern DPS of North American Green Sturgeon

The aggregate effects resulting from past, present, and reasonably foreseeable future actions, including the Proposed Action, have the potential to affect ESA-listed fish (and habitat) in the lower Bear River. These activities include timber harvest, livestock grazing, mining, and operation of upstream and downstream water projects.

While timber harvest and grazing rates are likely to decline in the future, the effects of past impacts from these activities are likely negative to ESA-listed fish and include altered flows, sediment availability and transport, increased stream temperatures, and reduced availability of large woody material. The water projects on the Bear River, including the Proposed Action, further these effects by blocking sediment and large woody material from traveling downstream and further altering flow and temperature regimes.

Similarly, mining on the scale that occurred in the mid-1800s has ceased, but those activities significantly altered the geology and soils of the Bear River watershed. These activities moved large amounts of sediment, some of which were deposited in the lower Bear River channel. The effect of that deposition is mixed, since these gravels were deposited prior to the construction of the water projects and continue to be available to ESA-listed fish in the lower Bear River (e.g., spawning habitat for anadromous salmonids) despite reduced sediment transport caused by the various water projects, including the Proposed Action. Mining activities also introduced mercury and other harmful metals into the Bear River. Camp Far West and the other reservoirs provide an opportunity for these elements to settle and in the case of mercury be bioaccumulated in fish. Camp Far West Reservoir likely prevents additional sediment containing these metals to be transported downstream into the lower Bear River and beyond.

The ongoing operation of the various water projects on the Bear River, all of which went into operation prior to the Project, represent the most significant past and present actions in the Project area, and the operators of those projects are predicting increased demand for water in the foreseeable future. The upstream projects affect inflow into the Project, and the non-Project diversion dam immediately downstream affects the Project's water releases to the lower Bear River. The resulting hydrograph in the lower Bear River is impaired and can be unpredictable. Such a hydrograph likely has negative effects to ESA-listed fish through reduced streamflows, including the timing and magnitude of spring run-off flows, which may negatively impact available spawning and rearing habitats and alter stream temperatures.

Another cumulative effect on ESA-listed fish is the introduction and persistence of non-native species. These species have been introduced by resource agencies, the public, or by conveyance from upstream projects. Camp Far West Reservoir provides good habitat for non-native fish (especially black bass species) which compete with native species and could be transported downstream during spill events. Similarly, the Sacramento River basin has also been stocked with non-native fish which are now present in the Bear River. These non-native species often predate on juvenile salmonids including ESA-listed CV steelhead DPS and CV spring-run Chinook salmon ESU.

The net effect of these cumulative impacts, including the Proposed Action, to ESA-listed fish in the lower Bear River is negative and likely realized through lower productivity and survival rates resulting from reductions in suitable habitats, altered magnitude and timing of stream flows, increased stream temperatures, and interactions with non-native species.

3.3.5.5 List of Attachments

Attachment 3.3.5A IPaC Report

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Attachment 3.3.5A

IPaC Report

IPaC **U.S. Fish & Wildlife Service**

IPaC resource list

This report is an automatically generated list of species and other resources such as critical habitat (collectively referred to as *trust resources*) under the U.S. Fish and Wildlife Service's (USFWS) jurisdiction that are known or expected to be on or near the project area referenced below. The list may also include trust resources that occur outside of the project area, but that could potentially be directly or indirectly affected by activities in the project area. However, determining the likelihood and extent of effects a project may have on trust resources typically requires gathering additional site-specific (e.g., vegetation/species surveys) and project-specific (e.g., magnitude and timing of proposed activities) information.

Below is a summary of the project information you provided and contact information for the USFWS office(s) with jurisdiction in the defined project area. Please read the introduction to each section that follows (Endangered Species, Migratory Birds, USFWS Facilities, and NWI Wetlands) for additional information applicable to the trust resources addressed in that section.

Location

Nevada, Placer and Yuba counties, California

Local office

Sacramento Fish And Wildlife Office

(916) 414-6600
(916) 414-6713

Federal Building
2800 Cottage Way, Room W-2605
Sacramento, CA 95825-1846

Endangered species

This resource list is for informational purposes only and does not constitute an analysis of project level impacts.

The primary information used to generate this list is the known or expected range of each species. Additional areas of influence (AOI) for species are also considered. An AOI includes areas outside of the species range if the species could be indirectly affected by activities in that area (e.g., placing a dam upstream of a fish population, even if that fish does not occur at the dam site, may indirectly impact the species by reducing or eliminating water flow downstream). Because species can move, and site conditions can change, the species on this list are not guaranteed to be found on or near the project area. To fully determine any potential effects to species, additional site-specific and project-specific information is often required.

Section 7 of the Endangered Species Act **requires** Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency. A letter from the local office and a species list which fulfills this requirement can **only** be obtained by requesting an official species list from either the Regulatory Review section in IPaC (see directions below) or from the local field office directly.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list by doing the following:

1. Draw the project location and click CONTINUE.
2. Click DEFINE PROJECT.
3. Log in (if directed to do so).
4. Provide a name and description for your project.
5. Click REQUEST SPECIES LIST.

Listed species[1] are managed by the Ecological Services Program of the U.S. Fish and Wildlife Service.

1. Species listed under the Endangered Species Act are threatened or endangered; IPaC also shows species that are candidates, or proposed, for listing. See the listing status page for more information.

The following species are potentially affected by activities in this location:

Reptiles

NAME	STATUS
Giant Garter Snake *Thamnophis gigas* No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/4482	Threatened

Amphibians

NAME	STATUS
California Red-legged Frog Rana draytonii There is **final** critical habitat for this species. Your location is outside the critical habitat. https://ecos.fws.gov/ecp/species/2891	Threatened

Fishes

NAME	STATUS
Delta Smelt Hypomesus transpacificus There is **final** critical habitat for this species. Your location is outside the critical habitat. https://ecos.fws.gov/ecp/species/321	Threatened

Insects

NAME	STATUS
Valley Elderberry Longhorn Beetle Desmocerus californicus dimorphus There is **final** critical habitat for this species. Your location is outside the critical habitat. https://ecos.fws.gov/ecp/species/7850	Threatened

Crustaceans

NAME	STATUS
Vernal Pool Fairy Shrimp Branchinecta lynchi There is **final** critical habitat for this species. Your location is outside the critical habitat. https://ecos.fws.gov/ecp/species/498	Threatened
Vernal Pool Tadpole Shrimp Lepidurus packardi There is **final** critical habitat for this species. Your location is outside the critical habitat. https://ecos.fws.gov/ecp/species/2246	Endangered

Critical habitats

Potential effects to critical habitat(s) in this location must be analyzed along with the endangered species themselves.

THERE ARE NO CRITICAL HABITATS AT THIS LOCATION.

Migratory birds

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

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1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.

Additional information can be found using the following links:

- Birds of Conservation Concern http://www.fws.gov/birds/management/managed-species/birds-of-conservation-concern.php
- Measures for avoiding and minimizing impacts to birds http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/conservation-measures.php
- Nationwide conservation measures for birds http://www.fws.gov/migratorybirds/pdf/management/nationwidestandardconservationmeasures.pdf

The birds listed below are birds of particular concern either because they occur on the USFWS Birds of Conservation Concern (BCC) list or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the FAQ below. This is not a list of every bird you may find in this location, nor a guarantee that every bird on this list will be found in your project area. To see maps of where birders and the general public have sighted birds in and around your project area, visit E-bird tools such as the E-bird data mapping tool (search for the name of a bird on your list to see specific locations where that bird has been reported to occur within your project area over a certain timeframe) and the E-bird Explore Data Tool (perform a query to see a list of all birds sighted in your county or region and within a certain timeframe). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list can be found below.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON (IF A BREEDING SEASON IS INDICATED FOR A BIRD ON YOUR LIST, THE BIRD MAY BREED IN YOUR PROJECT AREA SOMETIME WITHIN THE TIMEFRAME SPECIFIED, WHICH IS A VERY LIBERAL ESTIMATE OF THE DATES INSIDE

WHICH THE BIRD BREEDS ACROSS ITS ENTIRE RANGE. "BREEDS ELSEWHERE" INDICATES THAT THE BIRD DOES NOT LIKELY BREED IN YOUR PROJECT AREA.)

Bald Eagle Haliaeetus leucocephalus This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/1626	Breeds Jan 1 to Aug 31
Black Rail Laterallus jamaicensis This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/7717	Breeds Mar 1 to Sep 15
Black Swift Cypseloides niger This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/8878	Breeds Jun 15 to Sep 10
Black-chinned Sparrow Spizella atrogularis This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9447	Breeds Apr 15 to Jul 31
Burrowing Owl Athene cunicularia This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/9737	Breeds Mar 15 to Aug 31
California Thrasher Toxostoma redivivum This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds Jan 1 to Jul 31
Clark's Grebe Aechmophorus clarkii This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds Jan 1 to Dec 31
Costa's Hummingbird Calypte costae This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/9470	Breeds Jan 15 to Jun 10

Golden Eagle Aquila chrysaetos — Breeds Jan 1 to Aug 31
This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.
https://ecos.fws.gov/ecp/species/1680

Lawrence's Goldfinch Carduelis lawrencei — Breeds Mar 20 to Sep 20
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/9464

Lewis's Woodpecker Melanerpes lewis — Breeds Apr 20 to Sep 30
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/9408

Long-billed Curlew Numenius americanus — Breeds elsewhere
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/5511

Marbled Godwit Limosa fedoa — Breeds elsewhere
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/9481

Nuttall's Woodpecker Picoides nuttallii — Breeds Apr 1 to Jul 20
This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA
https://ecos.fws.gov/ecp/species/9410

Oak Titmouse Baeolophus inornatus — Breeds Mar 15 to Jul 15
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/9656

Rufous Hummingbird selasphorus rufus — Breeds elsewhere
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/8002

Short-billed Dowitcher Limnodromus griseus — Breeds elsewhere
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/9480

Tricolored Blackbird Agelaius tricolor — Breeds Mar 15 to Aug 10

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/3910

Whimbrel Numenius phaeopus — Breeds elsewhere

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/9483

White Headed Woodpecker Picoides albolarvatus — Breeds May 1 to Aug 15

This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA
https://ecos.fws.gov/ecp/species/9411

Willet Tringa semipalmata — Breeds elsewhere

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Wrentit Chamaea fasciata — Breeds Mar 15 to Aug 10

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Yellow-billed Magpie Pica nuttalli — Breeds Apr 1 to Jul 31

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/9726

Probability of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds.

Probability of Presence ( )

Each green bar represents the bird's relative probability of presence in your project's counties during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.

2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

To see a bar's probability of presence score, simply hover your mouse cursor over the bar.

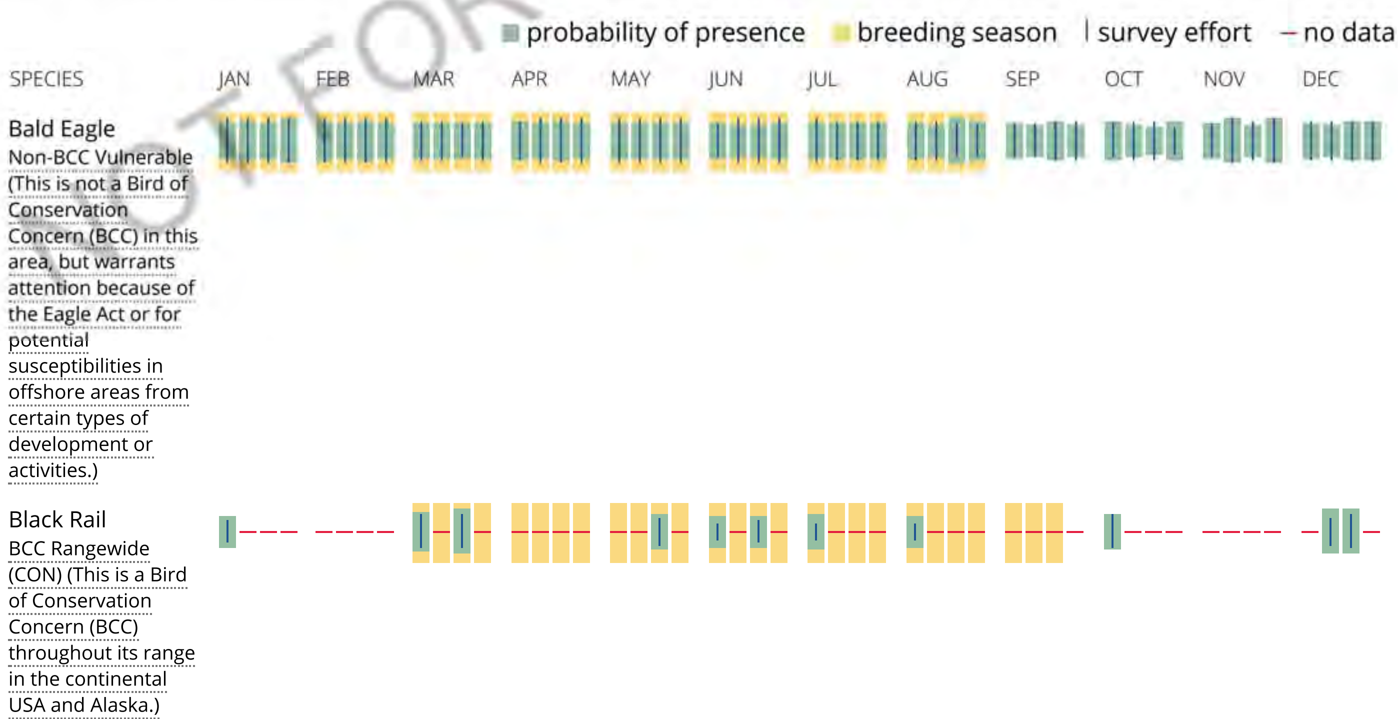
Breeding Season ( )
Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort (|)
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the counties of your project area. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

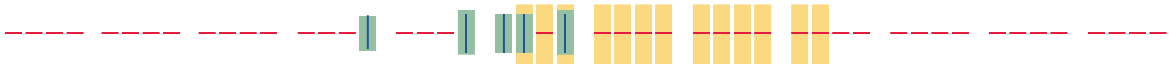
To see a bar's survey effort range, simply hover your mouse cursor over the bar.

No Data (–)
A week is marked as having no data if there were no survey events for that week.

Survey Timeframe
Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information.

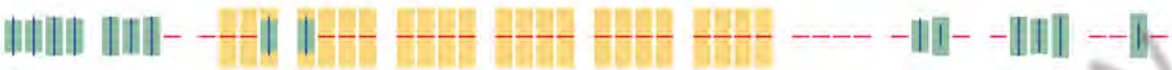


Black Swift
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

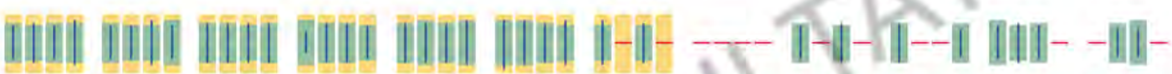


Black-chinned Sparrow
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

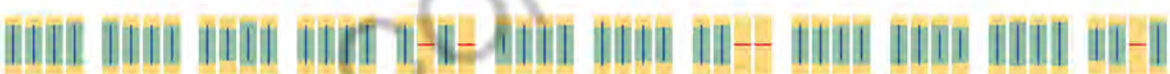
Burrowing Owl
BCC - BCR (This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA)



California Thrasher
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

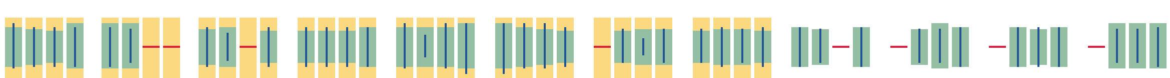


Clark's Grebe
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

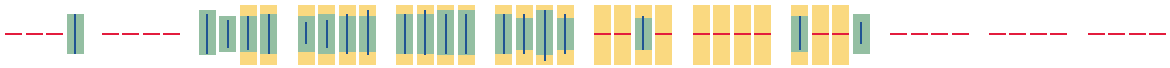


Costa's Hummingbird
BCC - BCR (This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA)

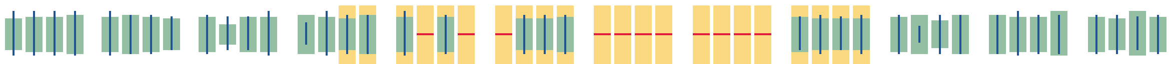
Golden Eagle
Non-BCC Vulnerable (This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.)



Lawrence's Goldfinch
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)



Lewis's Woodpecker
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

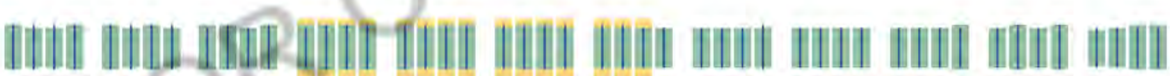


Long-billed Curlew
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

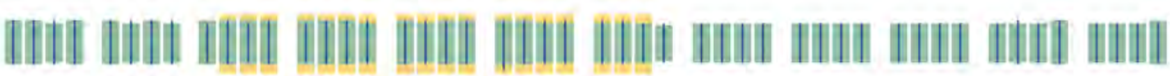
SPECIES JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC

Marbled Godwit
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

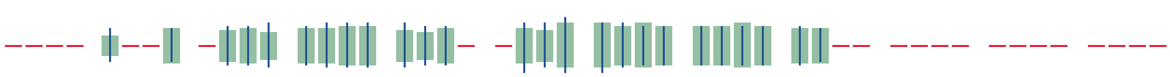
Nuttall's Woodpecker
BCC - BCR (This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA)



Oak Titmouse
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

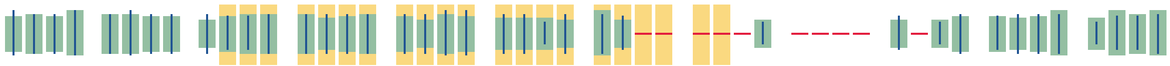


Rufous Hummingbird
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)



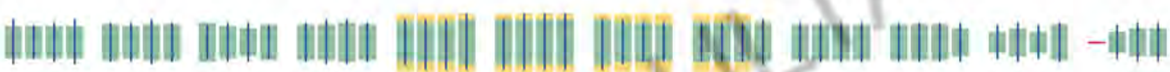
Short-billed Dowitcher
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

Tricolored Blackbird
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

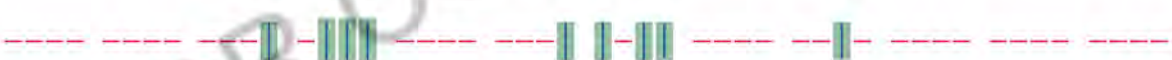


Whimbrel
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

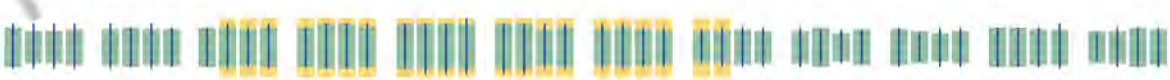
White Headed Woodpecker
BCC - BCR (This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA)



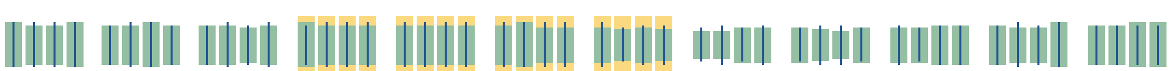
Willet
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)



Wrentit
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)



Yellow-billed Magpie
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)



Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

Nationwide Conservation Measures describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. Additional measures and/or permits may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the migratory birds potentially occurring in my specified location?

The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the counties which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the E-bird Explore Data Tool.

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?

The probability of presence graphs associated with your migratory bird list are based on data provided by the Avian Knowledge Network (AKN). This data is derived from a growing collection of survey, banding, and citizen science datasets .

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering, migrating or present year-round in my project area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may refer to the following resources: The The Cornell Lab of Ornithology All About Birds Bird Guide, or (if you are unsuccessful in locating the bird of interest there), the Cornell Lab of Ornithology Neotropical Birds guide. If a bird entry on your migratory bird species list indicates a breeding season, it is probable that the bird breeds in your project's counties at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?

Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are Birds of Conservation Concern (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the Eagle Act requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the Northeast Ocean Data Portal. The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the Diving Bird Study and the nanotag studies or contact Caleb Spiegel or Pam Loring.

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the BGEPA should such impacts occur.

Facilities

National Wildlife Refuge lands

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

THERE ARE NO REFUGE LANDS AT THIS LOCATION.

Fish hatcheries

THERE ARE NO FISH HATCHERIES AT THIS LOCATION.

Wetlands in the National Wetlands Inventory

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

This location overlaps the following wetlands:

FRESHWATER POND

PUBK

LAKE

L1UBK

RIVERINE

R3UBH

A full description for each wetland code can be found at the National Wetlands Inventory website: https://ecos.fws.gov/ipac/wetlands/decoder

Data limitations

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

Data exclusions

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tuberficid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

Data precautions

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

3.3.6 Recreation Resources

The discussion of recreation is divided into three sections. The affected environment (baseline) is discussed in Section 3.3.6.1, environmental effects of the Project are discussed in Section 3.3.6.2, and unavoidable adverse effects are addressed in Section 3.3.6.3.

Where existing, relevant, and reasonably available information from SSWD's PAD was not sufficient to determine the potential effects of the Project on recreational resources, SSWD conducted one study: Study 6.1, *Recreation Use and Visitor Survey Study*.

3.3.6.1 Affected Environment

This section describes existing recreational resources and is divided into four sections: 1) existing recreational resources within the FERC Project Boundary; 2) recreational use; 3) visitor use characteristics and preferences; and 4) recreation opportunities downstream of the Project.

3.3.6.1.1 Recreation Facilities and Opportunities in and Around the Project Reservoir

Recreation Opportunities

The Project provides developed and undeveloped recreation opportunities at Camp Far West Reservoir. Water-related recreational opportunities include water skiing, wakeboarding, power boating, jet skiing, wildlife viewing, non-motorized boating and warmwater fishing. Boating use and launching occurs year-round. Yuba County Ordinance 8.51.010 limits the speed of boats to 20 mi. per hour on the reservoir (Yuba County 2010a). Camp Far West Reservoir offers anglers shoreline and boat-based fishing opportunities for smallmouth bass, largemouth bass, striped bass, catfish and panfish (CDFW 2015a). The reservoir does not have any site-specific fishing regulations or limits (CDFW 2015b). Historically, CDFG stocked Camp Far West Reservoir with warmwater game fish species from 1964 to 1985 (CDFW 2015c). Refer to Section 3.3.3.1.4 for the fish stocking details.

Land-based recreation opportunities provided in the Project Vicinity include camping, wildlife viewing, hiking, biking and horseback riding. Facilities developed to support camping and other land-based recreation activities are described below. While the recreation areas do not provide formal trails for hiking, biking and horseback riding, the dispersed use areas provide a network of unpaved roads that provide a trail experience for visitors. In addition, informal trails occur within the FERC Project Boundary, primarily near the NMWSE, which are a result of non-Project cattle and ranch trails as well as Project user-created trails and paths due to the gentle sloping terrain adjacent to the shoreline. Dispersed camping is allowed outside the developed recreation areas.

The concessionaire that operates the two developed recreation areas at Camp Far West Reservoir provides numerous and varied events at the recreation areas and reservoir, including bi-monthly fishing tournaments, boating and fishing club events, equestrian events and other group events.

Project Recreation Facilities

As a condition of its FERC license, SSWD provides recreational opportunities and facilities within the FERC Project Boundary. SSWD owns and maintains two developed recreation areas at Camp Far West Reservoir – the North Shore Recreation Area (NSRA) and South Shore Recreation Area (SSRA) (Table 3.3.6-1). The NSRA and SSRA are the only public vehicular access points to the reservoir for recreation due to private lands abutting the Project. Outside of the recreation areas, the remaining shoreline is only accessible by foot or boat, particularly when the reservoir water level is below the NMWSE. All of these facilities are located on SSWD-owned land and operated through a concessionaire. The recreation facilities were originally constructed using Davis-Grunsky Act funding prior to the Project, but became part of the Project as a condition of its FERC license. The NSRA boat ramp was reconstructed in 2005 using the California State Parks, Division of Boating and Waterways (DBOW) boat launching facilities grant funding. Below is a description of the developed facilities and recreation opportunities at Camp Far West Reservoir.

Table 3.3.6-1. Recreation facilities at the NSRA and SSRA.

Facility	Amenity	North Shore Recreation Area	South Shore Recreation Area
Family Campgrounds	No. Sites (standard)	70	67
	Sites (RV with hookups)	10	none
	Parking Spurs	1 spur per site	1 spur per site
	Overflow Parking Spaces	None	18 single
	Restrooms	2 flush	1 flush, 2 vault
Group Campgrounds	Sites	2, 25-person group sites, 1, 50-person horse camp site	1, 50-person group site
	Parking Spaces	None[1]	10
	Restrooms	4 portable chemical toilets	None[2]
Day Use Areas	Picnic Sites	20	33
	Swim Beaches	1	1
	Parking Spaces	None[3]	44
	Restrooms	1 flush	None[4]
Boat Ramps	Number	1, 4-lane concrete ramp	1, 2-lane concrete ramp
	Parking Spaces	82 single, 73 vehicle with trailer	52 vehicle with trailer
	Restrooms	1 flush	1 flush
Dispersed Use Areas[5]	Sites	2	2
	Restrooms	6 portable chemical toilets	6 portable chemical toilets
Other Facilities	Entrance Station	1	1
	Store	1	1
	RV Dump Station & Holding Pond	1	1
	Concessionaire Trailers	2	1
	Water Treatment Plant	1	None[6]
	Water Storage Tank	1, 60,000-gallon tank	None[6]

1 Parking is available in open areas adjacent to the group sites, but is not designated or defined.
2 The group campsites use the adjoining family campground restroom building.
3 The day use area (picnic area and swim beach) uses the adjoining boat ramp parking area for parking.
4 The picnic area uses the adjoining boat ramp restroom building.
5 The dispersed use areas provide day use and overnight opportunities with minimal facilities (roads, portable chemical toilets and trash cans).
6 Water is piped under the reservoir to South Shore Recreation Area from the North Shore Recreation Area treatment plant and storage tank.

Based on site observations in 2015, SSWD provided a general assessment of the condition of each facility. Importantly, the facilities and site amenities (e.g., restrooms, tables, pedestal grills, roads and water spigots) at both recreation areas are mostly the same design, construction and/or model and are of similar age within each amenity type. Facilities and site elements (e.g., vehicle spurs, tables, fire rings, and ramps) are in "good" condition if they are functional, well-maintained, showed no signs of deterioration and have the majority of their useful life remaining. Facilities and components are considered in "poor" condition if they are non-functional, had missing or broken parts and/or major structural damage is evident. A facility is considered to be in "fair" condition when it has some minor structural damage that could be repaired with ease or is functional, but shows signs of wear and tear (e.g. cracked wood, broken windows or door handles). Facilities in "fair" condition generally have a portion of their useful life remaining, but do not need immediate replacement. In the facility descriptions below, SSWD has categorized the condition of each facility and site amenities. Notably, the most recent FERC Public Use and Environmental Inspection on July 19, 2007, noted only a single recreation facility issue at the NSRA (i.e., 2 overturned picnic tables), and no issues at the SSRA (FERC 2007).

North Shore Recreation Area

The NSRA is located on the north shoreline of the reservoir on a large peninsula. The NSRA is accessible by vehicle from the west and north via Camp Far West Road and Spenceville Road. The access road is gated and an entrance station is located along the access road that regulates public access to the recreation area. The NSRA consists of a family campground, group campground, day use area with swimming beach, boat ramp and dispersed use areas (Figure 3.2.6-1). The NSRA also includes a general store at the entrance station for use by the public. The NSRA is open year-round for day use and overnight recreation opportunities. The NSRA is set in a partially wooded oak and grassland setting. The oak trees provide substantial shading throughout the recreation area, but especially within the campground facilities. Due to the predominant grasses and lack of other ground-level vegetation, there is minimal screening between the individual sites with the campgrounds and day use areas.

Figure 3.3.6-1. Aerial site map of the North Shore Recreation Area.

Family Campground

The family campground is located in a semi-forested setting along the south shoreline of the NSRA. The facility consists of a total of 80 campsites including 70 standard sites and 10 recreational vehicle (RV) sites with hookups. Representative photographs are provided in Figure 3.3.6-2.

The family campground is comprised primarily of 70 standard campsites with each consisting of a table (i.e., concrete or wood-metal construction), a rock fire ring, a parking spur (i.e., dirt or gravel), several tent pads and a trash can. Most of the sites also have a pedestal grill. Overall, the campsite amenities are in fair condition, with the exception of the remaining wood-metal construction tables and most pedestal grills that are aging and in poor condition. Potable water[1] is provided at seven spigots dispersed throughout the campground. The facility includes two flush restroom buildings each with eight stalls (i.e., 7 toilets and 1 urinal) and four sinks; and both are in aging and in fair-to-poor condition. A typical campsite provides opportunities for tent or RV camping, but does not have hookups for water, electric or sewer. The circulation roads consist of one-way, 10-ft-wide and two-way, 20-ft-wide road segments; and are a combination of paved and dirt surfacing; and in fair condition overall.

The family campground also includes a loop with 10 RV sites each with full-service hookups including water, electric and sewer. In addition to the hookups, each site consists of a gravel spur, metal table, concrete fire ring, and a trash can. The RV campsites utilize a restroom facility at the adjacent standard campsite loop. The circulation road is a two-way, 20-ft-wide paved road. Overall, the RV camping facilities are newer construction and in good condition

[1] Currently, temporary drinking restrictions are in place while SSWD completes water treatment infrastructure improvements.

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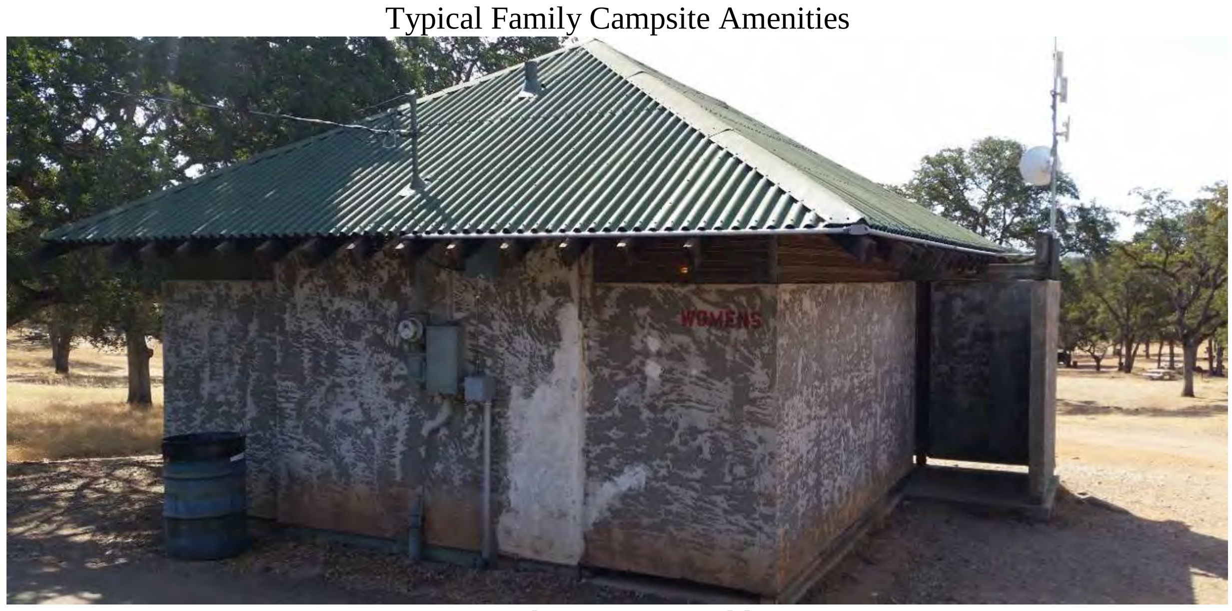
Typical Family Campsite

Typical Family Campsite Amenities



Typical Restroom Building

Typical RV Campsite with Full Hookups

Typical Circulation Roads

Figure 3.3.6-2. Representative photographs (dated 7/21/15) of the family campground at the North Shore Recreation Area.

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Group Campground

The group campground is located in an open setting along the west shoreline of the NSRA to the north of the boat ramp and day use area. The facility consists of two group campsites (i.e., Tree and Point sites) serving 25 people–at–one-time (PAOT). Each of the campsites consists of a concrete table, rock fire ring, water spigot, portable chemical toilet, and two trash cans. The access road to the sites is a two-way dirt surface road. Overall, the facilities are aging and in fair-to-poor condition. Representative photographs are provided in Figure 3.3.6-3.

Tree Site

Figure 3.3.6-3. Representative photographs (dated 7/21/15) of the group campsites at the North Shore Recreation Area.

Day Use Area

The day use area is located in a semi-forested setting along the west shoreline of the NSRA to the north of the boat ramp. The facility consists of 20 picnic sites, a swim beach and shares a parking area with the boat ramp. Each picnic site consists of a table and a trash can. Pedestal grills and water spigots are also dispersed throughout the area. The swim beach is located between the picnic sites and the reservoir. The facility includes one flush restroom building with eight stalls (i.e., 7 toilets and 1 urinal) and four sinks. Overall, the facilities are aging and in fair condition. A representative photograph is provided in Figure 3.3.6-4.

Typical Picnic Site

Typical Picnic Site Amenities

Typical Restroom Building

Figure 3.3.6-4. Representative photographs (dated 7/21/15) of the day use area at the North Shore Recreation Area.

Boat Ramp

The boat ramp is located on the south shoreline between the family campground and the day use area. The facility consists of a boat launching ramp, parking area, restroom building and picnic site. The boat ramp is a 4-lane concrete ramp with a floating courtesy dock and a 4-lane boat preparation area. The end of the concrete ramp is at 236.0 ft elevation; however, informal boat launching is still available down to 188.0 ft elevation. The parking area is divided into three separate lots, all of which are paved with striped spaces; and provides a total of 82 single vehicle spaces, including two accessible spaces, and 73 vehicle with trailer spaces, including three accessible spaces. At lower water levels, parking is allowed adjacent to the boat ramp in dirt parking areas. The facility includes one flush restroom building with four stalls, each with a toilet and sink. A water spigot, water fountain and trash receptacles are located at the restroom building. The accessible restroom building area includes an accessible picnic table connected by an accessible ramp. This facility was reconstructed in 2005 using a DBOW Boat Launch Facilities grant. The facilities are in very good condition. Representative photographs are provided in Figure 3.3.6-5.


Ramp


Parking Area


Restroom and Picnic Site

Figure 3.3.6-5. Representative photographs (dated 7/21/15) of the boat ramp facilities at the North Shore Recreation Area.

Dispersed Use Areas

The NSRA has two dispersed use areas within the recreation area, which are accessed by one-way and two-way dirt roads. Jet Ski Cove dispersed use area is located on the northwest portion of the recreation area. Facilities include two portable chemical toilets and trash cans dispersed throughout the area. In all, Jet Ski Cove dispersed use area encompasses 15 ac with approximately 0.5 mi of shoreline. The second dispersed use area, Boss Point, is located in the northeast portion of the recreation area. Facilities include four portable chemical toilets and trash cans dispersed throughout the area. In addition, the Horse Camp is located in the midst of the Boss Point dispersed use area and includes hitch-and-post facilities, two portable chemical toilets, a large concrete fire ring and trash cans. In all, Boss Point dispersed use area encompasses 55 ac with approximately 1.6 mi of shoreline. The dispersed use areas provide for largely undeveloped, dispersed day-use opportunities and overnight camping with minimal facilities and direct access to the reservoir shoreline. Overall, the few facilities provided are in good condition. Representative photographs are provided in Figure 3.3.6-6.

Typical View of the Jet Ski Cove Dispersed Use Area

Typical View of the Boss Point Area Dispersed Use Area

Horse Camp

Figure 3.3.6-6. Representative photographs (dated 7/21/15) of the dispersed use areas at the North Shore Recreation Area.

Recreational Water System

A recreational water system provides water throughout the NSRA, excluding the dispersed use area. The water system source is the reservoir, where two pumps in the reservoir deliver water at 70 gallons/minute (5,000,000 gallons or 15.3 ac-ft per year) uphill via underground piping to the water treatment facility atop a hill within the NSRA. After being treated, the water is piped nearby to a 60,000-gallon storage tank constructed of belted steel and recently installed in 2011. From the storage tank, underground distribution piping sends the water throughout the NSRA, where water is accessible via water hydrants dispersed throughout the recreation area facilities. The system also includes a sewage holding pond with an aerator to handle the sanitary needs of the flush restroom buildings and the RV dump station. The sewage system uses a gravity-feed operation and is supplemented by a pump to get the sewage up to the holding pond. (Figure 3.3.6-7)

Overall, much of the major above-ground compenents (i.e., water treatment plants, water storage tank, sewage holding ponds and aeration facilities) are in good to very good condition with the treatment plant and storage tank having been reconstructed or replaced recently. The below-ground components (i.e., distribution piping) are largely original construction are in fair condition; and the above-ground water hydrants and fountains are largely in poor condition.

Water Treatment Facility

Water Storage Tank

Sewage Holding Pond

Figure 3.3.6-7. Photographs (dated 4/2/18) of the recreational water system components.

Other Facilities

The NSRA also includes a general store, RV dump station, and private concessionaire residences and maintenance buildings. The store is located near the entrance to the NSRA facilities and also serves as the entrance station for the NSRA. The RV dump station is located near the family campground and boat ramp; and provides a 1-lane facility connected to a sewer system for disposing of RV holding tanks. Overall, these facilities are in good condition. Private concessionaire residences are also located between the entrance station and the boat ramp facilities that include residences and maintenance buildings. Photographs of these facilities are provided in Figure 3.3.6-8.

General Store/Entrance Station


RV Dump Station

Figure 3.3.6-8. Photographs (dated 7/21/15) of the entrance station and RV dump station at the North Shore Recreation Area.

South Shore Recreation Area

The SSRA is located on the southwest shoreline of the reservoir on a long narrow peninsula. The SSRA is accessible by vehicle from the north and south via McCourtney Road. The access road is gated and an entrance station is located immediately after the gate that regulates public access to the recreation area. The SSRA consists of a family campground, group campsite, day use area, swim beach, boat ramp and dispersed use areas (Figure 3.3.6-9). The SSRA also includes a general store at the entrance station for use by the public located. The SSRA is generally open seasonally from April through October for day use and overnight recreation opportunities.[2] Similar to the NSRA, the SSRA is set in a partially wooded oak and grassland setting. The oak trees provide substantial shading throughout the recreation area. Due to the predominant grasses and lack of other ground-level vegetation there is minimal screening between the individual sites with the campgrounds and day use areas.

[2] The NSRA is open year-round for public use.

Figure 3.3.6-9. Aerial site map of the South Shore Recreation Area.

Family Campground

The family campground is located in a semi-forested setting on the north end of the recreation area. The facility consists of 67 standard campsites for either tent or RV camping, but the sites do not provide RV hookups. Each campsite consists of a table (i.e., concrete or wood-metal construction), a rock fire ring, a parking spur (i.e., dirt or gravel), several tent pads and a trash can. Most of the sites also have a pedestal grill. Six of the sites include a pull-through parking spur, whereas the remaining sites utilize back-in parking spurs. Water is provided at 12 spigots dispersed throughout the campground. Overall, the campsite amenities are in good condition, with the exception of the wood-metal construction tables that are aging and in fair-to-poor condition. The facility also includes one flush restroom buildings (i.e., 7 toilets, 1 urinal and 4 sinks) and two vault restroom buildings (i.e., each with 4 toilets), all of which are aging and in fair condition overall. The facility includes two overflow parking areas (paved) for a total of 18 single vehicles. The circulation roads consist of one-way, 12-ft-wide, and two-way, 20-ft-wide paved roads. The parking areas and roads are in good condition. Representative photographs are provided in Figure 3.3.6-10.

Standard Campsite

Standard Campsite Table

Vault Restroom Building (4 stalls)

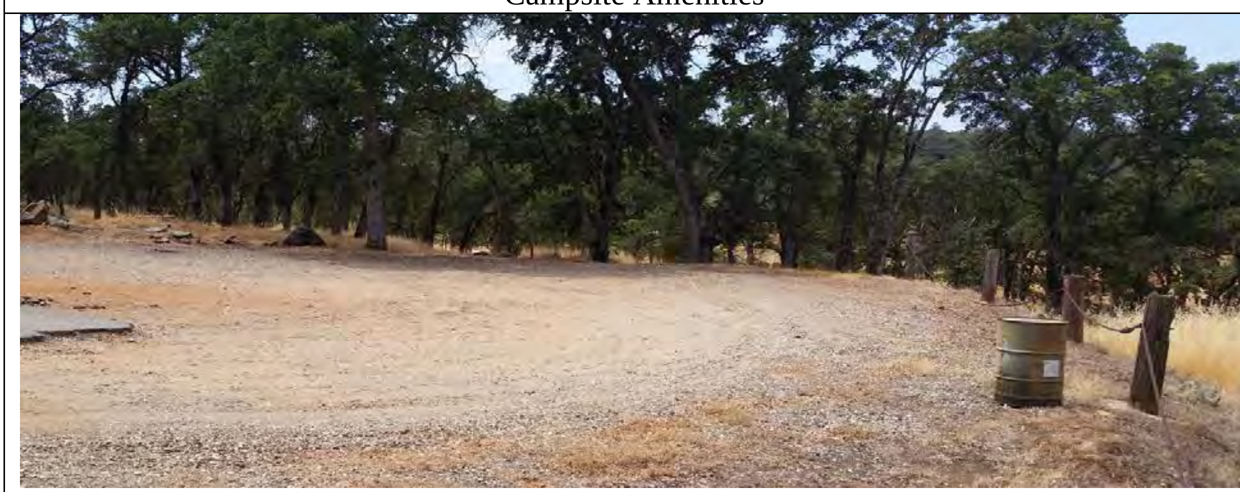
Figure 3.3.6-10. Photographs (dated 7/21/15) of the family campground at the South Shore Recreation Area.

Group Campsite

A single group campsite is located in a forested setting on a bluff along the west shoreline of the SSRA. The facility consists of one group campsite serving 50 PAOT; and consists of wood-metal table, large concrete fire ring, large food preparation table/area, a pedestal grill, trash cans and a gravel parking area for 10 vehicles. The access road to the sites is a two-way paved road. A water spigot is located at the start of the access road to the group campsite. Overall, the amenities are aging, but in good condition, with the exception of the wood-metal construction table that is in poor condition. A restroom building is available at the nearby family campground. A representative photograph of the facility is provided in Figure 3.3.6-11.

Group Campsite

Campsite Amenities



Parking Area

Figure 3.3.6-11. Photograph (dated 7/21/15) of the group campsite at the South Shore Recreation Area.

Picnic Area

The picnic area is located in a semi-forested setting along the east shoreline of the SSRA. The facility consists of 33 picnic sites, each with a table, and a parking area for 44 single vehicles. Pedestal grills, water spigots and trash cans are dispersed throughout the area for picnickers. The facility utilizes the boat ramp's flush restroom building (i.e., 7 toilets, 1 urinal and 4 sinks) located at the top of the boat ramp facility. Overall, the facilities are in good condition. Representative photographs of the facilities are provided in Figure 3.3.6-12.

Picnic Area

Picnic Site Amenities

Parking Area

Figure 3.3.6-12. Photographs (dated 7/21/15) of the picnic area at the South Shore Recreation Area.

Swim Beach

The swim beach is located in an open setting along the west shoreline of the SSRA in a cove commonly referred to as "Quarter Mile Cove" (Figure 3.3.6-12). The site provides direct water access for swimming and other water play activities for the campground visitors. Trash cans are dispersed throughout the area. Overall, the few facilities provided (i.e., trash cans) are good condition. The facility utilizes the family campground's vault restroom buildings located near the swim beach area.

Figure 3.3.6-13. Photograph (dated 7/21/15) of the swim beach at the South Shore Recreation Area.

Boat Ramp

The boat ramp is located on the northeast shoreline between the family campground and the day use area. The facility consists of a boat launching ramp, parking area and restroom building. The boat ramp is a 2-lane concrete and asphalt ramp with a floating courtesy dock. The end of the concrete/asphalt ramp is at 220.0 ft elevation and boat launching below this level is not advisable. The concrete section of the ramp and the courtesy dock are in good condition; whereas the lower asphalt section of the ramp is in poor condition with eroding edges and extensive cracking. The parking area provides a total of 52 vehicles with trailer spaces in a gravel lot and paved lot paralleling the top of the ramp access road. The parking areas are in good condition. The facility includes one flush restroom building with seven toilets, one urinal and four sinks. The restroom building is in fair condition. Representative photographs of the facilities are provided in Figure 3.3.6-14.

Boat Ramp (concrete section)

Boat Ramp (asphalt section)

Parking Area

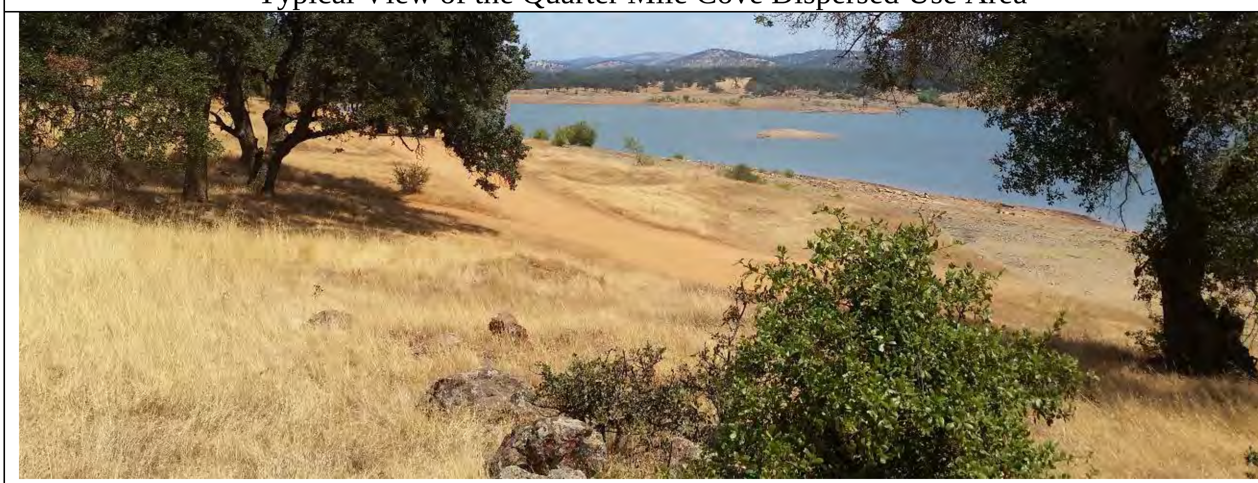
Restroom Building

Figure 3.3.6-14. Photographs (dated 7/21/15) of the boat ramp facility at the South Shore Recreation Area.

Dispersed Use Areas

The SSRA has two dispersed use areas located on the west shoreline (Quarter Mile Cove dispersed use area) and southeast shoreline adjacent to the entrance station (Entrance Gate dispersed use area). Both areas are accessed by one-way and two-way dirt roads. These areas allow for dispersed day use and overnight camping, but provide minimal facilities – roads, trash cans and six portable chemical toilets. Overall, the minimal facilities are good condition. Representative photographs of the facilities are provided in Figure 3.3.6-15.

Typical View of the Quarter Mile Cove Dispersed Use Area



Typical View of the Entrance Gate Dispersed Use Area

Figure 3.3.6-15. Photographs (dated 7/21/15) of the dispersed use areas at the South Shore Recreation Area.

Recreational Water System

A recreational water system provides water throughout the SSRA, excluding the dispersed use area. The SSRA receives water from the NSRA water treatment plant and storage tank via two pipes under the reservoir. The water is dispersed throughout the SSRA via underground distribution piping, where water is accessible via water hydrants dispersed throughout the recreation area facilities. The SSRA system also includes a sewage holding pond with an aerator to handle the sanitary needs of the flush restroom buildings and the RV dump station. The SSRA sewage system is a gravity-fed system.

Other Facilities

The SSRA also includes a general store, RV dump station, and private ranger residences and maintenance buildings. The store is located near the entrance to the SSRA facilities and also serves as the entrance station for the recreation area. A fuel station is also located at the general store. The RV dump station is located across from the general store and provides a 1-lane facility connected to a sewer system for RV holding tank disposal. Overall, these facilities are in good-to-very good condition. Private ranger residences are also located between the entrance station and the boat ramp facilities that include residences and maintenance buildings. Photographs of these facilities are provided in Figure 3.3.6-16.

General Store/Entrance Station with Fuel Station (in background)

RV Dump Station

Figure 3.3.6-16. Photographs (dated 7/21/15) of the entrance station and RV dump station at the South Shore Recreation Area.

3.3.6.1.2 Recreational Use

Recreation Visitation

Current Recreational Use Estimates

In 2017, the total Project recreation use was 78,641 RDs with the majority of that use occurring in the peak season (66.6% or 52,397 RDs) compared to the non-peak season (33.4% or 26,244 RDs) (Table 3.3.6-2). Day-use (70.6% or 55,5181RDs) accounted for the majority of total use as compared to overnight use (29.4% or 23,123 RDs); and this day-use-to-overnight use ratio was similar during both the peak and non-peak season. When comparing use by day type overall, total use was highest on the weekends (39,599 RDs) as compared to weekdays (26,217 RDs) and holidays (12,825 RDs). When comparing overall use by recreation, NSRA accounted for the highest percentage of use (81.9% or 64,429 RDs) compared to the SSR (18.1% or 14,212 RDs), which was open on a limited bases in 2017 on select weekdays, weekends and holidays during the peak season. The SSRA was closed during the non-peak season.

Table 3.3.6-2. Project recreation use estimate in Recreation Days by season and day type.

Recreation Area	Day Type	Use Estimate in Recreation Days (RDs)								
		Peak Season			Non-peak Season			Overall[1]		
		Overnight Use	Day Use	Total Use	Overnight Use	Day Use	Total Use	Overnight Use	Day Use	Total Use
North Shore Recreation Area	**Overall**	**10,690**	**27,495**	**38,185**	**7,267**	**18,977**	**26,244**	**17,957**	**46,472**	**64,429**
	Weekday	5,602	7,665	13,267	4,214	5,417	9,631	9,816	13,082	22,898
	Weekend	2,937	12,207	15,144	3,053	13,560	16,613	5,990	25,767	31,757
	Holiday	2,151	7,623	9,774	n/a	n/a	n/a	2,151	7,623	9,774
South Shore Recreation Area	**Overall**	**5,166**	**9,046**	**14,212**	**closed**	**closed**	**closed**	**5,166**	**9,046**	**14,212**
	Weekday	2,408	911	3,319	closed	closed	closed	2,408	911	3,319
	Weekend	1,820	6,022	7,842	closed	closed	closed	1,820	6,022	7,842
	Holiday	938	2,113	3,051	closed	closed	closed	938	2,113	3,051
Project Total	**Overall**	**15,856**	**36,541**	**52,397**	**7,267**	**18,977**	**26,244**	**23,123**	**55,518**	**78,641**
	Weekday	8,010	8,576	16,586	4,214	5,417	9,631	12,224	13,993	26,217
	Weekend	4,757	18,229	22,986	3,053	13,560	16,613	7,810	31,789	39,599
	Holiday	3,089	9,736	12,825	n/a	n/a	n/a	3,089	9,736	12,825

Source: Camp Far West Reservoir recreation concessionaire entrance gate records (SSWD 2017).
Legend: n/a = no holidays during non-peak season.

Future Recreation Use Estimate through 2060

SSWD used the 2017 recreation use estimate for the Project as the baseline and applied the county population growth rates for the top 80 percent of the visitors surveyed (i.e., Sacramento, Placer, Yuba, and Sutter counties in California) to the peak season, non-peak season, and overall or annual use estimate by day type. SSWD obtained the California county population projections from the State of California Department of Finance[3]. Next, SSWD multiplied the weighted percentage for each county by the growth rate for each decade (2020 through 2060) and the 2017 use estimate. The weighted use estimate for each county was summed to get a

[3] http://www.dof.ca.gov/Forecasting/Demographics/Projections/.

projected use estimate for the Project by type of season (overall or annual, peak and non-peak) and day type (weekday, weekend and holidays).

Overall, if population growth continues for relevant counties, recreation use is projected to increase by 38.5 percent by 2060 (Table 3.3.6-3). By 2060, the overall or annual recreation use is projected to increase to 116,400 RDs or an additional 30,259 RDs; peak season recreation use is projected to increase to 77,600 RD (+20,203 RDs); and non-peak season use is projected to increase to 38,900 RDs (+10,156 RDs).

Table 3.3.6-3. Annual recreation use estimate projections through 2060 based on county population growth rates for Sacramento, Placer, Yuba and Sutter counties.

Use Season	Day Type	2017 Use Estimate (RDs)	Use Projections[1] (RDs)					Change (2017 to 2060)	
			2020	2030	2040	2050	2060	RDs	Percent
Annual	**Overall**	**78,641**	**81,600**	**91,400**	**100,800**	**108,900**	**116,400**	**30,259**	38.5
	Weekday	26,217	27,200	30,500	33,600	36,300	38,800	10,083	
	Weekend	39,599	41,100	46,000	50,700	54,800	58,600	15,201	
	Holiday	12,825	13,300	14,900	16,500	17,800	19,000	4,975	
Peak Season	**Overall**	**52,397**	**43,400**	**60,900**	**67,300**	**72,600**	**77,600**	**20,203**	38.5
	Weekday	16,586	14,500	19,300	21,300	23,000	24,600	6,414	
	Weekend	22,986	21,800	26,700	29,500	31,800	34,000	8,814	
	Holiday	12,825	7,100	14,900	16,500	17,800	19,000	4,975	
Non-peak Season	**Overall**	**26,244**	**21,900**	**30,500**	**33,700**	**36,400**	**38,900**	**10,156**	38.5
	Weekday	9,631	9,200	11,200	12,400	13,400	14,300	3,769	
	Weekend	16,613	12,700	19,300	21,300	23,000	24,600	6,387	
	Holiday	n/a	N/A	N/A	N/A	N/A	N/A	N/A	

[1] Projections are based on the county population growth rates for the top four counties accounting for 80% of the visitors surveyed (i.e., Sacramento, Placer, Yuba and Sutter counties in California).

Developed Facility Occupancy

Campgrounds

Family Campgrounds

In 2017, the combined Project family campground occupancy was 28.9 percent overall (Table 3.3.6-4). The family campground occupancy was slightly higher at SSRA (32.8% overall) than NSRA (27.8%); however, the SSRA was only open at peak use periods during the peak season, including select weekdays (large group events), weekends and holidays. The SSRA was closed for nearly all of the weekdays during the peak season and for the entire non-peak season. During the peak season, the overall NSRA family campground occupancy was higher (60.0%) compared to the SSRA family campground (32.8%). The overall occupancy levels by day type followed a typical pattern with holidays experiencing the highest occupancy followed by weekends and weekdays. Notably, neither of the family campgrounds was ever at full capacity during the 2017 season.

RV Campgrounds

The only Project RV campground (with full RV hookups) is located at the NSRA. In 2017, the overall campground occupancy was 22.6 percent, but with a substantial divergence between the peak season (56.7%) and the non-peak season (5.6%) (Table 3.3.6-4). The RV campground was never at full capacity during the 2017 season.

Group Campgrounds

The Project includes three group campsites, including two sites at the NSRA and one site at the SSRA. Combined in 2017, the overall group campground occupancy was 44.1 percent, but with a substantial divergence between the peak season (75.0%) and the non-peak season (16.7%) (Table 3.3.6-4). The group campgrounds did reach full capacity on occasion during the 2017 season, which is not uncommon given the small number of total sites (3 sites).

The Project also includes the Horse Camp at the NSRA, which is also a group site (1 site), tailored specifically for equestrian use with horse tie posts. In 2017, the overall occupancy was 25.9 percent, but with a substantial divergence between the peak season (66.7%) and the non-peak season (5.6%) (Table 3.3.6-4). The campground was at full capacity numerous times during the 2017 season, but any time the lone site was occupied, the site was considered at full occupancy.

Table 3.3.6-4. Project campground occupancy by season and day type.

Recreation Area	Campground	Day Type	Average Occupancy (%)			Maximum Occupancy (%)		
			Peak Season	Non-peak Season	Overall	Peak Season	Non-peak Season	Overall
North Shore Recreation Area	Family Campground (70 sites)	**Overall**	**60.0**	**11.7**	**27.8**	**95.7**	**57.1**	**95.7**
		Weekday	28.6	7.6	12.9	37.1	25.7	37.1
		Weekend	65.2	15.9	28.2	74.3	57.1	74.3
		Holiday	86.2	n/a	86.2	95.7	n/a	95.7
	RV Campground (10 sites)	**Overall**	**56.7**	**5.6**	**22.6**	**80.0**	**20.0**	**80.0**
		Weekday	23.3	3.3	8.3	50.0	10.0	50.0
		Weekend	70.0	7.8	23.3	80.0	20.0	80.0
		Holiday	76.7	n/a	76.7	80.0	n/a	80.0
	Group Campground (2 sites)	**Overall**	**66.7**	**16.7**	**33.3**	**100.0**	**100.0**	**100.0**
		Weekday	16.7	11.1	12.5	50.0	50.0	50.0
		Weekend	83.3	22.2	37.5	100.0	100.0	100.0
		Holiday	100.0	n/a	100.0	100.0	n/a	100.0
	Horse Camp (1 site)	**Overall**	**66.7**	**5.6**	**25.9**	**100.0**	**100.0**	**100.0**
		Weekday	33.3	11.1	16.7	100.0	100.0	100.0
		Weekend	66.7	0.0	16.7	100.0	0.0	100.0
		Holiday	100.0	n/a	100.0	100.0	n/a	100.0
South Shore Recreation Area	Family Campground (67 sites)	**Overall**	**32.8**	**closed**	**32.8**	**49.3**	**closed**	**49.3**
		Weekday	20.9	closed	20.9	31.3	closed	31.3
		Weekend	35.8	closed	35.8	49.3	closed	49.3
		Holiday	40.3	closed	40.3	49.3	closed	49.3
	Group Campground (1 site)	**Overall**	**85.7**	**closed**	**85.7**	**100.0**	**closed**	**100.0**
		Weekday	50.0	closed	50.0	100.0	closed	100.0
		Weekend	100.0	closed	100.0	100.0	closed	100.0
		Holiday	100.0	closed	100.0	100.0	closed	100.0

Table 3.3.6-4. (continued)

Recreation Area	Campground	Day Type	Average Occupancy (%)			Maximum Occupancy (%)		
			Peak Season	Non-peak Season	Overall	Peak Season	Non-peak Season	Overall
Project-wide	Family Campgrounds (137 sites)	**Overall**	**48.1**	**11.7**	**28.9**	**95.7**	**57.1**	**95.7**
		Weekday	25.5	7.6	14.0	37.1	25.7	37.1
		Weekend	50.5	15.9	29.7	74.3	57.1	74.3
		Holiday	67.8	n/a	67.8	95.7	n/a	95.7
	RV Campgrounds (10 sites)	**Overall**	**56.7**	**5.6**	**22.6**	**80.0**	**20.0**	**80.0**
		Weekday	23.3	3.3	8.3	50.0	10.0	50.0
		Weekend	70.0	7.8	23.3	80.0	20.0	80.0
		Holiday	76.7	n/a	76.7	80.0	n/a	80.0
	Group Campgrounds (3 sites)	**Overall**	**75.0**	**16.7**	**44.1**	**100.0**	**100.0**	**100.0**
		Weekday	30.0	11.1	17.9	100.0	50.0	100.0
		Weekend	91.7	22.2	50.0	100.0	100.0	100.0
		Holiday	100.0	n/a	100.0	100.0	n/a	100.0
	Horse Camp (1 site)	**Overall**	**66.7**	**5.6**	**25.9**	**100.0**	**100.0**	**100.0**
		Weekday	33.3	11.1	16.7	100.0	100.0	100.0
		Weekend	66.7	0.0	16.7	100.0	0.0	100.0
		Holiday	100.0	n/a	100.0	100.0	n/a	100.0

Source: on-site observations (SSWD 2017)
Legend: n/a = no holidays during non-peak season.

Projected Peak Season Campground Occupancy through 2060

At the NSRA, the overall peak season occupancy at the developed campgrounds is projected to be between 91.4 percent and 107.5 percent by 2060 (Table 3.3.6-5). When examining weekend occupancies at these campgrounds, all are projected to be between 105.2 percent and 134.4 percent occupancy by 2060. The Group Campground is the first campground projected to reach full capacity on weekends by 2030 followed by the RV Campground (2040), Horse Camp (2050) and Family Campground (2060).

At the SSRA, the overall peak season occupancy at the family and group campgrounds is projected to be between 53.0 percent and 138.3 percent by 2060 (Table 3.3.6-5). Again, the SSRA is only open during the peak season and primarily on weekends and holidays so the overall peak season occupancy levels are skewed without weekdays included. When examining weekend occupancies at these campgrounds, all are projected to be between 105.2 percent and 134.4 percent occupancy by 2060. The Group Campground is the first campground projected to reach full capacity on weekends by 2030 followed by the RV Campground (2040), Horse Camp (2050) and Family Campground (2060).

When examining the combined occupancy rates for the common types of campground facilities between the NSRA and SSRA, the family campgrounds are projected to reach 77.6 percent overall and 81.5 percent on weekends by 2060. The group campgrounds are projected to reach 121.0 percent overall and 147.9 percent on weekends by 2060.

Table 3.3.6-5. Average peak season occupancy projections by day type for the Project campgrounds, 2020-2060.

Campground	Type of Day	2017 Occupancy	Occupancy Projections[1]				
			2020	2030	2040	2050	2060
INDIVIDUAL CAMPGROUNDS							
NSRA Family Campground (70 sites)	**Overall**	**60.0**	**68.7**	**76.6**	**89.6**	**90.1**	**96.8**
	Weekday	28.6	32.7	36.5	42.7	42.9	46.1
	Weekend	65.2	74.7	83.2	97.5	98.0	105.2
	Holiday	86.2	98.7	110.0	128.8	129.5	139.0
NSRA RV Campground (10 sites)	**Overall**	**56.7**	**64.9**	**72.3**	**84.7**	**85.1**	**91.4**
	Weekday	23.3	26.7	29.8	34.9	35.0	37.6
	Weekend	70.0	80.2	89.3	104.6	105.1	112.9
	Holiday	76.7	87.8	97.8	114.5	115.2	123.7
NSRA Group Campground (2 sites)	**Overall**	**66.7**	**76.3**	**85.1**	**99.6**	**100.1**	**107.5**
	Weekday	16.7	19.1	21.3	24.9	25.0	26.9
	Weekend	83.3	95.4	106.3	124.5	125.2	134.4
	Holiday	100.0	114.5	127.6	149.4	150.2	161.3
NSRA Horse Camp (1 site)	**Overall**	**66.7**	**76.3**	**85.1**	**99.6**	**100.1**	**107.5**
	Weekday	33.3	38.2	42.5	49.8	50.1	53.8
	Weekend	66.7	76.3	85.1	99.6	100.1	107.5
	Holiday	100.0	114.5	127.6	149.4	150.2	161.3
SSRA Family Campground (67 sites)	**Overall**	**32.8**	**37.6**	**41.9**	**49.0**	**49.3**	**53.0**
	Weekday	20.9	23.9	26.6	31.1	31.3	33.6
	Weekend	35.8	41.0	45.7	53.5	53.8	57.8
	Holiday	40.3	46.1	51.4	60.2	60.5	65.0
SSRA Group Campground (1 site)	**Overall**	**85.7**	**98.1**	**109.4**	**128.1**	**128.7**	**138.3**
	Weekday	50.0	57.3	63.8	74.7	75.1	80.7
	Weekend	100.0	114.5	127.6	149.4	150.2	161.3
	Holiday	100.0	114.5	127.6	149.4	150.2	161.3
COMBINED NSRA & SSRA CAMPGROUNDS							
Family Campgrounds Combined (137 sites)	**Overall**	**48.1**	**55.1**	**61.4**	**71.9**	**72.3**	**77.6**
	Weekday	25.5	29.2	32.5	38.1	38.3	41.1
	Weekend	50.5	57.9	64.5	75.5	75.9	81.5
	Holiday	67.8	77.7	86.6	101.4	101.9	109.4
Group Campgrounds Combined (3 sites)	**Overall**	**75.0**	**85.9**	**95.7**	**112.1**	**112.7**	**121.0**
	Weekday	30.0	34.4	38.3	44.8	45.1	48.4
	Weekend	91.7	105.0	117.0	137.0	137.7	147.9
	Holiday	100.0	114.5	127.6	149.4	150.2	161.3

[1] Developed Site Use index: 1.145 by 2020; 1.276 by 2030; 1.494 by 2040; 1.502 by 2050; and 1.613 by 2060 (Bowker et al. 2012).

Parking Areas

In 2017 at the NSRA Boat Launch (155 spaces), the parking area occupancy was 16.3 percent overall and slightly higher at 26.2 percent during the peak season (Table 3.3.6-6). The occupancy by day type was highest on holidays (48.4%) and weekends (27.1%) and dropped substantially on weekdays (3.2%). The parking area was never observed at full capacity with a maximum occupancy of 90.3 percent on a holiday. Notably, parking along the shoreline in the dispersed use areas abutting the Boat Launch is allowed at NSRA, which is commonly utilized by visitors since it provides parking closer to the reservoir shoreline, particularly as the water level recedes.

In 2017 at the SSRA Boat Launch (52 spaces), the parking area occupancy was 24.0 percent overall with the highest average and maximum occupancy rates on weekends at 32.7 and 82.7 percent, respectively (Table 3.3.6-6). The parking area was never observed at full capacity.

In 2017 at the SSRA Day Use Area (44 spaces), the parking area occupancy was 20.8 percent overall with the highest average and maximum occupancy rates on holidays at 31.1 and 72.7 percent, respectively (Table 3.3.6-6). The parking area was never observed at full capacity.

Table 3.3.6-6. Project parking area occupancy by season and day type.

Facility	Day Type	Average Occupancy (%)			Maximum Occupancy (%)		
		Peak Season	Non-peak Season	Overall	Peak Season	Non-peak Season	Overall
NSRA Boat Launch (155 spaces)	**Overall**	**26.2**	**11.4**	**16.3**	**90.3**	**46.5**	**90.3**
	Weekday	3.2	4.0	3.8	5.2	7.7	7.7
	Weekend	27.1	17.2	19.5	38.7	46.5	46.5
	Holiday	48.4	n/a	48.4	90.3	n/a	90.3
SSRA Boat Launch (52 spaces)	**Overall**	**24.0**	**closed**	**24.0**	**82.7**	**closed**	**82.7**
	Weekday	3.8	closed	3.8	3.8	closed	3.8
	Weekend	32.7	closed	32.7	82.7	closed	82.7
	Holiday	28.9	closed	28.9	63.5	closed	63.5
SSRA Day Use Area (44 spaces)	**Overall**	**20.8**	**closed**	**20.8**	**72.7**	**closed**	**72.7**
	Weekday	2.3	closed	2.3	2.3	closed	2.3
	Weekend	22.7	closed	22.7	59.1	closed	59.1
	Holiday	31.1	closed	31.1	72.7	closed	72.7
Combined Boat Launch (207 spaces)	**Overall**	**25.2**	**11.4**	**18.1**	**90.3**	**46.5**	**90.3**
	Weekday	3.5	4.0	3.8	5.2	7.7	7.7
	Weekend	29.9	17.2	22.0	82.7	46.5	82.7
	Holiday	38.6	n/a	38.6	90.3	n/a	90.3

Source: on-site observations (SSWD 2017)
Legend: n/a = no holidays during non-peak season.

Projected Peak Season Parking Area Occupancy through 2060

At the NSRA Boat Launch, the peak season parking area occupancy is projected to be 41.4 percent overall and 42.7 percent on weekends by 2060 (Table 3.3.6-7). At the SSRA Boat Launch, the peak season parking area occupancy is projected to be 41.2 percent overall and 56.0 percent on weekends by 2060. The combined peak season occupancy is projected to be 41.4 percent overall and 49.1 percent on weekends. At the SSRA Day Use Area, the peak season parking area occupancy is projected to be 34.6 percent overall and 37.9 percent on weekends by 2060.

Table 3.3.6-7. Average peak season parking area occupancy projections by day type, 2020-2060.

Facility	Day Type	2017 Occupancy	Occupancy Projections				
			2020 Projection	2030 Projection	2040 Projection	2050 Projection	2060 Projection
INDIVIDUAL FACILITIES							
NSRA Boat Launch (155 spaces)	**Overall**	**26.2**	**29.8**	**32.7**	**35.8**	**38.3**	**41.4**
	Weekday	3.2	3.7	4.0	4.4	4.7	5.1
	Weekend	27.1	30.8	33.8	36.9	39.5	42.7
	Holiday	48.4	54.9	60.4	65.9	70.6	76.3
SSRA Boat Launch (52 spaces)	**Overall**	**24.0**	**27.8**	**30.9**	**35.3**	**37.5**	**41.2**
	Weekday	3.8	4.4	4.9	5.6	5.9	6.5
	Weekend	32.7	37.8	42.1	48.1	50.9	56.0
	Holiday	28.9	33.3	37.2	42.4	45.0	49.5
SSRA Day Use Area (44 spaces)	**Overall**	**20.8**	**23.9**	**26.7**	**30.7**	**31.9**	**34.6**
	Weekday	2.3	2.6	3.0	3.4	3.5	3.8
	Weekend	22.7	26.2	29.2	33.6	34.9	37.9
	Holiday	31.1	35.8	39.9	45.9	47.7	51.8
COMBINED FACILITIES							
Boat Launches Combined (207 spaces)	**Overall**	**25.2**	**28.9**	**32.0**	**36.3**	**38.1**	**41.4**
	Weekday	3.5	4.0	4.4	5.0	5.2	5.7
	Weekend	29.9	34.3	38.0	43.1	45.2	49.1
	Holiday	38.6	44.2	49.1	55.6	58.3	63.4

Picnic Sites

In 2017, picnic site usage was very low at both the NSRA and SSRA day use areas based on average and maximum occupancy rates. At the NSRA Day Use Area (22 sites), the picnic site occupancy was 3.2 percent overall, on average, with a maximum occupancy of 13.6 percent (Table 3.3.6-8). Occupancy was slightly higher during the peak season (6.6%) compared to the non-peak season (1.5%). At the SSRA Day Use Area (33 sites), the picnic site occupancy was slightly higher at 5.7 percent overall, on average, with a maximum occupancy of 24.2 percent (Table 3.3.6-8). The combined occupancy was a modes 3.8 percent.

Table 3.3.6-8. Project picnic area occupancy by season and day type.

Facility	Day Type	Average Occupancy (%)			Maximum Ocupancy (%)		
		Peak Season	Non-peak Season	Overall	Peak Season	Non-peak Season	Overall
NSRA Day Use Area (20 sites)	**Overall**	**6.6**	**1.5**	**3.2**	**13.6**	**9.1**	**13.6**
	Weekday	1.5	0.0	0.4	4.5	0.0	4.5
	Weekend	10.6	2.7	4.5	13.6	9.1	13.6
	Holiday	7.6	n/a	7.6	13.6	n/a	13.6
SSRA Day Use Area (33 sites)	**Overall**	**5.7**	**closed**	**5.7**	**24.2**	**closed**	**24.2**
	Weekday	3.0	closed	3.0	3.0	closed	3.0
	Weekend	3.0	closed	3.0	9.1	closed	9.1
	Holiday	10.1	closed	10.1	24.2	closed	24.2

Table 3.3.6-8. (continued)

Facility	Day Type	Average Occupancy (%)			Maximum Ocupancy (%)		
		Peak Season	Non-peak Season	Overall	Peak Season	Non-peak Season	Overall
Day Use Areas Combined (53 sites)	**Overall**	**6.1**	**1.5**	**3.8**	**24.2**	**9.1**	**24.2**
	Weekday	2.1	0.0	0.8	4.5	0.0	4.5
	Weekend	6.8	2.7	4.3	13.6	9.1	13.6
	Holiday	8.8	n/a	8.8	24.2	n/a	24.2

Source: on-site observations (SSWD 2017).
Legend: n/a = no holidays during non-peak season.

Projected Peak Season Picnic Site Occupancy through 2060

At the NSRA Day Use Area, the peak season parking area occupancy is projected to be 10.6 percent overall and 17.1 percent on weekends by 2060 (Table 3.3.6-9). At the SSRA Day Use Area, the peak season parking area occupancy is projected to be 9.2 percent overall and 4.9 percent on weekends by 2060. The combined peak season occupancy is projected to be 9.8 percent overall and 11.0 percent on weekends.

Table 3.3.6-9. Average peak season picnic area occupancy projections by day type, 2020-2060.

Picnic Area	Type of Day	2012 Occupancy	Occupancy Projections				
			2020 Projection	2030 Projection	2040 Projection	2050 Projection	2060 Projection
North Shore Recreation Area Day Use Area (20 sites)	**Overall**	**6.6**	**7.5**	**8.4**	**9.8**	**9.8**	**10.6**
	Weekday	1.5	1.7	1.9	2.2	2.3	2.4
	Weekend	10.6	12.1	13.5	15.8	15.9	17.1
	Holiday	7.6	8.7	9.7	11.3	11.4	12.2
South Shore Recreation Area Day Use Area (33 sites)	**Overall**	**5.7**	**6.5**	**7.2**	**8.5**	**8.5**	**9.2**
	Weekday	3.0	3.4	3.8	4.5	4.5	4.8
	Weekend	3.0	3.5	3.9	4.5	4.6	4.9
	Holiday	10.1	11.6	12.9	15.1	15.2	16.3
Day Use Areas Combined (53 sites)	**Overall**	**6.1**	**7.0**	**7.8**	**9.1**	**9.2**	**9.8**
	Weekday	2.1	2.4	2.7	3.1	3.2	3.4
	Weekend	6.8	7.8	8.7	10.2	10.2	11.0
	Holiday	8.8	10.1	11.2	13.1	13.2	14.2

Dispersed Use Areas

The four dispersed use areas at Camp Far West Reservoir do not have any developed camping, picnic or parking facilities; and thus, do not have occupancy rates. However, a substantial amount of recreation occurs in these areas. The following section summarizes the vehicle data for the areas.

NSRA

Jet Ski Cove Dispersed Use Area

Overall at Jet Ski Cove dispersed use area, SSWD observed an average of 31.9 total vehicles. The majority were vehicles only (i.e., 15.5 vehicles-at-one-time or VAOT) and RV/campers (i.e., 5.3 VAOT) (Table 3.3.6-10). During the peak season, SSWD observed an average of 63.3 total vehicles. These were comprised mostly of vehicles only (i.e., 24.9 VAOT) and RV/campers (i.e., 12.3 VAOT). Overall, holiday days had the highest total vehicle observations (i.e., 126.0 VAOT) followed by weekends (i.e., 25.5 VAOT) and weekdays (i.e., 13.6 VAOT).

The overall average number of shoreline users was 101.0 people-at-one-time (PAOT) (Table 3.3.6-10). The peak average number of shoreline users occurred during the peak season on holidays (i.e., 432.4 PAOT) and weekends (i.e., 146.7 PAOT).

Table 3.3.6-10. Average observed vehicles and shoreline users at the NSRA Jet Ski Cove dispersed use area by season and day type, 2017.

Dispersed Use Area	Day Type	Season	Average Observed Vehicles in 2017								Total Shoreline Users[1]
			Vehicle Only	Vehicle with Boat Trailer	Vehicle with Other Trailer	Trailer Only	RV/ Camper	Motor-cycle	Other Vehicle	Total Vehicles	
NSRA Jet Ski Cove (15 ac)	All Day Types	**Overall**	**15.5**	**3.8**	**3.6**	**3.1**	**5.3**	**0.3**	**0.3**	**31.9**	**101.1**
		Peak	24.9	9.6	8.0	7.4	12.3	0.7	0.4	63.3	208.8
		Non-peak	10.8	0.9	1.4	1.0	1.8	0.1	0.2	16.1	43.0
	Weekday	**Overall**	**10.5**	**0.5**	**0.3**	**1.3**	**0.9**	**0.0**	**0.1**	**13.6**	**36.1**
		Peak	1.3	1.7	0.7	3.3	1.7	0.0	0.3	9.0	32.6
		Non-peak	14.0	0.1	0.1	0.5	0.6	0.0	0.0	15.4	27.3
	Weekend	**Overall**	**12.0**	**2.8**	**3.8**	**2.8**	**3.8**	**0.2**	**0.2**	**25.5**	**76.6**
		Peak	24.7	7.0	8.0	7.3	7.3	0.7	0.0	55.0	146.7
		Non-peak	8.2	1.5	2.5	1.4	2.7	0.1	0.3	16.7	59.4
	Holiday	**Overall**	**48.7**	**20.0**	**15.3**	**11.7**	**28.0**	**1.3**	**1.0**	**126.0**	**432.4**
		Peak	48.7	20.0	15.3	11.7	28.0	1.3	1.0	126.0	432.4
		Non-peak	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

[1] SSWD calculated the number of shoreline users by using the avera people and vehicle per group data from the visitor survey responses and multiplying by the average observed vehicles.

Boss Point Dispersed Use Area

Overall at Boss Point dispersed use area, SSWD observed an average of 37.1 total vehicles. These were comprised mostly of vehicles only (i.e., 23.2 VAOT), vehicles with boat or other trailers (i.e., 7.0 VAOT), and RV/campers (i.e., 3.6 VAOT) (Table 3.3.6-11). During the peak season, SSWD observed an average of 57.2 total vehicles. These were comprised mostly of vehicles only (i.e., 36.3 VAOT) vehicles with boat or other trailers (i.e., 8.5 VAOT), and RV/campers (i.e., 6.8 VAOT). Overall, holiday days had the highest total vehicle observations (i.e., 117.3 VAOT) followed by weekends (i.e., 35.0 VAOT) and weekdays (i.e., 5.0 VAOT).

The overall average number of shoreline users was 122.2 PAOT overall (Table 3.3.6-11). The highest average number of shoreline users occurred during the peak season on holidays (i.e., 370.3 PAOT) and weekends (i.e., 133.7 PAOT).

Table 3.3.6-11. Average observed vehicles and shoreline users at the NSRA Boss Point dispersed use area by season and day type, 2017.

Dispersed Use Area	Day Type	Season	Average Observed Vehicles in 2017								Total Shoreline Users[1]
			Vehicle Only	Vehicle with Boat Trailer	Vehicle with Other Trailer	Trailer Only	RV/ Camper	Motor-cycle	Other Vehicle	Total Vehicles	
NSRA Boss Point (55 ac)	All Day Types	**Overall**	**23.2**	**4.0**	**3.0**	**3.0**	**3.6**	**0.1**	**0.1**	**37.1**	**122.2**
		Peak	36.3	5.3	3.2	5.1	6.8	0.2	0.2	57.2	179.9
		Non-peak	10.1	2.7	2.8	0.9	0.4	0.0	0.0	16.9	64.7
	Weekday	**Overall**	**3.1**	**0.0**	**0.6**	**0.3**	**1.0**	**0.0**	**0.0**	**5.0**	**15.0**
		Peak	6.7	0.0	1.0	0.7	2.3	0.0	0.0	10.7	37.3
		Non-peak	0.5	0.0	0.3	0.0	0.0	0.0	0.0	0.8	1.5
	Weekend	**Overall**	**23.8**	**4.3**	**4.0**	**1.6**	**1.4**	**0.0**	**0.0**	**35.0**	**121.5**
		Peak	33.7	3.3	2.7	1.7	2.3	0.0	0.0	43.7	133.7
		Non-peak	17.8	4.8	4.8	1.6	0.8	0.0	0.0	29.8	122.0
	Holiday	**Overall**	**68.7**	**12.7**	**6.0**	**13.0**	**15.7**	**0.7**	**0.7**	**117.3**	**370.3**
		Peak	68.7	12.7	6.0	13.0	15.7	0.7	0.7	117.3	370.3
		Non-peak	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

[1] SSWD calculated the number of shoreline users by using the avera people and vehicle per group data from the visitor survey responses and multiplying by the average observed vehicles.

SSRA

Entrance Gate Dispersed Use Area

During the peak season at the Entrance Gate dispersed use area, SSWD observed an average of 19.0 total vehicles. These were comprised mostly of vehicles only (i.e., 11.5 VAOT) with some vehicles with boat or other trailers (i.e., 2.9 VAOT), and RV/campers (i.e., 2.0 VAOT) (Table 3.3.6-12). Overall, holiday days had the highest total vehicle observations (i.e., 35.0 VAOT) followed by weekends (i.e., 13.0 VAOT) and weekdays (i.e., 3.5 VAOT).

The overall average number of shoreline users was 74.2 PAOT overall (Table 3.3.6-12). The highest average number of shoreline users occurred during the peak season on holidays (i.e., 148.4 PAOT) and weekends (i.e., 46.1 PAOT).

Table 3.3.6-12. Average observed vehicles and shoreline users at the SSRA Entrance Gate dispersed use area by season and day type, 2017.

Dispersed Use Area	Day Type	Season	Average Observed Vehicles in 2017								Total Shoreline Users[1]
			Vehicle Only	Vehicle with Boat Trailer	Vehicle with Other Trailer	Trailer Only	RV/ Camper	Motor-cycle	Other Vehicle	Total Vehicles	
SSRA Entrance Gate (24 ac)	All Day Types	**Overall**	**11.5**	**2.0**	**0.9**	**2.5**	**2.0**	**0.1**	**0.0**	**19.0**	**74.2**
		Peak	11.5	2.0	0.9	2.5	2.0	0.1	0.0	19.0	74.2
		Non-peak	closed	closed	closed	closed	closed	closed	closed	closed	closed

Table 3.3.6-12. (continued)

Dispersed Use Area	Day Type	Season	Average Observed Vehicles in 2017: Vehicle Only	Vehicle with Boat Trailer	Vehicle with Other Trailer	Trailer Only	RV/ Camper	Motor-cycle	Other Vehicle	Total Vehicles	Total Shoreline Users[1]
SSRA Entrance Gate (24 ac)	Weekday	**Overall**	**3.5**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**3.5**	**14.0**
		Peak	3.5	0.0	0.0	0.0	0.0	0.0	0.0	3.5	14.0
		Non-peak	closed	closed	closed	closed	closed	closed	closed	closed	closed
	Weekend	**Overall**	**8.3**	**1.7**	**1.3**	**0.7**	**0.7**	**0.3**	**0.0**	**13.0**	**46.1**
		Peak	8.3	1.7	1.3	0.7	0.7	0.3	0.0	13.0	46.1
		Non-peak	closed	closed	closed	closed	closed	closed	closed	closed	closed
	Holiday	**Overall**	**20.0**	**3.7**	**1.0**	**6.0**	**4.7**	**0.0**	**0.0**	**35.3**	**148.4**
		Peak	20.0	3.7	1.0	6.0	4.7	0.0	0.0	35.3	148.4
		Non-peak	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

[1] SSWD used data from the visitor survey responses to calculate the number of shoreline users by using the average people and vehicle per group and multiplying by the average observed vehicles.

Quarter Mile Cove Dispersed Use Area

During the peak season at Quarter Mile Cove dispersed use area, SSWD observed an average of 19.1 total vehicles. These were comprised mostly of vehicles only (i.e., 12.3 VAOT) with some vehicles with boat or other trailers (i.e., 3.9 VAOT), and RV/campers (i.e., 2.8 VAOT) (Table 3.3.6-13). Overall, holiday days had the highest total vehicle observations (i.e., 49.3 VAOT) followed by weekends (i.e., 1.3 VAOT) and weekdays (i.e., 0.5 VAOT).

The overall average number of shoreline users was 55.3 PAOT overall (Table 3.3.6-13). The highest average number of shoreline users occurred during the peak season on holidays (i.e., 135.7 PAOT).

Table 3.3.6-13. Average observed vehicles and shoreline users at the SSRA Quarter Mile Cove dispersed use area by season and day type, 2017.

Dispersed Use Area	Day Type	Season	Average Observed Vehicles in 2017: Vehicle Only	Vehicle with Boat Trailer	Vehicle with Other Trailer	Trailer Only	RV/ Camper	Motor-cycle	Other Vehicle	Total Vehicles	Total Shoreline Users[1]
SSRA Quarter-Mile Cove (8 ac)	All Day Types	**Overall**	**12.3**	**3.3**	**0.6**	**0.3**	**2.8**	**0.0**	**0.0**	**19.1**	**55.3**
		Peak	12.3	3.3	0.6	0.3	2.8	0.0	0.0	19.1	55.3
		Non-peak	closed	closed	closed	closed	closed	closed	closed	closed	closed
	Weekday	**Overall**	**0.5**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.5**	**1.5**
		Peak	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.5	1.5
		Non-peak	closed	closed	closed	closed	closed	closed	closed	closed	closed
	Weekend	**Overall**	**1.0**	**0.0**	**0.3**	**0.0**	**0.0**	**0.0**	**0.0**	**1.3**	**4.0**
		Peak	1.0	0.0	0.3	0.0	0.0	0.0	0.0	1.3	4.0
		Non-peak	closed	closed	closed	closed	closed	closed	closed	closed	closed
	Holiday	**Overall**	**31.3**	**8.7**	**1.3**	**0.7**	**7.3**	**0.0**	**0.0**	**49.3**	**135.7**
		Peak	31.3	8.7	1.3	0.7	7.3	0.0	0.0	49.3	135.7
		Non-peak	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

[1] SSWD calculated the number of shoreline users by using the avera people and vehicle per group data from the visitor survey responses and multiplying by the average observed vehicles.

3.3.6.1.3 Visitor Use Characteristics and Preferences

SSWD received 349 completed visitor surveys at the two Project recreation areas, including 309 surveys at NSRA and 40 surveys at SSRA (Table 3.3.6-14). The results are summarized below.

Table 3.3.6-14. Summary of completed visitor surveys by recreation area, facility and season.

Recreation Area	Recreation Facility	Number of Completed Visitor Surveys		
		Peak Season	**Non-peak Season**	**Overall**
NSRA	Boat Launch	26	54	80
	Family Campground	31	36	67
	RV Campground	11	8	19
	Horse Camp	2	4	6
	Group Camp	14	9	23
	Day Use Area	19	12	31
	Boss Point Dispersed	33	17	50
	Jet Ski Cove Dispersed	23	10	33
	Total	159	150	309
SSRA	Boat Launch	2	closed	2
	Family Campground	8	closed	8
	Group Camp	3	closed	3
	Day Use Area	7	closed	7
	Swim Beach	5	closed	5
	Quarter-Mile Cove Dispersed	5	closed	5
	Entrance Gate Dispersed	10	closed	10
	Total	40	closed	40
Total		**199**	**150**	**349**

General Visitor Characteristics

The results of the visitor surveys demonstrated the majority of use (i.e., 60%) was overnight use at the Project overall. The population of visitors was not ethnically diverse, with most identifying as white (i.e., 74%) and English speaking (i.e., 91%). The majority of overnight and day-use visitors (i.e., 79%) were from Sacramento, Placer, Yuba and Sutter counties in California.

Overnight Visitors

On average, overnight visitors spent 2.4 days during their trip overall; first visited the Project in 2005; and have visited 66 times since their first visit. The only significant difference in responses between the NSRA and SSRA was the number of times visited since their first visit with NSRA survey respondents visiting 72 times compared to 32 times for SSRA survey respondents. Regarding respondent's group composition, overnight visitor's group size was 9 people travelling in approximately 3 vehicles and with 1 RV/camper, on average. Jet skis were the most popular watercraft with approximately 1 per group, on average; most othe water craft averaged less than 1 craft per group. Family or family and friends described the majority of groups by composition for overnight visitors overall. All of the overnight visitors indicated they utilized either the Project campgrounds (49%) or dispersed use areas (51%) for their overnight facility.

<u>Day-use Visitors</u>

On average, day-use visitors spent 6 hours, 25 minutes during their trips overall; first visited the Project in 2000; and have visited 119 times since their first visit. When comparing the responses by recreation area, the year first visited and times visited showed a difference. Specifically, NSRA respondents first visited in 2000 and 114 times since compared to 1993 and 192 times for SSRA respondents. Regarding day-use group composition, respondents identified 5 people travelling in approximately 2 vehicles and most commonly with powerboats greater than 15 horespower (0.6 craft) and jet skis (0.5 craft), on average. Family or family and friends described the majority of groups by composition for day-use visitors overall.

Detailed visitor survey responses related to trip characteristics and demographics are provided in the Recreation Use and Visitor Survey study data summary provided in Attachment 3.3.6A.

Activity Participation

In 2017, the primary recreational activities for the majority of the Project visitors surveyed (i.e., 85%) were camping (38%), fishing (21%), jet skiing (11%), motorized boating (9%) and swimming (6%). The only difference in the top five activites between the recreation areas was that SSRA survey respondents participated more frequently in water skiing/wakeboarding instead of jet skiing, which was more popular at the NSRA. In 2017, visitors to the Project most commonly visit Folsom Lake, Collins Lake, Lake Oroville, Rollins Lake, New Bullards Bar Reservoir, Lake Berryesa, Camanche Reservoir, Englebright Lake, Clear Lake and Lake Tahoe to participate in similar recreational activities. A small minority of visitors surveyed (i.e., 3%) indicated that a barrier existed that prevented them or a member of their group from participating in a recreation activity at the Project. The barriers identified by the visitors surveyed were varied, but included difficulties in launching a boat alone, inability to access water due to the steep shoreline, and boats located too close to shore prohibiting waterplay activities.

Detailed visitor survey responses related to recreation activity participation are provided in the Recreation Use and Visitor Survey study data summary provided in Attachment 3.3.6A.

Reservoir Level and Recreational Uses

Visitors were asked if the reservoir level affected their ability to use the beach, safely swim, launch or take out a boat, safely boat, fish along the shoreline, access the shoreline or utilize trails. For all these uses, the majority of overnight and day-use visitors responded that the reservoir level was “not a problem” (i.e, between 65% and 75%), with most of the remaining respondents indicating it was only a “small problem” (i.e., between 8% and 16%) or had no opinion or response (i.e., 1% and 5%). When comparing the responses between recreation areas, day-use versus overnight visitors, and seasons, the responses were similar overall. A slightly higher percentage of respondents indicated their ability to utilize the reservoir or shoreline was a “small problem” during the peak season compared to the non-peak season, but the difference was nominal (i.e., 5% or less) overall.

Detailed visitor survey responses related to reservoir levels and recreational uses are provided in the Recreation Use and Visitor Survey study data summary provided in Attachment 3.3.6A.

Functional Use Periods of Project's Developed Boat Ramps

SSWD found that the functional range of the NSRA developed boat ramp is 60.7 vertical ft, which ranges from Camp Far West Reservoir's NMWSE at 300 ft down to the functional end of the ramp at 239.3 ft. Note that a boat ramp is considered functional if the reservoir water level is at least 3 vertical ft above the constructed end of the ramp. In addition, SSWD found the functional range of the NSRA undeveloped (dirt, 1-lane) ramp is 109.0 vertical ft, which ranges from Camp Far West Reservoir's NMWSE at 300 ft. down to the functional end of the ramp at 188.0 ft. The NSRA boat ramp is open year-round. In 2017, the developed and undeveloped boat ramps were functional the entire year as the reservoir WSE never dropped below 248 ft.

SSWD found that the functional range of the SSRA developed boat ramp is 67.0 vertical ft, which ranges from Camp Far West Reservoir's NMWSE at 300 ft down to the functional end of the ramp at 233.0 ft. The SSRA does not have an undeveloped ramp. The SSRA is typically only open during the peak recreation season. In 2017, the developed boat ramp was functional the entire year as the reservoir WSE never dropped below 248 ft.

Acceptability of Existing Facilities and Conditions

Visitors to the reservoir also had the opportunity to rate the level of acceptability for the existing facilities at the recreation areas, including the campsites, picnic sites, restrooms, potable water, parking areas, boat ramps, roads, trails, signage, visitor information and reservoir WSE information. Overall, respondents rated a majority of facilities as acceptable (i.e., responses of "acceptable" or "slightly acceptable") or had no opinion, did not use the facility, or had no response. A small minority of survey respondents (i.e., 5% or less) rated the facilities as unacceptable (i.e., responses of "unacceptable" or "slightly unacceptable"), except for restrooms (25%), potable water (18%), and roads (9%). The most common reasons and comments from visitors on the unacceptable existing condition of the facilities were categorized into the following categories:

- Potable water: lack of/need for potable water and poor condition of water hydrants
- Restrooms: cleanliness issues, lack of maintenance, poor overall condition, old/aging facilities, and lack of permanent restrooms in the dispersed use areas
- Roads: poor condition (e.g. cracking, eroding edges, potholes, and uneven surface), need for resurfacing

Detailed visitor survey responses related to the acceptability of existing facilities and conditions are provided in the Recreation Use and Visitor Survey study data summary provided in Attachment 3.3.6A.

User Conflict and Safety Issues

Visitors were also asked about conflict and safety issues at Camp Far West Reservoir. The majority of overnight visitors surveyed (89%) and day-use (96%) did not experience conflicts with very little difference between the recreation areas and the season. Of the minority of overnight visitors surveyed who did experience conflict, a range of reasons were identified such as proximity of motorized boaters and jet skiers, and rowdiness/loudness related to campers. For day-use visitors surveyed, motorized boaters and jet skiers were identified as the predominant sources of conflict.

Visitors were asked if there was anywhere in the recreation areas or on the reservoir that they felt unsafe. A minority of visitors surveyed (i.e., 7%) indicated they felt unsafe overall with very similar results between day-use and overnight visitors. Unsafe responses were slightly higher during the non-peak season as compared to the peak season. The predominant reasons for feeling unsafe were the presence/behavior of motorized boaters and jet skiers, low water boating hazards, boat ramp/courtesy dock congestion and lack of boater etiquette, and restroom conditions.

Detailed visitor survey responses related to user conflict and safety are provided in the Recreation Use and Visitor Survey study data summary provided in Attachment 3.3.6A.

Perceived Crowding

Respondents' level of perceived crowding was also measured, and overall the majority of visitors surveyed (i.e., 80% and higher) did not feel crowded; and results were similar between overnight and day-use visitors as well as between the recreation areas. When comparing the seasons, the non-peak season had slightly higher percentages of visitors surveyed that did not feel crowded (i.e., 85% and higher generally). For the respondents that did feel crowded, very few (i.e., 7%) modified their plans or most moved to a new location.

Detailed visitor survey responses related to crowding are provided in the Recreation Use and Visitor Survey study data summary provided in Attachment 3.3.6A.

Potential Facility Improvements

Visitors were asked their preference for potential facility improvements. Overall, visitors surveyed had low preferences (i.e., 30% or less) for facility improvements, with the exception of restrooms and potable water. Most visitors surveyed (i.e., 61% overall) indicated a preference for improved restroom facilities; and particularly overnight visitors (i.e., 67%) and those visiting during the peak season (i.e., 67%). In particular, visitors surveyed at SSRA indicated a higher preference for improved restroom facilities (i.e., 83%) and potable water facilities (i.e., 77%) when compared to NSRA (i.e., 64% and 55%, respectively).

Several other facility improvements were preferred by the majority of visitors surveyed when further examining preferences by type of user, recreation area or season. Many visitors surveyed also indicated a preference for improved potable water facilities, but particularly overnight visitors (i.e., 58%) and visitors during the peak season (i.e., 56%). In addition, visitors surveyed during the non-peak season indicated a higher preference for boat ramp-related improvements at NSRA as compared to the peak season. In particular, day-use visitors at NSRA indicated a preference for extending the boat ramp (i.e., 53.5%), adding boat ramp lanes (i.e., 43.5%) and improving the courtesy dock (i.e., 55.4%). Overnight visitors surveyed indicated a higher preference for campsite improvements than day-users at both recreation areas (i.e., 48%) and group campsite improvements (i.e., 43%).

Detailed visitor survey responses related to potential facility improvements are provided in the Recreation Use and Visitor Survey study data summary provided in Attachment 3.3.6A.

Angling at Camp Far West Reservoir

Angling at the Project was a primary recreational use. Overall, 25 percent of all visitors surveyed indicated that fishing was their primary recreation activity during their trip to Camp Far West Reservoir in 2017, which equates to nearly 20,000 RDs or visits specifically to fish at the Project. Visitors were asked a series of angling-specific questions on the recreation questionnaire.

Of the visitors surveyed who responded to the angling questions, the majority were general anglers (i.e., 57%) as compared to fishing for a target species (i.e., 43%). The predominant target species of choice was bass. Overall, the anglers surveyed fished for approximately 3 hours, on average; with a longer fishing period during the non-peak season (i.e., 4 hours) as compared to the peak season (i.e., 2 hours). Day-use visitors also fished for a longer period (i.e., 5 hours) as compared to overnight visitors (i.e., 2 hours). The anlgers surveyed also rated their fishing experience between average (i.e., 36%) and good (i.e., 29%) overall with similar results across types of users, seasons and recreation areas. One-fifth of the anglers surveyed indicated that the reservoir water level noticeably affected their angling experience. The reasons were varied, and included muddy/turbid water, inability to reach typical fishing spots due to low water level, floating debris at high water levels, and submerged debris/hazards at low water levels.

The majority of anglers surveyed fished from a boat (i.e., 52%) with most of the remaining anglers fishing from the shoreline fishing (i.e., 41%). Boat anglers surveyed primarily used a cast and retrieve approach. Most anglers surveyed used artificial lures (i.e., 57%) or bait (i.e., 50%).

Detailed visitor survey responses related to angling are provided in the Recreation Use and Visitor Survey study data summary provided in Attachment 3.3.6A.

Unmet Demand and Regional Uniqueness

SSWD identified potential activities with high unmet demand in the Project Area based on the review of unmet demand information from the visitor surveys and by reviewing relevant regional unmet demand sources such as the California Deparment of Parks and Recreation (CDPR) 2015 California Statewide Comprehensive Outdoor Recreation Plan (SCORP) and the 2012 Survey on Public Opinions and Attitudes on Outdoor Recreation (SPOA) in California. County general and master plans did not have relevant or specific information regarding unmet demand.

Visitor Survey Unmet Demand Information

Visitors to the recreation areas were asked if there were any activities or opportunities that they would like to participate in, but were unable to during their visit. The majority of respondents to the Project Area (i.e., 90%) indicated there were no activities that they felt they were unable to participate in at the Project Area or they did not respond. Only 10 percent of the visitors surveyed (36 respondents) indicated they wanted to participate in a recreational activity but were unable to. The predominant unmet recreational opportunity identified by visitors surveyed were boat-related rentals (16 responses) such as powerboat, jet-ski, pontoon boat, kayaks and ski boat rentals. The seond most common response were children-related opportunities (5 responses) such as a playground area, children bike park/ramps, waterslide area, etc.). Other responses for unmet demand opportunities/activities included off-highway vehicle/4x4/ATV areas (2 responses) and swim beach amenities (2 responses). Overall, the visitor survey responses are related more to additional services (i.e., boat rentals and additional swim beach features), whereby the visitors are able to participate in boating and swimming activities, but wish to have more services that cater to those activities.

Regional Unmet Demand Sources

The 2012 SPOA identifies the top 15 recreational activities in California with the highest latent demand. Additionally, the SCORP divides California into seven regions to identify how recreation activity participation varies by region throughout the state. The Project overlaps the Northern California and Central Valley regions. Table 3.3.6-15 summarizes the activities that Californians would participate in, from a statewide and regional perspective, if more facilities and opportunities were provided (DPR 2014).

The Project provides opportunities for 12 of the 15 statewide and regional activities to some degriee (Table 3.3.6-15). The three activities not provided at the Project (i.e., swimming in a pool, visiting outdoor nature museums, and shopping at a farmer's markert) are not recreation activities typically provided at reservoir-based recreational settings such as the Project.

Overall, the Project currently provides opportunities for visitors to participate in nearly all of the applicable outdoor activities that visitors indicated they would like to participate in more frequently (i.e., have high latent/unmet demand) statewide and regionally. And, those activities that the Project does not provide are not common to reservoir-based recreation areas.

Unmet demand information is provided in the Recreation Use and Visitor Survey study data summary provided in Attachment 3.3.6A.

Table 3.3.6-15. Summary of completed visitor surveys by recreation area, facility and season.

Order	Top 15 Activites Statewide	Available at Project	Top 15 Activites in the Northern California Region	Available at Project	Top 15 Activites in the Central Valley Region	Available at Project
1	Picnicking in picnic areas	Yes	Picnicking in picnic areas	Yes	Picnicking in picnic areas	Yes
2	Walking for fitness or pleasure on paved surfaces	Yes	Camping in developed sites with facilities such as tables and toilets	Yes	Walking for fitness or pleasure on paved surfaces	Yes

Table 3.3.6-15. (continued)

Order	Top 15 Activites Statewide	Available at Project	Top 15 Activites in the Northern California Region	Available at Project	Top 15 Activites in the Central Valley Region	Available at Project
3	Camping in developed sites with facilities such as tables and toilets	Yes	Beach activities	Yes	Driving on paved surfaces for pleasure, sightseeing, driving through natural scenery	Yes
4	Beach activities	Yes	Shopping at a farmer's market	No	Camping in developed sites with facilities such as tables and toilets	Yes
5	Swimming in a pool	No	Walking for fitness or pleasure on paved surfaces	Yes	Swimming in a pool	No
6	Day hiking on unpaved trails	Yes	Visiting outdoor nature museums, zoos, gardens, or arboretums	No	Visiting historic or cultural sites	Yes
7	Attending outdoor cultural events	Yes	Attending outdoor cultural events	Yes	Attending outdoor cultural events	Yes
8	Visiting outdoor nature museums, zoos, gardens or arboretums	No	Swimming in freshwater lakes, rivers and/or streams	Yes	Visiting outdoor nature museums, zoos, gardens, or arboretums	No
9	Shopping at a farmer's market	No	Day hiking on un-paved trails	Yes	Bicycling on paved surfaces	Yes
10	Visiting historic or cultural sites	Yes	Driving on paved surfaces for pleasure, sightseeing, driving through natural scenery	Yes	Shopping at a farmer's market	No
11	Wildlife viewing, bird watching, viewing natural scenery	Yes	Visiting historic or cultural sites	Yes	Swimming in freshwater lakes, rivers and/or streams	Yes
12	Driving on paved surfaces for pleasure, sightseeing, driving through natural scenery	Yes	Fishing – freshwater	Yes	Day hiking on un-paved trails	Yes
13	Swimming in fresh water lakes, rivers and/or streams	Yes	Wildlife viewing, bird watching, viewing natural scenery	Yes	Wildlife viewing, bird watching, viewing natural scenery	Yes
14	Jogging and running for exercise	Yes	Swimming in a pool	No	Beach activities	Yes
15	Bicycling on paved surfaces	Yes	Outdoor photography	Yes	Fishing – freshwater	Yes

Regional Significance and Uniqueness

Similar Regional Recreation Opportunities

SSWD identified regional recreational opportunities by focusing on alternatives located within the five bordering counties (i.e., Yuba, Sutter, Nevada, Placer, and Sacramento). These five counties include the four most popular counties where the majority (i.e., 78.5%) of the visitors surveyed had their primary residence, including Sacramento, Placer, Yuba, and Sutter counties.

Further, SSWD focused on alternatives located in a similar valley and foothill setting. Overall, SSWD used a 35-mile radius from Camp Far West Reservoir as the delineation for similar regional opportunities, as shown in Table 3.3.6-16.

Table 3.3.6-16. Similar reservoir-based public recreation opportunities within 35 mi of the Project.

Distance from Project	Public Reservoir Recreation Area
0 - 25 mi	Folsom Lake, Rollins Lake, Englebright Lake and Collins Lake
26 - 30 mi	New Bullards Bar Reservoir, Scotts Flat Lake, Sugar Pine Reservoir and Lake Natoma
31 - 35 mi	Lake Oroville

SSWD then reviewed guidebooks, online web resources, state and national park information, Forest Service information, and tourism information and compared the recreation opportunities at the regional reservoirs against the top primary activities at Camp Far West Reservoir. Based on the visitor use survey, the top recreational activiites at the Project are camping, fishing, jet skiing, motorized boating, water skiing/wake boarding, and swimming. A listing of regional recreational alternatives can be found in Table 3.3.6-17.

Table 3.3.6-17. Regional alternatives to Camp Far West Reservoir.

Facility Name	County	Surface Ac	Elevation (ft, msl)	Developed Camping	Motorized Boating	Jet Skiing	Water Skiing/ Wake-boarding	Fishing	Swimming
Folsom Lake	Sacramento	11,930	480	X	X	X	X	X	X
Rollins Reservoir	Yuba, Placer	788	2,171	X	X	X	X	X	X
Englebright Reservoir	Yuba, Nevada	815	527	X	X	X	X	X	X
Collins Lake	Yuba	1,000	1,200	X	X	--	X (seasonal)	X	X
New Bullards Bar Reservoir	Yuba	4,790	1,956	X	X	X	X	X	X
Scotts Flat Lake	Nevada	850	3,100	X	X	--	X	X	X
Sugar Pine Reservoir	Placer	160	3,618	X	10 mph	--	--	X	X
Lake Natoma	Sacramento	500	128	X	5 mph	--	--	X	X
Lake Oroville	Butte	15,500	902	X	X	X	X	X	X

Source: D. Dirksen and J. Dirksen, Recreation Lakes of California, 16th Ed. (2014); Stienstra, California Recreation Lakes and Rivers, 4th ed. (2008); Collins Lake (www.collinslake.com), Scotts Flat Lake, Rollins Reservoir (www.nidwater.com/recreation); Sugar Pine Resrvoir (https://www.fs.usda.gov/recarea/tahoe/recarea/?recid=55736); Folsom Lake (https://www.parks.ca.gov/?page_id=500); New Bullards Bar Reservoir (www.SSWD.com).

All of the eight similar alternative reservoirs provide at least four of the top six primary activities offered at the Project; and five of the eight alternatives offer all six of the Project's primary recreation activities. Overall, the Project offers similar recreational activities and opportunities to much of the regional alternatives.

Regional Uniqueness

SSWS analyzed all of the visitor survey responses to the question that asked visitors to rate the relative uniqueness of Camp Far West Reservoir. The overall rating for the Project was 3.0, which equates to a uniqueness rating of "somewhat common."[4] For the visitors surveyed who responded Camp Far West Project was unique (54 responses or 32% overall), the predominant

[4] Rating scale: 1.0 = extremely common; 1.1 to 2.0 = common; 2.1 to 3.0 = somewhat common; 3.1 to 4.0 = somewhat unique; 4.1 to 4.9 = unique; and 5.0 = extremely unique.

reasons (categorized by SSWD) were as follows. Note that respondents could provide more than one reason for the uniqueness so the uniqueness reasons are greater than the number of respondents (i.e., 54 respondents).

- Close proximity/ease of accessing the reservoir (38 responses)
- Peaceful, uncrowded setting (16 responses)
- Fewer/limited regulations (13 responses)
- Open/dispersed use areas for camping and shoreline access (12 responses)

Detailed visitor survey responses related to regional uniqueness are provided in the Recreation Use and Visitor Survey study data summary provided in Attachment 3.3.6A.

3.3.6.1.4 Recreation Facilities and Opportunities Downstream of the Project

Developed recreation facilities do not exist along the Bear River downstream of Camp Far West Dam. The public has limited access for recreational fishing and other activities where public roads run adjacent to or intersect the Bear River (SSWD 2003). The limiting factor for public access is pervasive private lands adjacent to the Bear River. This reach is not recognized as a whitewater boating reach due to the lack of gradient and whitewater features. No federal land occurs along the Bear River downstream of the Project.

Private recreational use occurs at the non-Project diversion dam impoundment, where SSWD leases non-Project SSWD-owned land to a local waterskiing club. Access to the area is gated. The site provides private access to the impoundment for recreational uses, primarily waterskiing.

3.3.6.2 Environmental Effects

This section discusses the potential environmental effects of SSWD's propsed Project, as described in Section 2.2 of this Exhibit E. As part fo the Project relicensing, SSWD proposes a Pool Raise, modifications of existing recreation facilities, and modification of the existing Project Boundary. SSWD's proposed Project include one measure, RR1, Recreation Plan, specifically related to Recreation Resources.

3.3.6.2.1 Effects of Construction-Related Activities

Recreation Facilities Rehabilitation and Enhancements

The construction of recreation facilities has the potential to affect the availability of recreation facilities and opportunities to the public. SSWD will minimize impacts to the public availability of recreation facilities during construction by: 1) undertaking construction activities during periods outside of the facilities peak recreation season, where possible (e.g., swim beaches and campgrounds); and 2) undertaking construction activities in a portion of the facilities and keep the remainder of the facility open to the public (e.g., campgrounds and picnic areas). By using these two approaches, the public would continue to have access to all of the types of recreation facilities and opportunities normally available at each recreation area except at a more limited basis. For instance, at campgrounds, SSWD will undertake construction on a single loop or several loops depending upon the total available number of loops in order to continue to provide camping facilities for the public while recreation construction or rehabilitation activities occur. At boat launches, SSWD will aim to construct/reconstruct the boat launches during the non-peak recreation season in order to minimize the effects to the public's ability to utilize the boat launches. During all recreation construction work, SSWD will take necessary measures to minimize potential impacts on nearby recreation users' experience such as the noise and proximity of construction equipment and staff. In addition, SSWD will make recreationists aware of planned construction work by posting notices of upcoming planned work on kiosks and at entrance gates.

Camp Far West Reservoir Dam Pool Raise

Construction of the Camp Far West Reservoir pool raise from 300 ft to 305 ft would have an affect on the recreational facilities along the shoreline at both the NSRA and SSRA. Overall, the Pool Raise would affect 104 recreational facilities or site features along the shoreline at the NSRA and SSRA (refer to Attachment 3.3.6B for figures showing the affected areas and features and Table 3.3.6-18 and 3.3.6-19 for a list of the features). Most of the affected features (i.e., 59%) would be directly affected by the pool raise by either partially or fully inundating the features. In these instances, the inundated features would be relocated, re-routed or re-aligned to avoid inundation. The remaining affected features (i.e., 41%) would be indirectly affected, whereby the Pool Raise would not inundate the feature, but would closely abut the feature likely resulting in flooding and/or erosion impacts to the features due to wind, wave or high flow events. In a few instances, a feature would be indirectly affected and require relocation because an inundated segment of a circulation road would likely be re-aligned through these features.

The construction work to relocate, re-route or realign the affected features would be completed in one calendar year. Overall, the majority of the construction would occur outside the peak recreation season (i.e., Memorial Day through Labor Day holiday weekends). In instances where construction would be necessary during the peak season, the work would be restricted to select areas and conducted during low-use periods (i.e., weekdays) to minimize any impacts to the recreation facilities and visitor experiences.

At NSRA, 57 site features would be affected, including 21 campsite living spaces (i.e., table and/or grill area), 19 campsite vehicle spurs, 13 circulation road segments (i.e., 2,410 ft of dirt roads and 480 ft of paved roads), 2 boat ramp and parking area segments, 1 picnic site, and 1 water hydrant (Table 3.3.6-18 and 3.3.6-19). The majority of the affected recreational site features at NSRA would be at the family campground (i.e., 43 affected features) followed by the dispersed use areas (i.e., 6 affected features – all dirt roads), group campground (i.e., 4 affected features), and the day use area and boat launch facilities (i.e., each with 2 affected features). At the family campground, most of the affected features would be campsite living spaces and vehicle spurs (i.e., each with 19 affected sites) with a five affected road (dirt surface) segments. At the group campground, one of the two group campsites would be fully inundated. At the dispersed use areas, all of the affected features would be the dirt roads (i.e., 1,410 ft) that provide shoreline access. Overall, most of the affected features at NSRA (i.e., 61%) would be directly affected by the pool raise and the remaining affected features would be indirectly affected (i.e., features abutting the 305 ft NMWSE).

Table 3.3.6-18. Summary of facilities and features affected at the North and South Shore Recreation Areas by pool raise to 305 ft elevation.

Recreat-ion Area	Facility	Affected Features							
		Road Segments	Vehicle Spurs	Campsites	Picnic Sites	Swim Beaches	Water Hydrants	Other	Total Features
NSRA	Family Campground	5	19	19	--	--	--	--	43
	Group Campground	1	--	2	--	--	1	--	4
	Day Use Area	1	--	--	1	--	--	--	2
	Swim Beach	--	--	--	--	--	--	--	0
	Boat Launch	2	--	--	--	--	--	--	2
	Dispersed Use Area	6	--	--	--	--	--	--	6
	Total	**15**	**19**	**21**	**1**	**--**	**1**	**--**	**57**
SSRA	Family Campground	3	7	11	--	--	--	1	22
	Group Campground	--	--	--	--	--	--	--	0
	Day Use Area	4	--	--	9	--	1	--	14
	Swim Beach	1	--	--	--	1	--	--	2
	Boat Launch	1	--	--	--	--	--	--	1
	Dispersed Use Area	9	--	--	--	--	--	--	9
	Total	**17**	**7**	**11**	**9**	**1**	**1**	**1**	**47**
Overall	Family Campground	8	26	30	--	--	--	1	65
	Group Campground	1	--	2	--	--	1	--	4
	Day Use Area	5	--	--	10	--	1	--	16
	Swim Beach	3	--	--	--	1	--	--	4
	Boat Launch	3	--	--	--	--	--	--	3
	Dispersed Use Area	15	--	--	--	--	--	--	15
	Total	**32**	**26**	**32**	**10**	**1**	**2**	**1**	**104**

Table 3.3.6-19. Summary of roads, parking areas and vehicle surfacing areas affected at the North and South Shore Recreation Areas by pool raise to 305 ft elevation

Recreat-ion Area	Facility	Type of Vehicle Surface Affected									
		Roads (Paved)		Roads (Dirt)		Parking Areas		Boat Ramps		Total	
		Segments	Length (ft)	Segments	Length (ft)	Segments	Length (ft)	Segments	Length (ft)	Segments	Length (ft)
NSRA	Boat Launch	1	180	--	--	--	--	1	65	2	245
	Day Use Area	--	--	1	120	--	--	--	--	1	120
	Dispersed Use Area	--	--	6	1,410	--	--	--	--	6	1,410
	Family Campground	1	300	4	705	--	--	--	--	5	1,005
	Group Campground	--	--	1	175	--	--	--	--	1	175
	Total	**2**	**480**	**12**	**2,410**	**--**	**--**	**1**	**65**	**15**	**2,955**
SSRA	Boat Launch	1	70	--	--	--	--	--	--	1	70
	Day Use Area	--	--	4	1,010	--	--	--	--	4	1,010
	Dispersed Use Area	--	--	9	2,710	--	--	--	--	9	2,710
	Family Campground	2	1,070	--	--	1	260	--	--	3	1,330
	Group Campground	--	--	--	--	--	--	--	--	--	--
	Total	**3**	**1,140**	**13**	**3,720**	**1**	**260**	**--**	**--**	**17**	**5,120**
Overall	Boat Launch	2	250	--	--	--	--	1	65	3	315
	Day Use Area	--	--	5	1,130	--	--	--	--	5	1,130
	Dispersed Use Area	--	--	15	4,120	--	--	--	--	15	4,120
	Family Campground	3	1,370	4	705	1	260	--	--	8	2,335
	Group Campground	--	--	1	175	--	--	--	--	1	175
	Total	**5**	**1,620**	**25**	**6,130**	**1**	**260**	**1**	**65**	**32**	**8,075**

At SSRA, 47 site features would be affected, including 15 circulation road segments (i.e., 3,720 ft of dirt roads and 1,140 ft of paved roads), 11 campsite living spaces (i.e., table and/or grill area), 9 picnic sites, 7 campsite vehicle spurs, 1 boat ramp turnaround area, 1 parking area, 1 swim beach, 1 water hydrant, and 1 stage (Table 3.3.6-18 and 3.3.6-19). The majority of the affected recreational site features at SSRA would be at the family campground (i.e., 22 affected features) followed by the day use area (i.e., 14 affected features), dispersed use areas (i.e., 9 im affected pacted features – all dirt road segments), the swim beach (i.e., 2 affected features), and the boat launch (i.e., 1 affected feature). At the family campground, most of the affected features would be campsite living spaces (i.e., 11 sites), vehicle spurs (i.e., 7 sites) and road segments (i.e., 3 segments). At the dispersed use areas, all of the affected features would be the dirt roads (i.e., 2,710 ft) that provide shoreline access. The entire swim beach would be inundated. Overall, most of the affected features at SSRA (i.e., 55%) would be directly affected by the Pool Raise and the remaining affected features would be indirectly affected (i.e., features abutting the 305 ft NMWSE). Notably, at five campsites in the family campground, the campsite living space and vehicle spurs would be indirectly affected and require relocation because an inundated segment of the campground circulation road would likely be re-aligned through these campsites. SSWD would obtain all necessary permits and approvals including FERC approval for relocating the affected recreation facilities (i.e., survey work, facility design, and on-site resource evaluations); and would adhere to all permit terms and conditions, which would mitigate effects to water quality, cultural resources, and aquatic resources.

3.3.6.2.2 Effects of Proposed Project Operations and Maintenance

SSWD's relicensing studies determined that the existing Project recreational facilities are adequate to meet recreational demand associated with the Project now and in the reasonably foreseeable future. While a few of the camping facilities (e.g., RV campgrounds and group campgrounds) at Camp Far West Reservoir are approaching capacity on non-holiday weekend days (i.e., between 70 and 92 percent in 2017), both Project RAs provide extensive dispered use areas that allow for group and RV camping outside of the developed facilities, including along the shoreline of the RA. These dispersed use areas are capable of providing for additional camping uses over the term of the new license.

While the Project RAs are able to meet the current and future recreational demand, some of the recreation facilities are in need of replacement or rehabilitation to maintain the proper functioning condition of the facility and to provide for ADA compliance on private lands. Nearly all of the facilities will require replacement or rehabilitation during the term of the new license to maintain the facilities in proper functioning condition; and, particularly the restrooms, potable water system and the circulation roads, which will need near-term rehabilitation in order to provide facilities in a safe and proper functioning condition. When constructing or rehabilitating Project recreation facilities, SSWD will obtain all necessary permits and approval for survey work, facility design and on-site resource evaluations.

To address these issues, SSWD's proposed Project includes a Recreation Facilities Plan. The primary goal of the plan is to manage public recreation use of the Project's recreation facilities over the term of the new license, and minimize recreation use impacts to sensitive resources within the Project Area.

Provided below is an assessment of the effects related to recreation resources and how SSWD proposes to address them over the new license term.

Developed Facilities

Campgrounds

Overall, the family and group campground facilities at both the NSRA and SSRA are in fair to poor condition. The RV Campground at NSRA is in good condition with newer amenities. During the new license term, as the campground facilities require replacement-in-kind, SSWD will upgrade the camping facilities to provide safe, reliable, and accessible opportunities commensurate with accessibility standards at that time. Since 30 family campsites will be affected due to the pool raise, SSWD is proposing to replace the lost family campsites in-kind within the existing RAs. SSWD proposes in the *Recreation Facilities Plan* to rehabilitate these facilities as they near the end of their useful life.

In 2017, the combined peak season occupancy at the NSRA and SSRA developed family campgrounds was 48 percent overall and 51 percent on weekends; and is projected to reach 78 percent overall and 82 percent on weekends by 2060. Based on these projections, the family campground facilities are adequate to meet the long-term demand over the term of the new license. The group campgrounds (3 campsites total) had a combined peak season occupancy of 75 percent overall and 92 percent on weekends; and are projected to reach full capacity overall by 2040 and on weekends by 2020. Similarly, the RV Campground (only at NSRA) had a combined peak season occupancy of 57 percent overall and 70 percent on weekends; and is projected to reach 91 percent overall by 2060 and full capacity on weekends by 2040. The Horse Camp (1 site; only at NSRA) had a combined peak season occupancy of 67 percent overall and on weekends; and is projected to reach full capacity overall and on weekends by 2040. Overall, while the developed group, RV and horse camp facilities will approach capacity over the term of the new license, the expansive dispersed use areas at both NSRA and SSRA (i.e., 92 ac and nearly 4 mi of shoreline) provide ample space for these camping uses in the near and long-term.

Day Use Facilities

Overall, the day-use facilities at New Bullards Bar had mostly very low picnic site utilization in 2017. The combined peak season picnic site occupancy was at or below 7 percent overall and on weekend; and is projected to reach 10 percent overall and 11 percent on weekends by 2060. As a result, the current picnic facilities are expected to still be adequate and to meet the increased demand throughout the term of the new license by 2060 overall and on weekends.

The other recreational demand aspect of the day-use facilities is the parking areas. The lone day-use facility parking area is located at the SSRA (44 spaces). The peak season occupancy of the parking area was 21 percent overall and 23 percent on weekends in 2017; and is projected to reach 35 percent overall and 38 percent on weekends by 2060. Based on these projections, the current day-use facility parking area is expected to still be adequate and to meet the increased demand throughout the term of the new license by 2060 overall and on weekends.

Overall, the condition of most of the day-use facilities (i.e., picnic sites and parking areas) were in fair condition, but will eventually require rehabilitation during the term of the license to ensure the facilities provide quality and accessible recreation opportunities throughout the license term. The restroom building at the NSRA day-use facility is in poor condition and will require near-term replacement to meet the near-term and long-term demands of the facility. SSWD proposes in the *Recreation Facilities Plan* to rehabilitate these facilities as they near the end of their useful life.

Boat Launch Facilities

Camp Far West Reservoir has two developed boat launch facilities – one each at NSRA and SSRA. The NSRA boat launch facility was reconstructed in 2005 using the California State Parks DBOW boat launching facilities grant funding; and provides up-to-date 3-lane concrete boat ramp with floating courtesy dock, a paved boat trailer turnaround area, boat launch preparation area, paved parking areas with 155 spaces, a flush restroom building and an accessible picnic site. The SSRA boat launch is less developed with a 2-lane concrete ramp to start and then a 1-lane asphalt boat ramp, dirt parking areas with 52 spaces, a paved boat trailer turnaround, and flush restroom building – all of these features are original construction and showing signs of aging. However, the SSRA is typically only open during the peak season on weekends and holidays and does not receive the same level of use consistently throughout the peak season or year-round that the NSRA boat launch facility experiences.

In 2017, the combined peak season occupancy at the NSRA and SSRA developed boat launch facilities was 25 percent overall and 30 percent on weekends; and is projected to reach 41 percent overall and 49 percent on weekends by 2060. Based on these projections, the boat launch facilities have adequate parking capacity to meet the long-term demand over the term of the new license.

The NSRA boat ramp is open year-round and has a functional range of 60.7 vertical ft (down to 239.3 ft). In addition, an undeveloped ramp abuts the developed ramp to provide low-water launching. The undeveloped ramp has a functional range of 109.0 vertical ft (down to 188.0 ft). The SSRA boat ramp is typically only open during the peak season and has a functional range of 67.0 vertical ft (down to 233.0 ft). The SSRA does not have an undeveloped ramp. In 2017, the all three boat ramps were functional the entire year as the reservoir WSE never dropped below 248 ft.

If and when SSWD proposes water year types for the Project, then SSWD will complete the evaluation of the boat ramps functionality by comparing the end of the ramp to the median WSE for each water year type.

Overall, the condition of the NSRA boat launch facility is good to excellent as it was constructed in 2005 to DBOW standards. However, the SSRA boat launch facility is original construction and is showing signs of aging. The boat ramp surface is a combination of concrete and asphalt surfacing that shows signs of disrepair. However, the SSRA boat ramp receives significantly less use than the NSRA boat ramp since the SSRA is only open during peak use periods (i.e., weekends and holidays) during the peak season. The SSRA boat launch facility, particularly the boat ramp will require rehabilitation during the new license term to ensure they provide a quality recreation opportunity. The NSRA boat launch facility may require rehabilitation late in the new license period considering the facility was recently reconstructed.

Camp Far West Reservoir provides a significant amount of available water surface area for boating with a maximum surface areas of 1,886 ac at NMWSE and observed boating patterns spread the boating use between the main boad of the reservoir near the dam and the Bear River and Rock Creek arms. The visitors surveyed did not indicate any reservoir boating capacity issues as 78 percent responded that they were able to safely boat or did not perceive a problem. In addition, 81 percent of visitors surveyed responded that the reservoir water surface was not at all crowded or slightly crowded.

Dispersed Use Areas

The dispersed use areas at both the NSRA and SSRA provide expansive areas (i.e., 92 ac and nearly 4 mi of shoreline) for visitors to participate in recreation activities in an undeveloped setting with easy access to the shoreline and camping areas. These areas provide basic facilities (i.e., portable chemical restrooms, trash cans and dirt access roads), yet the open, dispersed shoreline setting was one of the main reasons some visitors found Camp Far West Reservoir unique. Overall, the dispersed use areas allow visitors to participate in virtually all the same activities as the developed areas of the recreation areas, but with the freedom to find areas that are best suited to their preferred uses. Camping (tent and RV/camper) is prevalent in these areas along with a wide variety of day-use activities such as swimming, general water play, jet skiing, hiking, wildlife viewing, picnicking, equestrian riding and camping, and boating. Visitors have the ability to bring small watercraft, typically jet skis into the dispersed areas and launch directly from the shoreline. All of these uses appears to minimize any crowding or conflict at the developed areas (i.e., family and group campgrounds, boat launch parking areas, and day-use areas) by providing expansive and varied dispersed recreation options for visitors with access to the reservoir shoreline.

Recreational Water System

Over the past three years, the recreational water system at Camp Far West Reservoir has not provided potable water due to issues with the aging water treatment facility. In response to these issues, SSWD is in the process of finishing the installation of a new water treatment facility. SSWD anticipates that the system will be providing potable water in 2019. In addition, in 2011, SSWD installed a new, steel-belted 60,000-gallon water storage tank adjacent to the new water treatment facility. SSWD expects that the updated water treatment system will provide reliable potable water to the NSRA and SSRA throughout the term of the new license with routine maintenance. The water distribution system is largely the original construction distribution system, which has undergone select areas of replacement, but the majority of the underground distribution will likely need to be replaced during the new license term to ensure the distribution of reliable potable water throughout the two recreation areas. In addition, the above-ground water hydrants and fountains will require near-term replacement to meet the demands of the new water treatment facility and upgraded water distribution system. SSWD proposes in the *Recreation Facilities Plan* to rehabilitate these facilities as they near the end of their useful life.

3.3.6.3 Unavoidable Adverse Effects

SSWD's proposed Project would not create any major, unavoidable adverse effects. The Project provides extensive recreational facilities including developed campgrounds, day-use areas, boat launches, dispersed use areas, facility access and circulation roads at Camp Far West Reservoir. All of the facilities provide a beneficial effect and minimize any adverse effects by providing the public with opportunities to recreate along the shoreline and on the Project reservoirs in varying natural settings and recreation settings from highly developed experiences to more primitive, undeveloped experiences, and by focusing these activities to appropriate and manageable areas around the reservoir.

Rehabilitation of the existing recreation facilities or replacement of inundated facilities due to the pool raise has short-term, minor adverse impacts (e.g., noise, ground disturbance including vegetation and erosion and water quality); however, SSWD has proposed appropriate resource protection measures and plans to minimize the short-term impacts from construction activities. In addition, the rehabilitation/construction work on recreation facilities would also have a minor short-term effect on recreation by closing some facilities during construction. SSWD will minimize this effect by undertaking construction activities during non-peak periods and periods when the facilities are closed, where possible; and undertaking construction activities in phases by working on portions of the facilities and keeping the remainder of the facility open to the public.

The construction of the Camp Far West Reservoir pool raise from 300 ft to 305 ft would have an effect on some of the shoreline recreational facilities at NSRA and SSRA, but only temporarily. SSWD proposes to replace the affected/inundated recreation facilities (mostly family campsites) with new, in-kind camping facilities. As with the rehabilitation of the existing recreation facilities, there will be short-term, minor adverse impacts (e.g., noise, ground disturbance including vegetation and erosion and water quality). However, SSWD has proposed appropriate resource protection measures and plans to minimize the short-term impacts from these construction activities.

3.3.6.4 List of Attachments

Attachment 3.3.6A Recreation Use and Visitor Survey Results

Attachment 3.3.6B Pool Raise Recreation Impact Figures

Attachment 3.3.6A

Recreation Visitor Questionaire Results by Question

Question 1: Please select the recreation site you are currently visiting?

Recreation Area	Recreation Facility	Day-use Visitors			Overnight Visitors			All Visitors		
		Peak Season	Off Peak Season	Overall	Peak Season	Off Peak Season	Overall	Peak Season	Off Peak Season	Overall
NSRA	Family Campground	2	6	8	29	30	59	31	36	67
	RV Campground	1	0	1	10	8	18	11	8	19
	Group Campground	0	3	3	14	6	20	14	9	23
	Horse Camp	0	3	3	2	1	3	2	4	6
	Day Use Area	10	12	22	9	0	9	19	12	31
	Boat Launch	16	51	67	10	3	13	26	54	80
	Boss Point Dispersed Use Area	3	12	15	30	5	35	33	17	50
	Jet Ski Cove Dispersed Use Area	6	5	11	17	5	22	23	10	33
	Total	38	92	130	121	58	179	159	150	309
SSRA	Family Campground	0	closed	0	8	closed	8	8	closed	8
	Group Campground	0	closed	0	3	closed	3	3	closed	3
	Day Use Area	3	closed	3	4	closed	4	7	closed	7
	Swim Beach	2	closed	2	3	closed	3	5	closed	5
	Boat Launch	1	closed	1	1	closed	1	2	closed	2
	Quarter-Mile Cove Dispersed Use Area	3	closed	3	2	closed	2	5	closed	5
	Entrance Gate Dispersed Use Area	1	closed	1	9	closed	9	10	closed	10
	Total	10	closed	10	30	closed	30	40	closed	40
Overall	Family Campground	2	6	8	37	30	67	39	36	75
	RV Campground	1	0	1	10	8	18	11	8	19
	Group Campground	0	3	3	17	6	23	17	9	26
	Horse Camp	0	3	3	2	1	3	2	4	6
	Day Use Area	13	12	25	13	0	13	26	12	38
	Swim Beach	2	closed	2	3	closed	3	5	closed	5
	Boat Launch	17	51	68	11	3	14	28	54	82
	Dispersed Use Areas	13	17	30	58	10	68	71	27	98
	Total	48	92	140	151	58	209	199	150	349

Question 2: Where are you staying or camping today?

Type of Visit	Recreation Area	Statistic	Day-use Visitors			Overnight Visitors			All Visitors		
			Peak Season	Off Peak Season	Overall	Peak Season	Off Peak Season	Overall	Peak Season	Off Peak Season	Overall
Day visit only	NSRA	Number	38	92	130	n/a	n/a	n/a	38	92	130
		Percent	79.2	100.0	92.9	n/a	n/a	n/a	19.1	61.3	37.2
	SSRA	Number	10	n/a	10	n/a	n/a	n/a	10	n/a	10
		Percent	20.8	n/a	7.1	n/a	n/a	n/a	5.0	n/a	2.9
	Overall	Number	48	92	140	n/a	n/a	n/a	48	92	140
		Percent	100.0	100.0	100.0	n/a	n/a	n/a	24.1	61.3	40.1
Project Campground	NSRA	Number	n/a	n/a	n/a	49	41	90	49	41	90
		Percent	n/a	n/a	n/a	32.5	70.7	43.1	24.6	27.3	25.8
	SSRA	Number	n/a	n/a	n/a	12	n/a	12	12	n/a	12
		Percent	n/a	n/a	n/a	7.9	n/a	5.7	6.0	n/a	3.4
	Overall	Number	n/a	n/a	n/a	61	41	102	61	41	102
		Percent	n/a	n/a	n/a	40.4	70.7	48.8	30.7	27.3	29.2
Camping in Dispersed Use Area	NSRA	Number	n/a	n/a	n/a	72	17	89	72	17	89
		Percent	n/a	n/a	n/a	47.7	29.3	42.6	36.2	11.3	25.5
	SSRA	Number	n/a	n/a	n/a	18	n/a	18	18	n/a	18
		Percent	n/a	n/a	n/a	11.9	n/a	8.6	9.0	n/a	5.2
	Overall	Number	n/a	n/a	n/a	90	17	107	90	17	107
		Percent	n/a	n/a	n/a	59.6	29.3	51.2	45.2	11.3	30.7
Overall	NSRA	Number	38	92	130	121	58	179	159	150	309
		Percent	79.2	100.0	92.9	80.1	100.0	85.6	79.9	100.0	88.5
	SSRA	Number	10	n/a	10	30	n/a	30	40	n/a	40
		Percent	20.8	n/a	7.1	19.9	n/a	14.4	20.1	n/a	11.5
	Overall	Number	48	92	140	151	58	209	199	150	349
		Percent	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Question 3,4, 5 and 7: Visitors' trip and group characteristics.

Characteristic	Recreation Area	Average Visitor Responses					
		Day-use Visitors			Overnight Visitors		
		Peak Season	Off-peak Season	Overall	Peak Season	Off-peak Season	Overall
Question 3: Length of Stay (hours:minutes for day-use; days for overnight)	NSRA	6:30	6:15	6:20	2.7 days	1.7	2.4
	SSRA	7:30	closed	7:30	2.6	closed	2.6
	Total	6:42	6:15	6:25	2.7	1.7	2.4
Question 4: What year did you first visit Camp Far West Reservoir?	NSRA	2000	2000	2000	2005	2004	2004
	SSRA	1993	closed	1993	2006	closed	2006
	Total	1999	2000	2000	2005	2004	2005
Question 5: How many times have you visited since your first visit?	NSRA	143.7	101.3	113.6	76.7	62.4	72.0
	SSRA	192.2	closed	192.2	31.7	closed	31.7
	Total	154.0	101.3	119.3	67.7	62.4	66.2
Question 7a: Number of people in group	NSRA	7.5	4.1	5.1	9.9	6.7	8.9
	SSRA	4.2	closed	4.2	10.2	closed	10.2
	Total	6.8	4.1	5.0	10.0	6.7	9.1
Question 7b: Number of vehicles used to travel to the area	NSRA	3.8	1.4	2.1	2.9	1.9	2.6
	SSRA	1.3	closed	1.3	2.6	closed	2.6
	Total	3.3	1.4	2.0	2.8	1.9	2.6
Question 7c: Number of campers in group	NSRA	0.1	0.0	0.1	1.0	0.7	0.9
	SSRA	0.0	closed	0.0	0.4	closed	0.4
	Total	0.1	0.0	0.1	0.9	0.7	0.8
Question 7d: Number of powerboats <15 hp in group	NSRA	0.1	0.2	0.1	0.1	0.1	0.1
	SSRA	0.0	closed	0.0	0.3	closed	0.3
	Total	0.1	0.2	0.1	0.1	0.1	0.1
Question 7e: Number of powerboats >= 15 hp in group	NSRA	0.7	0.6	0.6	0.3	0.3	0.3
	SSRA	0.3	closed	0.3	0.3	closed	0.3
	Total	0.6	0.6	0.6	0.3	0.3	0.3
Question 7f: Number of PWCs in group	NSRA	0.8	0.3	0.5	1.6	0.6	1.2
	SSRA	0.1	closed	0.1	0.3	closed	0.3
	Total	0.7	0.3	0.5	1.3	0.6	1.1
Question 7g: Number of canoes/kayaks/other non-motorized watercraft in group	NSRA	0.3	0.1	0.2	0.3	0.3	0.3
	SSRA	0.2	closed	0.2	0.3	closed	0.3
	Total	0.3	0.1	0.2	0.3	0.3	0.3
Question 7h: Number of fishing tubes in group	NSRA	0.0	0.0	0.0	0.1	0.1	0.1
	SSRA	0.1	closed	0.1	0.4	closed	0.4
	Total	0.0	0.0	0.0	0.2	0.1	0.1
Question 7i: Number of other	NSRA	0.0	0.0	0.0	0.0	0.1	0.1
	SSRA	0.1	closed	0.1	0.0	closed	0.0
	Total	0.0	0.0	0.0	0.0	0.1	0.0

Question 6: Which of the following best describes your recreation group at this area.

Recreation Area	Recreation Group	Statistic	Day-use Visitor			Overnight Visitor			Total		
			Peak Season	Off Peak Season	Overall	Peak Season	Off Peak Season	Overall	Peak Season	Off Peak Season	Overall
NSRA	Alone	Number	3	13	16	0	3	3	3	16	19
		Percent	7.9	14.6	12.6	0.0	5.2	1.7	1.9	10.9	6.2
	Family	Number	13	30	43	42	15	57	55	45	100
		Percent	34.2	33.7	33.9	35.0	25.9	32.0	34.8	30.6	32.8
	Multiple Families	Number	1	5	6	12	5	17	13	10	23
		Percent	2.6	5.6	4.7	10.0	8.6	9.6	8.2	6.8	7.5
	Friends	Number	4	22	26	9	7	16	13	29	42
		Percent	10.5	24.7	20.5	7.5	12.1	9.0	8.2	19.7	13.8
	Family & Friends	Number	16	12	28	55	26	81	71	38	109
		Percent	42.1	13.5	22.0	45.8	44.8	45.5	44.9	25.9	35.7
	Organized Outing Group	Number	1	7	8	2	2	4	3	9	12
		Percent	2.6	7.9	6.3	1.7	3.4	2.2	1.9	6.1	3.9
	Other	Number	0	0	0	0	0	0	0	0	0
		Percent	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Total	Number	38	89	127	120	58	178	158	147	305
		Percent	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
SSRA	Alone	Number	0	closed	0	0	closed	0	0	closed	0
		Percent	0.0	closed	0.0	0.0	closed	0.0	0.0	closed	0.0
	Family	Number	5	closed	5	7	closed	7	12	closed	12
		Percent	50.0	closed	50.0	23.3	closed	23.3	30.0	closed	30.0
	Multiple Families	Number	0	closed	0	4	closed	4	4	closed	4
		Percent	0.0	closed	0.0	13.3	closed	13.3	10.0	closed	10.0
	Friends	Number	1	closed	1	3	closed	3	4	closed	4
		Percent	10.0	closed	10.0	10.0	closed	10.0	10.0	closed	10.0
	Family & Friends	Number	4	closed	4	15	closed	15	19	closed	19
		Percent	40.0	closed	40.0	50.0	closed	50.0	47.5	closed	47.5
	Organized Outing Group	Number	0	closed	0	0	closed	0	0	closed	0
		Percent	0.0	closed	0.0	0.0	closed	0.0	0.0	closed	0.0
	Other	Number	0	closed	0	1	closed	1	1	closed	1
		Percent	0.0	closed	0.0	3.3	closed	3.3	2.5	closed	2.5
	Total	Number	10	closed	10	30	closed	30	40	closed	40
		Percent	100.0	closed	100.0	100.0	closed	100.0	100.0	closed	100.0
Overall	Alone	Number	3	13	16	0	3	3	3	16	19
		Percent	6.3	14.6	11.7	0.0	5.2	1.4	1.5	10.9	5.5
	Family	Number	18	30	48	49	15	64	67	45	112
		Percent	37.5	33.7	35.0	32.7	25.9	30.8	33.8	30.6	32.5
	Multiple Families	Number	1	5	6	16	5	21	17	10	27
		Percent	2.1	5.6	4.4	10.7	8.6	10.1	8.6	6.8	7.8
	Friends	Number	5	22	27	12	7	19	17	29	46
		Percent	10.4	24.7	19.7	8.0	12.1	9.1	8.6	19.7	13.3
	Family & Friends	Number	20	12	32	70	26	96	90	38	128
		Percent	41.7	13.5	23.4	46.7	44.8	46.2	45.5	25.9	37.1
	Organized Outing Group	Number	1	7	8	2	2	4	3	9	12
		Percent	2.1	7.9	5.8	1.3	3.4	1.9	1.5	6.1	3.5
	Other	Number	0	0	0	1	0	1	1	0	1
		Percent	0.0	0.0	0.0	0.7	0.0	0.5	0.5	0.0	0.3
	------	Number	48	89	137	150	58	208	198	147	345
		Percent	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Question 8: Which activities did you participate in during your current visit?

Activity Particip-ation	Recreat-ion Area	Statistic	Day-use Visitors Peak Season	Day-use Visitors Off Peak Season	Day-use Visitors Overall	Overnight Visitors Peak Season	Overnight Visitors Off Peak Season	Overnight Visitors Overall	Overall Peak Season	Overall Off Peak Season	Overall Overall
Camping	NSRA	Number	3	6	9	118	55	173	121	61	182
		Percent	7.9	6.5	6.9	97.5	94.8	96.6	76.1	40.7	58.9
	SSRA	Number	0	closed	0	30	closed	30	30	closed	30
		Percent	0.0	closed	0.0	100.0	closed	100.0	75.0	closed	75.0
	Overall	Number	3	6	9	148	55	203	151	61	212
		Percent	6.3	6.5	6.4	98.0	94.8	97.1	75.9	40.7	60.7
Fishing	NSRA	Number	9	65	74	44	33	77	53	98	151
		Percent	23.7	70.7	56.9	36.4	56.9	43.0	33.3	65.3	48.9
	SSRA	Number	1	closed	1	15	closed	15	16	closed	16
		Percent	10.0	closed	10.0	50.0	closed	50.0	40.0	closed	40.0
	Overall	Number	10	65	75	59	33	92	69	98	167
		Percent	20.8	70.7	53.6	39.1	56.9	44.0	34.7	65.3	47.9
Picnicking	NSRA	Number	13	23	36	70	30	100	83	53	136
		Percent	34.2	25.0	27.7	57.9	51.7	55.9	52.2	35.3	44.0
	SSRA	Number	7	closed	7	18	closed	18	25	closed	25
		Percent	70.0	closed	70.0	60.0	closed	60.0	62.5	closed	62.5
	Overall	Number	20	23	43	88	30	118	108	53	161
		Percent	41.7	25.0	30.7	58.3	51.7	56.5	54.3	35.3	46.1
Motorized Boating	NSRA	Number	16	27	43	55	17	72	71	44	115
		Percent	42.1	29.3	33.1	45.5	29.3	40.2	44.7	29.3	37.2
	SSRA	Number	4	closed	4	16	closed	16	20	closed	20
		Percent	40.0	closed	40.0	53.3	closed	53.3	50.0	closed	50.0
	Overall	Number	20	27	47	71	17	88	91	44	135
		Percent	41.7	29.3	33.6	47.0	29.3	42.1	45.7	29.3	38.7
Non-motorized Boating	NSRA	Number	7	5	12	17	11	28	24	16	40
		Percent	18.4	5.4	9.2	14.0	19.0	15.6	15.1	10.7	12.9
	SSRA	Number	2	closed	2	6	closed	6	8	closed	8
		Percent	20.0	closed	20.0	20.0	closed	20.0	20.0	closed	20.0
	Overall	Number	9	5	14	23	11	34	32	16	48
		Percent	18.8	5.4	10.0	15.2	19.0	16.3	16.1	10.7	13.8
Water Skiing/ Wakeboard-ing	NSRA	Number	9	12	21	42	7	49	51	19	70
		Percent	23.7	13.0	16.2	34.7	12.1	27.4	32.1	12.7	22.7
	SSRA	Number	0	closed	0	11	closed	11	11	closed	11
		Percent	0.0	closed	0.0	36.7	closed	36.7	27.5	closed	27.5
	Overall	Number	9	12	21	53	7	60	62	19	81
		Percent	18.8	13.0	15.0	35.1	12.1	28.7	31.2	12.7	23.2
Swimming	NSRA	Number	24	20	44	110	29	139	134	49	183
		Percent	63.2	21.7	33.8	90.9	50.0	77.7	84.3	32.7	59.2
	SSRA	Number	7	closed	7	29	closed	29	36	closed	36
		Percent	70.0	closed	70.0	96.7	closed	96.7	90.0	closed	90.0
	Overall	Number	31	20	51	139	29	168	170	49	219
		Percent	64.6	21.7	36.4	92.1	50.0	80.4	85.4	32.7	62.8
Hiking/ Walking	NSRA	Number	3	5	8	35	22	57	38	27	65
		Percent	7.9	5.4	6.2	28.9	37.9	31.8	23.9	18.0	21.0
	SSRA	Number	1	closed	1	11	closed	11	12	closed	12
		Percent	10.0	closed	10.0	36.7	closed	36.7	30.0	closed	30.0
	Overall	Number	4	5	9	46	22	68	50	27	77
		Percent	8.3	5.4	6.4	30.5	37.9	32.5	25.1	18.0	22.1

Question 8 (continued): Which activities did you participate in during your current visit?

Activity Particip-ation	Recreat-ion Area	Statistic	Day-use Visitors			Overnight Visitors			Overall		
			Peak Season	Off Peak Season	Overall	Peak Season	Off Peak Season	Overall	Peak Season	Off Peak Season	Overall
Mountain Biking	NSRA	Number	0	0	0	2	0	2	2	0	2
		Percent	0.0	0.0	0.0	1.7	0.0	1.1	1.3	0.0	0.6
	SSRA	Number	0	closed	0	4	closed	4	4	closed	4
		Percent	0.0	closed	0.0	13.3	closed	13.3	10.0	closed	10.0
	Overall	Number	0	0	0	6	0	6	6	0	6
		Percent	0.0	0.0	0.0	4.0	0.0	2.9	3.0	0.0	1.7
Horseback Riding	NSRA	Number	0	1	1	5	2	7	5	3	8
		Percent	0.0	1.1	0.8	4.1	3.4	3.9	3.1	2.0	2.6
	SSRA	Number	0	closed	0	0	closed	0	0	closed	0
		Percent	0.0	closed	0.0	0.0	closed	0.0	0.0	closed	0.0
	Overall	Number	0	1	1	5	2	7	5	3	8
		Percent	0.0	1.1	0.7	3.3	3.4	3.3	2.5	2.0	2.3
Wildlife Viewing	NSRA	Number	5	14	19	19	13	32	24	27	51
		Percent	13.2	15.2	14.6	15.7	22.4	17.9	15.1	18.0	16.5
	SSRA	Number	2	closed	2	7	closed	7	9	closed	9
		Percent	20.0	closed	20.0	23.3	closed	23.3	22.5	closed	22.5
	Overall	Number	7	14	21	26	13	39	33	27	60
		Percent	14.6	15.2	15.0	17.2	22.4	18.7	16.6	18.0	17.2
Jet Skiing	NSRA	Number	11	6	17	24	3	27	35	9	44
		Percent	28.9	6.5	13.1	19.8	5.2	15.1	22.0	6.0	14.2
	SSRA	Number	0	closed	0	1	closed	1	1	closed	1
		Percent	0.0	closed	0.0	3.3	closed	3.3	2.5	closed	2.5
	Overall	Number	11	6	17	25	3	28	36	9	45
		Percent	22.9	6.5	12.1	16.6	5.2	13.4	18.1	6.0	12.9
Other Activity	NSRA	Number	2	2	4	2	5	7	4	7	11
		Percent	5.3	2.2	3.1	1.7	8.6	3.9	2.5	4.7	3.6
	SSRA	Number	2	closed	2	2	closed	2	4	closed	4
		Percent	20.0	closed	20.0	6.7	closed	6.7	10.0	closed	10.0
	Overall	Number	4	2	6	4	5	9	8	7	15
		Percent	8.3	2.2	4.3	2.6	8.6	4.3	4.0	4.7	4.3

Question 9: What is your primary recreation activity for your visit?

Primary Activity	Recreat-ion Area	Statistic	Day-use Visitors			Overnight Visitors			Overall		
			Peak Season	Off Peak Season	Overall	Peak Season	Off Peak Season	Overall	Peak Season	Off Peak Season	Overall
Camping	NSRA	Number	0	1	1	78	34	112	78	35	113
		Percent	0.0	1.1	0.8	64.5	58.6	62.6	49.1	23.3	36.6
	SSRA	Number	0	closed	0	18	closed	18	18	closed	18
		Percent	0.0	closed	0.0	60.0	closed	60.0	45.0	closed	45.0
	Overall	Number	0	1	1	96	34	130	96	35	131
		Percent	0.0	1.1	0.7	63.6	58.6	62.2	48.2	23.3	37.5
Fishing	NSRA	Number	6	58	64	2	6	8	8	64	72
		Percent	15.8	63.0	49.2	1.7	10.3	4.5	5.0	42.7	23.3
	SSRA	Number	0	closed	0	3	closed	3	3	closed	3
		Percent	0.0	closed	0.0	10.0	closed	10.0	7.5	closed	7.5
	Overall	Number	6	58	64	5	6	11	11	64	75
		Percent	12.5	63.0	45.7	3.3	10.3	5.3	5.5	42.7	21.5
Picnicking	NSRA	Number	2	7	9	0	2	2	2	9	11
		Percent	5.3	7.6	6.9	0.0	3.4	1.1	1.3	6.0	3.6
	SSRA	Number	1	closed	1	0	closed	0	1	closed	1
		Percent	10.0	closed	10.0	0.0	closed	0.0	2.5	closed	2.5
	Overall	Number	3	7	10	0	2	2	3	9	12
		Percent	6.3	7.6	7.1	0.0	3.4	1.0	1.5	6.0	3.4
Motorized Boating	NSRA	Number	6	9	15	7	2	9	13	11	24
		Percent	15.8	9.8	11.5	5.8	3.4	5.0	8.2	7.3	7.8
	SSRA	Number	2	closed	2	7	closed	7	9	closed	9
		Percent	20.0	closed	20.0	23.3	closed	23.3	22.5	closed	22.5
	Overall	Number	8	9	17	14	2	16	22	11	33
		Percent	16.7	9.8	12.1	9.3	3.4	7.7	11.1	7.3	9.5
Non-motorized Boating	NSRA	Number	2	2	4	3	0	3	5	2	7
		Percent	5.3	2.2	3.1	2.5	0.0	1.7	3.1	1.3	2.3
	SSRA	Number	1	closed	1	0	closed	0	1	closed	1
		Percent	10.0	closed	10.0	0.0	closed	0.0	2.5	closed	2.5
	Overall	Number	3	2	5	3	0	3	6	2	8
		Percent	6.3	2.2	3.6	2.0	0.0	1.4	3.0	1.3	2.3
Water Skiing/ Wakeboarding	NSRA	Number	1	0	1	1	0	1	2	0	2
		Percent	2.6	0.0	0.8	0.8	0.0	0.6	1.3	0.0	0.6
	SSRA	Number	0	closed	0	2	closed	2	2	closed	2
		Percent	0.0	closed	0.0	6.7	closed	6.7	5.0	closed	5.0
	Overall	Number	1	0	1	3	0	3	4	0	4
		Percent	2.1	0.0	0.7	2.0	0.0	1.4	2.0	0.0	1.1
Swimming	NSRA	Number	7	2	9	5	2	7	12	4	16
		Percent	18.4	2.2	6.9	4.1	3.4	3.9	7.5	2.7	5.2
	SSRA	Number	5	closed	5	0	closed	0	5	closed	5
		Percent	50.0	closed	50.0	0.0	closed	0.0	12.5	closed	12.5
	Overall	Number	12	2	14	5	2	7	17	4	21
		Percent	25.0	2.2	10.0	3.3	3.4	3.3	8.5	2.7	6.0
Hiking/ Walking	NSRA	Number	0	1	1	0	1	1	0	2	2
		Percent	0.0	1.1	0.8	0.0	1.7	0.6	0.0	1.3	0.6
	SSRA	Number	0	closed	0	0	closed	0	0	closed	0
		Percent	0.0	closed	0.0	0.0	closed	0.0	0.0	closed	0.0
	Overall	Number	0	1	1	0	1	1	0	2	2
		Percent	0.0	1.1	0.7	0.0	1.7	0.5	0.0	1.3	0.6

Question 9 (continued): What is your primary recreation activity for your visit?

Primary Activity	Recreation Area	Statistic	Day-use Visitors			Overnight Visitors			Overall		
			Peak Season	Off Peak Season	Overall	Peak Season	Off Peak Season	Overall	Peak Season	Off Peak Season	Overall
Horseback Riding	NSRA	Number	0	0	0	0	2	2	0	2	2
		Percent	0.0	0.0	0.0	0.0	3.4	1.1	0.0	1.3	0.6
	SSRA	Number	0	closed	0	0	closed	0	0	closed	0
		Percent	0.0	closed	0.0	0.0	closed	0.0	0.0	closed	0.0
	Overall	Number	0	0	0	0	2	2	0	2	2
		Percent	0.0	0.0	0.0	0.0	3.4	1.0	0.0	1.3	0.6
Wildlife Viewing	NSRA	Number	0	0	0	0	1	1	0	1	1
		Percent	0.0	0.0	0.0	0.0	1.7	0.6	0.0	0.7	0.3
	SSRA	Number	0	closed	0	0	closed	0	0	closed	0
		Percent	0.0	closed	0.0	0.0	closed	0.0	0.0	closed	0.0
	Overall	Number	0	0	0	0	1	1	0	1	1
		Percent	0.0	0.0	0.0	0.0	1.7	0.5	0.0	0.7	0.3
Jet Skiing	NSRA	Number	10	8	18	16	3	19	26	11	37
		Percent	26.3	8.7	13.8	13.2	5.2	10.6	16.4	7.3	12.0
	SSRA	Number	0	closed	0	0	closed	0	0	closed	0
		Percent	0.0	closed	0.0	0.0	closed	0.0	0.0	closed	0.0
	Overall	Number	10	8	18	16	3	19	26	11	37
		Percent	20.8	8.7	12.9	10.6	5.2	9.1	13.1	7.3	10.6
Relaxation/ Outdoors	NSRA	Number	0	0	0	2	2	4	2	2	4
		Percent	0.0	0.0	0.0	1.7	3.4	2.2	1.3	1.3	1.3
	SSRA	Number	1	closed	1	0	closed	0	1	closed	1
		Percent	10.0	closed	10.0	0.0	closed	0.0	2.5	closed	2.5
	Overall	Number	1	0	1	2	2	4	3	2	5
		Percent	2.1	0.0	0.7	1.3	3.4	1.9	1.5	1.3	1.4
Drinking	NSRA	Number	1	1	2	0	0	0	1	1	2
		Percent	2.6	1.1	1.5	0.0	0.0	0.0	0.6	0.7	0.6
	SSRA	Number	0	closed	0	0	closed	0	0	closed	0
		Percent	0.0	closed	0.0	0.0	closed	0.0	0.0	closed	0.0
	Overall	Number	1	1	2	0	0	0	1	1	2
		Percent	2.1	1.1	1.4	0.0	0.0	0.0	0.5	0.7	0.6
Fun/Good Time	NSRA	Number	0	0	0	2	0	2	2	0	2
		Percent	0.0	0.0	0.0	1.7	0.0	1.1	1.3	0.0	0.6
	SSRA	Number	0	closed	0	0	closed	0	0	closed	0
		Percent	0.0	closed	0.0	0.0	closed	0.0	0.0	closed	0.0
	Overall	Number	0	0	0	2	0	2	2	0	2
		Percent	0.0	0.0	0.0	1.3	0.0	1.0	1.0	0.0	0.6
Family Time/ Reunion	NSRA	Number	1	0	1	1	0	1	2	0	2
		Percent	2.6	0.0	0.8	0.8	0.0	0.6	1.3	0.0	0.6
	SSRA	Number	0	closed	0	0	closed	0	0	closed	0
		Percent	0.0	closed	0.0	0.0	closed	0.0	0.0	closed	0.0
	Overall	Number	1	0	1	1	0	1	2	0	2
		Percent	2.1	0.0	0.7	0.7	0.0	0.5	1.0	0.0	0.6
Water Play	NSRA	Number	1	0	1	0	0	0	1	0	1
		Percent	2.6	0.0	0.8	0.0	0.0	0.0	0.6	0.0	0.3
	SSRA	Number	0	closed	0	0	closed	0	0	closed	0
		Percent	0.0	closed	0.0	0.0	closed	0.0	0.0	closed	0.0
	Overall	Number	1	0	1	0	0	0	1	0	1
		Percent	2.1	0.0	0.7	0.0	0.0	0.0	0.5	0.0	0.3

Question 9 (continued): What is your primary recreation activity for your visit?

Primary Activity	Recreat-ion Area	Statistic	Day-use Visitors			Overnight Visitors			Overall		
			Peak Season	Off Peak Season	Overall	Peak Season	Off Peak Season	Overall	Peak Season	Off Peak Season	Overall
Concert	NSRA	Number	0	0	0	1	0	1	1	0	1
		Percent	0.0	0.0	0.0	0.8	0.0	0.6	0.6	0.0	0.3
	SSRA	Number	0	closed	0	0	closed	0	0	closed	0
		Percent	0.0	closed	0.0	0.0	closed	0.0	0.0	closed	0.0
	Overall	Number	0	0	0	1	0	1	1	0	1
		Percent	0.0	0.0	0.0	0.7	0.0	0.5	0.5	0.0	0.3
Hunting	NSRA	Number	0	0	0	1	0	1	1	0	1
		Percent	0.0	0.0	0.0	0.8	0.0	0.6	0.6	0.0	0.3
	SSRA	Number	0	closed	0	0	closed	0	0	closed	0
		Percent	0.0	closed	0.0	0.0	closed	0.0	0.0	closed	0.0
	Overall	Number	0	0	0	1	0	1	1	0	1
		Percent	0.0	0.0	0.0	0.7	0.0	0.5	0.5	0.0	0.3
Metal Detecting	NSRA	Number	0	1	1	0	0	0	0	1	1
		Percent	0.0	1.1	0.8	0.0	0.0	0.0	0.0	0.7	0.3
	SSRA	Number	0	closed	0	0	closed	0	0	closed	0
		Percent	0.0	closed	0.0	0.0	closed	0.0	0.0	closed	0.0
	Overall	Number	0	1	1	0	0	0	0	1	1
		Percent	0.0	1.1	0.7	0.0	0.0	0.0	0.0	0.7	0.3
No Response	NSRA	Number	1	2	3	2	3	5	3	5	8
		Percent	2.6	2.2	2.3	1.7	5.2	2.8	1.9	3.3	2.6
	SSRA	Number	0	closed	0	0	closed	0	0	closed	0
		Percent	0.0	closed	0.0	0.0	closed	0.0	0.0	closed	0.0
	Overall	Number	1	2	3	2	3	5	3	5	8
		Percent	2.1	2.2	2.1	1.3	5.2	2.4	1.5	3.3	2.3
Overall	NSRA	Number	38	92	130	121	58	179	159	150	309
		Percent	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
	SSRA	Number	10	closed	10	30	closed	30	40	closed	40
		Percent	100.0	closed	100.0	100.0	closed	100.0	100.0	closed	100.0
	Overall	Number	48	92	140	151	58	209	199	150	349
		Percent	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Question 10: Other areas in Northern California you visit for your primary activity.

Other Similar Area Visited	Number	Other Similar Area Visited	Number	Other Similar Area Visited	Number
Folsom Lake	103	Sly Creek Reservoir	2	Mineral Bar/Iowa Hill	1
Collins Lake	59	Sonora, CA	2	Monterey, CA	1
Lake Oroville	46	Sycamore Ranch	2	Mossdale Lake	1
Rollins Reservoir	37	Thermolito Afterbay	2	North coast of California	1
New Bullards Bar Reservoir	29	Trinity Lake	2	North Fork	1
Lake Berryesa	24	Tulloch Lake	2	Ocean Cove Campground (Jenner, CA)	1
Camanche Reservoir	22	Woodward Reservoir	2	Off-roading in Sierras	1
Englebright Lake	22	Any dispersed camping in Central Valley CA	1	Pardee Reservoir	1
Clear Lake	21	Any national park	1	Penn Valley, CA	1
Lake Tahoe	20	Auburn River	1	Philbrook Lake	1
Delta	18	Auburn State Recreation Area	1	Pinecrest Lake	1
Shasta Lake	14	Bass Lake	1	Pipi Valley	1
Ice House Reservoir	12	Beale Lake	1	Pismo Beach, CA	1
Sacramento River	12	Bear Lake	1	Piut Lake	1
Scotts Flat Reservoir	11	Bear River	1	Pleasanton, CA	1
American River	8	Black Butte Reservoir	1	Pollock Pines, CA	1
Feather River	8	Bowman Lake	1	Pyramid Lake	1
Sly Park Reservoir	8	Branan Island State Recreation Area	1	Redwoods	1
East Park Reservoir	7	Bridgeport State Park	1	Rubicon Lake	1
New Hogan Reservoir	7	Colfax, CA	1	Russian River	1
Sugar Pine Reservoir	6	Cowboy Camp Horse Camp	1	San Joaquin River	1
Lake Amador	5	Cronan Ranch	1	Sandy Beach Park	1
Lake Francis	5	Delta-Discovery Bay	1	Santa Cruz Campground	1
New Melones Lake	5	Delta-Sherman Island	1	Santa Cruz, CA	1
Stonyford Recreation Area	5	Dutch Flats	1	Sardine Lake	1
Don Pedro Lake	4	Eagle Lake	1	Sierra Foothills	1
Donner Lake	4	Freeport	1	Stampede Reservoir	1
French Meadows Reservoir	4	Frenchmen Lake	1	Stony Gorge Reservoir	1
Lake Clementine	4	Fulbright	1	Strawberry	1
Loon Lake	4	Fuller Lake	1	Stumpy Meadows Reservoir	1
Union Valley Reservoir	4	Gerle Creek Reservoir	1	Sun River, OR	1
Yuba River	4	Graeagle, CA	1	Thousand Trails Resort	1
Boca Reservoir	3	Grass Valley, CA	1	Undeveloped camps near Turlock, CA	1
Bodega Bay, CA	3	Grover Sierra Hot Springs	1	Whiskeytown Recreation Area	1
Dillons Beach State Park	3	Hidden Falls Regional Park	1	Wild Plum Campground (Sierra City, CA)	1
Indian Valley Reservoir	3	Hogan Reservoir	1	Wrights Lake	1
Lake Almanor	3	Humbolt, CA	1	Yosemite National Park	1
Lake McClure	3	Jackson Meadows Reservoir	1	Yuba Gap	1
Afterbay	2	Lake Davis	1	**Total**	**677**
Antelope Lake	2	Lake Solano	1		
Bucks Lake	2	Lake Spaulding	1		
Calaveras Big Trees State Park	2	Lassen National Park	1		
Foresthill, CA	2	Lawsons Landing (Dillon Beach, CA)	2		
Fort Bragg, CA	2	Leggett, CA	1		
Gold Lake	2	Lindsey Lake	1		
Hollister, CA	2	Mather Lake	1		
Lake Natoma	2	McSwain Reservoir	1		
Little Grass Valley Reservoir	2	Medicine Lake	1		
Rancho Seco Lake	2	Middle Meadows Group Campground	1		

Question 11a: Are you fishing for a target species or are you a "general angler"?

Type of Angler	Recreation Area	Statistic	Day-use Visitors			Overnight Visitors			Overall		
			Peak Season	Off Peak Season	Overall	Peak Season	Off Peak Season	Overall	Peak Season	Off Peak Season	Overall
General Angler	NSRA	Number	5	20	25	13	27	40	18	47	65
		Percent	13.2	21.7	19.2	10.7	46.6	22.3	11.3	31.3	21.0
	SSRA	Number	0	closed	0	9	closed	9	9	closed	9
		Percent	0.0	closed	0.0	30.0	closed	30.0	22.5	closed	22.5
	Overall	Number	5	20	25	22	27	49	27	47	74
		Percent	10.4	21.7	17.9	14.6	46.6	23.4	13.6	31.3	21.2
Target Species Angler	NSRA	Number	4	41	45	7	2	9	11	43	54
		Percent	10.5	44.6	34.6	5.8	3.4	5.0	6.9	28.7	17.5
	SSRA	Number	0	closed	0	2	closed	2	2	closed	2
		Percent	0.0	closed	0.0	6.7	closed	6.7	5.0	closed	5.0
	Overall	Number	4	41	45	9	2	11	13	43	56
		Percent	8.3	44.6	32.1	6.0	3.4	5.3	6.5	28.7	16.0
Did not fish	NSRA	Number	29	31	60	101	29	130	130	60	190
		Percent	76.3	33.7	46.2	83.5	50.0	72.6	81.8	40.0	61.5
	SSRA	Number	10	closed	10	19	closed	19	29	closed	29
		Percent	100.0	closed	100.0	63.3	closed	63.3	72.5	closed	72.5
	Overall	Number	39	31	70	120	29	149	159	60	219
		Percent	81.3	33.7	50.0	79.5	50.0	71.3	79.9	40.0	62.8
Overall	NSRA	Number	38	92	130	121	58	179	159	150	309
		Percent	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
	SSRA	Number	10	closed	10	30	closed	30	40	closed	40
		Percent	100.0	closed	100.0	100.0	closed	100.0	100.0	closed	100.0
	Overall	Number	48	92	140	151	58	209	199	150	349
		Percent	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Question 11b: Target Species.

Target Species	Recreat-ion Area	Statistic	Day-use Visitors			Overnight Visitors			Overall		
			Peak Season	Off Peak Season	Overall	Peak Season	Off Peak Season	Overall	Peak Season	Off Peak Season	Overall
Bass	NSRA	Number	3	26	29	3	2	5	6	28	34
		Percent	75.0	63.4	64.4	42.9	100.0	55.6	54.5	65.1	63.0
	SSRA	Number	0	closed	0	1	closed	1	1	closed	1
		Percent	0.0	closed	0.0	50.0	closed	50.0	50.0	closed	50.0
	Overall	Number	3	26	29	4	2	6	7	28	35
		Percent	75.0	63.4	64.4	44.4	100.0	54.5	53.8	65.1	62.5
Black Bass	NSRA	Number	0	8	8	0	0	0	0	8	8
		Percent	0.0	19.5	17.8	0.0	0.0	0.0	0.0	18.6	14.8
	SSRA	Number	0	closed	0	0	closed	0	0	closed	0
		Percent	0.0	closed	0.0	0.0	closed	0.0	0.0	closed	0.0
	Overall	Number	0	8	8	0	0	0	0	8	8
		Percent	0.0	19.5	17.8	0.0	0.0	0.0	0.0	18.6	14.3
Large-mouth Bass	NSRA	Number	0	1	1	0	0	0	0	1	1
		Percent	0.0	2.4	2.2	0.0	0.0	0.0	0.0	2.3	1.9
	SSRA	Number	0	closed	0	0	closed	0	0	closed	0
		Percent	0.0	closed	0.0	0.0	closed	0.0	0.0	closed	0.0
	Overall	Number	0	1	1	0	0	0	0	1	1
		Percent	0.0	2.4	2.2	0.0	0.0	0.0	0.0	2.3	1.8
Carp	NSRA	Number	0	1	1	0	0	0	0	1	1
		Percent	0.0	2.4	2.2	0.0	0.0	0.0	0.0	2.3	1.9
	SSRA	Number	0	closed	0	0	closed	0	0	closed	0
		Percent	0.0	closed	0.0	0.0	closed	0.0	0.0	closed	0.0
	Overall	Number	0	1	1	0	0	0	0	1	1
		Percent	0.0	2.4	2.2	0.0	0.0	0.0	0.0	2.3	1.8
Crappie	NSRA	Number	0	1	1	0	0	0	0	1	1
		Percent	0.0	2.4	2.2	0.0	0.0	0.0	0.0	2.3	1.9
	SSRA	Number	0	closed	0	0	closed	0	0	closed	0
		Percent	0.0	closed	0.0	0.0	closed	0.0	0.0	closed	0.0
	Overall	Number	0	1	1	0	0	0	0	1	1
		Percent	0.0	2.4	2.2	0.0	0.0	0.0	0.0	2.3	1.8
Catfish	NSRA	Number	0	0	0	3	0	3	3	0	3
		Percent	0.0	0.0	0.0	42.9	0.0	33.3	27.3	0.0	5.6
	SSRA	Number	0	closed	0	1	closed	1	1	closed	1
		Percent	0.0	closed	0.0	50.0	closed	50.0	50.0	closed	50.0
	Overall	Number	0	0	0	4	0	4	4	0	4
		Percent	0.0	0.0	0.0	44.4	0.0	36.4	30.8	0.0	7.1
Spotted Bass	NSRA	Number	0	4	4	0	0	0	0	4	4
		Percent	0.0	9.8	8.9	0.0	0.0	0.0	0.0	9.3	7.4
	SSRA	Number	0	closed	0	0	closed	0	0	closed	0
		Percent	0.0	closed	0.0	0.0	closed	0.0	0.0	closed	0.0
	Overall	Number	0	4	4	0	0	0	0	4	4
		Percent	0.0	9.8	8.9	0.0	0.0	0.0	0.0	9.3	7.1
No Response	NSRA	Number	1	0	1	1	0	1	2	0	2
		Percent	25.0	0.0	2.2	14.3	0.0	11.1	18.2	0.0	3.7
	SSRA	Number	0	closed	0	0	closed	0	0	closed	0
		Percent	0.0	closed	0.0	0.0	closed	0.0	0.0	closed	0.0
	Overall	Number	1	0	1	1	0	1	2	0	2
		Percent	25.0	0.0	2.2	11.1	0.0	9.1	15.4	0.0	3.6
Overall	NSRA	Number	4	41	45	7	2	9	11	43	54
		Percent	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
	SSRA	Number	0	closed	0	2	closed	2	2	closed	2
		Percent	0.0	closed	0.0	100.0	closed	100.0	100.0	closed	100.0
	Overall	Number	4	41	45	9	2	11	13	43	56
		Percent	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Question 12: Number of fish by species and size category that you caught today?

Season	Statistic	Number of Fish 0-11 in. Kept	Number of Fish 0-11 in. Released	Number of Fish 12-24 in. Kept	Number of Fish 12-24 in. Released	Number of Fish >24 in. Kept	Number of Fish >24 in. Released	Number of Fish 0-11 in. Kept	Number of Fish 0-11 in. Released	Number of Fish 12-24 in. Kept	Number of Fish 12-24 in. Released	Number of Fish >24 in. Kept	Number of Fish >24 in. Released
		BASS						BLUEGILL					
Peak Season	Average	0.1	1.0	0.2	0.8	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0
	Minimum	0	0	0	0	0	0	0	0	0	0	0	0
	Maximum	2	10	8	20	0	0	0	4	3	1	0	0
Off Peak Season	Average	0.0	1.6	0.1	1.6	0.1	0.4	0.1	0.0	0.0	0.0	0.0	0.0
	Minimum	0	0	0	0	0	0	0	0	0	0	0	0
	Maximum	0	40	2	25	2	30	10	4	0	0	0	0
Overall	Average	0.0	1.4	0.1	1.4	0.1	0.3	0.1	0.1	0.0	0.0	0.0	0.0
	Minimum	0	0	0	0	0	0	0	0	0	0	0	0
	Maximum	2	40	8	25	2	30	10	4	3	1	0	0
		CATFISH						CRAPPIE					
Peak Season	Average	0.0	0.3	0.0	0.3	0.0	0.0	0.1	0.5	0.0	0.0	0.0	0.0
	Minimum	0	0	0	0	0	0	0	0	0	0	0	0
	Maximum	1	3	1	6	0	0	2	18	0	0	0	0
Off Peak Season	Average	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0
	Minimum	0	0	0	0	0	0	0	0	0	0	0	0
	Maximum	0	0	0	2	0	0	0	1	0	0	0	0
Overall	Average	0.0	0.1	0.0	0.1	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0
	Minimum	0	0	0	0	0	0	0	0	0	0	0	0
	Maximum	1	3	1	6	0	0	2	18	0	0	0	0
		TROUT						SALMON					
Peak Season	Average	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Minimum	0	0	0	0	0	0	0	0	0	0	0	0
	Maximum	1	2	0	0	0	0	0	0	0	0	0	0
Off Peak Season	Average	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Minimum	0	0	0	0	0	0	0	0	0	0	0	0
	Maximum	0	0	0	0	0	0	0	0	0	0	0	0
Overall	Average	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Minimum	0	0	0	0	0	0	0	0	0	0	0	0
	Maximum	1	2	0	0	0	0	0	0	0	0	0	0

Question 13: How many hours did you fish today?

Recreation Area	Statistic	Hours Fished								
		Day-use Visitors			Overnight Visitors			Overall		
		Peak Season	Off Peak Season	Overall	Peak Season	Off Peak Season	Overall	Peak Season	Off Peak Season	Overall
NSRA	Average	2.4	4.9	4.6	2.1	2.0	2.0	2.2	3.9	3.5
	Maximum	6	12	12	5	8	8	6	12	12
SSRA	Average	0.0	closed	0.0	1.5	closed	1.5	1.5	closed	1.5
	Maximum	0	closed	0	3	closed	3	3	closed	3
Overall	Average	2.4	4.9	4.6	1.9	2.0	1.9	2.0	3.9	3.3
	Maximum	6	12	12	5	8	8	6	12	12

Question 14a: What fishing technique did you use at this recreation area today?

Fishing Technique	Recreation Area	Statistic	Day-use Visitors			Overnight Visitors			Overall		
			Peak Season	Off Peak Season	Overall	Peak Season	Off Peak Season	Overall	Peak Season	Off Peak Season	Overall
Spin Technique	NSRA	Number	3	11	14	7	5	12	10	16	26
		Percent	33.3	18.0	20.0	36.8	17.9	25.5	35.7	18.0	22.2
	SSRA	Number	0	closed	0	3	closed	3	3	closed	3
		Percent	0.0	closed	0.0	27.3	closed	27.3	27.3	closed	27.3
	Overall	Number	3	11	14	10	5	15	13	16	29
		Percent	33.3	18.0	20.0	33.3	17.9	25.9	33.3	18.0	22.7
Artificial Lure Technique	NSRA	Number	4	50	54	6	9	15	10	59	69
		Percent	44.4	82.0	77.1	31.6	32.1	31.9	35.7	66.3	59.0
	SSRA	Number	0	closed	0	4	closed	4	4	closed	4
		Percent	0.0	closed	0.0	36.4	closed	36.4	36.4	closed	36.4
	Overall	Number	4	50	54	10	9	19	14	59	73
		Percent	44.4	82.0	77.1	33.3	32.1	32.8	35.9	66.3	57.0
Bait Technique	NSRA	Number	3	18	21	16	18	34	19	36	55
		Percent	33.3	29.5	30.0	84.2	64.3	72.3	67.9	40.4	47.0
	SSRA	Number	0	closed	0	9	closed	9	9	closed	9
		Percent	0.0	closed	0.0	81.8	closed	81.8	81.8	closed	81.8
	Overall	Number	3	18	21	25	18	43	28	36	64
		Percent	33.3	29.5	30.0	83.3	64.3	74.1	71.8	40.4	50.0
Fly Technique	NSRA	Number	0	1	1	1	0	1	1	1	2
		Percent	0.0	1.6	1.4	5.3	0.0	2.1	3.6	1.1	1.7
	SSRA	Number	0	closed	0	0	closed	0	0	closed	0
		Percent	0.0	closed	0.0	0.0	closed	0.0	0.0	closed	0.0
	Overall	Number	0	1	1	1	0	1	1	1	2
		Percent	0.0	1.6	1.4	3.3	0.0	1.7	2.6	1.1	1.6

Question 14b: What fishing method did you use at this recreation area today?

Fishing Location	Recreation Area	Statistic	Day-use Visitors			Overnight Visitors			Overall		
			Peak Season	Off Peak Season	Overall	Peak Season	Off Peak Season	Overall	Peak Season	Off Peak Season	Overall
Boat Fishing	NSRA	Number	5	46	51	3	8	11	8	54	62
		Percent	55.6	75.4	72.9	15.8	28.6	23.4	28.6	60.7	53.0
	SSRA	Number	0	closed	0	4	closed	4	4	closed	4
		Percent	0.0	closed	0.0	36.4	closed	36.4	36.4	closed	36.4
	Overall	Number	5	46	51	7	8	15	12	54	66
		Percent	55.6	75.4	72.9	23.3	28.6	25.9	30.8	60.7	51.6
Wading	NSRA	Number	0	1	1	3	0	3	3	1	4
		Percent	0.0	1.6	1.4	15.8	0.0	6.4	10.7	1.1	3.4
	SSRA	Number	0	closed	0	1	closed	1	1	closed	1
		Percent	0.0	closed	0.0	9.1	closed	9.1	9.1	closed	9.1
	Overall	Number	0	1	1	4	0	4	4	1	5
		Percent	0.0	1.6	1.4	13.3	0.0	6.9	10.3	1.1	3.9
Shoreline Fishing	NSRA	Number	4	12	16	13	14	27	17	26	43
		Percent	44.4	19.7	22.9	68.4	50.0	57.4	60.7	29.2	36.8
	SSRA	Number	0	closed	0	10	closed	10	10	closed	10
		Percent	0.0	closed	0.0	90.9	closed	90.9	90.9	closed	90.9
	Overall	Number	4	12	16	23	14	37	27	26	53
		Percent	44.4	19.7	22.9	76.7	50.0	63.8	69.2	29.2	41.4

Question 14c: What fishing approach did you use at this recreation area today?

Boat Fishing Approach	Recreation Area	Statistic	Day-use Visitors			Overnight Visitors			Overall		
			Peak Season	Off Peak Season	Overall	Peak Season	Off Peak Season	Overall	Peak Season	Off Peak Season	Overall
Troll	NSRA	Number	0	8	8	0	2	2	0	10	10
		Percent	0.0	17.4	15.7	0.0	16.7	12.5	0.0	17.2	14.9
	SSRA	Number	0	closed	0	3	closed	3	3	closed	3
		Percent	0.0	closed	0.0	75.0	closed	75.0	75.0	closed	75.0
	Overall	Number	0	8	8	3	2	5	3	10	13
		Percent	0.0	17.4	15.7	37.5	16.7	25.0	23.1	17.2	18.3
Cast & Retrieve	NSRA	Number	5	38	43	2	4	6	7	42	49
		Percent	100.0	82.6	84.3	50.0	33.3	37.5	77.8	72.4	73.1
	SSRA	Number	0	closed	0	4	closed	4	4	closed	4
		Percent	0.0	closed	0.0	100.0	closed	100.0	100.0	closed	100.0
	Overall	Number	5	38	43	6	4	10	11	42	53
		Percent	100.0	82.6	84.3	75.0	33.3	50.0	84.6	72.4	74.6
Plunking	NSRA	Number	0	0	0	0	0	0	0	0	0
		Percent	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	SSRA	Number	0	closed	0	0	closed	0	0	closed	0
		Percent	0.0	closed	0.0	0.0	closed	0.0	0.0	closed	0.0
	Overall	Number	0	0	0	0	0	0	0	0	0
		Percent	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Drifting	NSRA	Number	1	1	2	0	3	3	1	4	5
		Percent	20.0	2.2	3.9	0.0	25.0	18.8	11.1	6.9	7.5
	SSRA	Number	0	closed	0	0	closed	0	0	closed	0
		Percent	0.0	closed	0.0	0.0	closed	0.0	0.0	closed	0.0
	Overall	Number	1	1	2	0	3	3	1	4	5
		Percent	20.0	2.2	3.9	0.0	25.0	15.0	7.7	6.9	7.0

Question 14c (continued): What fishing approach did you use at this recreation area today?

Boat Fishing Approach	Recreation Area	Statistic	Day-use Visitors			Overnight Visitors			Overall		
			Peak Season	Off Peak Season	Overall	Peak Season	Off Peak Season	Overall	Peak Season	Off Peak Season	Overall
Other	NSRA	Number	0	0	0	1	0	1	1	0	1
		Percent	0.0	0.0	0.0	25.0	0.0	6.3	11.1	0.0	1.5
	SSRA	Number	0	closed	0	0	closed	0	0	closed	0
		Percent	0.0	closed	0.0	0.0	closed	0.0	0.0	closed	0.0
	Overall	Number	0	0	0	1	0	1	1	0	1
		Percent	0.0	0.0	0.0	12.5	0.0	5.0	7.7	0.0	1.4
No	NSRA	Number	5	46	51	2	8	10	7	54	61
		Percent	100.0	100.0	100.0	50.0	66.7	62.5	77.8	93.1	91.0
	SSRA	Number	0	closed	0	4	closed	4	4	closed	4
		Percent	0.0	closed	0.0	100.0	closed	100.0	100.0	closed	100.0
	Overall	Number	5	46	51	6	8	14	11	54	65
		Percent	100.0	100.0	100.0	75.0	66.7	70.0	84.6	93.1	91.5
No response	NSRA	Number	0	0	0	1	4	5	1	4	5
		Percent	0.0	0.0	0.0	25.0	33.3	31.3	11.1	6.9	7.5
	SSRA	Number	0	closed	0	0	closed	0	0	closed	0
		Percent	0.0	closed	0.0	0.0	closed	0.0	0.0	closed	0.0
	Overall	Number	0	0	0	1	4	5	1	4	5
		Percent	0.0	0.0	0.0	12.5	33.3	25.0	7.7	6.9	7.0
Overall	NSRA	Number	5	46	51	4	12	16	9	58	67
		Percent	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
	SSRA	Number	0	closed	0	4	closed	4	4	closed	4
		Percent	0.0	closed	0.0	100.0	closed	100.0	100.0	closed	100.0
	Overall	Number	5	46	51	8	12	20	13	58	71
		Percent	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Question 15a: Did the water level of the reservoir noticeably affect your angling experience?

Response	Recreation Area	Statistic	Day-use Visitors			Overnight Visitors			Overall		
			Peak Season	Off Peak Season	Overall	Peak Season	Off Peak Season	Overall	Peak Season	Off Peak Season	Overall
Yes	NSRA	Number	2	13	15	2	7	9	4	20	24
		Percent	22.2	21.3	21.4	10.0	25.0	18.8	13.8	22.5	20.3
	SSRA	Number	0	closed	0	0	closed	0	0	closed	0
		Percent	0.0	closed	0.0	0.0	closed	0.0	0.0	closed	0.0
	Overall	Number	2	13	15	2	7	9	4	20	24
		Percent	22.2	21.3	21.4	6.5	25.0	15.3	10.0	22.5	18.6
No	NSRA	Number	7	48	55	18	20	38	25	68	93
		Percent	77.8	78.7	78.6	90.0	71.4	79.2	86.2	76.4	78.8
	SSRA	Number	0	closed	0	11	closed	11	11	closed	11
		Percent	0.0	closed	0.0	100.0	closed	100.0	100.0	closed	100.0
	Overall	Number	7	48	55	29	20	49	36	68	104
		Percent	77.8	78.7	78.6	93.5	71.4	83.1	90.0	76.4	80.6
No Response	NSRA	Number	0	0	0	0	1	1	0	1	1
		Percent	0.0	0.0	0.0	0.0	3.6	2.1	0.0	1.1	0.8
	SSRA	Number	0	closed	0	0	closed	0	0	closed	0
		Percent	0.0	closed	0.0	0.0	closed	0.0	0.0	closed	0.0
	Overall	Number	0	0	0	0	1	1	0	1	1
		Percent	0.0	0.0	0.0	0.0	3.6	1.7	0.0	1.1	0.8
Overall	NSRA	Number	9	61	70	20	28	48	29	89	118
		Percent	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
	SSRA	Number	0	closed	0	11	closed	11	11	closed	11
		Percent	0.0	closed	0.0	100.0	closed	100.0	100.0	closed	100.0
	Overall	Number	9	61	70	31	28	59	40	89	129
		Percent	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Question 15b: Reasons the water level of the reservoir noticeably affected your angling experience.

Recreation Area	Reason	Number of Responses
NSRA	Muddy water	4
	Access to good fishing areas	1
	Can't reach the back	1
	Couldn't get to my fishing spots because of the water level	1
	Dropping water level hurts fishing	1
	Fluctuation of 4-6 inches a day affects fishing-generally in a negative way	1
	Higher water=submerged trees=fishing spots	1
	Incoming water makes the bite turn on and allows for reaction bite all day.	1
	Lake is down too low; ruins the fish beds	1
	Low water limits fishing area	1
	Murky	1
	Nice to have full -- better looking and less mud	1
	Of course it does. Anytime you drop water levels 4-6 inches a day it affects fishing, generally in a negative manner. Today was an exception due to perfect conditions	1
	Partially submerged trees and rocks were more accessible today	1
	Shallow	1
	Some debris issues	1
	Too low	1
	Too shallow to fish from shore	1
	Very low in some areas I usually fish	1
	Water level was very low	1
SSRA	None	0
Overall		**19**

Question 16: How would you rate the quality of your fishing experience?

Rating	Recreation Area	Statistic	Day-use Visitors			Overnight Visitors			Overall		
			Peak Season	Off Peak Season	Overall	Peak Season	Off Peak Season	Overall	Peak Season	Off Peak Season	Overall
Very Good	NSRA	Number	3	5	8	1	4	5	4	9	13
		Percent	33.3	8.2	11.4	5.0	14.3	10.4	13.8	10.1	11.0
	SSRA	Number	0	closed	0	5	closed	5	5	closed	5
		Percent	0.0	closed	0.0	45.5	closed	45.5	45.5	closed	45.5
	Overall	Number	3	5	8	6	4	10	9	9	18
		Percent	33.3	8.2	11.4	19.4	14.3	16.9	22.5	10.1	14.0
Good	NSRA	Number	4	19	23	5	7	12	9	26	35
		Percent	44.4	31.1	32.9	25.0	25.0	25.0	31.0	29.2	29.7
	SSRA	Number	0	closed	0	3	closed	3	3	closed	3
		Percent	0.0	closed	0.0	27.3	closed	27.3	27.3	closed	27.3
	Overall	Number	4	19	23	8	7	15	12	26	38
		Percent	44.4	31.1	32.9	25.8	25.0	25.4	30.0	29.2	29.5
Average	NSRA	Number	0	22	22	12	11	23	12	33	45
		Percent	0.0	36.1	31.4	60.0	39.3	47.9	41.4	37.1	38.1
	SSRA	Number	0	closed	0	2	closed	2	2	closed	2
		Percent	0.0	closed	0.0	18.2	closed	18.2	18.2	closed	18.2
	Overall	Number	0	22	22	14	11	25	14	33	47
		Percent	0.0	36.1	31.4	45.2	39.3	42.4	35.0	37.1	36.4

Question 16 (continued): How would you rate the quality of your fishing experience?

Rating	Recreation Area	Statistic	Day-use Visitors			Overnight Visitors			Overall		
			Peak Season	Off Peak Season	Overall	Peak Season	Off Peak Season	Overall	Peak Season	Off Peak Season	Overall
Poor	NSRA	Number	2	10	12	1	2	3	3	12	15
		Percent	22.2	16.4	17.1	5.0	7.1	6.3	10.3	13.5	12.7
	SSRA	Number	0	closed	0	1	closed	1	1	closed	1
		Percent	0.0	closed	0.0	9.1	closed	9.1	9.1	closed	9.1
	Overall	Number	2	10	12	2	2	4	4	12	16
		Percent	22.2	16.4	17.1	6.5	7.1	6.8	10.0	13.5	12.4
Very Poor	NSRA	Number	0	1	1	0	0	0	0	1	1
		Percent	0.0	1.6	1.4	0.0	0.0	0.0	0.0	1.1	0.8
	SSRA	Number	0	closed	0	0	closed	0	0	closed	0
		Percent	0.0	closed	0.0	0.0	closed	0.0	0.0	closed	0.0
	Overall	Number	0	1	1	0	0	0	0	1	1
		Percent	0.0	1.6	1.4	0.0	0.0	0.0	0.0	1.1	0.8
No response	NSRA	Number	0	4	4	1	4	5	1	8	9
		Percent	0.0	6.6	5.7	5.0	14.3	10.4	3.4	9.0	7.6
	SSRA	Number	0	closed	0	0	closed	0	0	closed	0
		Percent	0.0	closed	0.0	0.0	closed	0.0	0.0	closed	0.0
	Overall	Number	0	4	4	1	4	5	1	8	9
		Percent	0.0	6.6	5.7	3.2	14.3	8.5	2.5	9.0	7.0
Overall	NSRA	Number	9	61	70	20	28	48	29	89	118
		Percent	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
	SSRA	Number	0	closed	0	11	closed	11	11	closed	11
		Percent	0.0	closed	0.0	100.0	closed	100.0	100.0	closed	100.0
	Overall	Number	9	61	70	31	28	59	40	89	129
		Percent	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Question 17a: Did the Reservoir Level Effect Your Ability to Use Beach Area?

Recreat-ion Area	Scale of Problem	Day-use Visitors						Overnight Visitors						All Visitors					
		Peak Season		Off-peak Season		Overall		Peak Season		Off-peak Season		Overall		Peak Season		Off-peak Season		Overall	
		#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%
NSRA	Large problem	0	0.0	1	2.1	1	1.2	4	3.5	2	4.1	6	3.7	4	2.7	3	3.1	7	2.9
	A moderate problem	3	9.1	3	6.3	6	7.4	6	5.2	4	8.2	10	6.1	9	6.1	7	7.2	16	6.5
	Neither	0	0.0	5	10.4	5	6.2	12	10.4	5	10.2	17	10.4	12	8.1	10	10.3	22	9.0
	A small problem	10	30.3	5	10.4	15	18.5	20	17.4	5	10.2	25	15.2	30	20.3	10	10.3	40	16.3
	Not a problem	19	57.6	34	70.8	53	65.4	73	63.5	32	65.3	105	64.0	92	62.2	66	68.0	158	64.5
	No opinion/response	1	3.0	0	0.0	1	1.2	0	0.0	1	2.0	1	0.6	1	0.7	1	1.0	2	0.8
	Total	33	100.0	48	100.0	81	100.0	115	100.0	49	100.0	164	100.0	148	100.0	97	100.0	245	100.0
SSRA	Large problem	0	0.0	closed	closed	0	0.0	1	3.7	closed	closed	1	3.7	1	2.8	closed	closed	1	2.8
	A moderate problem	0	0.0	closed	closed	0	0.0	1	3.7	closed	closed	1	3.7	1	2.8	closed	closed	1	2.8
	Neither	0	0.0	closed	closed	0	0.0	3	11.1	closed	closed	3	11.1	3	8.3	closed	closed	3	8.3
	A small problem	1	11.1	closed	closed	1	11.1	5	18.5	closed	closed	5	18.5	6	16.7	closed	closed	6	16.7
	Not a problem	8	88.9	closed	closed	8	88.9	17	63.0	closed	closed	17	63.0	25	69.4	closed	closed	25	69.4
	No opinion/response	0	0.0	closed	closed	0	0.0	0	0.0	closed	closed	0	0.0	0	0.0	closed	closed	0	0.0
	Total	9	100.0	closed	closed	9	100.0	27	100.0	closed	closed	27	100.0	36	100.0	closed	closed	36	100.0
Total	Large problem	0	0.0	1	2.1	1	1.1	5	3.5	2	4.1	7	3.7	5	2.7	3	3.1	8	2.8
	A moderate problem	3	7.1	3	6.3	6	6.7	7	4.9	4	8.2	11	5.8	10	5.4	7	7.2	17	6.0
	Neither	0	0.0	5	10.4	5	5.6	15	10.6	5	10.2	20	10.5	15	8.2	10	10.3	25	8.9
	A small problem	11	26.2	5	10.4	16	17.8	25	17.6	5	10.2	30	15.7	36	19.6	10	10.3	46	16.4
	Not a problem	27	64.3	34	70.8	61	67.8	90	63.4	32	65.3	122	63.9	117	63.6	66	68.0	183	65.1
	No opinion/response	1	2.4	0	0.0	1	1.1	0	0.0	1	2.0	1	0.5	1	0.5	1	1.0	2	0.7
	Total	42	100.0	48	100.0	90	100.0	142	100.0	49	100.0	191	100.0	184	100.0	97	100.0	281	100.0

Question 17b: Did the Reservoir Level Effect Your Ability to Safely Swim?

Recreat-ion Area	Scale of Problem	Day-use Visitors						Overnight Visitors						All Visitors					
		Peak Season		Off-peak Season		Overall		Peak Season		Off-peak Season		Overall		Peak Season		Off-peak Season		Overall	
		#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%
NSRA	Large problem			0	0.0	0	0.0			5	11.4	5	3.1			5	5.7	5	2.1
	A moderate problem	0	0.0	4	9.3	4	5.3	8	6.7	0	0.0	8	4.9	8	5.3	4	4.6	12	5.0
	Neither	1	3.0	5	11.6	6	7.9	4	3.4	5	11.4	9	5.5	5	3.3	10	11.5	15	6.3
	A small problem	2	6.1	4	9.3	6	7.9	17	14.3	4	9.1	21	12.9	19	12.5	8	9.2	27	11.3
	Not a problem	29	87.9	30	69.8	59	77.6	88	73.9	29	65.9	117	71.8	117	77.0	59	67.8	176	73.6
	No opinion/response	1	3.0	0	0.0	1	1.3	2	1.7	1	2.3	3	1.8	3	2.0	1	1.1	4	1.7
	Total	33	100.0	43	100.0	76	100.0	119	100.0	44	100.0	163	100.0	152	100.0	87	100.0	239	100.0
SSRA	Large problem	1	11.1	closed	closed	1	11.1	0	0.0	closed	closed	0	0.0	1	2.8	closed	closed	1	2.8
	A moderate problem	0	0.0	closed	closed	0	0.0	3	11.1	closed	closed	3	11.1	3	8.3	closed	closed	3	8.3
	Neither	0	0.0	closed	closed	0	0.0	1	3.7	closed	closed	1	3.7	1	2.8	closed	closed	1	2.8
	A small problem	0	0.0	closed	closed	0	0.0	5	18.5	closed	closed	5	18.5	5	13.9	closed	closed	5	13.9
	Not a problem	8	88.9	closed	closed	8	88.9	18	66.7	closed	closed	18	66.7	26	72.2	closed	closed	26	72.2
	No opinion/response	0	0.0	closed	closed	0	0.0	0	0.0	closed	closed	0	0.0	0	0.0	closed	closed	0	0.0
	Total	9	100.0	closed	closed	9	100.0	27	100.0	closed	closed	27	100.0	36	100.0	closed	closed	36	100.0
Total	Large problem	1	2.4	0	0.0	1	1.2	0	0.0	5	11.4	5	2.6	1	0.5	5	5.7	6	2.2
	A moderate problem	0	0.0	4	9.3	4	4.7	11	7.5	0	0.0	11	5.8	11	5.9	4	4.6	15	5.5
	Neither	1	2.4	5	11.6	6	7.1	5	3.4	5	11.4	10	5.3	6	3.2	10	11.5	16	5.8
	A small problem	2	4.8	4	9.3	6	7.1	22	15.1	4	9.1	26	13.7	24	12.8	8	9.2	32	11.6
	Not a problem	37	88.1	30	69.8	67	78.8	106	72.6	29	65.9	135	71.1	143	76.1	59	67.8	202	73.5
	No opinion/response	1	2.4	0	0.0	1	1.2	2	1.4	1	2.3	3	1.6	3	1.6	1	1.1	4	1.5
	Total	42	100.0	43	100.0	85	100.0	146	100.0	44	100.0	190	100.0	188	100.0	87	100.0	275	100.0

Question 17c: Did the Reservoir Level Effect Your Ability to Launch or Take Out a Boat?

Recreat-ion Area	Scale of Problem	Day-use Visitors						Overnight Visitors						All Visitors					
		Peak Season		Off-peak Season		Overall		Peak Season		Off-peak Season		Overall		Peak Season		Off-peak Season		Overall	
		#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%
NSRA	Large problem			3	3.7	3	2.7			0	0.0	0	0.0			3	2.5	3	1.3
	A moderate problem	0	0.0	4	4.9	4	3.6	2	2.3	3	7.7	5	4.0	2	1.7	7	5.8	9	3.8
	Neither	0	0.0	3	3.7	3	2.7	6	6.9	4	10.3	10	7.9	6	5.2	7	5.8	13	5.5
	A small problem	2	6.9	9	11.1	11	10.0	14	16.1	8	20.5	22	17.5	16	13.8	17	14.2	33	14.0
	Not a problem	26	89.7	62	76.5	88	80.0	61	70.1	23	59.0	84	66.7	87	75.0	85	70.8	172	72.9
	No opinion/response	1	3.4	0	0.0	1	0.9	4	4.6	1	2.6	5	4.0	5	4.3	1	0.8	6	2.5
	Total	29	100.0	81	100.0	110	100.0	87	100.0	39	100.0	126	100.0	116	100.0	120	100.0	236	100.0
SSRA	Large problem	0	0.0	closed	closed	0	0.0	0	0.0	closed	closed	0	0.0	0	0.0	closed	closed	0	0.0
	A moderate problem	0	0.0	closed	closed	0	0.0	1	5.0	closed	closed	1	5.0	1	3.6	closed	closed	1	3.6
	Neither	0	0.0	closed	closed	0	0.0	1	5.0	closed	closed	1	5.0	1	3.6	closed	closed	1	3.6
	A small problem	0	0.0	closed	closed	0	0.0	5	25.0	closed	closed	5	25.0	5	17.9	closed	closed	5	17.9
	Not a problem	8	100.0	closed	closed	8	100.0	13	65.0	closed	closed	13	65.0	21	75.0	closed	closed	21	75.0
	No opinion/response	0	0.0	closed	closed	0	0.0	0	0.0	closed	closed	0	0.0	0	0.0	closed	closed	0	0.0
	Total	8	100.0	closed	closed	8	100.0	20	100.0	closed	closed	20	100.0	28	100.0	closed	closed	28	100.0
Total	Large problem			3	3.7	3	2.5			0	0.0	0	0.0			3	2.5	3	1.1
	A moderate problem	0	0.0	4	4.9	4	3.4	3	2.8	3	7.7	6	4.1	3	2.1	7	5.8	10	3.8
	Neither	0	0.0	3	3.7	3	2.5	7	6.5	4	10.3	11	7.5	7	4.9	7	5.8	14	5.3
	A small problem	2	5.4	9	11.1	11	9.3	19	17.8	8	20.5	27	18.5	21	14.6	17	14.2	38	14.4
	Not a problem	34	91.9	62	76.5	96	81.4	74	69.2	23	59.0	97	66.4	108	75.0	85	70.8	193	73.1
	No opinion/response	1	2.7	0	0.0	1	0.8	4	3.7	1	2.6	5	3.4	5	3.5	1	0.8	6	2.3
	Total	37	100.0	81	100.0	118	100.0	107	100.0	39	100.0	146	100.0	144	100.0	120	100.0	264	100.0

Question 17d: Did the Reservoir Level Effect Your Ability to Safely Boat?

Recreation Area	Scale of Problem	Day-use Visitors						Overnight Visitors						All Visitors					
		Peak Season		Off-peak Season		Overall		Peak Season		Off-peak Season		Overall		Peak Season		Off-peak Season		Overall	
		#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%
NSRA	Large problem	0	0.0	1	1.3	1	0.9	1	1.2	0	0.0	1	0.8	1	0.9	1	0.9	2	0.9
	A moderate problem	1	3.4	5	6.3	6	5.6	4	4.7	5	13.5	9	7.3	5	4.3	10	8.6	15	6.5
	Neither	0	0.0	2	2.5	2	1.9	4	4.7	3	8.1	7	5.7	4	3.5	5	4.3	9	3.9
	A small problem	2	6.9	6	7.6	8	7.4	18	20.9	4	10.8	22	17.9	20	17.4	10	8.6	30	13.0
	Not a problem	26	89.7	64	81.0	90	83.3	56	65.1	24	64.9	80	65.0	82	71.3	88	75.9	170	73.6
	No opinion/response	0	0.0	1	1.3	1	0.9	3	3.5	1	2.7	4	3.3	3	2.6	2	1.7	5	2.2
	Total	29	100.0	79	100.0	108	100.0	86	100.0	37	100.0	123	100.0	115	100.0	116	100.0	231	100.0
SSRA	Large problem	0	0.0	closed	closed	0	0.0	0	0.0	closed	closed	0	0.0	0	0.0	closed	closed	0	0.0
	A moderate problem	0	0.0	closed	closed	0	0.0	1	5.0	closed	closed	1	5.0	1	3.6	closed	closed	1	3.6
	Neither	0	0.0	closed	closed	0	0.0	2	10.0	closed	closed	2	10.0	2	7.1	closed	closed	2	7.1
	A small problem	0	0.0	closed	closed	0	0.0	4	20.0	closed	closed	4	20.0	4	14.3	closed	closed	4	14.3
	Not a problem	8	100.0	closed	closed	8	100.0	13	65.0	closed	closed	13	65.0	21	75.0	closed	closed	21	75.0
	No opinion/response	0	0.0	closed	closed	0	0.0	0	0.0	closed	closed	0	0.0	0	0.0	closed	closed	0	0.0
	Total	8	100.0	closed	closed	8	100.0	20	100.0	closed	closed	20	100.0	28	100.0	closed	closed	28	100.0
Total	Large problem	0	0.0	1	1.3	1	0.9	1	0.9	0	0.0	1	0.7	1	0.7	1	0.9	2	0.8
	A moderate problem	1	2.7	5	6.3	6	5.2	5	4.7	5	13.5	10	7.0	6	4.2	10	8.6	16	6.2
	Neither	0	0.0	2	2.5	2	1.7	6	5.7	3	8.1	9	6.3	6	4.2	5	4.3	11	4.2
	A small problem	2	5.4	6	7.6	8	6.9	22	20.8	4	10.8	26	18.2	24	16.8	10	8.6	34	13.1
	Not a problem	34	91.9	64	81.0	98	84.5	69	65.1	24	64.9	93	65.0	103	72.0	88	75.9	191	73.7
	No opinion/response	0	0.0	1	1.3	1	0.9	3	2.8	1	2.7	4	2.8	3	2.1	2	1.7	5	1.9
	Total	37	100.0	79	100.0	116	100.0	106	100.0	37	100.0	143	100.0	143	100.0	116	100.0	259	100.0

Question 17e: Did the Reservoir Level Effect Your Ability to Fish Along the Shoreline?

Recreat-ion Area	Scale of Problem	Day-use Visitors						Overnight Visitors						All Visitors					
		Peak Season		Off-peak Season		Overall		Peak Season		Off-peak Season		Overall		Peak Season		Off-peak Season		Overall	
		#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%
NSRA	Large problem	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
	A moderate problem	0	0.0	2	3.4	2	2.6	5	11.1	3	8.6	8	10.0	5	7.7	5	5.4	10	6.3
	Neither	0	0.0	3	5.2	3	3.8	3	6.7	5	14.3	8	10.0	3	4.6	8	8.6	11	7.0
	A small problem	3	15.0	2	3.4	5	6.4	9	20.0	2	5.7	11	13.8	12	18.5	4	4.3	16	10.1
	Not a problem	16	80.0	50	86.2	66	84.6	26	57.8	25	71.4	51	63.8	42	64.6	75	80.6	117	74.1
	No opinion/response	1	5.0	1	1.7	2	2.6	2	4.4	0	0.0	2	2.5	3	4.6	1	1.1	4	2.5
	Total	20	100.0	58	100.0	78	100.0	45	100.0	35	100.0	80	100.0	65	100.0	93	100.0	158	100.0
SSRA	Large problem	0	0.0	closed	closed	0	0.0	0	0.0	closed	closed	0	0.0	0	0.0	closed	closed	0	0.0
	A moderate problem	0	0.0	closed	closed	0	0.0	1	5.3	closed	closed	1	5.3	1	4.2	closed	closed	1	4.2
	Neither	0	0.0	closed	closed	0	0.0	3	15.8	closed	closed	3	15.8	3	12.5	closed	closed	3	12.5
	A small problem	0	0.0	closed	closed	0	0.0	1	5.3	closed	closed	1	5.3	1	4.2	closed	closed	1	4.2
	Not a problem	4	80.0	closed	closed	4	80.0	14	73.7	closed	closed	14	73.7	18	75.0	closed	closed	18	75.0
	No opinion/response	1	20.0	closed	closed	1	20.0	0	0.0	closed	closed	0	0.0	1	4.2	closed	closed	1	4.2
	Total	5	100.0	closed	closed	5	100.0	19	100.0	closed	closed	19	100.0	24	100.0	closed	closed	24	100.0
Total	Large problem	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
	A moderate problem	0	0.0	2	3.4	2	2.4	6	9.4	3	8.6	9	9.1	6	6.7	5	5.4	11	6.0
	Neither	0	0.0	3	5.2	3	3.6	6	9.4	5	14.3	11	11.1	6	6.7	8	8.6	14	7.7
	A small problem	3	12.0	2	3.4	5	6.0	10	15.6	2	5.7	12	12.1	13	14.6	4	4.3	17	9.3
	Not a problem	20	80.0	50	86.2	70	84.3	40	62.5	25	71.4	65	65.7	60	67.4	75	80.6	135	74.2
	No opinion/response	2	8.0	1	1.7	3	3.6	2	3.1	0	0.0	2	2.0	4	4.5	1	1.1	5	2.7
	Total	25	100.0	58	100.0	83	100.0	64	100.0	35	100.0	99	100.0	89	100.0	93	100.0	182	100.0

Question 17f: Did the Reservoir Level Effect Your Ability to Access the Shoreline?

Recreat-ion Area	Scale of Problem	Day-use Visitors						Overnight Visitors						All Visitors					
		Peak Season		Off-peak Season		Overall		Peak Season		Off-peak Season		Overall		Peak Season		Off-peak Season		Overall	
		#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%
NSRA	Large problem	0	0.0	0	0.0	0	0.0	2	1.7	2	3.8	4	2.4	2	1.3	2	1.6	4	1.4
	A moderate problem	8	21.6	4	5.5	12	10.9	8	6.9	5	9.6	13	7.7	16	10.5	9	7.2	25	9.0
	Neither	0	0.0	4	5.5	4	3.6	5	4.3	5	9.6	10	6.0	5	3.3	9	7.2	14	5.0
	A small problem	3	8.1	5	6.8	8	7.3	21	18.1	3	5.8	24	14.3	24	15.7	8	6.4	32	11.5
	Not a problem	25	67.6	60	82.2	85	77.3	80	69.0	37	71.2	117	69.6	105	68.6	97	77.6	202	72.7
	No opinion/response	1	2.7	0	0.0	1	0.9	0	0.0	0	0.0	0	0.0	1	0.7	0	0.0	1	0.4
	Total	37	100.0	73	100.0	110	100.0	116	100.0	52	100.0	168	100.0	153	100.0	125	100.0	278	100.0
SSRA	Large problem	0	0.0	closed	closed	0	0.0	0	0.0	closed	closed	0	0.0	0	0.0	closed	closed	0	0.0
	A moderate problem	0	0.0	closed	closed	0	0.0	1	3.4	closed	closed	1	3.4	1	2.6	closed	closed	1	2.6
	Neither	0	0.0	closed	closed	0	0.0	2	6.9	closed	closed	2	6.9	2	5.1	closed	closed	2	5.1
	A small problem	0	0.0	closed	closed	0	0.0	5	17.2	closed	closed	5	17.2	5	12.8	closed	closed	5	12.8
	Not a problem	10	100.0	closed	closed	10	100.0	21	72.4	closed	closed	21	72.4	31	79.5	closed	closed	31	79.5
	No opinion/response	0	0.0	closed	closed	0	0.0	0	0.0	closed	closed	0	0.0	0	0.0	closed	closed	0	0.0
	Total	10	100.0	closed	closed	10	100.0	29	100.0	closed	closed	29	100.0	39	100.0	closed	closed	39	100.0
Total	Large problem	0	0.0	0	0.0	0	0.0	2	1.4	2	3.8	4	2.0	2	1.0	2	1.6	4	1.3
	A moderate problem	8	17.0	4	5.5	12	10.0	9	6.2	5	9.6	14	7.1	17	8.9	9	7.2	26	8.2
	Neither	0	0.0	4	5.5	4	3.3	7	4.8	5	9.6	12	6.1	7	3.6	9	7.2	16	5.0
	A small problem	3	6.4	5	6.8	8	6.7	26	17.9	3	5.8	29	14.7	29	15.1	8	6.4	37	11.7
	Not a problem	35	74.5	60	82.2	95	79.2	101	69.7	37	71.2	138	70.1	136	70.8	97	77.6	233	73.5
	No opinion/response	1	2.1			1	0.8	0	0.0			0	0.0	1	0.5			1	0.3
	Total	47	100.0	73	100.0	120	100.0	145	100.0	52	100.0	197	100.0	192	100.0	125	100.0	317	100.0

Question 17g: Did the Reservoir Level Effect Your Ability to Utilize Trails?

Recreat-ion Area	Scale of Problem	Day-use Visitors						Overnight Visitors						All Visitors					
		Peak Season		Off-peak Season		Overall		Peak Season		Off-peak Season		Overall		Peak Season		Off-peak Season		Overall	
		#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%
NSRA	Large problem	0	0.0	1	2.5	1	1.7	0	0.0	0	0.0	0	0.0	0	0.0	1	1.1	1	0.5
	A moderate problem	1	5.3	5	12.5	6	10.2	7	8.9	1	2.1	8	6.3	8	8.2	6	6.9	14	7.6
	Neither	2	10.5	4	10.0	6	10.2	6	7.6	7	14.9	13	10.3	8	8.2	11	12.6	19	10.3
	A small problem	2	10.5	0	0.0	2	3.4	9	11.4	6	12.8	15	11.9	11	11.2	6	6.9	17	9.2
	Not a problem	11	57.9	29	72.5	40	67.8	51	64.6	33	70.2	84	66.7	62	63.3	62	71.3	124	67.0
	No opinion/response	3	15.8	1	2.5	4	6.8	6	7.6	0	0.0	6	4.8	9	9.2	1	1.1	10	5.4
	Total	19	100.0	40	100.0	59	100.0	79	100.0	47	100.0	126	100.0	98	100.0	87	100.0	185	100.0
SSRA	Large problem	0	0.0	closed	closed	0	0.0	0	0.0	closed	closed	0	0.0	0	0.0	closed	closed	0	0.0
	A moderate problem	0	0.0	closed	closed	0	0.0	1	5.6	closed	closed	1	5.6	1	4.2	closed	closed	1	4.2
	Neither	0	0.0	closed	closed	0	0.0	1	5.6	closed	closed	1	5.6	1	4.2	closed	closed	1	4.2
	A small problem	1	16.7	closed	closed	1	16.7	2	11.1	closed	closed	2	11.1	3	12.5	closed	closed	3	12.5
	Not a problem	5	83.3	closed	closed	5	83.3	13	72.2	closed	closed	13	72.2	18	75.0	closed	closed	18	75.0
	No opinion/response	0	0.0	closed	closed	0	0.0	1	5.6	closed	closed	1	5.6	1	4.2	closed	closed	1	4.2
	Total	6	100.0	closed	closed	6	100.0	18	100.0	closed	closed	18	100.0	24	100.0	closed	closed	24	100.0
Total	Large problem			1	2.5	1	1.5			0	0.0	0	0.0			1	1.1	1	0.5
	A moderate problem	1	4.0	5	12.5	6	9.2	8	8.2	1	2.1	9	6.3	9	7.4	6	6.9	15	7.2
	Neither	2	8.0	4	10.0	6	9.2	7	7.2	7	14.9	14	9.7	9	7.4	11	12.6	20	9.6
	A small problem	3	12.0	0	0.0	3	4.6	11	11.3	6	12.8	17	11.8	14	11.5	6	6.9	20	9.6
	Not a problem	16	64.0	29	72.5	45	69.2	64	66.0	33	70.2	97	67.4	80	65.6	62	71.3	142	67.9
	No opinion/response	3	12.0	1	2.5	4	6.2	7	7.2	0	0.0	7	4.9	10	8.2	1	1.1	11	5.3
	Total	25	100.0	40	100.0	65	100.0	97	100.0	47	100.0	144	100.0	122	100.0	87	100.0	209	100.0

Question 17h: Did the Reservoir Level Effect the Scenic Quality of the Shoreline?

Recreat-ion Area	Scale of Problem	Day-use Visitors						Overnight Visitors						All Visitors					
		Peak Season		Off-peak Season		Overall		Peak Season		Off-peak Season		Overall		Peak Season		Off-peak Season		Overall	
		#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%
NSRA	Large problem	0	0.0	1	1.1	1	0.8	0	0.0	2	3.7	2	1.2	0	0.0	3	2.1	3	1.0
	A moderate problem	1	2.7	8	9.2	9	7.3	12	10.3	3	5.6	15	8.8	13	8.4	11	7.8	24	8.1
	Neither	5	13.5	3	3.4	8	6.5	13	11.1	11	20.4	24	14.0	18	11.7	14	9.9	32	10.8
	A small problem	3	8.1	1	1.1	4	3.2	13	11.1	4	7.4	17	9.9	16	10.4	5	3.5	21	7.1
	Not a problem	27	73.0	73	83.9	100	80.6	75	64.1	33	61.1	108	63.2	102	66.2	106	75.2	208	70.5
	No opinion/response	1	2.7	1	1.1	2	1.6	4	3.4	1	1.9	5	2.9	5	3.2	2	1.4	7	2.4
	Total	37	100.0	87	100.0	124	100.0	117	100.0	54	100.0	171	100.0	154	100.0	141	100.0	295	100.0
SSRA	Large problem	0	0.0	closed	closed	0	0.0	0	0.0	closed	closed	0	0.0	0	0.0	closed	closed	0	0.0
	A moderate problem	0	0.0	closed	closed	0	0.0	0	0.0	closed	closed	0	0.0	0	0.0	closed	closed	0	0.0
	Neither	0	0.0	closed	closed	0	0.0	0	0.0	closed	closed	0	0.0	0	0.0	closed	closed	0	0.0
	A small problem	0	0.0	closed	closed	0	0.0	4	13.8	closed	closed	4	13.8	4	10.3	closed	closed	4	10.3
	Not a problem	0	0.0	closed	closed	0	0.0	5	17.2	closed	closed	5	17.2	5	12.8	closed	closed	5	12.8
	No opinion/response	10	100.0	closed	closed	10	100.0	20	69.0	closed	closed	20	69.0	30	76.9	closed	closed	30	76.9
	Total	10	100.0	closed	closed	10	100.0	29	100.0	closed	closed	29	100.0	39	100.0	closed	closed	39	100.0
Total	Large problem	0	0.0	1	1.1	1	0.7	0	0.0	2	3.7	2	1.0	0	0.0	3	2.1	3	0.9
	A moderate problem	1	2.1	8	9.2	9	6.7	12	8.2	3	5.6	15	7.5	13	6.7	11	7.8	24	7.2
	Neither	5	10.6	3	3.4	8	6.0	17	11.6	11	20.4	28	14.0	22	11.4	14	9.9	36	10.8
	A small problem	3	6.4	1	1.1	4	3.0	18	12.3	4	7.4	22	11.0	21	10.9	5	3.5	26	7.8
	Not a problem	37	78.7	73	83.9	110	82.1	95	65.1	33	61.1	128	64.0	132	68.4	106	75.2	238	71.3
	No opinion/response	1	2.1	1	1.1	2	1.5	4	2.7	1	1.9	5	2.5	5	2.6	2	1.4	7	2.1
	Total	47	100.0	87	100.0	134	100.0	146	100.0	54	100.0	200	100.0	193	100.0	141	100.0	334	100.0

Question 18a: Did you experience any conflict with other recreation users today?

Recreation Area	Did You Experience Any Conflict?	Day-use						Overnight						All Visitors					
		Peak Season		Off Peak Season		Overall		Peak Season		Off Peak Season		Overall		Peak Season		Off Peak Season		Overall	
		#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%
NSRA	Yes	1	2.6	5	5.4	6	4.6	13	10.7	6	10.3	19	10.6	14	8.8	11	7.3	25	8.1
	No	37	97.4	87	94.6	124	95.4	108	89.3	52	89.7	160	89.4	145	91.2	139	92.7	284	91.9
	Total	38	100.0	92	100.0	130	100.0	121	100.0	58	100.0	179	100.0	159	100.0	150	100.0	309	100.0
SSRA	Yes	0	0.0	closed	closed	0	0.0	4	13.3	closed	closed	4	13.3	4	10.0	closed	closed	4	10.0
	No	10	100.0	closed	closed	10	100.0	26	86.7	closed	closed	26	86.7	36	90.0	closed	closed	36	90.0
	Total	10	100.0	closed	closed	10	100.0	30	100.0	closed	closed	30	100.0	40	100.0	closed	closed	40	100.0
Total	Yes	1	2.1	5	5.4	6	4.3	17	11.3	6	10.3	23	11.0	18	9.0	11	7.3	29	8.3
	No	47	97.9	87	94.6	134	95.7	134	88.7	52	89.7	186	89.0	181	91.0	139	92.7	320	91.7
	Total	48	100.0	92	100.0	140	100.0	151	100.0	58	100.0	209	100.0	199	100.0	150	100.0	349	100.0

Question 18b: If you experienced conflict, what was the activity of the other recreation user?

Recreation Area	Activity	Day-use						Overnight						All Visitors					
		Peak Season		Off Peak Season		Overall		Peak Season		Off Peak Season		Overall		Peak Season		Off Peak Season		Overall	
		#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%
NSRA	Camper	0	0.0	1	20.0	1	16.7	7	41.2	3	33.3	10	38.5	7	38.9	4	28.6	11	34.4
	Motorized boater	0	0.0	3	60.0	3	50.0	5	29.4	3	33.3	8	30.8	5	27.8	6	42.9	11	34.4
	Vehicle use	0	0.0	0	0.0	0	0.0	1	5.9	0	0.0	1	3.8	1	5.6	0	0.0	1	3.1
	Other	0	0.0	0	0.0	0	0.0	1	5.9	1	11.1	2	7.7	1	5.6	1	7.1	2	6.3
	Jet skier	1	100.0	0	0.0	1	16.7	0	0.0	2	22.2	2	7.7	1	5.6	2	14.3	3	9.4
	Hiker	0	0.0	0	0.0	0	0.0	1	5.9	0	0.0	1	3.8	1	5.6	0	0.0	1	3.1
	No response	0	0.0	1	20.0	1	16.7	2	11.8	0	0.0	2	7.7	2	11.1	1	7.1	3	9.4
	Total	1	100.0	5	100.0	6	100.0	17	100.0	9	100.0	26	100.0	18	100.0	14	100.0	32	100.0
SSRA	Camper	0	0.0	closed	closed	0	0.0	2	40.0	closed	closed	2	40.0	2	40.0	closed	closed	2	40.0
	Jet skier	0	0.0	closed	closed	0	0.0	2	40.0	closed	closed	2	40.0	2	40.0	closed	closed	2	40.0
	Motorized boater	0	0.0	closed	closed	0	0.0	1	20.0	closed	closed	1	20.0	1	20.0	closed	closed	1	20.0
	Total	0	0.0	closed	closed	0	0.0	5	100.0	closed	closed	5	100.0	5	100.0	closed	closed	5	100.0
Total	Camper	0	0.0	1	20.0	1	16.7	9	40.9	3	33.3	12	38.7	9	39.1	4	28.6	13	35.1
	Motorized boater	0	0.0	3	60.0	3	50.0	6	27.3	3	33.3	9	29.0	6	26.1	6	42.9	12	32.4
	Vehicle Use	0	0.0	0	0.0	0	0.0	1	4.5	0	0.0	1	3.2	1	4.3	0	0.0	1	2.7
	Other	0	0.0	0	0.0	0	0.0	1	4.5	1	11.1	2	6.5	1	4.3	1	7.1	2	5.4
	Jet skier	1	100.0	0	0.0	1	16.7	2	9.1	2	22.2	4	12.9	3	13.0	2	14.3	5	13.5
	Hiker	0	0.0	0	0.0	0	0.0	1	4.5	0	0.0	1	3.2	1	4.3	0	0.0	1	2.7
	No response	0	0.0	1	20.0	1	16.7	2	9.1	0	0.0	2	6.5	2	8.7	1	7.1	3	8.1
	Total	1	100.0	5	100.0	6	100.0	22	100.0	9	100.0	31	100.0	23	100.0	14	100.0	37	100.0

Question 18c: If you experienced conflict, please check the reasons that contributed to the conflict?

Recreation Area	Reason	Day-use						Overnight						All Visitors					
		Peak Season		Off Peak Season		Overall		Peak Season		Off Peak Season		Overall		Peak Season		Off Peak Season		Overall	
		#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%
NSRA	Proximity	0	0.0	2	50.0	2	40.0	5	20.0	2	28.6	7	21.9	5	19.2	4	36.4	9	24.3
	Rowdiness	0	0.0	0	0.0	0	0.0	6	24.0	1	14.3	7	21.9	6	23.1	1	9.1	7	18.9
	Loudness	0	0.0	2	50.0	2	40.0	10	40.0	3	42.9	13	40.6	10	38.5	5	45.5	15	40.5
	Other	1	100.0	0	0.0	1	20.0	4	16.0	1	14.3	5	15.6	5	19.2	1	9.1	6	16.2
	Total	1	100.0	4	100.0	5	100.0	25	100.0	7	100.0	32	100.0	26	100.0	11	100.0	37	100.0
SSRA	Proximity	0	0.0	closed	closed	0	0.0	3	60.0	closed	closed	3	60.0	3	60.0	closed	closed	3	60.0
	Rowdiness	0	0.0	closed	closed	0	0.0	1	20.0	closed	closed	1	20.0	1	20.0	closed	closed	1	20.0
	Loudness	0	0.0	closed	closed	0	0.0	1	20.0	closed	closed	1	20.0	1	20.0	closed	closed	1	20.0
	Other	0	0.0	closed	closed	0	0.0	0	0.0	closed	closed	0	0.0	0	0.0	closed	closed	0	0.0
	Total	0	0.0	closed	closed	0	0.0	5	100.0	closed	closed	5	100.0	5	100.0	closed	closed	5	100.0
Total	Proximity	0	0.0	2	50.0	2	40.0	8	26.7	2	28.6	10	27.0	8	25.8	4	36.4	12	28.6
	Rowdiness	0	0.0	0	0.0	0	0.0	7	23.3	1	14.3	8	21.6	7	22.6	1	9.1	8	19.0
	Loudness	0	0.0	2	50.0	2	40.0	11	36.7	3	42.9	14	37.8	11	35.5	5	45.5	16	38.1
	Other	1	100.0	0	0.0	1	20.0	4	13.3	1	14.3	5	13.5	5	16.1	1	9.1	6	14.3
	Total	1	100.0	4	100.0	5	100.0	30	100.0	7	100.0	37	100.0	31	100.0	11	100.0	42	100.0

Question 19a: Are there any places in this recreation area where you feel unsafe?

Recreat-ion Area	Response	Day-use Visitors						Overnight Visitors						All Visitors					
		Peak Season		Off Peak Season		Overall		Peak Season		Off Peak Season		Overall		Peak Season		Off Peak Season		Overall	
		#		#		#		#		#		#		#		#		#	
NSRA	Yes	2	5.3	9	9.8	11	8.5	7	5.8	5	8.6	12	6.7	9	5.7	14	9.3	23	7.4
	No	35	92.1	74	80.4	109	83.8	112	92.6	50	86.2	162	90.5	147	92.5	124	82.7	271	87.7
	No response	1	2.6	9	9.8	10	7.7	2	1.7	3	5.2	5	2.8	3	1.9	12	8.0	15	4.9
	Total	38	100.0	92	100.0	130	100.0	121	100.0	58	100.0	179	100.0	159	100.0	150	100.0	309	100.0
SSRA	Yes	0	0.0	closed	closed	0	0.0	3	10.0	closed	closed	3	10.0	3	7.5	closed	closed	3	7.5
	No	10	100.0	closed	closed	10	100.0	25	83.3	closed	closed	25	83.3	35	87.5	closed	closed	35	87.5
	No response	0	0.0	closed	closed	0	0.0	2	6.7	closed	closed	2	6.7	2	5.0	closed	closed	2	5.0
	Total	10	100.0	closed	closed	10	100.0	30	100.0	closed	closed	30	100.0	40	100.0	closed	closed	40	100.0
Total	Yes	2	4.2	9	9.8	11	7.9	10	6.6	5	8.6	15	7.2	12	6.0	14	9.3	26	7.4
	No	45	93.8	74	80.4	119	85.0	137	90.7	50	86.2	187	89.5	182	91.5	124	82.7	306	87.7
	No response	1	2.1	9	9.8	10	7.1	4	2.6	3	5.2	7	3.3	5	2.5	12	8.0	17	4.9
	Total	48	100.0	92	100.0	140	100.0	151	100.0	58	100.0	209	100.0	199	100.0	150	100.0	349	100.0

Question 19b: If you felt unsafe, please identify the location where you felt unsafe?

Recreation Area	Reason for Feeling Unsafe (categorized)	Day-use			Overnight			All Visitors		
		Peak Season	Off Peak Season	Overall	Peak Season	Off Peak Season	Overall	Peak Season	Off Peak Season	Overall
		#	#	#	#	#	#	#	#	#
NSRA	Boat ramp/courtesy dock congestion	0	1	1	0	1	1	0	2	2
	Busy/congested shoreline areas	0	0	0	1	0	1	1	0	1
	High water/current near dam	0	1	1	0	0	0	0	1	1
	Rude human behavior	0	0	0	1	0	1	1	0	1
	Low water levels/hazards	2	1	3	0	1	1	2	2	4
	Other	0	1	1	2	0	2	2	1	3
	Presence/behavior of boaters and/or jet skiers	0	1	1	0	2	2	0	3	3
	Restroom conditions	0	0	0	1	0	1	1	0	1
	Road conditions	0	1	1	1	0	1	1	1	2
	Speeding vehicles	0	0	0	1	1	2	1	1	2
	Unleashed dogs	0	1	1	0	0	0	0	1	1
	Unsafe boating within 200 ft of shoreline/boat ramps	0	1	1	0	0	0	0	1	1
	No response	1	10	11	2	3	5	3	13	16
	Total	3	18	21	9	8	17	12	26	38
SSRA	Presence/behavior of boaters and jet skiers	0	closed	0	2	closed	2	2	closed	2
	Restroom conditions	0	closed	0	1	closed	1	1	closed	1
	No response	0	closed	0	2	closed	2	2	closed	2
	Total	0	closed	0	5	closed	5	5	closed	5

Question 20a: Please rate the acceptability of the CAMPSITES at this recreation area today.

Existing Facility	Recreat-ion Area	Acceptability Rating	Day-use Visitors						Overnight Visitors						All Visitors					
			Peak Season		Off Peak Season		Overall		Peak Season		Off Peak Season		Overall		Peak Season		Off Peak Season		Overall	
			#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%
Campsites	NSRA	Unacceptable	0	0.0	0	0.0	0	0.0	1	0.8	1	1.7	2	1.1	1	0.6	1	0.7	2	0.6
		Slightly Unacceptable	0	0.0	0	0.0	0	0.0	1	0.8	1	1.7	2	1.1	1	0.6	1	0.7	2	0.6
		Neither	0	0.0	1	1.1	1	0.8	2	1.7	2	3.4	4	2.2	2	1.3	3	2.0	5	1.6
		Slightly Acceptable	7	18.4	2	2.2	9	6.9	25	20.7	9	15.5	34	19.0	32	20.1	11	7.3	43	13.9
		Acceptable	12	31.6	29	31.5	41	31.5	77	63.6	44	75.9	121	67.6	89	56.0	73	48.7	162	52.4
		No response/opinion	19	50.0	60	65.2	79	60.8	15	12.4	1	1.7	16	8.9	34	21.4	61	40.7	95	30.7
		Total	38	100.0	92	100.0	130	100.0	121	100.0	58	100.0	179	100.0	159	100.0	150	100.0	309	100.0
	SSRA	Unacceptable	0	0.0	closed	closed	0	0.0	1	3.3	closed	closed	1	3.3	1	2.5	closed	closed	1	2.5
		Slightly Unacceptable	1	10.0	closed	closed	1	10.0	0	0.0	closed	closed	0	0.0	1	2.5	closed	closed	1	2.5
		Neither	0	0.0	closed	closed	0	0.0	2	6.7	closed	closed	2	6.7	2	5.0	closed	closed	2	5.0
		Slightly Acceptable	0	0.0	closed	closed	0	0.0	5	16.7	closed	closed	5	16.7	5	12.5	closed	closed	5	12.5
		Acceptable	4	40.0	closed	closed	4	40.0	20	66.7	closed	closed	20	66.7	24	60.0	closed	closed	24	60.0
		No response/opinion	5	50.0	closed	closed	5	50.0	2	6.7	closed	closed	2	6.7	7	17.5	closed	closed	7	17.5
		Total	10	100.0	closed	closed	10	100.0	30	100.0	closed	closed	30	100.0	40	100.0	closed	closed	40	100.0
	Total	Unacceptable	0	0.0	0	0.0	0	0.0	2	1.3	1	1.7	3	1.4	2	1.0	1	0.7	3	0.9
		Slightly Unacceptable	1	2.1	0	0.0	1	0.7	1	0.7	1	1.7	2	1.0	2	1.0	1	0.7	3	0.9
		Neither	0	0.0	1	1.1	1	0.7	4	2.6	2	3.4	6	2.9	4	2.0	3	2.0	7	2.0
		Slightly Acceptable	7	14.6	2	2.2	9	6.4	30	19.9	9	15.5	39	18.7	37	18.6	11	7.3	48	13.8
		Acceptable	16	33.3	29	31.5	45	32.1	97	64.2	44	75.9	141	67.5	113	56.8	73	48.7	186	53.3
		No response/opinion	24	50.0	60	65.2	84	60.0	17	11.3	1	1.7	18	8.6	41	20.6	61	40.7	102	29.2
		Total	48	100.0	92	100.0	140	100.0	151	100.0	58	100.0	209	100.0	199	100.0	150	100.0	349	100.0

Question 20a: Please rate the acceptability of the PICNIC SITES at this recreation area today.

Existing Facility	Recreat-ion Area	Acceptability Rating	Day-use Visitors						Overnight Visitors						All Visitors					
			Peak Season		Off Peak Season		Overall		Peak Season		Off Peak Season		Overall		Peak Season		Off Peak Season		Overall	
			#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%
Picnic sites	NSRA	Unacceptable	1	2.6	0	0.0	1	0.8	0	0.0	0	0.0	0	0.0	1	0.6	0	0.0	1	0.3
		Slightly Unacceptable	0	0.0	2	2.2	2	1.5	1	0.8	0	0.0	1	0.6	1	0.6	2	1.3	3	1.0
		Neither	0	0.0	3	3.3	3	2.3	8	6.6	5	8.6	13	7.3	8	5.0	8	5.3	16	5.2
		Slightly Acceptable	2	5.3	7	7.6	9	6.9	16	13.2	14	24.1	30	16.8	18	11.3	21	14.0	39	12.6
		Acceptable	17	44.7	29	31.5	46	35.4	57	47.1	36	62.1	93	52.0	74	46.5	65	43.3	139	45.0
		No response/opinion	18	47.4	51	55.4	69	53.1	39	32.2	3	5.2	42	23.5	57	35.8	54	36.0	111	35.9
		Total	38	100.0	92	100.0	130	100.0	121	100.0	58	100.0	179	100.0	159	100.0	150	100.0	309	100.0
	SSRA	Unacceptable	0	0.0	closed	closed	0	0.0	1	3.3	closed	closed	1	3.3	1	2.5	closed	closed	1	2.5
		Slightly Unacceptable	1	10.0	closed	closed	1	10.0	2	6.7	closed	closed	2	6.7	3	7.5	closed	closed	3	7.5
		Neither	0	0.0	closed	closed	0	0.0	4	13.3	closed	closed	4	13.3	4	10.0	closed	closed	4	10.0
		Slightly Acceptable	0	0.0	closed	closed	0	0.0	3	10.0	closed	closed	3	10.0	3	7.5	closed	closed	3	7.5
		Acceptable	5	50.0	closed	closed	5	50.0	7	23.3	closed	closed	7	23.3	12	30.0	closed	closed	12	30.0
		No response/opinion	4	40.0	closed	closed	4	40.0	13	43.3	closed	closed	13	43.3	17	42.5	closed	closed	17	42.5
		Total	10	100.0	closed	closed	10	100.0	30	100.0	closed	closed	30	100.0	40	100.0	closed	closed	40	100.0
	Total	Unacceptable	1	2.1			1	0.7	1	0.7			1	0.5	2	1.0			2	0.6
		Slightly Unacceptable	1	2.1	2	2.2	3	2.1	3	2.0	0	0.0	3	1.4	4	2.0	2	1.3	6	1.7
		Neither	0	0.0	3	3.3	3	2.1	12	7.9	5	8.6	17	8.1	12	6.0	8	5.3	20	5.7
		Slightly Acceptable	2	4.2	7	7.6	9	6.4	19	12.6	14	24.1	33	15.8	21	10.6	21	14.0	42	12.0
		Acceptable	22	45.8	29	31.5	51	36.4	64	42.4	36	62.1	100	47.8	86	43.2	65	43.3	151	43.3
		No response/opinion	22	45.8	51	55.4	73	52.1	52	34.4	3	5.2	55	26.3	74	37.2	54	36.0	128	36.7
		Total	48	100.0	92	100.0	140	100.0	151	100.0	58	100.0	209	100.0	199	100.0	150	100.0	349	100.0

Question 20a: Please rate the acceptability of the RESTROOMS at this recreation area today.

Existing Facility	Recreat-ion Area	Acceptability Rating	Day-use Visitors						Overnight Visitors						All Visitors					
			Peak Season		Off Peak Season		Overall		Peak Season		Off Peak Season		Overall		Peak Season		Off Peak Season		Overall	
			#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%
Restroom	NSRA	Unacceptable	0	0.0	5	5.4	5	3.8	13	10.7	8	13.8	21	11.7	13	8.2	13	8.7	26	8.4
		Slightly Unacceptable	7	18.4	9	9.8	16	12.3	20	16.5	8	13.8	28	15.6	27	17.0	17	11.3	44	14.2
		Neither	2	5.3	4	4.3	6	4.6	6	5.0	5	8.6	11	6.1	8	5.0	9	6.0	17	5.5
		Slightly Acceptable	4	10.5	10	10.9	14	10.8	33	27.3	12	20.7	45	25.1	37	23.3	22	14.7	59	19.1
		Acceptable	24	63.2	44	47.8	68	52.3	42	34.7	21	36.2	63	35.2	66	41.5	65	43.3	131	42.4
		No response/opinion	1	2.6	20	21.7	21	16.2	7	5.8	4	6.9	11	6.1	8	5.0	24	16.0	32	10.4
		Total	38	100.0	92	100.0	130	100.0	121	100.0	58	100.0	179	100.0	159	100.0	150	100.0	309	100.0
	SSRA	Unacceptable	1	10.0	closed	closed	1	10.0	6	20.0	closed	closed	6	20.0	7	17.5	closed	closed	7	17.5
		Slightly Unacceptable	2	20.0	closed	closed	2	20.0	9	30.0	closed	closed	9	30.0	11	27.5	closed	closed	11	27.5
		Neither	0	0.0	closed	closed	0	0.0	1	3.3	closed	closed	1	3.3	1	2.5	closed	closed	1	2.5
		Slightly Acceptable	2	20.0	closed	closed	2	20.0	7	23.3	closed	closed	7	23.3	9	22.5	closed	closed	9	22.5
		Acceptable	5	50.0	closed	closed	5	50.0	7	23.3	closed	closed	7	23.3	12	30.0	closed	closed	12	30.0
		No response/opinion	0	0.0	closed	closed	0	0.0	0	0.0	closed	closed	0	0.0	0	0.0	closed	closed	0	0.0
		Total	10	100.0	closed	closed	10	100.0	30	100.0	closed	closed	30	100.0	40	100.0	closed	closed	40	100.0
	Total	Unacceptable	1	2.1	5	5.4	6	4.3	19	12.6	8	13.8	27	12.9	20	10.1	13	8.7	33	9.5
		Slightly Unacceptable	9	18.8	9	9.8	18	12.9	29	19.2	8	13.8	37	17.7	38	19.1	17	11.3	55	15.8
		Neither	2	4.2	4	4.3	6	4.3	7	4.6	5	8.6	12	5.7	9	4.5	9	6.0	18	5.2
		Slightly Acceptable	6	12.5	10	10.9	16	11.4	40	26.5	12	20.7	52	24.9	46	23.1	22	14.7	68	19.5
		Acceptable	29	60.4	44	47.8	73	52.1	49	32.5	21	36.2	70	33.5	78	39.2	65	43.3	143	41.0
		No response/opinion	1	2.1	20	21.7	21	15.0	7	4.6	4	6.9	11	5.3	8	4.0	24	16.0	32	9.2
		Total	48	100.0	92	100.0	140	100.0	151	100.0	58	100.0	209	100.0	199	100.0	150	100.0	349	100.0

Question 20a: Please rate the acceptability of the POTABLE WATER at this recreation area today.

Existing Facility	Recreat-ion Area	Acceptability Rating	Day-use Visitors						Overnight Visitors						All Visitors					
			Peak Season		Off Peak Season		Overall		Peak Season		Off Peak Season		Overall		Peak Season		Off Peak Season		Overall	
			#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%
Potable Water	NSRA	Unacceptable	1	2.6	6	6.5	7	5.4	14	11.6	10	17.2	24	13.4	15	9.4	16	10.7	31	10.0
		Slightly Unacceptable	1	2.6	4	4.3	5	3.8	11	9.1	1	1.7	12	6.7	12	7.5	5	3.3	17	5.5
		Neither	3	7.9	12	13.0	15	11.5	7	5.8	8	13.8	15	8.4	10	6.3	20	13.3	30	9.7
		Slightly Acceptable	0	0.0	5	5.4	5	3.8	17	14.0	5	8.6	22	12.3	17	10.7	10	6.7	27	8.7
		Acceptable	8	21.1	12	13.0	20	15.4	25	20.7	21	36.2	46	25.7	33	20.8	33	22.0	66	21.4
		No response/opinion	25	65.8	53	57.6	78	60.0	47	38.8	13	22.4	60	33.5	72	45.3	66	44.0	138	44.7
		Total	38	100.0	92	100.0	130	100.0	121	100.0	58	100.0	179	100.0	159	100.0	150	100.0	309	100.0
	SSRA	Unacceptable	0	0.0	closed	closed	0	0.0	6	20.0	closed	closed	6	20.0	6	15.0	closed	closed	6	15.0
		Slightly Unacceptable	2	20.0	closed	closed	2	20.0	5	16.7	closed	closed	5	16.7	7	17.5	closed	closed	7	17.5
		Neither	2	20.0	closed	closed	2	20.0	7	23.3	closed	closed	7	23.3	9	22.5	closed	closed	9	22.5
		Slightly Acceptable	2	20.0	closed	closed	2	20.0	2	6.7	closed	closed	2	6.7	4	10.0	closed	closed	4	10.0
		Acceptable	2	20.0	closed	closed	2	20.0	2	6.7	closed	closed	2	6.7	4	10.0	closed	closed	4	10.0
		No response/opinion	2	20.0	closed	closed	2	20.0	8	26.7	closed	closed	8	26.7	10	25.0	closed	closed	10	25.0
		Total	10	100.0	closed	closed	10	100.0	30	100.0	closed	closed	30	100.0	40	100.0	closed	closed	40	100.0
	Total	Unacceptable	1	2.1	6	6.5	7	5.0	20	13.2	10	17.2	30	14.4	21	10.6	16	10.7	37	10.6
		Slightly Unacceptable	3	6.3	4	4.3	7	5.0	16	10.6	1	1.7	17	8.1	19	9.5	5	3.3	24	6.9
		Neither	5	10.4	12	13.0	17	12.1	14	9.3	8	13.8	22	10.5	19	9.5	20	13.3	39	11.2
		Slightly Acceptable	2	4.2	5	5.4	7	5.0	19	12.6	5	8.6	24	11.5	21	10.6	10	6.7	31	8.9
		Acceptable	10	20.8	12	13.0	22	15.7	27	17.9	21	36.2	48	23.0	37	18.6	33	22.0	70	20.1
		No response/opinion	27	56.3	53	57.6	80	57.1	55	36.4	13	22.4	68	32.5	82	41.2	66	44.0	148	42.4
		Total	48	100.0	92	100.0	140	100.0	151	100.0	58	100.0	209	100.0	199	100.0	150	100.0	349	100.0

Question 20a: Please rate the acceptability of the PARKING AREAS at this recreation area today.

Existing Facility	Recreat-ion Area	Acceptability Rating	Day-use Visitors						Overnight Visitors						All Visitors					
			Peak Season		Off Peak Season		Overall		Peak Season		Off Peak Season		Overall		Peak Season		Off Peak Season		Overall	
			#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%
Parking Areas	NSRA	Unacceptable	1	2.6	0	0.0	1	0.8	0	0.0	1	1.7	1	0.6	1	0.6	1	0.7	2	0.6
		Slightly Unacceptable	1	2.6	2	2.2	3	2.3	2	1.7	0	0.0	2	1.1	3	1.9	2	1.3	5	1.6
		Neither	0	0.0	2	2.2	2	1.5	8	6.6	5	8.6	13	7.3	8	5.0	7	4.7	15	4.9
		Slightly Acceptable	6	15.8	8	8.7	14	10.8	20	16.5	7	12.1	27	15.1	26	16.4	15	10.0	41	13.3
		Acceptable	28	73.7	77	83.7	105	80.8	78	64.5	43	74.1	121	67.6	106	66.7	120	80.0	226	73.1
		No response/opinion	2	5.3	3	3.3	5	3.8	13	10.7	2	3.4	15	8.4	15	9.4	5	3.3	20	6.5
		Total	38	100.0	92	100.0	130	100.0	121	100.0	58	100.0	179	100.0	159	100.0	150	100.0	309	100.0
	SSRA	Unacceptable	0	0.0	closed	closed	0	0.0	0	0.0	closed	closed	0	0.0	0	0.0	closed	closed	0	0.0
		Slightly Unacceptable	0	0.0	closed	closed	0	0.0	0	0.0	closed	closed	0	0.0	0	0.0	closed	closed	0	0.0
		Neither	0	0.0	closed	closed	0	0.0	6	20.0	closed	closed	6	20.0	6	15.0	closed	closed	6	15.0
		Slightly Acceptable	3	30.0	closed	closed	3	30.0	9	30.0	closed	closed	9	30.0	12	30.0	closed	closed	12	30.0
		Acceptable	6	60.0	closed	closed	6	60.0	13	43.3	closed	closed	13	43.3	19	47.5	closed	closed	19	47.5
		No response/opinion	1	10.0	closed	closed	1	10.0	2	6.7	closed	closed	2	6.7	3	7.5	closed	closed	3	7.5
		Total	10	100.0	closed	closed	10	100.0	30	100.0	closed	closed	30	100.0	40	100.0	closed	closed	40	100.0
	Total	Unacceptable	1	2.1	0	0.0	1	0.7	0	0.0	1	1.7	1	0.5	1	0.5	1	0.7	2	0.6
		Slightly Unacceptable	1	2.1	2	2.2	3	2.1	2	1.3	0	0.0	2	1.0	3	1.5	2	1.3	5	1.4
		Neither	0	0.0	2	2.2	2	1.4	14	9.3	5	8.6	19	9.1	14	7.0	7	4.7	21	6.0
		Slightly Acceptable	9	18.8	8	8.7	17	12.1	29	19.2	7	12.1	36	17.2	38	19.1	15	10.0	53	15.2
		Acceptable	34	70.8	77	83.7	111	79.3	91	60.3	43	74.1	134	64.1	125	62.8	120	80.0	245	70.2
		No response/opinion	3	6.3	3	3.3	6	4.3	15	9.9	2	3.4	17	8.1	18	9.0	5	3.3	23	6.6
		Total	48	100.0	92	100.0	140	100.0	151	100.0	58	100.0	209	100.0	199	100.0	150	100.0	349	100.0

Question 20a: Please rate the acceptability of the BOAT RAMP at this recreation area today.

Existing Facility	Recreation Area	Acceptability Rating	Day-use Visitors						Overnight Visitors						All Visitors					
			Peak Season		Off Peak Season		Overall		Peak Season		Off Peak Season		Overall		Peak Season		Off Peak Season		Overall	
			#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%
Boat Ramp	NSRA	Unacceptable	0	0.0	5	5.4	5	3.8	0	0.0	0	0.0	0	0.0	0	0.0	5	3.3	5	1.6
		Slightly Unacceptable	1	2.6	4	4.3	5	3.8	1	0.8	0	0.0	1	0.6	2	1.3	4	2.7	6	1.9
		Neither	1	2.6	4	4.3	5	3.8	10	8.3	8	13.8	18	10.1	11	6.9	12	8.0	23	7.4
		Slightly Acceptable	6	15.8	6	6.5	12	9.2	10	8.3	5	8.6	15	8.4	16	10.1	11	7.3	27	8.7
		Acceptable	20	52.6	59	64.1	79	60.8	46	38.0	25	43.1	71	39.7	66	41.5	84	56.0	150	48.5
		No response/opinion	10	26.3	14	15.2	24	18.5	54	44.6	20	34.5	74	41.3	64	40.3	34	22.7	98	31.7
		Total	38	100.0	92	100.0	130	100.0	121	100.0	58	100.0	179	100.0	159	100.0	150	100.0	309	100.0
	SSRA	Unacceptable	0	0.0	closed	closed	0	0.0	0	0.0	closed	closed	0	0.0	0	0.0	closed	closed	0	0.0
		Slightly Unacceptable	0	0.0	closed	closed	0	0.0	0	0.0	closed	closed	0	0.0	0	0.0	closed	closed	0	0.0
		Neither	0	0.0	closed	closed	0	0.0	2	6.7	closed	closed	2	6.7	2	5.0	closed	closed	2	5.0
		Slightly Acceptable	3	30.0	closed	closed	3	30.0	11	36.7	closed	closed	11	36.7	14	35.0	closed	closed	14	35.0
		Acceptable	4	40.0	closed	closed	4	40.0	6	20.0	closed	closed	6	20.0	10	25.0	closed	closed	10	25.0
		No response/opinion	3	30.0	closed	closed	3	30.0	11	36.7	closed	closed	11	36.7	14	35.0	closed	closed	14	35.0
		Total	10	100.0	closed	closed	10	100.0	30	100.0	closed	closed	30	100.0	40	100.0	closed	closed	40	100.0
	Total	Unacceptable	0	0.0	5	5.4	5	3.6	0	0.0	0	0.0	0	0.0	0	0.0	5	3.3	5	1.4
		Slightly Unacceptable	1	2.1	4	4.3	5	3.6	1	0.7	0	0.0	1	0.5	2	1.0	4	2.7	6	1.7
		Neither	1	2.1	4	4.3	5	3.6	12	7.9	8	13.8	20	9.6	13	6.5	12	8.0	25	7.2
		Slightly Acceptable	9	18.8	6	6.5	15	10.7	21	13.9	5	8.6	26	12.4	30	15.1	11	7.3	41	11.7
		Acceptable	24	50.0	59	64.1	83	59.3	52	34.4	25	43.1	77	36.8	76	38.2	84	56.0	160	45.8
		No response/opinion	13	27.1	14	15.2	27	19.3	65	43.0	20	34.5	85	40.7	78	39.2	34	22.7	112	32.1
		Total	48	100.0	92	100.0	140	100.0	151	100.0	58	100.0	209	100.0	199	100.0	150	100.0	349	100.0

Question 20a: Please rate the acceptability of the ROADS at this recreation area today.

Existing Facility	Recreat-ion Area	Acceptability Rating	Day-use Visitors						Overnight Visitors						All Visitors					
			Peak Season		Off Peak Season		Overall		Peak Season		Off Peak Season		Overall		Peak Season		Off Peak Season		Overall	
			#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%
Roads within the Recreation Area	NSRA	Unacceptable	0	0.0	3	3.3	3	2.3	2	1.7	1	1.7	3	1.7	2	1.3	4	2.7	6	1.9
		Slightly Unacceptable	1	2.6	7	7.6	8	6.2	11	9.1	4	6.9	15	8.4	12	7.5	11	7.3	23	7.4
		Neither	7	18.4	2	2.2	9	6.9	11	9.1	9	15.5	20	11.2	18	11.3	11	7.3	29	9.4
		Slightly Acceptable	3	7.9	25	27.2	28	21.5	26	21.5	14	24.1	40	22.3	29	18.2	39	26.0	68	22.0
		Acceptable	24	63.2	52	56.5	76	58.5	67	55.4	27	46.6	94	52.5	91	57.2	79	52.7	170	55.0
		No response/opinion	3	7.9	3	3.3	6	4.6	4	3.3	3	5.2	7	3.9	7	4.4	6	4.0	13	4.2
		Total	38	100.0	92	100.0	130	100.0	121	100.0	58	100.0	179	100.0	159	100.0	150	100.0	309	100.0
	SSRA	Unacceptable	0	0.0	closed	closed	0	0.0	1	3.3	closed	closed	1	3.3	1	2.5	closed	closed	1	2.5
		Slightly Unacceptable	0	0.0	closed	closed	0	0.0	1	3.3	closed	closed	1	3.3	1	2.5	closed	closed	1	2.5
		Neither	1	10.0	closed	closed	1	10.0	4	13.3	closed	closed	4	13.3	5	12.5	closed	closed	5	12.5
		Slightly Acceptable	4	40.0	closed	closed	4	40.0	7	23.3	closed	closed	7	23.3	11	27.5	closed	closed	11	27.5
		Acceptable	5	50.0	closed	closed	5	50.0	17	56.7	closed	closed	17	56.7	22	55.0	closed	closed	22	55.0
		No response/opinion	0	0.0	closed	closed	0	0.0	0	0.0	closed	closed	0	0.0	0	0.0	closed	closed	0	0.0
		Total	10	100.0	closed	closed	10	100.0	30	100.0	closed	closed	30	100.0	40	100.0	closed	closed	40	100.0
	Total	Unacceptable	0	0.0	3	3.3	3	2.1	3	2.0	1	1.7	4	1.9	3	1.5	4	2.7	7	2.0
		Slightly Unacceptable	1	2.1	7	7.6	8	5.7	12	7.9	4	6.9	16	7.7	13	6.5	11	7.3	24	6.9
		Neither	8	16.7	2	2.2	10	7.1	15	9.9	9	15.5	24	11.5	23	11.6	11	7.3	34	9.7
		Slightly Acceptable	7	14.6	25	27.2	32	22.9	33	21.9	14	24.1	47	22.5	40	20.1	39	26.0	79	22.6
		Acceptable	29	60.4	52	56.5	81	57.9	84	55.6	27	46.6	111	53.1	113	56.8	79	52.7	192	55.0
		No response/opinion	3	6.3	3	3.3	6	4.3	4	2.6	3	5.2	7	3.3	7	3.5	6	4.0	13	3.7
		Total	48	100.0	92	100.0	140	100.0	151	100.0	58	100.0	209	100.0	199	100.0	150	100.0	349	100.0

Question 20a: Please rate the acceptability of the FOOT TRAILS AROUND THE SHORELINE at this recreation area today.

Existing Facility	Recreat-ion Area	Acceptability Rating	Day-use Visitors						Overnight Visitors						All Visitors					
			Peak Season		Off Peak Season		Overall		Peak Season		Off Peak Season		Overall		Peak Season		Off Peak Season		Overall	
			#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%
Foot Trails around the Shoreline	NSRA	Unacceptable	1	2.6	1	1.1	2	1.5	0	0.0	1	1.7	1	0.6	1	0.6	2	1.3	3	1.0
		Slightly Unacceptable	2	5.3	4	4.3	6	4.6	2	1.7	2	3.4	4	2.2	4	2.5	6	4.0	10	3.2
		Neither	2	5.3	7	7.6	9	6.9	14	11.6	11	19.0	25	14.0	16	10.1	18	12.0	34	11.0
		Slightly Acceptable	0	0.0	12	13.0	12	9.2	20	16.5	11	19.0	31	17.3	20	12.6	23	15.3	43	13.9
		Acceptable	14	36.8	25	27.2	39	30.0	61	50.4	26	44.8	87	48.6	75	47.2	51	34.0	126	40.8
		No response/opinion	19	50.0	43	46.7	62	47.7	24	19.8	7	12.1	31	17.3	43	27.0	50	33.3	93	30.1
		Total	38	100.0	92	100.0	130	100.0	121	100.0	58	100.0	179	100.0	159	100.0	150	100.0	309	100.0
	SSRA	Unacceptable	0	0.0	closed	closed	0	0.0	1	3.3	closed	closed	1	3.3	1	2.5	closed	closed	1	2.5
		Slightly Unacceptable	0	0.0	closed	closed	0	0.0	0	0.0	closed	closed	0	0.0	0	0.0	closed	closed	0	0.0
		Neither	0	0.0	closed	closed	0	0.0	5	16.7	closed	closed	5	16.7	5	12.5	closed	closed	5	12.5
		Slightly Acceptable	3	30.0	closed	closed	3	30.0	4	13.3	closed	closed	4	13.3	7	17.5	closed	closed	7	17.5
		Acceptable	4	40.0	closed	closed	4	40.0	15	50.0	closed	closed	15	50.0	19	47.5	closed	closed	19	47.5
		No response/opinion	3	30.0	closed	closed	3	30.0	5	16.7	closed	closed	5	16.7	8	20.0	closed	closed	8	20.0
		Total	10	100.0	closed	closed	10	100.0	30	100.0	closed	closed	30	100.0	40	100.0	closed	closed	40	100.0
	Total	Unacceptable	1	2.1	1	1.1	2	1.4	1	0.7	1	1.7	2	1.0	2	1.0	2	1.3	4	1.1
		Slightly Unacceptable	2	4.2	4	4.3	6	4.3	2	1.3	2	3.4	4	1.9	4	2.0	6	4.0	10	2.9
		Neither	2	4.2	7	7.6	9	6.4	19	12.6	11	19.0	30	14.4	21	10.6	18	12.0	39	11.2
		Slightly Acceptable	3	6.3	12	13.0	15	10.7	24	15.9	11	19.0	35	16.7	27	13.6	23	15.3	50	14.3
		Acceptable	18	37.5	25	27.2	43	30.7	76	50.3	26	44.8	102	48.8	94	47.2	51	34.0	145	41.5
		No response/opinion	22	45.8	43	46.7	65	46.4	29	19.2	7	12.1	36	17.2	51	25.6	50	33.3	101	28.9
		Total	48	100.0	92	100.0	140	100.0	151	100.0	58	100.0	209	100.0	199	100.0	150	100.0	349	100.0

Question 20a: Please rate the acceptability of the SIGNAGE at this recreation area today.

Existing Facility	Recreat-ion Area	Acceptability Rating	Day-use Visitors						Overnight Visitors						All Visitors					
			Peak Season		Off Peak Season		Overall		Peak Season		Off Peak Season		Overall		Peak Season		Off Peak Season		Overall	
			#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%
Signage within the Recreation Area	NSRA	Unacceptable	1	2.6	0	0.0	1	0.8	1	0.8	2	3.4	3	1.7	2	1.3	2	1.3	4	1.3
		Slightly Unacceptable	0	0.0	3	3.3	3	2.3	7	5.8	2	3.4	9	5.0	7	4.4	5	3.3	12	3.9
		Neither	1	2.6	10	10.9	11	8.5	12	9.9	9	15.5	21	11.7	13	8.2	19	12.7	32	10.4
		Slightly Acceptable	2	5.3	9	9.8	11	8.5	24	19.8	11	19.0	35	19.6	26	16.4	20	13.3	46	14.9
		Acceptable	29	76.3	60	65.2	89	68.5	68	56.2	33	56.9	101	56.4	97	61.0	93	62.0	190	61.5
		No response/opinion	5	13.2	10	10.9	15	11.5	9	7.4	1	1.7	10	5.6	14	8.8	11	7.3	25	8.1
		Total	38	100.0	92	100.0	130	100.0	121	100.0	58	100.0	179	100.0	159	100.0	150	100.0	309	100.0
	SSRA	Unacceptable	0	0.0	closed	closed	0	0.0	1	3.3	closed	closed	1	3.3	1	2.5	closed	closed	1	2.5
		Slightly Unacceptable	0	0.0	closed	closed	0	0.0	2	6.7	closed	closed	2	6.7	2	5.0	closed	closed	2	5.0
		Neither	0	0.0	closed	closed	0	0.0	5	16.7	closed	closed	5	16.7	5	12.5	closed	closed	5	12.5
		Slightly Acceptable	4	40.0	closed	closed	4	40.0	7	23.3	closed	closed	7	23.3	11	27.5	closed	closed	11	27.5
		Acceptable	5	50.0	closed	closed	5	50.0	15	50.0	closed	closed	15	50.0	20	50.0	closed	closed	20	50.0
		No response/opinion	1	10.0	closed	closed	1	10.0	0	0.0	closed	closed	0	0.0	1	2.5	closed	closed	1	2.5
		Total	10	100.0	closed	closed	10	100.0	30	100.0	closed	closed	30	100.0	40	100.0	closed	closed	40	100.0
	Total	Unacceptable	1	2.1	0	0.0	1	0.7	2	1.3	2	3.4	4	1.9	3	1.5	2	1.3	5	1.4
		Slightly Unacceptable	0	0.0	3	3.3	3	2.1	9	6.0	2	3.4	11	5.3	9	4.5	5	3.3	14	4.0
		Neither	1	2.1	10	10.9	11	7.9	17	11.3	9	15.5	26	12.4	18	9.0	19	12.7	37	10.6
		Slightly Acceptable	6	12.5	9	9.8	15	10.7	31	20.5	11	19.0	42	20.1	37	18.6	20	13.3	57	16.3
		Acceptable	34	70.8	60	65.2	94	67.1	83	55.0	33	56.9	116	55.5	117	58.8	93	62.0	210	60.2
		No response/opinion	6	12.5	10	10.9	16	11.4	9	6.0	1	1.7	10	4.8	15	7.5	11	7.3	26	7.4
		Total	48	100.0	92	100.0	140	100.0	151	100.0	58	100.0	209	100.0	199	100.0	150	100.0	349	100.0

Question 20a: Please rate the acceptability of the RECREATION VISITOR INFORMATION at this recreation area today.

Existing Facility	Recreat-ion Area	Acceptability Rating	Day-use Visitors						Overnight Visitors						All Visitors					
			Peak Season		Off Peak Season		Overall		Peak Season		Off Peak Season		Overall		Peak Season		Off Peak Season		Overall	
			#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%
Recreation Visitor Inform-ation	NSRA	Unacceptable	0	0.0	0	0.0	0	0.0	0	0.0	1	1.7	1	0.6	0	0.0	1	0.7	1	0.3
		Slightly Unacceptable	0	0.0	5	5.4	5	3.8	3	2.5	2	3.4	5	2.8	3	1.9	7	4.7	10	3.2
		Neither	2	5.3	10	10.9	12	9.2	20	16.5	12	20.7	32	17.9	22	13.8	22	14.7	44	14.2
		Slightly Acceptable	0	0.0	14	15.2	14	10.8	13	10.7	10	17.2	23	12.8	13	8.2	24	16.0	37	12.0
		Acceptable	31	81.6	33	35.9	64	49.2	75	62.0	29	50.0	104	58.1	106	66.7	62	41.3	168	54.4
		No response/opinion	5	13.2	30	32.6	35	26.9	10	8.3	4	6.9	14	7.8	15	9.4	34	22.7	49	15.9
		Total	38	100.0	92	100.0	130	100.0	121	100.0	58	100.0	179	100.0	159	100.0	150	100.0	309	100.0
	SSRA	Unacceptable	0	0.0	closed	closed	0	0.0	1	3.3	closed	closed	1	3.3	1	2.5	closed	closed	1	2.5
		Slightly Unacceptable	0	0.0	closed	closed	0	0.0	0	0.0	closed	closed	0	0.0	0	0.0	closed	closed	0	0.0
		Neither	0	0.0	closed	closed	0	0.0	3	10.0	closed	closed	3	10.0	3	7.5	closed	closed	3	7.5
		Slightly Acceptable	4	40.0	closed	closed	4	40.0	5	16.7	closed	closed	5	16.7	9	22.5	closed	closed	9	22.5
		Acceptable	4	40.0	closed	closed	4	40.0	17	56.7	closed	closed	17	56.7	21	52.5	closed	closed	21	52.5
		No response/opinion	2	20.0	closed	closed	2	20.0	4	13.3	closed	closed	4	13.3	6	15.0	closed	closed	6	15.0
		Total	10	100.0	closed	closed	10	100.0	30	100.0	closed	closed	30	100.0	40	100.0	closed	closed	40	100.0
	Total	Unacceptable	0	0.0	0	0.0	0	0.0	1	0.7	1	1.7	2	1.0	1	0.5	1	0.7	2	0.6
		Slightly Unacceptable	0	0.0	5	5.4	5	3.6	3	2.0	2	3.4	5	2.4	3	1.5	7	4.7	10	2.9
		Neither	2	4.2	10	10.9	12	8.6	23	15.2	12	20.7	35	16.7	25	12.6	22	14.7	47	13.5
		Slightly Acceptable	4	8.3	14	15.2	18	12.9	18	11.9	10	17.2	28	13.4	22	11.1	24	16.0	46	13.2
		Acceptable	35	72.9	33	35.9	68	48.6	92	60.9	29	50.0	121	57.9	127	63.8	62	41.3	189	54.2
		No response/opinion	7	14.6	30	32.6	37	26.4	14	9.3	4	6.9	18	8.6	21	10.6	34	22.7	55	15.8
		Total	48	100.0	92	100.0	140	100.0	151	100.0	58	100.0	209	100.0	199	100.0	150	100.0	349	100.0

Question 20a: Please rate the acceptability of the RESERVOIR WATER SURFACE ELEVATION INFORMATION at this recreation area today.

Existing Facility	Recreat-ion Area	Acceptability Rating	Day-use Visitors						Overnight Visitors						All Visitors					
			Peak Season		Off Peak Season		Overall		Peak Season		Off Peak Season		Overall		Peak Season		Off Peak Season		Overall	
			#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%
Reservoir Water Surface Elevation Inform-ation	NSRA	Unacceptable	1	2.6	5	5.4	6	4.6	2	1.7	2	3.4	4	2.2	3	1.9	7	4.7	10	3.2
		Slightly Unacceptable	0	0.0	2	2.2	2	1.5	2	1.7	2	3.4	4	2.2	2	1.3	4	2.7	6	1.9
		Neither	4	10.5	7	7.6	11	8.5	20	16.5	11	19.0	31	17.3	24	15.1	18	12.0	42	13.6
		Slightly Acceptable	2	5.3	14	15.2	16	12.3	6	5.0	8	13.8	14	7.8	8	5.0	22	14.7	30	9.7
		Acceptable	16	42.1	25	27.2	41	31.5	40	33.1	21	36.2	61	34.1	56	35.2	46	30.7	102	33.0
		No response/opinion	15	39.5	39	42.4	54	41.5	51	42.1	14	24.1	65	36.3	66	41.5	53	35.3	119	38.5
		Total	38	100.0	92	100.0	130	100.0	121	100.0	58	100.0	179	100.0	159	100.0	150	100.0	309	100.0
	SSRA	Unacceptable	0	0.0	closed	closed	0	0.0	2	6.7	closed	closed	2	6.7	2	5.0	closed	closed	2	5.0
		Slightly Unacceptable	0	0.0	closed	closed	0	0.0	1	3.3	closed	closed	1	3.3	1	2.5	closed	closed	1	2.5
		Neither	0	0.0	closed	closed	0	0.0	2	6.7	closed	closed	2	6.7	2	5.0	closed	closed	2	5.0
		Slightly Acceptable	2	20.0	closed	closed	2	20.0	4	13.3	closed	closed	4	13.3	6	15.0	closed	closed	6	15.0
		Acceptable	3	30.0	closed	closed	3	30.0	7	23.3	closed	closed	7	23.3	10	25.0	closed	closed	10	25.0
		No response/opinion	5	50.0	closed	closed	5	50.0	14	46.7	closed	closed	14	46.7	19	47.5	closed	closed	19	47.5
		Total	10	100.0	closed	closed	10	100.0	30	100.0	closed	closed	30	100.0	40	100.0	closed	closed	40	100.0
	Total	Unacceptable	1	2.1	5	5.4	6	4.3	4	2.6	2	3.4	6	2.9	5	2.5	7	4.7	12	3.4
		Slightly Unacceptable	0	0.0	2	2.2	2	1.4	3	2.0	2	3.4	5	2.4	3	1.5	4	2.7	7	2.0
		Neither	4	8.3	7	7.6	11	7.9	22	14.6	11	19.0	33	15.8	26	13.1	18	12.0	44	12.6
		Slightly Acceptable	4	8.3	14	15.2	18	12.9	10	6.6	8	13.8	18	8.6	14	7.0	22	14.7	36	10.3
		Acceptable	19	39.6	25	27.2	44	31.4	47	31.1	21	36.2	68	32.5	66	33.2	46	30.7	112	32.1
		No response/opinion	20	41.7	39	42.4	59	42.1	65	43.0	14	24.1	79	37.8	85	42.7	53	35.3	138	39.5
		Total	48	100.0	92	100.0	140	100.0	151	100.0	58	100.0	209	100.0	199	100.0	150	100.0	349	100.0

Question 20a: AVERAGE visitor acceptability rating of the existing facilities on a 5-point scale [1=unacceptable; 5=acceptable].

Existing Facility	Recreation Area	Day-use Visitors			Overnight Visitors			All Visitors		
		Peak Season	Off Peak Season	Overall	Peak Season	Off Peak Season	Overall	Peak Season	Off Peak Season	Overall
Campsites	NSRA	4.6	4.9	4.8	4.7	4.6	4.7	4.7	4.7	4.7
	SSRA	4.4	closed	4.4	4.5	closed	4.5	4.5	closed	4.5
	Total	4.6	4.9	4.8	4.6	4.6	4.6	4.6	4.7	4.7
Picnic Sites	NSRA	4.7	4.5	4.6	4.6	4.6	4.6	4.6	4.6	4.6
	SSRA	4.5	closed	4.5	3.8	closed	3.8	4.0	closed	4.0
	Total	4.7	4.5	4.6	4.4	4.6	4.5	4.5	4.6	4.5
Restrooms	NSRA	4.2	4.1	4.1	3.6	3.6	3.6	3.8	3.9	3.8
	SSRA	3.8	closed	3.8	3.0	closed	3.0	3.2	closed	3.2
	Total	4.1	4.1	4.1	3.5	3.6	3.5	3.6	3.9	3.7
Potable Water	NSRA	4.0	3.3	3.5	3.4	3.6	3.5	3.5	3.5	3.5
	SSRA	3.5	closed	3.5	2.5	closed	2.5	2.8	closed	2.8
	Total	3.8	3.3	3.5	3.2	3.6	3.3	3.3	3.5	3.4
Parking Areas	NSRA	4.6	4.8	4.8	4.6	4.6	4.6	4.6	4.7	4.7
	SSRA	4.7	closed	4.7	4.3	closed	4.3	4.4	closed	4.4
	Total	4.6	4.8	4.7	4.5	4.6	4.6	4.6	4.7	4.6
Boat Ramp	NSRA	4.6	4.4	4.5	4.5	4.4	4.5	4.5	4.4	4.5
	SSRA	4.6	closed	4.6	4.2	closed	4.2	4.3	closed	4.3
	Total	4.6	4.4	4.5	4.4	4.4	4.4	4.5	4.4	4.5
Roads within Recreation Area	NSRA	4.4	4.3	4.3	4.2	4.1	4.2	4.3	4.2	4.3
	SSRA	4.4	closed	4.4	4.3	closed	4.3	4.3	closed	4.3
	Total	4.4	4.3	4.3	4.2	4.1	4.2	4.3	4.2	4.3
Foot Trails Around the Shoreline	NSRA	4.3	4.1	4.2	4.4	4.2	4.3	4.4	4.2	4.3
	SSRA	4.6	closed	4.6	4.3	closed	4.3	4.3	closed	4.3
	Total	4.3	4.1	4.2	4.4	4.2	4.3	4.4	4.2	4.3
Signage	NSRA	4.8	4.5	4.6	4.3	4.2	4.3	4.4	4.4	4.4
	SSRA	4.6	closed	4.6	4.1	closed	4.1	4.2	closed	4.2
	Total	4.7	4.5	4.6	4.3	4.2	4.3	4.4	4.4	4.4
Recreation Visitor Information	NSRA	4.9	4.2	4.4	4.4	4.2	4.4	4.5	4.2	4.4
	SSRA	4.5	closed	4.5	4.4	closed	4.4	4.4	closed	4.4
	Total	4.8	4.2	4.4	4.4	4.2	4.4	4.5	4.2	4.4
Reservoir Water Surface Elevation Information	NSRA	4.4	4.0	4.1	4.1	4.0	4.1	4.2	4.0	4.1
	SSRA	4.6	closed	4.6	3.8	closed	3.8	4.0	closed	4.0
	Total	4.4	4.0	4.1	4.1	4.0	4.1	4.2	4.0	4.1

Question 21a1: Did/do you feel crowded at any of the following locations during your visit to this recreation area today?

Recreation Area	Perceived Crowding Response (9-point Likert Scale)	Day-use Visitors						Overnight Visitors						All Visitors					
		Peak Season		Off Peak Season		Overall		Peak Season		Off Peak Season		Overall		Peak Season		Off Peak Season		Overall	
		#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%
NSRA	Not at all Crowded (1)	11	28.9	23	25.0	34	26.2	52	43.0	30	51.7	82	45.8	63	39.6	53	35.3	116	37.5
	Not at all Crowded (2)	4	10.5	6	6.5	10	7.7	19	15.7	15	25.9	34	19.0	23	14.5	21	14.0	44	14.2
	Slightly Crowded (3)	0	0.0	0	0.0	0	0.0	12	9.9	4	6.9	16	8.9	12	7.5	4	2.7	16	5.2
	Slightly Crowded (4)	0	0.0	1	1.1	1	0.8	9	7.4	3	5.2	12	6.7	9	5.7	4	2.7	13	4.2
	Moderately Crowded (5)	0	0.0	0	0.0	0	0.0	4	3.3	1	1.7	5	2.8	4	2.5	1	0.7	5	1.6
	Moderately Crowded (6)	1	2.6	0	0.0	1	0.8	2	1.7	2	3.4	4	2.2	3	1.9	2	1.3	5	1.6
	Moderately Crowded (7)	0	0.0	0	0.0	0	0.0	3	2.5	2	3.4	5	2.8	3	1.9	2	1.3	5	1.6
	Extremely Crowded (8)	1	2.6	0	0.0	1	0.8	2	1.7	1	1.7	3	1.7	3	1.9	1	0.7	4	1.3
	Extremely Crowded (9)	0	0.0	0	0	0	0.0	1	0.8	0	0	1	0.6	1	0.6	0	0	1	0.3
	No Opinion/Did Not Use	21	55.3	62	67.4	83	63.8	17	14.0	0	0.0	17	9.5	38	23.9	62	41.3	100	32.4
	Total	38	100.0	92	100.0	130	100.0	121	100.0	58	100.0	179	100.0	159	100.0	150	100.0	309	100.0
SSRA	Not at all Crowded (1)	2	20.0	closed	closed	2	20.0	19	63.3	closed	closed	19	63.3	21	52.5	closed	closed	21	52.5
	Not at all Crowded (2)	0	0.0	closed	closed	0	0.0	0	0.0	closed	closed	0	0.0	0	0.0	closed	closed	0	0.0
	Slightly Crowded (3)	1	10.0	closed	closed	1	10.0	3	10.0	closed	closed	3	10.0	4	10.0	closed	closed	4	10.0
	Slightly Crowded (4)	0	0.0	closed	closed	0	0.0	1	3.3	closed	closed	1	3.3	1	2.5	closed	closed	1	2.5
	Moderately Crowded (5)	0	0.0	closed	closed	0	0.0	2	6.7	closed	closed	2	6.7	2	5.0	closed	closed	2	5.0
	Moderately Crowded (6)	1	10.0	closed	closed	1	10.0	1	3.3	closed	closed	1	3.3	2	5.0	closed	closed	2	5.0
	Moderately Crowded (7)	0	0.0	closed	closed	0	0.0	0	0.0	closed	closed	0	0.0	0	0.0	closed	closed	0	0.0
	Extremely Crowded (8)	0	0.0	closed	closed	0	0.0	0	0.0	closed	closed	0	0.0	0	0.0	closed	closed	0	0.0
	Extremely Crowded (9)	0	0.0	closed	closed	0	0.0	0	0.0	closed	closed	0	0.0	0	0.0	closed	closed	0	0.0
	No Opinion/Did Not Use	6	60.0	closed	closed	6	60.0	4	13.3	closed	closed	4	13.3	10	25.0	closed	closed	10	25.0
	Total	10	100.0	closed	closed	10	100.0	30	100.0	closed	closed	30	100.0	40	100.0	closed	closed	40	100.0
Total	Not at all Crowded (1)	13	27.1	23	25.0	36	25.7	71	47.0	30	51.7	101	48.3	84	42.2	53	35.3	137	39.3
	Not at all Crowded (2)	4	8.3	6	6.5	10	7.1	19	12.6	15	25.9	34	16.3	23	11.6	21	14.0	44	12.6
	Slightly Crowded (3)	1	2.1	0	0.0	1	0.7	15	9.9	4	6.9	19	9.1	16	8.0	4	2.7	20	5.7
	Slightly Crowded (4)	0	0.0	1	1.1	1	0.7	10	6.6	3	5.2	13	6.2	10	5.0	4	2.7	14	4.0
	Moderately Crowded (5)	0	0.0	0	0.0	0	0.0	6	4.0	1	1.7	7	3.3	6	3.0	1	0.7	7	2.0
	Moderately Crowded (6)	2	4.2	0	0.0	2	1.4	3	2.0	2	3.4	5	2.4	5	2.5	2	1.3	7	2.0
	Moderately Crowded (7)	0	0.0	0	0.0	0	0.0	3	2.0	2	3.4	5	2.4	3	1.5	2	1.3	5	1.4
	Extremely Crowded (8)	1	2.1	0	0.0	1	0.7	2	1.3	1	1.7	3	1.4	3	1.5	1	0.7	4	1.1
	Extremely Crowded (9)	0	0.0	0	0	0	0.0	1	0.7	0	0	1	0.5	1	0.5	0	0	1	0.3
	No Opinion/Did Not Use	27	56.3	62	67.4	89	63.6	21	13.9	0	0.0	21	10.0	48	24.1	62	41.3	110	31.5
	Total	48	100.0	92	100.0	140	100.0	151	100.0	58	100.0	209	100.0	199	100.0	150	100.0	349	100.0

Question 21a2: Did/do you feel crowded at the PICNIC AREA during your visit to this recreation area today?

Recreation Area	Perceived Crowding Response (9-point Likert Scale)	Day-use Visitors						Overnight Visitors						All Visitors					
		Peak Season		Off Peak Season		Overall		Peak Season		Off Peak Season		Overall		Peak Season		Off Peak Season		Overall	
		#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%
NSRA	Not at all Crowded (1)	15	39.5	26	28.3	41	31.5	39	32.2	29	50.0	68	38.0	54	34.0	55	36.7	109	35.3
	Not at all Crowded (2)	4	10.5	6	6.5	10	7.7	15	12.4	11	19.0	26	14.5	19	11.9	17	11.3	36	11.7
	Slightly Crowded (3)	0	0.0	1	1.1	1	0.8	4	3.3	2	3.4	6	3.4	4	2.5	3	2.0	7	2.3
	Slightly Crowded (4)	0	0.0	0	0.0	0	0.0	4	3.3	1	1.7	5	2.8	4	2.5	1	0.7	5	1.6
	Moderately Crowded (5)	0	0.0	0	0.0	0	0.0	0	0.0	1	1.7	1	0.6	0	0.0	1	0.7	1	0.3
	Moderately Crowded (6)	2	5.3	0	0.0	2	1.5	1	0.8	1	1.7	2	1.1	3	1.9	1	0.7	4	1.3
	Moderately Crowded (7)	0	0.0	0	0.0	0	0.0	0	0.0	1	1.7	1	0.6	0	0.0	1	0.7	1	0.3
	Extremely Crowded (8)	0	0.0	0	0.0	0	0.0	1	0.8	0	0.0	1	0.6	1	0.6	0	0.0	1	0.3
	Extremely Crowded (9)	0	0.0	0	0	0	0.0	3	2.5	0	0	3	1.7	3	1.9	0	0	3	1.0
	No Opinion/Did Not Use	17	44.7	59	64.1	76	58.5	54	44.6	12	20.7	66	36.9	71	44.7	71	47.3	142	46.0
	Total	38	100.0	92	100.0	130	100.0	121	100.0	58	100.0	179	100.0	159	100.0	150	100.0	309	100.0
SSRA	Not at all Crowded (1)	4	40.0	closed	closed	4	40.0	10	33.3	closed	closed	10	33.3	14	35.0	closed	closed	14	35.0
	Not at all Crowded (2)	0	0.0	closed	closed	0	0.0	0	0.0	closed	closed	0	0.0	0	0.0	closed	closed	0	0.0
	Slightly Crowded (3)	1	10.0	closed	closed	1	10.0	2	6.7	closed	closed	2	6.7	3	7.5	closed	closed	3	7.5
	Slightly Crowded (4)	0	0.0	closed	closed	0	0.0	2	6.7	closed	closed	2	6.7	2	5.0	closed	closed	2	5.0
	Moderately Crowded (5)	1	10.0	closed	closed	1	10.0	0	0.0	closed	closed	0	0.0	1	2.5	closed	closed	1	2.5
	Moderately Crowded (6)	0	0.0	closed	closed	0	0.0	0	0.0	closed	closed	0	0.0	0	0.0	closed	closed	0	0.0
	Moderately Crowded (7)	0	0.0	closed	closed	0	0.0	0	0.0	closed	closed	0	0.0	0	0.0	closed	closed	0	0.0
	Extremely Crowded (8)	0	0.0	closed	closed	0	0.0	0	0.0	closed	closed	0	0.0	0	0.0	closed	closed	0	0.0
	Extremely Crowded (9)	0	0.0	closed	closed	0	0.0	0	0.0	closed	closed	0	0.0	0	0.0	closed	closed	0	0.0
	No Opinion/Did Not Use	4	40.0	closed	closed	4	40.0	16	53.3	closed	closed	16	53.3	20	50.0	closed	closed	20	50.0
	Total	10	100.0	closed	closed	10	100.0	30	100.0	closed	closed	30	100.0	40	100.0	closed	closed	40	100.0
Total	Not at all Crowded (1)	19	39.6	26	28.3	45	32.1	49	32.5	29	50.0	78	37.3	68	34.2	55	36.7	123	35.2
	Not at all Crowded (2)	4	8.3	6	6.5	10	7.1	15	9.9	11	19.0	26	12.4	19	9.5	17	11.3	36	10.3
	Slightly Crowded (3)	1	2.1	1	1.1	2	1.4	6	4.0	2	3.4	8	3.8	7	3.5	3	2.0	10	2.9
	Slightly Crowded (4)	0	0.0	0	0.0	0	0.0	6	4.0	1	1.7	7	3.3	6	3.0	1	0.7	7	2.0
	Moderately Crowded (5)	1	2.1	0	0.0	1	0.7	0	0.0	1	1.7	1	0.5	1	0.5	1	0.7	2	0.6
	Moderately Crowded (6)	2	4.2	0	0.0	2	1.4	1	0.7	1	1.7	2	1.0	3	1.5	1	0.7	4	1.1
	Moderately Crowded (7)	0	0.0	0	0.0	0	0.0	0	0.0	1	1.7	1	0.5	0	0.0	1	0.7	1	0.3
	Extremely Crowded (8)	0	0.0	0	0.0	0	0.0	1	0.7	0	0.0	1	0.5	1	0.5	0	0.0	1	0.3
	Extremely Crowded (9)	0	0.0	0	0	0	0.0	3	2.0	0	0	3	1.4	3	1.5	0	0	3	0.9
	No Opinion/Did Not Use	21	43.8	59	64.1	80	57.1	70	46.4	12	20.7	82	39.2	91	45.7	71	47.3	162	46.4
	Total	48	100.0	92	100.0	140	100.0	151	100.0	58	100.0	209	100.0	199	100.0	150	100.0	349	100.0

Question 21a3: Did/do you feel crowded at the SWIM BEACH during your visit to this recreation area today?

Recreation Area	Perceived Crowding Response (9-point Likert Scale)	Day-use Visitors						Overnight Visitors						All Visitors					
		Peak Season		Off Peak Season		Overall		Peak Season		Off Peak Season		Overall		Peak Season		Off Peak Season		Overall	
		#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%
NSRA	Not at all Crowded (1)	18	47.4	26	28.3	44	33.8	48	39.7	24	41.4	72	40.2	66	41.5	50	33.3	116	37.5
	Not at all Crowded (2)	5	13.2	8	8.7	13	10.0	29	24.0	11	19.0	40	22.3	34	21.4	19	12.7	53	17.2
	Slightly Crowded (3)	1	2.6	0	0.0	1	0.8	8	6.6	2	3.4	10	5.6	9	5.7	2	1.3	11	3.6
	Slightly Crowded (4)	1	2.6	0	0.0	1	0.8	5	4.1	0	0.0	5	2.8	6	3.8	0	0.0	6	1.9
	Moderately Crowded (5)	5	13.2	0	0.0	5	3.8	5	4.1	1	1.7	6	3.4	10	6.3	1	0.7	11	3.6
	Moderately Crowded (6)	1	2.6	0	0.0	1	0.8	3	2.5	1	1.7	4	2.2	4	2.5	1	0.7	5	1.6
	Moderately Crowded (7)	1	2.6	0	0.0	1	0.8	0	0.0	0	0.0	0	0.0	1	0.6	0	0.0	1	0.3
	Extremely Crowded (8)	0	0.0	0	0.0	0	0.0	0	0.0	1	1.7	1	0.6	0	0.0	1	0.7	1	0.3
	Extremely Crowded (9)	0	0.0	0	0	0	0.0	2	1.7	0	0	2	1.1	2	1.3	0	0	2	0.6
	No Opinion/Did Not Use	6	15.8	58	63.0	64	49.2	21	17.4	18	31.0	39	21.8	27	17.0	76	50.7	103	33.3
	Total	38	100.0	92	100.0	130	100.0	121	100.0	58	100.0	179	100.0	159	100.0	150	100.0	309	100.0
SSRA	Not at all Crowded (1)	4	40.0	closed	closed	4	40.0	17	56.7	closed	closed	17	56.7	21	52.5	closed	closed	21	52.5
	Not at all Crowded (2)	0	0.0	closed	closed	0	0.0	1	3.3	closed	closed	1	3.3	1	2.5	closed	closed	1	2.5
	Slightly Crowded (3)	1	10.0	closed	closed	1	10.0	1	3.3	closed	closed	1	3.3	2	5.0	closed	closed	2	5.0
	Slightly Crowded (4)	0	0.0	closed	closed	0	0.0	1	3.3	closed	closed	1	3.3	1	2.5	closed	closed	1	2.5
	Moderately Crowded (5)	0	0.0	closed	closed	0	0.0	0	0.0	closed	closed	0	0.0	0	0.0	closed	closed	0	0.0
	Moderately Crowded (6)	1	10.0	closed	closed	1	10.0	0	0.0	closed	closed	0	0.0	1	2.5	closed	closed	1	2.5
	Moderately Crowded (7)	0	0.0	closed	closed	0	0.0	0	0.0	closed	closed	0	0.0	0	0.0	closed	closed	0	0.0
	Extremely Crowded (8)	0	0.0	closed	closed	0	0.0	1	3.3	closed	closed	1	3.3	1	2.5	closed	closed	1	2.5
	Extremely Crowded (9)	0	0.0	closed	closed	0	0.0	0	0.0	closed	closed	0	0.0	0	0.0	closed	closed	0	0.0
	No Opinion/Did Not Use	4	40.0	closed	closed	4	40.0	9	30.0	closed	closed	9	30.0	13	32.5	closed	closed	13	32.5
	Total	10	100.0	closed	closed	10	100.0	30	100.0	closed	closed	30	100.0	40	100.0	closed	closed	40	100.0
Total	Not at all Crowded (1)	22	45.8	26	28.3	48	34.3	65	43.0	24	41.4	89	42.6	87	43.7	50	33.3	137	39.3
	Not at all Crowded (2)	5	10.4	8	8.7	13	9.3	30	19.9	11	19.0	41	19.6	35	17.6	19	12.7	54	15.5
	Slightly Crowded (3)	2	4.2	0	0.0	2	1.4	9	6.0	2	3.4	11	5.3	11	5.5	2	1.3	13	3.7
	Slightly Crowded (4)	1	2.1	0	0.0	1	0.7	6	4.0	0	0.0	6	2.9	7	3.5	0	0.0	7	2.0
	Moderately Crowded (5)	5	10.4	0	0.0	5	3.6	5	3.3	1	1.7	6	2.9	10	5.0	1	0.7	11	3.2
	Moderately Crowded (6)	2	4.2	0	0.0	2	1.4	3	2.0	1	1.7	4	1.9	5	2.5	1	0.7	6	1.7
	Moderately Crowded (7)	1	2.1	0	0.0	1	0.7	0	0.0	0	0.0	0	0.0	1	0.5	0	0.0	1	0.3
	Extremely Crowded (8)	0	0.0	0	0.0	0	0.0	1	0.7	1	1.7	2	1.0	1	0.5	1	0.7	2	0.6
	Extremely Crowded (9)	0	0.0	0	0	0	0.0	2	1.3	0	0	2	1.0	2	1.0	0	0	2	0.6
	No Opinion/Did Not Use	10	20.8	58	63.0	68	48.6	30	19.9	18	31.0	48	23.0	40	20.1	76	50.7	116	33.2
	Total	48	100.0	92	100.0	140	100.0	151	100.0	58	100.0	209	100.0	199	100.0	150	100.0	349	100.0

Question 21a4: Did/do you feel crowded at the BOAT LAUNCH during your visit to this recreation area today?

Recreation Area	Perceived Crowding Response (9-point Likert Scale)	Day-use Visitors						Overnight Visitors						All Visitors					
		Peak Season		Off Peak Season		Overall		Peak Season		Off Peak Season		Overall		Peak Season		Off Peak Season		Overall	
		#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%
	Not at all Crowded (1)	15	39.5	49	53.3	64	49.2	39	32.2	19	32.8	58	32.4	54	34.0	68	45.3	122	39.5
	Not at all Crowded (2)	4	10.5	10	10.9	14	10.8	12	9.9	8	13.8	20	11.2	16	10.1	18	12.0	34	11.0
	Slightly Crowded (3)	2	5.3	10	10.9	12	9.2	9	7.4	1	1.7	10	5.6	11	6.9	11	7.3	22	7.1
	Slightly Crowded (4)	4	10.5	0	0.0	4	3.1	3	2.5	2	3.4	5	2.8	7	4.4	2	1.3	9	2.9
	Moderately Crowded (5)	1	2.6	2	2.2	3	2.3	0	0.0	0	0.0	0	0.0	1	0.6	2	1.3	3	1.0
NSRA	Moderately Crowded (6)	0	0.0	0	0.0	0	0.0	1	0.8	1	1.7	2	1.1	1	0.6	1	0.7	2	0.6
	Moderately Crowded (7)	0	0.0	1	1.1	1	0.8	2	1.7	0	0.0	2	1.1	2	1.3	1	0.7	3	1.0
	Extremely Crowded (8)	0	0.0	1	1.1	1	0.8	0	0.0	0	0.0	0	0.0	0	0.0	1	0.7	1	0.3
	Extremely Crowded (9)	0	0.0	2	0.0217	2	1.5	0	0.0	1	0.0172	1	0.6	0	0.0	3	0.02	3	1.0
	No Opinion/Did Not Use	12	31.6	17	18.5	29	22.3	55	45.5	26	44.8	81	45.3	67	42.1	43	28.7	110	35.6
	Total	38	100.0	92	100.0	130	100.0	121	100.0	58	100.0	179	100.0	159	100.0	150	100.0	309	100.0
	Not at all Crowded (1)	4	40.0	closed	closed	4	40.0	15	50.0	closed	closed	15	50.0	19	47.5	closed	closed	19	47.5
	Not at all Crowded (2)	1	10.0	closed	closed	1	10.0	1	3.3	closed	closed	1	3.3	2	5.0	closed	closed	2	5.0
	Slightly Crowded (3)	1	10.0	closed	closed	1	10.0	2	6.7	closed	closed	2	6.7	3	7.5	closed	closed	3	7.5
	Slightly Crowded (4)	0	0.0	closed	closed	0	0.0	1	3.3	closed	closed	1	3.3	1	2.5	closed	closed	1	2.5
	Moderately Crowded (5)	0	0.0	closed	closed	0	0.0	1	3.3	closed	closed	1	3.3	1	2.5	closed	closed	1	2.5
SSRA	Moderately Crowded (6)	1	10.0	closed	closed	1	10.0	0	0.0	closed	closed	0	0.0	1	2.5	closed	closed	1	2.5
	Moderately Crowded (7)	0	0.0	closed	closed	0	0.0	0	0.0	closed	closed	0	0.0	0	0.0	closed	closed	0	0.0
	Extremely Crowded (8)	0	0.0	closed	closed	0	0.0	0	0.0	closed	closed	0	0.0	0	0.0	closed	closed	0	0.0
	Extremely Crowded (9)	0	0.0	closed	closed	0	0.0	0	0.0	closed	closed	0	0.0	0	0.0	closed	closed	0	0.0
	No Opinion/Did Not Use	3	30.0	closed	closed	3	30.0	10	33.3	closed	closed	10	33.3	13	32.5	closed	closed	13	32.5
	Total	10	100.0	closed	closed	10	100.0	30	100.0	closed	closed	30	100.0	40	100.0	closed	closed	40	100.0
	Not at all Crowded (1)	19	39.6	49	53.3	68	48.6	54	35.8	19	32.8	73	34.9	73	36.7	68	45.3	141	40.4
	Not at all Crowded (2)	5	10.4	10	10.9	15	10.7	13	8.6	8	13.8	21	10.0	18	9.0	18	12.0	36	10.3
	Slightly Crowded (3)	3	6.3	10	10.9	13	9.3	11	7.3	1	1.7	12	5.7	14	7.0	11	7.3	25	7.2
	Slightly Crowded (4)	4	8.3	0	0.0	4	2.9	4	2.6	2	3.4	6	2.9	8	4.0	2	1.3	10	2.9
	Moderately Crowded (5)	1	2.1	2	2.2	3	2.1	1	0.7	0	0.0	1	0.5	2	1.0	2	1.3	4	1.1
Total	Moderately Crowded (6)	1	2.1	0	0.0	1	0.7	1	0.7	1	1.7	2	1.0	2	1.0	1	0.7	3	0.9
	Moderately Crowded (7)	0	0.0	1	1.1	1	0.7	2	1.3	0	0.0	2	1.0	2	1.0	1	0.7	3	0.9
	Extremely Crowded (8)	0	0.0	1	1.1	1	0.7	0	0.0	0	0.0	0	0.0	0	0.0	1	0.7	1	0.3
	Extremely Crowded (9)	0	0.0	2	0.0217	2	1.4	0	0.0	1	0.0172	1	0.5	0	0.0	3	0.02	3	0.9
	No Opinion/Did Not Use	15	31.3	17	18.5	32	22.9	65	43.0	26	44.8	91	43.5	80	40.2	43	28.7	123	35.2
	Total	48	100.0	92	100.0	140	100.0	151	100.0	58	100.0	209	100.0	199	100.0	150	100.0	349	100.0

Question 21a5: Did/do you feel crowded at the DISPSERSED USE AREA during your visit to this recreation area today?

Recreation Area	Perceived Crowding Response (9-point Likert Scale)	Day-use Visitors						Overnight Visitors						All Visitors					
		Peak Season		Off Peak Season		Overall		Peak Season		Off Peak Season		Overall		Peak Season		Off Peak Season		Overall	
		#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%
NSRA	Not at all Crowded (1)	19	50.0	32	34.8	51	39.2	57	47.1	27	46.6	84	46.9	76	47.8	59	39.3	135	43.7
	Not at all Crowded (2)	3	7.9	9	9.8	12	9.2	20	16.5	14	24.1	34	19.0	23	14.5	23	15.3	46	14.9
	Slightly Crowded (3)	2	5.3	2	2.2	4	3.1	7	5.8	2	3.4	9	5.0	9	5.7	4	2.7	13	4.2
	Slightly Crowded (4)	0	0.0	2	2.2	2	1.5	7	5.8	0	0.0	7	3.9	7	4.4	2	1.3	9	2.9
	Moderately Crowded (5)	2	5.3	1	1.1	3	2.3	0	0.0	1	1.7	1	0.6	2	1.3	2	1.3	4	1.3
	Moderately Crowded (6)	0	0.0	0	0.0	0	0.0	3	2.5	0	0.0	3	1.7	3	1.9	0	0.0	3	1.0
	Moderately Crowded (7)	0	0.0	0	0.0	0	0.0	4	3.3	1	1.7	5	2.8	4	2.5	1	0.7	5	1.6
	Extremely Crowded (8)	0	0.0	0	0.0	0	0.0	0	0.0	1	1.7	1	0.6	0	0.0	1	0.7	1	0.3
	Extremely Crowded (9)	0	0.0	0	0	0	0.0	0	0.0	0	0	0	0.0	0	0.0	0	0	0	0.0
	No Opinion/Did Not Use	12	31.6	46	50.0	58	44.6	23	19.0	12	20.7	35	19.6	35	22.0	58	38.7	93	30.1
	Total	38	100.0	92	100.0	130	100.0	121	100.0	58	100.0	179	100.0	159	100.0	150	100.0	309	100.0
SSRA	Not at all Crowded (1)	6	60.0	closed	closed	6	60.0	20	66.7	closed	closed	20	66.7	26	65.0	closed	closed	26	65.0
	Not at all Crowded (2)	0	0.0	closed	closed	0	0.0	0	0.0	closed	closed	0	0.0	0	0.0	closed	closed	0	0.0
	Slightly Crowded (3)	1	10.0	closed	closed	1	10.0	2	6.7	closed	closed	2	6.7	3	7.5	closed	closed	3	7.5
	Slightly Crowded (4)	0	0.0	closed	closed	0	0.0	2	6.7	closed	closed	2	6.7	2	5.0	closed	closed	2	5.0
	Moderately Crowded (5)	0	0.0	closed	closed	0	0.0	1	3.3	closed	closed	1	3.3	1	2.5	closed	closed	1	2.5
	Moderately Crowded (6)	1	10.0	closed	closed	1	10.0	0	0.0	closed	closed	0	0.0	1	2.5	closed	closed	1	2.5
	Moderately Crowded (7)	0	0.0	closed	closed	0	0.0	1	3.3	closed	closed	1	3.3	1	2.5	closed	closed	1	2.5
	Extremely Crowded (8)	0	0.0	closed	closed	0	0.0	0	0.0	closed	closed	0	0.0	0	0.0	closed	closed	0	0.0
	Extremely Crowded (9)	0	0.0	closed	closed	0	0.0	0	0.0	closed	closed	0	0.0	0	0.0	closed	closed	0	0.0
	No Opinion/Did Not Use	2	20.0	closed	closed	2	20.0	4	13.3	closed	closed	4	13.3	6	15.0	closed	closed	6	15.0
	Total	10	100.0	closed	closed	10	100.0	30	100.0	closed	closed	30	100.0	40	100.0	closed	closed	40	100.0
Total	Not at all Crowded (1)	25	52.1	32	34.8	57	40.7	77	51.0	27	46.6	104	49.8	102	51.3	59	39.3	161	46.1
	Not at all Crowded (2)	3	6.3	9	9.8	12	8.6	20	13.2	14	24.1	34	16.3	23	11.6	23	15.3	46	13.2
	Slightly Crowded (3)	3	6.3	2	2.2	5	3.6	9	6.0	2	3.4	11	5.3	12	6.0	4	2.7	16	4.6
	Slightly Crowded (4)	0	0.0	2	2.2	2	1.4	9	6.0	0	0.0	9	4.3	9	4.5	2	1.3	11	3.2
	Moderately Crowded (5)	2	4.2	1	1.1	3	2.1	1	0.7	1	1.7	2	1.0	3	1.5	2	1.3	5	1.4
	Moderately Crowded (6)	1	2.1	0	0.0	1	0.7	3	2.0	0	0.0	3	1.4	4	2.0	0	0.0	4	1.1
	Moderately Crowded (7)	0	0.0	0	0.0	0	0.0	5	3.3	1	1.7	6	2.9	5	2.5	1	0.7	6	1.7
	Extremely Crowded (8)	0	0.0	0	0.0	0	0.0	0	0.0	1	1.7	1	0.5	0	0.0	1	0.7	1	0.3
	Extremely Crowded (9)	0	0.0	0	0	0	0.0	0	0.0	0	0	0	0.0	0	0.0	0	0	0	0.0
	No Opinion/Did Not Use	14	29.2	46	50.0	60	42.9	27	17.9	12	20.7	39	18.7	41	20.6	58	38.7	99	28.4
	Total	48	100.0	92	100.0	140	100.0	151	100.0	58	100.0	209	100.0	199	100.0	150	100.0	349	100.0

Question 21a6: Did/do you feel crowded at the WATER SURFACE during your visit to this recreation area today?

Recreation Area	Perceived Crowding Response (9-point Likert Scale)	Day-use Visitors						Overnight Visitors						All Visitors					
		Peak Season		Off Peak Season		Overall		Peak Season		Off Peak Season		Overall		Peak Season		Off Peak Season		Overall	
		#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%
NSRA	Not at all Crowded (1)	23	60.5	57	62.0	80	61.5	59	48.8	28	48.3	87	48.6	82	51.6	85	56.7	167	54.0
	Not at all Crowded (2)	5	13.2	15	16.3	20	15.4	20	16.5	11	19.0	31	17.3	25	15.7	26	17.3	51	16.5
	Slightly Crowded (3)	0	0.0	3	3.3	3	2.3	13	10.7	3	5.2	16	8.9	13	8.2	6	4.0	19	6.1
	Slightly Crowded (4)	2	5.3	3	3.3	5	3.8	7	5.8	3	5.2	10	5.6	9	5.7	6	4.0	15	4.9
	Moderately Crowded (5)	2	5.3	2	2.2	4	3.1	4	3.3	0	0.0	4	2.2	6	3.8	2	1.3	8	2.6
	Moderately Crowded (6)	5	13.2	4	4.3	9	6.9	2	1.7	0	0.0	2	1.1	7	4.4	4	2.7	11	3.6
	Moderately Crowded (7)	0	0.0	1	1.1	1	0.8	0	0.0	1	1.7	1	0.6	0	0.0	2	1.3	2	0.6
	Extremely Crowded (8)	0	0.0	0	0.0	0	0.0	2	1.7	0	0.0	2	1.1	2	1.3	0	0.0	2	0.6
	Extremely Crowded (9)	0	0.0	0	0	0	0.0	1	0.8	2	0.0345	3	1.7	1	0.6	2	0.0133	3	1.0
	No Opinion/Did Not Use	1	2.6	7	7.6	8	6.2	13	10.7	10	17.2	23	12.8	14	8.8	17	11.3	31	10.0
	Total	38	100.0	92	100.0	130	100.0	121	100.0	58	100.0	179	100.0	159	100.0	150	100.0	309	100.0
SSRA	Not at all Crowded (1)	7	70.0	closed	closed	7	70.0	20	66.7	closed	closed	20	66.7	27	67.5	closed	closed	27	67.5
	Not at all Crowded (2)	0	0.0	closed	closed	0	0.0	1	3.3	closed	closed	1	3.3	1	2.5	closed	closed	1	2.5
	Slightly Crowded (3)	0	0.0	closed	closed	0	0.0	3	10.0	closed	closed	3	10.0	3	7.5	closed	closed	3	7.5
	Slightly Crowded (4)	0	0.0	closed	closed	0	0.0	1	3.3	closed	closed	1	3.3	1	2.5	closed	closed	1	2.5
	Moderately Crowded (5)	1	10.0	closed	closed	1	10.0	1	3.3	closed	closed	1	3.3	2	5.0	closed	closed	2	5.0
	Moderately Crowded (6)	1	10.0	closed	closed	1	10.0	0	0.0	closed	closed	0	0.0	1	2.5	closed	closed	1	2.5
	Moderately Crowded (7)	0	0.0	closed	closed	0	0.0	0	0.0	closed	closed	0	0.0	0	0.0	closed	closed	0	0.0
	Extremely Crowded (8)	0	0.0	closed	closed	0	0.0	0	0.0	closed	closed	0	0.0	0	0.0	closed	closed	0	0.0
	Extremely Crowded (9)	0	0.0	closed	closed	0	0.0	1	3.3	closed	closed	1	3.3	1	2.5	closed	closed	1	2.5
	No Opinion/Did Not Use	1	10.0	closed	closed	1	10.0	3	10.0	closed	closed	3	10.0	4	10.0	closed	closed	4	10.0
	Total	10	100.0	closed	closed	10	100.0	30	100.0	closed	closed	30	100.0	40	100.0	closed	closed	40	100.0
Total	Not at all Crowded (1)	30	62.5	57	62.0	87	62.1	79	52.3	28	48.3	107	51.2	109	54.8	85	56.7	194	55.6
	Not at all Crowded (2)	5	10.4	15	16.3	20	14.3	21	13.9	11	19.0	32	15.3	26	13.1	26	17.3	52	14.9
	Slightly Crowded (3)	0	0.0	3	3.3	3	2.1	16	10.6	3	5.2	19	9.1	16	8.0	6	4.0	22	6.3
	Slightly Crowded (4)	2	4.2	3	3.3	5	3.6	8	5.3	3	5.2	11	5.3	10	5.0	6	4.0	16	4.6
	Moderately Crowded (5)	3	6.3	2	2.2	5	3.6	5	3.3	0	0.0	5	2.4	8	4.0	2	1.3	10	2.9
	Moderately Crowded (6)	6	12.5	4	4.3	10	7.1	2	1.3	0	0.0	2	1.0	8	4.0	4	2.7	12	3.4
	Moderately Crowded (7)	0	0.0	1	1.1	1	0.7	0	0.0	1	1.7	1	0.5	0	0.0	2	1.3	2	0.6
	Extremely Crowded (8)	0	0.0	0	0.0	0	0.0	2	1.3	0	0.0	2	1.0	2	1.0	0	0.0	2	0.6
	Extremely Crowded (9)	0	0.0	0	0	0	0.0	2	1.3	2	0.0345	4	1.9	2	1.0	2	0.0133	4	1.1
	No Opinion/Did Not Use	2	4.2	7	7.6	9	6.4	16	10.6	10	17.2	26	12.4	18	9.0	17	11.3	35	10.0
	Total	48	100.0	92	100.0	140	100.0	151	100.0	58	100.0	209	100.0	199	100.0	150	100.0	349	100.0

Question 21b: If you indicated some level of crowding, did you modify your recreation plans because of the crowding?

Recreation Area	Perceived Crowding Response (9-point Likert Scale)	Day-use Visitors						Overnight Visitors						All Visitors					
		Peak Season		Off Peak Season		Overall		Peak Season		Off Peak Season		Overall		Peak Season		Off Peak Season		Overall	
		#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%
NSRA	Yes	2	5.3	4	4.3	6	4.6	9	7.4	5	8.6	14	7.8	11	6.9	9	6.0	20	6.5
	No	15	39.5	15	16.3	30	23.1	26	21.5	20	34.5	46	25.7	41	25.8	35	23.3	76	24.6
	Did not feel crowded	21	55.3	68	73.9	89	68.5	85	70.2	33	56.9	118	65.9	106	66.7	101	67.3	207	67.0
	No response	0	0.0	5	5.4	5	3.8	1	0.8	0	0.0	1	0.6	1	0.6	5	3.3	6	1.9
	Total	38	100.0	92	100.0	130	100.0	121	100.0	58	100.0	179	100.0	159	100.0	150	100.0	309	100.0
SSRA	Yes	1	10.0	closed	closed	1	10.0	2	6.7	closed	closed	2	6.7	3	7.5	closed	closed	3	7.5
	No	3	30.0	closed	closed	3	30.0	1	3.3	closed	closed	1	3.3	4	10.0	closed	closed	4	10.0
	Did not feel crowded	6	60.0	closed	closed	6	60.0	27	90.0	closed	closed	27	90.0	33	82.5	closed	closed	33	82.5
	No response	0	0.0	closed	closed	0	0.0	0	0.0	closed	closed	0	0.0	0	0.0	closed	closed	0	0.0
	Total	10	100.0	closed	closed	10	100.0	30	100.0	closed	closed	30	100.0	40	100.0	closed	closed	40	100.0
Overall	Yes	3	6.3	4	4.3	7	5.0	11	7.3	5	8.6	16	7.7	14	7.0	9	6.0	23	6.6
	No	18	37.5	15	16.3	33	23.6	27	17.9	20	34.5	47	22.5	45	22.6	35	23.3	80	22.9
	Did not feel crowded	27	56.3	68	73.9	95	67.9	112	74.2	33	56.9	145	69.4	139	69.8	101	67.3	240	68.8
	No response	0	0.0	5	5.4	5	3.6	1	0.7	0	0.0	1	0.5	1	0.5	5	3.3	6	1.7
	Total	48	100.0	92	100.0	140	100.0	151	100.0	58	100.0	209	100.0	199	100.0	150	100.0	349	100.0

Question 21c: If you felt crowded, how did you modify your plans?

Recreation Area	Perceived Crowding Response (9-point Likert Scale)	Day-use Visitors						Overnight Visitors						All Visitors					
		Peak Season		Off Peak Season		Overall		Peak Season		Off Peak Season		Overall		Peak Season		Off Peak Season		Overall	
		#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%
NSRA	Moved to a new location	1	4.3	2	2.6	3	3.0	3	3.2	3	7.9	6	4.5	4	3.4	5	4.3	9	3.8
	Changed the time of day	0	0.0	0	0	0	0.0	1	1.1	0	0	1	0.8	1	0.8	0	0	1	0.4
	Changed your activity	0	0.0	0	0.0	0	0.0	2	2.1	1	2.6	3	2.3	2	1.7	1	0.9	3	1.3
	Chose not to recreate	0	0.0	0	0	0	0.0	1	1.1	0	0	1	0.8	1	0.8	0	0	1	0.4
	Did nothing	0	0.0	2	2.6	2	2.0	1	1.1	1	2.6	2	1.5	1	0.8	3	2.6	4	1.7
	Other	1	4.3	1	1.3	2	2.0	1	1.1	0	0.0	1	0.8	2	1.7	1	0.9	3	1.3
	Did Not Feel Crowded	21	91.3	68	87.2	89	88.1	85	89.5	33	86.8	118	88.7	106	89.8	101	87.1	207	88.5
	No response	0	0.0	5	6.4	5	5.0	1	1.1	0	0.0	1	0.8	1	0.8	5	4.3	6	2.6
	Total	23	100.0	78	100.0	101	100.0	95	100.0	38	100.0	133	100.0	118	100.0	116	100.0	234	100.0
SSRA	Moved to a new location	1	14.3	closed	closed	1	14.3	0	0.0	closed	closed	2	6.9	3	8.3	closed	closed	3	8.3
	Changed the time of day	0	0.0	closed	closed	0	0.0	0	0.0	closed	closed	0	0.0	0	0.0	closed	closed	0	0.0
	Changed your activity	0	0.0	closed	closed	0	0.0	0	0.0	closed	closed	0	0.0	0	0.0	closed	closed	0	0.0
	Chose not to recreate	0	0.0	closed	closed	0	0.0	0	0.0	closed	closed	0	0.0	0	0.0	closed	closed	0	0.0
	Did nothing	0	0.0	closed	closed	0	0.0	0	0.0	closed	closed	0	0.0	0	0.0	closed	closed	0	0.0
	Other	0	0.0	closed	closed	0	0.0	0	0.0	closed	closed	0	0.0	0	0.0	closed	closed	0	0.0
	Did Not Feel Crowded	6	85.7	closed	closed	6	85.7	27	93.1	closed	closed	27	93.1	33	91.7	closed	closed	33	91.7
	No response	0	0.0	closed	closed	0	0.0	0	0.0	closed	closed	0	0.0	0	0.0	closed	closed	0	0.0
	Total	7	100.0	closed	closed	7	100.0	29	100.0	closed	closed	29	100.0	36	100.0	closed	closed	36	100.0
Total	Moved to a new location	2	6.7	2	2.6	4	3.7	5	4.0	3	7.9	8	4.9	7	4.5	5	4.3	12	4.4
	Changed the time of day	0	0.0	0	0	0	0.0	1	0.8	0	0	1	0.6	1	0.6	0	0	1	0.4
	Changed your activity	0	0.0	0	0.0	0	0.0	2	1.6	1	2.6	3	1.9	2	1.3	1	0.9	3	1.1
	Chose not to recreate	0	0.0	0	0	0	0.0	1	0.8	0	0	1	0.6	1	0.6	0	0	1	0.4
	Did nothing	0	0.0	2	2.6	2	1.9	1	0.8	1	2.6	2	1.2	1	0.6	3	2.6	4	1.5
	Other	1	3.3	1	1.3	2	1.9	1	0.8	0	0.0	1	0.6	2	1.3	1	0.9	3	1.1
	Did Not Feel Crowded	27	90.0	68	87.2	95	88.0	112	90.3	33	86.8	145	89.5	139	90.3	101	87.1	240	88.9
	No response	0	0.0	5	6.4	5	4.6	1	0.8	0	0.0	1	0.6	1	0.6	5	4.3	6	2.2
	Total	30	100.0	78	100.0	108	100.0	124	100.0	38	100.0	162	100.0	154	100.0	116	100.0	270	100.0

Question 22a: Are there any barriers that prevent you or a member of your group from participating in any recreation activities at this recreation area?

Response	Recreation Area	Statistic	Day-use Visitors			Overnight Visitors			All Visitors		
			Peak Season	Off Peak Season	Overall	Peak Season	Off Peak Season	Overall	Peak Season	Off Peak Season	Overall
Yes	NSRA	Number	0	4	4	2	3	5	2	7	9
		Percent	0.0	4.3	3.1	1.7	5.2	2.8	1.3	4.7	2.9
	SSRA	Number	1	closed	1	0	closed	0	1	closed	1
		Percent	10.0	closed	10.0	0.0	closed	0.0	2.5	closed	2.5
	Total	Number	1	4	5	2	3	5	3	7	10
		Percent	2.1	4.3	3.6	1.3	5.2	2.4	1.5	4.7	2.9
No	NSRA	Number	37	88	125	117	55	172	154	143	297
		Percent	97.4	95.7	96.2	96.7	94.8	96.1	96.9	95.3	96.1
	SSRA	Number	9	closed	9	30	closed	30	39	closed	39
		Percent	90.0	closed	90.0	100.0	closed	100.0	97.5	closed	97.5
	Total	Number	46	88	134	147	55	202	193	143	336
		Percent	95.8	95.7	95.7	97.4	94.8	96.7	97.0	95.3	96.3
No Response	NSRA	Number	1	0	1	2	0	2	3	0	3
		Percent	2.6	0.0	0.8	1.7	0.0	1.1	1.9	0.0	1.0
	SSRA	Number	0	closed	0	0	closed	0	0	closed	0
		Percent	0.0	closed	0.0	0.0	closed	0.0	0.0	closed	0.0
	Total	Number	1	0	1	2	0	2	3	0	3
		Percent	2.1	0.0	0.7	1.3	0.0	1.0	1.5	0.0	0.9
Total	NSRA	Number	38	92	130	121	58	179	159	150	309
		Percent	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
	SSRA	Number	10	closed	10	30	closed	30	40	closed	40
		Percent	100.0	closed	100.0	100.0	closed	100.0	100.0	closed	100.0
	Total	Number	48	92	140	151	58	209	199	150	349
		Percent	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Question 22b: If yes, please identify the area(s) and the type of barrier(s).

Recreat-ion Area	Response	Statistic	Day-use Visitors			Overnight Visitors			All Visitors		
			Peak Season	Off Peak Season	Overall	Peak Season	Off Peak Season	Overall	Peak Season	Off Peak Season	Overall
NSRA	Boat launch can be accomplished, but for one person it's a pain	Number	0	1	1	0	0	0	0	1	1
		Percent	0.0	25.0	20.0	0.0	0.0	0.0	0.0	14.3	8.3
	Difficult for some to access shore (too steep)	Number	0	0	0	0	1	1	0	1	1
		Percent	0.0	0.0	0.0	0.0	33.3	14.3	0.0	14.3	8.3
	Feces	Number	0	1	1	0	0	0	0	1	1
		Percent	0.0	25.0	20.0	0.0	0.0	0.0	0.0	14.3	8.3
	Hillside too steep for young kids	Number	0	0	0	0	1	1	0	1	1
		Percent	0.0	0.0	0.0	0.0	33.3	14.3	0.0	14.3	8.3
	If the ramp is out of the water it is difficult to launch by yourself	Number	0	1	1	0	0	0	0	1	1
		Percent	0.0	25.0	20.0	0.0	0.0	0.0	0.0	14.3	8.3
	People get too close to shore	Number	0	0	0	1	0	1	1	0	1
		Percent	0.0	0.0	0.0	25.0	0.0	14.3	20.0	0.0	8.3
	No response	Number	1	1	2	3	1	4	4	2	6
		Percent	100.0	25.0	40.0	75.0	33.3	57.1	80.0	28.6	50.0
	Total	Number	1	4	5	4	3	7	5	7	12
		Percent	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
SSRA	No response	Number	1	closed	1	0	closed	0	1	closed	1
		Percent	100.0	closed	100.0	0.0	closed	0.0	100.0	closed	100.0
	Total	Number	1	closed	1	0	closed	0	1	closed	1
		Percent	100.0	closed	100.0	0.0	closed	0.0	100.0	closed	100.0

Question 23a: Are there any any recreation activities that you would like to participate in but are not able to at this recreation area?

Response	Recreation Area	Statistic	Day-use Visitors			Overnight Visitors			All Visitors		
			Peak Season	Off Peak Season	Overall	Peak Season	Off Peak Season	Overall	Peak Season	Off Peak Season	Overall
Yes	NSRA	Number	3	6	9	18	6	24	21	12	33
		Percent	7.9	6.5	6.9	14.9	10.3	13.4	13.2	8.0	10.7
	SSRA	Number	1	closed	1	2	closed	2	3	closed	3
		Percent	10.0	closed	10.0	6.7	closed	6.7	7.5	closed	7.5
	Total	Number	4	6	10	20	6	26	24	12	36
		Percent	8.3	6.5	7.1	13.2	10.3	12.4	12.1	8.0	10.3
No	NSRA	Number	34	83	117	98	51	149	132	134	266
		Percent	89.5	90.2	90.0	81.0	87.9	83.2	83.0	89.3	86.1
	SSRA	Number	9	closed	9	28	closed	28	37	closed	37
		Percent	90.0	closed	90.0	93.3	closed	93.3	92.5	closed	92.5
	Total	Number	43	83	126	126	51	177	169	134	303
		Percent	89.6	90.2	90.0	83.4	87.9	84.7	84.9	89.3	86.8
No Response	NSRA	Number	1	3	4	5	1	6	6	4	10
		Percent	2.6	3.3	3.1	4.1	1.7	3.4	3.8	2.7	3.2
	SSRA	Number	0	closed	0	0	closed	0	0	closed	0
		Percent	0.0	closed	0.0	0.0	closed	0.0	0.0	closed	0.0
	Total	Number	1	3	4	5	1	6	6	4	10
		Percent	2.1	3.3	2.9	3.3	1.7	2.9	3.0	2.7	2.9
Total	NSRA	Number	38	92	130	121	58	179	159	150	309
		Percent	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
	SSRA	Number	10	closed	10	30	closed	30	40	closed	40
		Percent	100.0	closed	100.0	100.0	closed	100.0	100.0	closed	100.0
	Total	Number	48	92	140	151	58	209	199	150	349
		Percent	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Question 23b: If yes, please identify the activity or opportunity?

Recreat-ion Area	Activity (Categorized)	Statistic	Day-use Visitors			Overnight Visitors			All Visitors		
			Peak Season	Off Peak Season	Overall	Peak Season	Off Peak Season	Overall	Peak Season	Off Peak Season	Overall
NSRA	Allow ATV/Quad use	Number	0	0	0	1	1	2	1	1	2
		Percent	0.0	0.0	0.0	5.6	16.7	8.3	4.8	8.3	6.1
	Allow fires	Number	0	0	0	0	1	1	0	1	1
		Percent	0.0	0.0	0.0	0.0	16.7	4.2	0.0	8.3	3.0
	Allow fireworks	Number	0	0	0	1	0	1	1	0	1
		Percent	0.0	0.0	0.0	5.6	0.0	4.2	4.8	0.0	3.0
	Boat or other rental	Number	2	2	4	9	0	9	11	2	13
		Percent	66.7	33.3	44.4	50.0	0.0	37.5	52.4	16.7	39.4
	Fishing in quiet setting	Number	0	1	1	0	0	0	0	1	1
		Percent	0.0	16.7	11.1	0.0	0.0	0.0	0.0	8.3	3.0
	Horseback Riding	Number	0	1	1	0	0	0	0	1	1
		Percent	0.0	16.7	11.1	0.0	0.0	0.0	0.0	8.3	3.0
	Horseshoes	Number	0	0	0	1	0	1	1	0	1
		Percent	0.0	0.0	0.0	5.6	0.0	4.2	4.8	0.0	3.0
	Kids Activities or Play Area	Number	1	2	3	3	0	3	4	2	6
		Percent	33.3	33.3	33.3	16.7	0.0	12.5	19.0	16.7	18.2
	Live Music	Number	0	0	0	1	0	1	1	0	1
		Percent	0.0	0.0	0.0	5.6	0.0	4.2	4.8	0.0	3.0
	More store services	Number	0	0	0	1	1	2	1	1	2
		Percent	0.0	0.0	0.0	5.6	16.7	8.3	4.8	8.3	6.1
	Shooting Range	Number	0	0	0	0	1	1	0	1	1
		Percent	0.0	0.0	0.0	0.0	16.7	4.2	0.0	8.3	3.0
	Swimming	Number	0	0	0	0	2	2	0	2	2
		Percent	0.0	0.0	0.0	0.0	33.3	8.3	0.0	16.7	6.1
	Swimming & fishing due to boat activity	Number	0	0	0	1	0	1	1	0	1
		Percent	0.0	0.0	0.0	5.6	0.0	4.2	4.8	0.0	3.0
	Total	Number	3	6	9	18	6	24	21	12	33
		Percent	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
SSRA	Boat or other rental	Number	1	closed	1	2	closed	2	3	closed	3
		Percent	100.0	closed	100.0	100.0	closed	100.0	100.0	closed	100.0
	Total	Number	1	closed	1	2	closed	2	3	closed	3
		Percent	100.0	closed	100.0	100.0	closed	100.0	100.0	closed	100.0

Question 24a1: Rate the relative uniqueness of the recreation opportunities at this area relative to similar opportunities within Northern California.

Recreation Area	Uniqueness Rating (5-point scale[1])	Day-use Visitors						Overnight Visitors						All Visitors					
		Peak Season		Off Peak Season		Overall		Peak Season		Off Peak Season		Overall		Peak Season		Off Peak Season		Overall	
		n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
NSRA	Extremely common	10	26.3	7	7.6	17	13.1	18	14.9	3	5.2	21	11.7	28	17.6	10	6.7	38	12.3
	Somewhat common	4	10.5	16	17.4	20	15.4	31	25.6	8	13.8	39	21.8	35	22.0	24	16.0	59	19.1
	Neutral	13	34.2	32	34.8	45	34.6	36	29.8	23	39.7	59	33.0	49	30.8	55	36.7	104	33.7
	Somewhat unique	8	21.1	28	30.4	36	27.7	24	19.8	12	20.7	36	20.1	32	20.1	40	26.7	72	23.3
	Extremely unique	3	7.9	7	7.6	10	7.7	9	7.4	11	19.0	20	11.2	12	7.5	18	12.0	30	9.7
	No response	0	0.0	2	2.2	2	1.5	3	2.5	1	1.7	4	2.2	3	1.9	3	2.0	6	1.9
	Total	38	100.0	92	100.0	130	100.0	121	100.0	58	100.0	179	100.0	159	100.0	150	100.0	309	100.0
SSRA	Extremely common	3	30.0			3	30.0	8	26.7			8	26.7	11	27.5			11	27.5
	Somewhat common	1	10.0			1	10.0	4	13.3			4	13.3	5	12.5			5	12.5
	Neutral	3	30.0			3	30.0	11	36.7			11	36.7	14	35.0			14	35.0
	Somewhat unique	1	10.0			1	10.0	4	13.3			4	13.3	5	12.5			5	12.5
	Extremely unique	2	20.0			2	20.0	3	10.0			3	10.0	5	12.5			5	12.5
	No response	0	0.0			0	0.0	0	0.0			0	0.0	0	0.0			0	0.0
	Total	10	100.0			10	100.0	30	100.0			30	100.0	40	100.0			40	100.0
Overall	Extremely common	13	27.1	7	7.6	20	14.3	26	17.2	3	5.2	29	13.9	39	19.6	10	6.7	49	14.0
	Somewhat common	5	10.4	16	17.4	21	15.0	35	23.2	8	13.8	43	20.6	40	20.1	24	16.0	64	18.3
	Neutral	16	33.3	32	34.8	48	34.3	47	31.1	23	39.7	70	33.5	63	31.7	55	36.7	118	33.8
	Somewhat unique	9	18.8	28	30.4	37	26.4	28	18.5	12	20.7	40	19.1	37	18.6	40	26.7	77	22.1
	Extremely unique	5	10.4	7	7.6	12	8.6	12	7.9	11	19.0	23	11.0	17	8.5	18	12.0	35	10.0
	No response	0	0.0	2	2.2	2	1.4	3	2.0	1	1.7	4	1.9	3	1.5	3	2.0	6	1.7
	Total	48	100.0	92	100.0	140	100.0	151	100.0	58	100.0	209	100.0	199	100.0	150	100.0	349	100.0

Question 24a2: AVERAGE relateive uniqueness rating[1] of visitors surveyed.

Recreation Area	Day-use Visitors			Overnight Visitors			All Visitors		
	Peak Season	Off-peak Season	Overall	Peak Season	Off-peak Season	Overall	Peak Season	Off-peak Season	Overall
NSRA	2.7	3.1	3.0	2.8	3.4	3.0	2.8	3.2	3.0
SSRA	2.8	closed	2.8	2.7	closed	2.7	2.7	closed	2.7
Total	2.8	3.1	3.0	2.8	3.4	2.9	2.8	3.2	3.0

[1] Rating scale: 1.0 = extremely common; 1.1 to 2.0 = common; 2.1 to 3.0 = somewhat common; 3.1 to 4.0 = somewhat unique; 4.1 to 4.9 = unique; and 5.0 = extremely unique.

Question 24b: Please explain, what, if anything is special or unique about this recreation area relative to other recreation areas in Northern California.

Recreation Area	Uniqueness Reason (categorized)	Day-use Visitors						Overnight Visitors						All Visitors					
		Peak Season		Off Peak Season		Overall		Peak Season		Off Peak Season		Overall		Peak Season		Off Peak Season		Overall	
		#	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
NSRA	Close proximity/ease of access	10	66.7	9	34.6	19	46.3	8	21.6	7	30.4	15	25.0	18	34.6	16	32.7	34	33.7
	Peaceful, uncrowded setting	1	6.7	4	15.4	5	12.2	4	10.8	6	26.1	10	16.7	5	9.6	10	20.4	15	14.9
	Fewer regulations	1	6.7	2	7.7	3	7.3	7	18.9	2	8.7	9	15.0	8	15.4	4	8.2	12	11.9
	Open/dispersed camping and vehicle access	0	0.0	4	15.4	4	9.8	6	16.2	1	4.3	7	11.7	6	11.5	5	10.2	11	10.9
	Quality jet skiing opportunity	0	0.0	1	3.8	1	2.4	4	10.8	1	4.3	5	8.3	4	7.7	2	4.1	6	5.9
	Easy shoreline access	0	0.0	1	3.8	1	2.4	2	5.4	0	0.0	2	3.3	2	3.8	1	2.0	3	3.0
	Good camping, fishing and boating	0	0.0	0	0.0	0	0.0	2	5.4	1	4.3	3	5.0	2	3.8	1	2.0	3	3.0
	Jet boating/speed boating opportunities	0	0.0	0	0.0	0	0.0	2	5.4	1	4.3	3	5.0	2	3.8	1	2.0	3	3.0
	Quality and accessible fishing lake	0	0.0	2	0.0	2	4.9	1	2.7	0	0.0	1	1.7	1	1.9	2	4.1	3	3.0
	Family friendly environment	2	13.3	0	0.0	2	4.9	0	0.0	0	0.0	0	0.0	2	3.8	0	0.0	2	2.0
	Warmer reservoir temperatures	0	0.0	1	3.8	1	2.4	1	2.7	0	0.0	1	1.7	1	1.9	1	2.0	2	2.0
	Minimal submerged obstacles	1	6.7	0	0.0	1	2.4	0	0.0	0	0.0	0	0.0	1	1.9	0	0.0	1	1.0
	Other	0	0.0	0	0.0	0	0.0	0	0.0	1	4.3	1	1.7	0	0.0	1	2.0	1	1.0
	People	0	0.0	0	0.0	0	0.0	0	0.0	1	4.3	1	1.7	0	0.0	1	2.0	1	1.0
	Reservoir navigability	0	0.0	1	3.8	1	2.4	0	0.0	0	0.0	0	0.0	0	0.0	1	2.0	1	1.0
	Scenic	0	0.0	1	3.8	1	2.4	0	0.0	0	0.0	0	0.0	0	0.0	1	2.0	1	1.0
	Sentimental reasons	0	0.0	0	0.0	0	0.0	0	0.0	1	4.3	1	1.7	0	0.0	1	2.0	1	1.0
	Winter horseback riding opportunities	0	0.0	0	0.0	0	0.0	0	0.0	1	4.3	1	1.7	0	0.0	1	2.0	1	1.0
	Total	15	100.0	26	100.0	41	100.0	37	100.0	23	100.0	60	100.0	52	100.0	49	100.0	101	100.0
SSRA	Close proximity/ease of access	1	33.3	closed		1	33.3	3	33.3	closed		3	33.3	4	33.3	closed		4	33.3
	Other	0	0.0	closed		0	0.0	2	22.2	closed		2	22.2	2	16.7	closed		2	16.7
	Clean water	1	33.3	closed		1	33.3	0	0.0	closed		0	0.0	1	8.3	closed		1	8.3
	Combination of water sports and camping	0	0.0	closed		0	0.0	1	11.1	closed		1	11.1	1	8.3	closed		1	8.3
	Fewer regulations	1	33.3	closed		1	33.3	0	0.0	closed		0	0.0	1	8.3	closed		1	8.3
	Large campsites	0	0.0	closed		0	0.0	1	11.1	closed		1	11.1	1	8.3	closed		1	8.3
	Open/dispersed camping and vehicle access	0	0.0	closed		0	0.0	1	11.1	closed		1	11.1	1	8.3	closed		1	8.3
	Peaceful, uncrowded setting	0	0.0	closed		0	0.0	1	11.1	closed		1	11.1	1	8.3	closed		1	8.3
	Total	3	100.0	closed		3	100.0	9	100.0	closed		9	100.0	12	100.0	closed		12	100.0

Question 25: Please rate your preference for EXTENDING THE BOAT RAMP.

Facility Improvement	Recreation Area	Preference Response (5-Point Scale)	Day-use Visitors						Overnight Visitors						All Visitors					
			Peak Season		Off Peak Season		Overall		Peak Season		Off Peak Season		Overall		Peak Season		Off Peak Season		Overall	
			#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%
Extending the Boat Ramp	NSRA	Not Preferred at All (1)	12	31.6	12	13.0	24	18.5	22	18.2	7	12.1	29	16.2	34	21.4	19	12.7	53	17.2
		Slightly Not Preferred (2)	0	0.0	4	4.3	4	3.1	0	0.0	0	0.0	0	0.0	0	0.0	4	2.7	4	1.3
		Neither (3)	6	15.8	8	8.7	14	10.8	24	19.8	15	25.9	39	21.8	30	18.9	23	15.3	53	17.2
		Slightly Preferred (4)	2	5.3	23	25.0	25	19.2	16	13.2	5	8.6	21	11.7	18	11.3	28	18.7	46	14.9
		Highly Preferred (5)	5	13.2	26	28.3	31	23.8	11	9.1	12	20.7	23	12.8	16	10.1	38	25.3	54	17.5
		No opinion/response	13	34.2	19	20.7	32	24.6	48	39.7	19	32.8	67	37.4	61	38.4	38	25.3	99	32.0
		Total	38	100.0	92	100.0	130	100.0	121	100.0	58	100.0	179	100.0	159	100.0	150	100.0	309	100.0
	SSRA	Not Preferred at All (1)	2	20.0	closed	closed	2	20.0	4	13.3	closed	closed	4	13.3	6	15.0	closed	closed	6	15.0
		Slightly Not Preferred (2)	0	0.0	closed	closed	0	0.0	0	0.0	closed	closed	0	0.0	0	0.0	closed	closed	0	0.0
		Neither (3)	6	60.0	closed	closed	6	60.0	13	43.3	closed	closed	13	43.3	19	47.5	closed	closed	19	47.5
		Slightly Preferred (4)	0	0.0	closed	closed	0	0.0	5	16.7	closed	closed	5	16.7	5	12.5	closed	closed	5	12.5
		Highly Preferred (5)	1	10.0	closed	closed	1	10.0	2	6.7	closed	closed	2	6.7	3	7.5	closed	closed	3	7.5
		No opinion/response	1	10.0	closed	closed	1	10.0	6	20.0	closed	closed	6	20.0	7	17.5	closed	closed	7	17.5
		Total	10	100.0	closed	closed	10	100.0	30	100.0	closed	closed	30	100.0	40	100.0	closed	closed	40	100.0
	Total	Not Preferred at All (1)	14	29.2	12	13.0	26	18.6	26	17.2	7	12.1	33	15.8	40	20.1	19	12.7	59	16.9
		Slightly Not Preferred (2)	0	0.0	4	4.3	4	2.9	0	0.0	0	0.0	0	0.0	0	0.0	4	2.7	4	1.1
		Neither (3)	12	25.0	8	8.7	20	14.3	37	24.5	15	25.9	52	24.9	49	24.6	23	15.3	72	20.6
		Slightly Preferred (4)	2	4.2	23	25.0	25	17.9	21	13.9	5	8.6	26	12.4	23	11.6	28	18.7	51	14.6
		Highly Preferred (5)	6	12.5	26	28.3	32	22.9	13	8.6	12	20.7	25	12.0	19	9.5	38	25.3	57	16.3
		No opinion/response	14	29.2	19	20.7	33	23.6	54	35.8	19	32.8	73	34.9	68	34.2	38	25.3	106	30.4
		Total	48	100.0	92	100.0	140	100.0	151	100.0	58	100.0	209	100.0	199	100.0	150	100.0	349	100.0

Question 25: Please rate your preference for ADDITIONAL BOAT RAMP LAUNCHING LANES.

Facility Improvement	Recreation Area	Preference Response (5-Point Scale)	Day-use Visitors						Overnight Visitors						All Visitors					
			Peak Season		Off Peak Season		Overall		Peak Season		Off Peak Season		Overall		Peak Season		Off Peak Season		Overall	
			#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%
Adding Boat Ramp Lanes	NSRA	Not Preferred at All (1)	8	21.1	25	27.2	33	25.4	19	15.7	7	12.1	26	14.5	27	17.0	32	21.3	59	19.1
		Slightly Not Preferred (2)	0	0.0	4	4.3	4	3.1	1	0.8	1	1.7	2	1.1	1	0.6	5	3.3	6	1.9
		Neither (3)	6	15.8	7	7.6	13	10.0	22	18.2	11	19.0	33	18.4	28	17.6	18	12.0	46	14.9
		Slightly Preferred (4)	6	15.8	21	22.8	27	20.8	26	21.5	8	13.8	34	19.0	32	20.1	29	19.3	61	19.7
		Highly Preferred (5)	5	13.2	19	20.7	24	18.5	7	5.8	12	20.7	19	10.6	12	7.5	31	20.7	43	13.9
		No opinion/response	13	34.2	16	17.4	29	22.3	46	38.0	19	32.8	65	36.3	59	37.1	35	23.3	94	30.4
		Total	38	100.0	92	100.0	130	100.0	121	100.0	58	100.0	179	100.0	159	100.0	150	100.0	309	100.0
	SSRA	Not Preferred at All (1)	1	10.0	closed	closed	1	10.0	4	13.3	closed	closed	4	13.3	5	12.5	closed	closed	5	12.5
		Slightly Not Preferred (2)	1	10.0	closed	closed	1	10.0	1	3.3	closed	closed	1	3.3	2	5.0	closed	closed	2	5.0
		Neither (3)	6	60.0	closed	closed	6	60.0	14	46.7	closed	closed	14	46.7	20	50.0	closed	closed	20	50.0
		Slightly Preferred (4)	0	0.0	closed	closed	0	0.0	3	10.0	closed	closed	3	10.0	3	7.5	closed	closed	3	7.5
		Highly Preferred (5)	1	10.0	closed	closed	1	10.0	2	6.7	closed	closed	2	6.7	3	7.5	closed	closed	3	7.5
		No opinion/response	1	10.0	closed	closed	1	10.0	6	20.0	closed	closed	6	20.0	7	17.5	closed	closed	7	17.5
		Total	10	100.0	closed	closed	10	100.0	30	100.0	closed	closed	30	100.0	40	100.0	closed	closed	40	100.0
	Total	Not Preferred at All (1)	9	18.8	25	27.2	34	24.3	23	15.2	7	12.1	30	14.4	32	16.1	32	21.3	64	18.3
		Slightly Not Preferred (2)	1	2.1	4	4.3	5	3.6	2	1.3	1	1.7	3	1.4	3	1.5	5	3.3	8	2.3
		Neither (3)	12	25.0	7	7.6	19	13.6	36	23.8	11	19.0	47	22.5	48	24.1	18	12.0	66	18.9
		Slightly Preferred (4)	6	12.5	21	22.8	27	19.3	29	19.2	8	13.8	37	17.7	35	17.6	29	19.3	64	18.3
		Highly Preferred (5)	6	12.5	19	20.7	25	17.9	9	6.0	12	20.7	21	10.0	15	7.5	31	20.7	46	13.2
		No opinion/response	14	29.2	16	17.4	30	21.4	52	34.4	19	32.8	71	34.0	66	33.2	35	23.3	101	28.9
		Total	48	100.0	92	100.0	140	100.0	151	100.0	58	100.0	209	100.0	199	100.0	150	100.0	349	100.0

Question 25: Please rate your preference for a new or improved BOAT RAMP COURTESY DOCK.

Facility Improvement	Recreation Area	Preference Response (5-Point Scale)	Day-use Visitors						Overnight Visitors						All Visitors					
			Peak Season		Off Peak Season		Overall		Peak Season		Off Peak Season		Overall		Peak Season		Off Peak Season		Overall	
			#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%
New or Improved Courtesy Dock	NSRA	Not Preferred at All (1)	7	18.4	8	8.7	15	11.5	15	12.4	5	8.6	20	11.2	22	13.8	13	8.7	35	11.3
		Slightly Not Preferred (2)	0	0.0	2	2.2	2	1.5	6	5.0	0	0.0	6	3.4	6	3.8	2	1.3	8	2.6
		Neither (3)	7	18.4	18	19.6	25	19.2	20	16.5	14	24.1	34	19.0	27	17.0	32	21.3	59	19.1
		Slightly Preferred (4)	5	13.2	18	19.6	23	17.7	23	19.0	7	12.1	30	16.8	28	17.6	25	16.7	53	17.2
		Highly Preferred (5)	5	13.2	33	35.9	38	29.2	9	7.4	11	19.0	20	11.2	14	8.8	44	29.3	58	18.8
		No opinion/response	14	36.8	13	14.1	27	20.8	48	39.7	21	36.2	69	38.5	62	39.0	34	22.7	96	31.1
		Total	38	100.0	92	100.0	130	100.0	121	100.0	58	100.0	179	100.0	159	100.0	150	100.0	309	100.0
	SSRA	Not Preferred at All (1)	1	10.0	closed	closed	1	10.0	2	6.7	closed	closed	2	6.7	3	7.5	closed	closed	3	7.5
		Slightly Not Preferred (2)	2	20.0	closed	closed	2	20.0	2	6.7	closed	closed	2	6.7	4	10.0	closed	closed	4	10.0
		Neither (3)	3	30.0	closed	closed	3	30.0	14	46.7	closed	closed	14	46.7	17	42.5	closed	closed	17	42.5
		Slightly Preferred (4)	2	20.0	closed	closed	2	20.0	2	6.7	closed	closed	2	6.7	4	10.0	closed	closed	4	10.0
		Highly Preferred (5)	1	10.0	closed	closed	1	10.0	4	13.3	closed	closed	4	13.3	5	12.5	closed	closed	5	12.5
		No opinion/response	1	10.0	closed	closed	1	10.0	6	20.0	closed	closed	6	20.0	7	17.5	closed	closed	7	17.5
		Total	10	100.0	closed	closed	10	100.0	30	100.0	closed	closed	30	100.0	40	100.0	closed	closed	40	100.0
	Total	Not Preferred at All (1)	8	16.7	8	8.7	16	11.4	17	11.3	5	8.6	22	10.5	25	12.6	13	8.7	38	10.9
		Slightly Not Preferred (2)	2	4.2	2	2.2	4	2.9	8	5.3	0	0.0	8	3.8	10	5.0	2	1.3	12	3.4
		Neither (3)	10	20.8	18	19.6	28	20.0	34	22.5	14	24.1	48	23.0	44	22.1	32	21.3	76	21.8
		Slightly Preferred (4)	7	14.6	18	19.6	25	17.9	25	16.6	7	12.1	32	15.3	32	16.1	25	16.7	57	16.3
		Highly Preferred (5)	6	12.5	33	35.9	39	27.9	13	8.6	11	19.0	24	11.5	19	9.5	44	29.3	63	18.1
		No opinion/response	15	31.3	13	14.1	28	20.0	54	35.8	21	36.2	75	35.9	69	34.7	34	22.7	103	29.5
		Total	48	100.0	92	100.0	140	100.0	151	100.0	58	100.0	209	100.0	199	100.0	150	100.0	349	100.0

Question 25: Please rate your preference for a new or improved CAMPSITES.

Facility Improvement	Recreation Area	Preference Response (5-Point Scale)	Day-use Visitors						Overnight Visitors						All Visitors					
			Peak Season		Off Peak Season		Overall		Peak Season		Off Peak Season		Overall		Peak Season		Off Peak Season		Overall	
			#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%
New or Improved Campsites	NSRA	Not Preferred at All (1)	7	18.4	6	6.5	13	10.0	29	24.0	6	10.3	35	19.6	36	22.6	12	8.0	48	15.5
		Slightly Not Preferred (2)	0	0.0	1	1.1	1	0.8	4	3.3	2	3.4	6	3.4	4	2.5	3	2.0	7	2.3
		Neither (3)	9	23.7	20	21.7	29	22.3	17	14.0	16	27.6	33	18.4	26	16.4	36	24.0	62	20.1
		Slightly Preferred (4)	3	7.9	7	7.6	10	7.7	36	29.8	14	24.1	50	27.9	39	24.5	21	14.0	60	19.4
		Highly Preferred (5)	9	23.7	9	9.8	18	13.8	24	19.8	17	29.3	41	22.9	33	20.8	26	17.3	59	19.1
		No opinion/response	10	26.3	49	53.3	59	45.4	11	9.1	3	5.2	14	7.8	21	13.2	52	34.7	73	23.6
		Total	38	100.0	92	100.0	130	100.0	121	100.0	58	100.0	179	100.0	159	100.0	150	100.0	309	100.0
	SSRA	Not Preferred at All (1)	1	10.0	closed	closed	1	10.0	3	10.0	closed	closed	3	10.0	4	10.0	closed	closed	4	10.0
		Slightly Not Preferred (2)	0	0.0	closed	closed	0	0.0	1	3.3	closed	closed	1	3.3	1	2.5	closed	closed	1	2.5
		Neither (3)	3	30.0	closed	closed	3	30.0	14	46.7	closed	closed	14	46.7	17	42.5	closed	closed	17	42.5
		Slightly Preferred (4)	1	10.0	closed	closed	1	10.0	7	23.3	closed	closed	7	23.3	8	20.0	closed	closed	8	20.0
		Highly Preferred (5)	2	20.0	closed	closed	2	20.0	5	16.7	closed	closed	5	16.7	7	17.5	closed	closed	7	17.5
		No opinion/response	3	30.0	closed	closed	3	30.0	0	0.0	closed	closed	0	0.0	3	7.5	closed	closed	3	7.5
		Total	10	100.0	closed	closed	10	100.0	30	100.0	closed	closed	30	100.0	40	100.0	closed	closed	40	100.0
	Total	Not Preferred at All (1)	8	16.7	6	6.5	14	10.0	32	21.2	6	10.3	38	18.2	40	20.1	12	8.0	52	14.9
		Slightly Not Preferred (2)	0	0.0	1	1.1	1	0.7	5	3.3	2	3.4	7	3.3	5	2.5	3	2.0	8	2.3
		Neither (3)	12	25.0	20	21.7	32	22.9	31	20.5	16	27.6	47	22.5	43	21.6	36	24.0	79	22.6
		Slightly Preferred (4)	4	8.3	7	7.6	11	7.9	43	28.5	14	24.1	57	27.3	47	23.6	21	14.0	68	19.5
		Highly Preferred (5)	11	22.9	9	9.8	20	14.3	29	19.2	17	29.3	46	22.0	40	20.1	26	17.3	66	18.9
		No opinion/response	13	27.1	49	53.3	62	44.3	11	7.3	3	5.2	14	6.7	24	12.1	52	34.7	76	21.8
		Total	48	100.0	92	100.0	140	100.0	151	100.0	58	100.0	209	100.0	199	100.0	150	100.0	349	100.0

Question 25: Please rate your preference for a new or improved GROUP CAMPSITES.

Facility Improvement	Recreation Area	Preference Response (5-Point Scale)	Day-use Visitors						Overnight Visitors						All Visitors					
			Peak Season		Off Peak Season		Overall		Peak Season		Off Peak Season		Overall		Peak Season		Off Peak Season		Overall	
			#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%
New or Improved Group Campsites	NSRA	Not Preferred at All (1)	7	18.4	7	7.6	14	10.8	27	22.3	5	8.6	32	17.9	34	21.4	12	8.0	46	14.9
		Slightly Not Preferred (2)	0	0.0	5	5.4	5	3.8	3	2.5	2	3.4	5	2.8	3	1.9	7	4.7	10	3.2
		Neither (3)	9	23.7	18	19.6	27	20.8	23	19.0	11	19.0	34	19.0	32	20.1	29	19.3	61	19.7
		Slightly Preferred (4)	3	7.9	6	6.5	9	6.9	19	15.7	19	32.8	38	21.2	22	13.8	25	16.7	47	15.2
		Highly Preferred (5)	8	21.1	6	6.5	14	10.8	24	19.8	18	31.0	42	23.5	32	20.1	24	16.0	56	18.1
		No opinion/response	11	28.9	50	54.3	61	46.9	25	20.7	3	5.2	28	15.6	36	22.6	53	35.3	89	28.8
		Total	38	100.0	92	100.0	130	100.0	121	100.0	58	100.0	179	100.0	159	100.0	150	100.0	309	100.0
	SSRA	Not Preferred at All (1)	1	10.0	closed	closed	1	10.0	3	10.0	closed	closed	3	10.0	4	10.0	closed	closed	4	10.0
		Slightly Not Preferred (2)	0	0.0	closed	closed	0	0.0	0	0.0	closed	closed	0	0.0	0	0.0	closed	closed	0	0.0
		Neither (3)	3	30.0	closed	closed	3	30.0	14	46.7	closed	closed	14	46.7	17	42.5	closed	closed	17	42.5
		Slightly Preferred (4)	1	10.0	closed	closed	1	10.0	6	20.0	closed	closed	6	20.0	7	17.5	closed	closed	7	17.5
		Highly Preferred (5)	2	20.0	closed	closed	2	20.0	3	10.0	closed	closed	3	10.0	5	12.5	closed	closed	5	12.5
		No opinion/response	3	30.0	closed	closed	3	30.0	4	13.3	closed	closed	4	13.3	7	17.5	closed	closed	7	17.5
		Total	10	100.0	closed	closed	10	100.0	30	100.0	closed	closed	30	100.0	40	100.0	closed	closed	40	100.0
	Total	Not Preferred at All (1)	8	16.7	7	7.6	15	10.7	30	19.9	5	8.6	35	16.7	38	19.1	12	8.0	50	14.3
		Slightly Not Preferred (2)	0	0.0	5	5.4	5	3.6	3	2.0	2	3.4	5	2.4	3	1.5	7	4.7	10	2.9
		Neither (3)	12	25.0	18	19.6	30	21.4	37	24.5	11	19.0	48	23.0	49	24.6	29	19.3	78	22.3
		Slightly Preferred (4)	4	8.3	6	6.5	10	7.1	25	16.6	19	32.8	44	21.1	29	14.6	25	16.7	54	15.5
		Highly Preferred (5)	10	20.8	6	6.5	16	11.4	27	17.9	18	31.0	45	21.5	37	18.6	24	16.0	61	17.5
		No opinion/response	14	29.2	50	54.3	64	45.7	29	19.2	3	5.2	32	15.3	43	21.6	53	35.3	96	27.5
		Total	48	100.0	92	100.0	140	100.0	151	100.0	58	100.0	209	100.0	199	100.0	150	100.0	349	100.0

Question 25: Please rate your preference for a new or improved PICNIC SITES.

Facility Improvement	Recreation Area	Preference Response (5-Point Scale)	Day-use Visitors						Overnight Visitors						All Visitors					
			Peak Season		Off Peak Season		Overall		Peak Season		Off Peak Season		Overall		Peak Season		Off Peak Season		Overall	
			#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%
New or Improved Picnic Sites	NSRA	Not Preferred at All (1)	7	18.4	7	7.6	14	10.8	29	24.0	4	6.9	33	18.4	36	22.6	11	7.3	47	15.2
		Slightly Not Preferred (2)	0	0.0	1	1.1	1	0.8	2	1.6	1	1.7	3	1.7	2	1.3	2	1.3	4	1.3
		Neither (3)	7	18.4	15	16.3	22	16.9	30	24.8	25	43.1	55	30.7	37	23.3	40	26.7	77	24.9
		Slightly Preferred (4)	4	10.5	16	17.4	20	15.4	20	16.5	9	15.5	29	16.2	24	15.1	25	16.7	49	15.9
		Highly Preferred (5)	8	21.1	5	5.4	13	10.0	16	13.2	11	19.0	27	15.1	24	15.1	16	10.7	40	12.9
		No opinion/response	12	31.6	48	52.2	60	46.2	24	19.8	8	13.8	32	17.9	36	22.6	56	37.3	92	29.8
		Total	38	100.0	92	100.0	130	100.0	121	100.0	58	100.0	179	100.0	159	100.0	150	100.0	309	100.0
	SSRA	Not Preferred at All (1)	1	10.0	closed	closed	1	10.0	3	10.0	closed	closed	3	10.0	4	10.0	closed	closed	4	10.0
		Slightly Not Preferred (2)	0	0.0	closed	closed	0	0.0	0	0.0	closed	closed	0	0.0	0	0.0	closed	closed	0	0.0
		Neither (3)	3	30.0	closed	closed	3	30.0	15	50.0	closed	closed	15	50.0	18	45.0	closed	closed	18	45.0
		Slightly Preferred (4)	1	10.0	closed	closed	1	10.0	5	16.7	closed	closed	5	16.7	6	15.0	closed	closed	6	15.0
		Highly Preferred (5)	2	20.0	closed	closed	2	20.0	4	13.3	closed	closed	4	13.3	6	15.0	closed	closed	6	15.0
		No opinion/response	3	30.0	closed	closed	3	30.0	3	10.0	closed	closed	3	10.0	6	15.0	closed	closed	6	15.0
		Total	10	100.0	closed	closed	10	100.0	30	100.0	closed	closed	30	100.0	40	100.0	closed	closed	40	100.0
	Total	Not Preferred at All (1)	8	16.7	7	7.6	15	10.7	32	21.2	4	6.9	36	17.2	40	20.1	11	7.3	51	14.6
		Slightly Not Preferred (2)	0	0.0	1	1.1	1	0.7	2	1.3	1	1.7	3	1.4	2	1.0	2	1.3	4	1.1
		Neither (3)	10	20.8	15	16.3	25	17.9	45	29.8	25	43.1	70	33.5	55	27.6	40	26.7	95	27.2
		Slightly Preferred (4)	5	10.4	16	17.4	21	15.0	25	16.6	9	15.5	34	16.3	30	15.1	25	16.7	55	15.8
		Highly Preferred (5)	10	20.8	5	5.4	15	10.7	20	13.2	11	19.0	31	14.8	30	15.1	16	10.7	46	13.2
		No opinion/response	15	31.3	48	52.2	63	45.0	27	17.9	8	13.8	35	16.7	42	21.1	56	37.3	98	28.1
		Total	48	100.0	92	100.0	140	100.0	151	100.0	58	100.0	209	100.0	199	100.0	150	100.0	349	100.0

Question 25: Please rate your preference for a new or improved SWIM BEACH AREAS.

Facility Improvement	Recreation Area	Preference Response (5-Point Scale)	Day-use Visitors						Overnight Visitors						All Visitors					
			Peak Season		Off Peak Season		Overall		Peak Season		Off Peak Season		Overall		Peak Season		Off Peak Season		Overall	
			#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%
New or Improved Swim Beach	NSRA	Not Preferred at All (1)	8	21.1	8	8.7	16	12.3	29	24.0	5	8.6	34	19.0	37	23.3	13	8.7	50	16.2
		Slightly Not Preferred (2)	0	0.0	1	1.1	1	0.8	4	3.3	5	8.6	9	5.0	4	2.5	6	4.0	10	3.2
		Neither (3)	7	18.4	16	17.4	23	17.7	20	16.5	17	29.3	37	20.7	27	17.0	33	22.0	60	19.4
		Slightly Preferred (4)	13	34.2	15	16.3	28	21.5	22	18.2	12	20.7	34	19.0	35	22.0	27	18.0	62	20.1
		Highly Preferred (5)	5	13.2	9	9.8	14	10.8	31	25.6	11	19.0	42	23.5	36	22.6	20	13.3	56	18.1
		No opinion/response	5	13.2	43	46.7	48	36.9	15	12.4	8	13.8	23	12.8	20	12.6	51	34.0	71	23.0
		Total	38	100.0	92	100.0	130	100.0	121	100.0	58	100.0	179	100.0	159	100.0	150	100.0	309	100.0
	SSRA	Not Preferred at All (1)	1	10.0	closed	closed	1	10.0	4	13.3	closed	closed	4	13.3	5	12.5	closed	closed	5	12.5
		Slightly Not Preferred (2)	0	0.0	closed	closed	0	0.0	0	0.0	closed	closed	0	0.0	0	0.0	closed	closed	0	0.0
		Neither (3)	3	30.0	closed	closed	3	30.0	18	60.0	closed	closed	18	60.0	21	52.5	closed	closed	21	52.5
		Slightly Preferred (4)	1	10.0	closed	closed	1	10.0	1	3.3	closed	closed	1	3.3	2	5.0	closed	closed	2	5.0
		Highly Preferred (5)	3	30.0	closed	closed	3	30.0	5	16.7	closed	closed	5	16.7	8	20.0	closed	closed	8	20.0
		No opinion/response	2	20.0	closed	closed	2	20.0	2	6.7	closed	closed	2	6.7	4	10.0	closed	closed	4	10.0
		Total	10	100.0	closed	closed	10	100.0	30	100.0	closed	closed	30	100.0	40	100.0	closed	closed	40	100.0
	Total	Not Preferred at All (1)	9	18.8	8	8.7	17	12.1	33	21.9	5	8.6	38	18.2	42	21.1	13	8.7	55	15.8
		Slightly Not Preferred (2)	0	0.0	1	1.1	1	0.7	4	2.7	5	8.6	9	4.3	4	2.0	6	4.0	10	2.9
		Neither (3)	10	20.8	16	17.4	26	18.6	38	25.2	17	29.3	55	26.3	48	24.1	33	22.0	81	23.2
		Slightly Preferred (4)	14	29.2	15	16.3	29	20.7	23	15.2	12	20.7	35	16.7	37	18.6	27	18.0	64	18.3
		Highly Preferred (5)	8	16.7	9	9.8	17	12.1	36	23.8	11	19.0	47	22.5	44	22.1	20	13.3	64	18.3
		No opinion/response	7	14.6	43	46.7	50	35.7	17	11.3	8	13.8	25	12.0	24	12.1	51	34.0	75	21.5
		Total	48	100.0	92	100.0	140	100.0	151	100.0	58	100.0	209	100.0	199	100.0	150	100.0	349	100.0

Question 25: Please rate your preference for a new or improved RESTROOMS.

Facility Improvement	Recreation Area	Preference Response (5-Point Scale)	Day-use Visitors						Overnight Visitors						All Visitors					
			Peak Season		Off Peak Season		Overall		Peak Season		Off Peak Season		Overall		Peak Season		Off Peak Season		Overall	
			#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%
New or Improved Restrooms	NSRA	Not Preferred at All (1)	8	21.1	8	8.7	16	12.3	14	11.6	6	10.3	20	11.2	22	13.8	14	9.3	36	11.7
		Slightly Not Preferred (2)	1	2.6	2	2.2	3	2.3	3	2.5	2	3.4	5	2.8	4	2.5	4	2.7	8	2.6
		Neither (3)	6	15.8	24	26.1	30	23.1	11	9.1	10	17.2	21	11.7	17	10.7	34	22.7	51	16.5
		Slightly Preferred (4)	6	15.8	19	20.7	25	19.2	31	25.6	12	20.7	43	24.0	37	23.3	31	20.7	68	22.0
		Highly Preferred (5)	13	34.2	29	31.5	42	32.3	50	41.3	21	36.2	71	39.7	63	39.6	50	33.3	113	36.6
		No opinion/response	4	10.5	10	10.9	14	10.8	12	9.9	7	12.1	19	10.6	16	10.1	17	11.3	33	10.7
		Total	38	100.0	92	100.0	130	100.0	121	100.0	58	100.0	179	100.0	159	100.0	150	100.0	309	100.0
	SSRA	Not Preferred at All (1)	1	10.0	closed	closed	1	10.0	1	3.3	closed	closed	1	3.3	2	5.0	closed	closed	2	5.0
		Slightly Not Preferred (2)	0	0.0	closed	closed	0	0.0	0	0.0	closed	closed	0	0.0	0	0.0	closed	closed	0	0.0
		Neither (3)	1	10.0	closed	closed	1	10.0	4	13.3	closed	closed	4	13.3	5	12.5	closed	closed	5	12.5
		Slightly Preferred (4)	2	20.0	closed	closed	2	20.0	11	36.7	closed	closed	11	36.7	13	32.5	closed	closed	13	32.5
		Highly Preferred (5)	6	60.0	closed	closed	6	60.0	14	46.7	closed	closed	14	46.7	20	50.0	closed	closed	20	50.0
		No opinion/response	0	0.0	closed	closed	0	0.0	0	0.0	closed	closed	0	0.0	0	0.0	closed	closed	0	0.0
		Total	10	100.0	closed	closed	10	100.0	30	100.0	closed	closed	30	100.0	40	100.0	closed	closed	40	100.0
	Total	Not Preferred at All (1)	9	18.8	8	8.7	17	12.1	15	9.9	6	10.3	21	10.0	24	12.1	14	9.3	38	10.9
		Slightly Not Preferred (2)	1	2.1	2	2.2	3	2.1	3	2.0	2	3.4	5	2.4	4	2.0	4	2.7	8	2.3
		Neither (3)	7	14.6	24	26.1	31	22.1	15	9.9	10	17.2	25	12.0	22	11.1	34	22.7	56	16.0
		Slightly Preferred (4)	8	16.7	19	20.7	27	19.3	42	27.8	12	20.7	54	25.8	50	25.1	31	20.7	81	23.2
		Highly Preferred (5)	19	39.6	29	31.5	48	34.3	64	42.4	21	36.2	85	40.7	83	41.7	50	33.3	133	38.1
		No opinion/response	4	8.3	10	10.9	14	10.0	12	7.9	7	12.1	19	9.1	16	8.0	17	11.3	33	9.5
		Total	48	100.0	92	100.0	140	100.0	151	100.0	58	100.0	209	100.0	199	100.0	150	100.0	349	100.0

Question 25: Please rate your preference for a new or improved POTABLE WATER.

Facility Improvement	Recreation Area	Preference Response (5-Point Scale)	Day-use Visitors						Overnight Visitors						All Visitors					
			Peak Season		Off Peak Season		Overall		Peak Season		Off Peak Season		Overall		Peak Season		Off Peak Season		Overall	
			#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%
New or Improved Potable Water	NSRA	Not Preferred at All (1)	6	15.8	5	5.4	11	8.5	11	9.1	6	10.3	17	9.5	17	10.7	11	7.3	28	9.1
		Slightly Not Preferred (2)	0	0.0	2	2.2	2	1.5	2	1.7	0	0.0	2	1.1	2	1.3	2	1.3	4	1.3
		Neither (3)	7	18.4	16	17.4	23	17.7	19	15.7	12	20.7	31	17.3	26	16.4	28	18.7	54	17.5
		Slightly Preferred (4)	4	10.5	13	14.1	17	13.1	25	20.7	10	17.2	35	19.6	29	18.2	23	15.3	52	16.8
		Highly Preferred (5)	6	15.8	19	20.7	25	19.2	45	37.2	19	32.8	64	35.8	51	32.1	38	25.3	89	28.8
		No opinion/response	15	39.5	37	40.2	52	40.0	19	15.7	11	19.0	30	16.8	34	21.4	48	32.0	82	26.5
		Total	38	100.0	92	100.0	130	100.0	121	100.0	58	100.0	179	100.0	159	100.0	150	100.0	309	100.0
	SSRA	Not Preferred at All (1)	1	10.0	closed	closed	1	10.0	1	3.3	closed	closed	1	3.3	2	5.0	closed	closed	2	5.0
		Slightly Not Preferred (2)	0	0.0	closed	closed	0	0.0	0	0.0	closed	closed	0	0.0	0	0.0	closed	closed	0	0.0
		Neither (3)	1	10.0	closed	closed	1	10.0	5	16.7	closed	closed	5	16.7	6	15.0	closed	closed	6	15.0
		Slightly Preferred (4)	4	40.0	closed	closed	4	40.0	6	20.0	closed	closed	6	20.0	10	25.0	closed	closed	10	25.0
		Highly Preferred (5)	4	40.0	closed	closed	4	40.0	17	56.7	closed	closed	17	56.7	21	52.5	closed	closed	21	52.5
		No opinion/response	0	0.0	closed	closed	0	0.0	1	3.3	closed	closed	1	3.3	1	2.5	closed	closed	1	2.5
		Total	10	100.0	closed	closed	10	100.0	30	100.0	closed	closed	30	100.0	40	100.0	closed	closed	40	100.0
	Total	Not Preferred at All (1)	7	14.6	5	5.4	12	8.6	12	7.9	6	10.3	18	8.6	19	9.5	11	7.3	30	8.6
		Slightly Not Preferred (2)	0	0.0	2	2.2	2	1.4	2	1.3	0	0.0	2	1.0	2	1.0	2	1.3	4	1.1
		Neither (3)	8	16.7	16	17.4	24	17.1	24	15.9	12	20.7	36	17.2	32	16.1	28	18.7	60	17.2
		Slightly Preferred (4)	8	16.7	13	14.1	21	15.0	31	20.5	10	17.2	41	19.6	39	19.6	23	15.3	62	17.8
		Highly Preferred (5)	10	20.8	19	20.7	29	20.7	62	41.1	19	32.8	81	38.8	72	36.2	38	25.3	110	31.5
		No opinion/response	15	31.3	37	40.2	52	37.1	20	13.2	11	19.0	31	14.8	35	17.6	48	32.0	83	23.8
		Total	48	100.0	92	100.0	140	100.0	151	100.0	58	100.0	209	100.0	199	100.0	150	100.0	349	100.0

Question 25: Please rate your preference for a new or improved VEHICLE PARKING.

Facility Improvement	Recreation Area	Preference Response (5-Point Scale)	Day-use Visitors						Overnight Visitors						All Visitors					
			Peak Season		Off Peak Season		Overall		Peak Season		Off Peak Season		Overall		Peak Season		Off Peak Season		Overall	
			#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%
New or Improved Vehicle Parking	NSRA	Not Preferred at All (1)	14	36.8	21	22.8	35	26.9	35	28.9	10	17.2	45	25.1	49	30.8	31	20.7	80	25.9
		Slightly Not Preferred (2)	1	2.6	12	13.0	13	10.0	7	5.8	3	5.2	10	5.6	8	5.0	15	10.0	23	7.4
		Neither (3)	8	21.1	24	26.1	32	24.6	31	25.6	23	39.7	54	30.2	39	24.5	47	31.3	86	27.8
		Slightly Preferred (4)	9	23.7	15	16.3	24	18.5	19	15.7	10	17.2	29	16.2	28	17.6	25	16.7	53	17.2
		Highly Preferred (5)	2	5.3	8	8.7	10	7.7	19	15.7	10	17.2	29	16.2	21	13.2	18	12.0	39	12.6
		No opinion/response	4	10.5	12	13.0	16	12.3	10	8.3	2	3.4	12	6.7	14	8.8	14	9.3	28	9.1
		Total	38	100.0	92	100.0	130	100.0	121	100.0	58	100.0	179	100.0	159	100.0	150	100.0	309	100.0
	SSRA	Not Preferred at All (1)	2	20.0	closed	closed	2	20.0	6	20.0	closed	closed	6	20.0	8	20.0	closed	closed	8	20.0
		Slightly Not Preferred (2)	0	0.0	closed	closed	0	0.0	2	6.7	closed	closed	2	6.7	2	5.0	closed	closed	2	5.0
		Neither (3)	4	40.0	closed	closed	4	40.0	19	63.3	closed	closed	19	63.3	23	57.5	closed	closed	23	57.5
		Slightly Preferred (4)	0	0.0	closed	closed	0	0.0	3	10.0	closed	closed	3	10.0	3	7.5	closed	closed	3	7.5
		Highly Preferred (5)	4	40.0	closed	closed	4	40.0	0	0.0	closed	closed	0	0.0	4	10.0	closed	closed	4	10.0
		No opinion/response	0	0.0	closed	closed	0	0.0	0	0.0	closed	closed	0	0.0	0	0.0	closed	closed	0	0.0
		Total	10	100.0	closed	closed	10	100.0	30	100.0	closed	closed	30	100.0	40	100.0	closed	closed	40	100.0
	Total	Not Preferred at All (1)	16	33.3	21	22.8	37	26.4	41	27.2	10	17.2	51	24.4	57	28.6	31	20.7	88	25.2
		Slightly Not Preferred (2)	1	2.1	12	13.0	13	9.3	9	6.0	3	5.2	12	5.7	10	5.0	15	10.0	25	7.2
		Neither (3)	12	25.0	24	26.1	36	25.7	50	33.1	23	39.7	73	34.9	62	31.2	47	31.3	109	31.2
		Slightly Preferred (4)	9	18.8	15	16.3	24	17.1	22	14.6	10	17.2	32	15.3	31	15.6	25	16.7	56	16.0
		Highly Preferred (5)	6	12.5	8	8.7	14	10.0	19	12.6	10	17.2	29	13.9	25	12.6	18	12.0	43	12.3
		No opinion/response	4	8.3	12	13.0	16	11.4	10	6.6	2	3.4	12	5.7	14	7.0	14	9.3	28	8.0
		Total	48	100.0	92	100.0	140	100.0	151	100.0	58	100.0	209	100.0	199	100.0	150	100.0	349	100.0

Question 25: Please rate your preference for a new or improved BOAT TRAILER PARKING.

Facility Improvement	Recreation Area	Preference Response (5-Point Scale)	Day-use Visitors						Overnight Visitors						All Visitors					
			Peak Season		Off Peak Season		Overall		Peak Season		Off Peak Season		Overall		Peak Season		Off Peak Season		Overall	
			#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%
New or Improved Boat Trailer Parking	NSRA	Not Preferred at All (1)	26	21.5	7	12.1	33	18.4	37	23.3	35	23.3	72	23.3	11	28.9	28	30.4	39	30.0
		Slightly Not Preferred (2)	9	7.4	1	1.7	10	5.6	9	5.7	2	1.3	11	3.6	0	0.0	1	1.1	1	0.8
		Neither (3)	24	19.8	19	32.8	43	24.0	32	20.1	42	28.0	74	23.9	8	21.1	23	25.0	31	23.8
		Slightly Preferred (4)	18	14.9	12	20.7	30	16.8	21	13.2	25	16.7	46	14.9	3	7.9	13	14.1	16	12.3
		Highly Preferred (5)	16	13.2	9	15.5	25	14.0	19	11.9	15	10.0	34	11.0	3	7.9	6	6.5	9	6.9
		No opinion/response	28	23.1	10	17.2	38	21.2	41	25.8	31	20.7	72	23.3	13	34.2	21	22.8	34	26.2
		Total	121	100.0	58	100.0	179	100.0	159	100.0	150	100.0	309	100.0	38	100.0	92	100.0	130	100.0
	SSRA	Not Preferred at All (1)	3	10.0	closed	closed	3	10.0	4	10.0	closed	closed	4	10.0	1	10.0	closed	closed	1	10.0
		Slightly Not Preferred (2)	2	6.7	closed	closed	2	6.7	2	5.0	closed	closed	2	5.0	0	0.0	closed	closed	0	0.0
		Neither (3)	15	50.0	closed	closed	15	50.0	18	45.0	closed	closed	18	45.0	3	30.0	closed	closed	3	30.0
		Slightly Preferred (4)	3	10.0	closed	closed	3	10.0	5	12.5	closed	closed	5	12.5	2	20.0	closed	closed	2	20.0
		Highly Preferred (5)	1	3.3	closed	closed	1	3.3	3	7.5	closed	closed	3	7.5	2	20.0	closed	closed	2	20.0
		No opinion/response	6	20.0	closed	closed	6	20.0	8	20.0	closed	closed	8	20.0	2	20.0	closed	closed	2	20.0
		Total	30	100.0	closed	closed	30	100.0	40	100.0	closed	closed	40	100.0	10	100.0	closed	closed	10	100.0
	Total	Not Preferred at All (1)	29	19.2	7	12.1	36	17.2	41	20.6	35	23.3	76	21.8	12	25.0	28	30.4	40	28.6
		Slightly Not Preferred (2)	11	7.3	1	1.7	12	5.7	11	5.5	2	1.3	13	3.7	0	0.0	1	1.1	1	0.7
		Neither (3)	39	25.8	19	32.8	58	27.8	50	25.1	42	28.0	92	26.4	11	22.9	23	25.0	34	24.3
		Slightly Preferred (4)	21	13.9	12	20.7	33	15.8	26	13.1	25	16.7	51	14.6	5	10.4	13	14.1	18	12.9
		Highly Preferred (5)	17	11.3	9	15.5	26	12.4	22	11.1	15	10.0	37	10.6	5	10.4	6	6.5	11	7.9
		No opinion/response	34	22.5	10	17.2	44	21.1	49	24.6	31	20.7	80	22.9	15	31.3	21	22.8	36	25.7
		Total	151	100.0	58	100.0	209	100.0	199	100.0	150	100.0	349	100.0	48	100.0	92	100.0	140	100.0

Question 25: Please rate your preference for a new or improved FOOT TRAILS TO THE SHORELINE.

Facility Improvement	Recreation Area	Preference Response (5-Point Scale)	Day-use Visitors						Overnight Visitors						All Visitors					
			Peak Season		Off Peak Season		Overall		Peak Season		Off Peak Season		Overall		Peak Season		Off Peak Season		Overall	
			#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%
New or Improved Trails to Shoreline	NSRA	Not Preferred at All (1)	7	18.4	8	8.7	15	11.5	29	24.0	8	13.8	37	20.7	36	22.6	16	10.7	52	16.8
		Slightly Not Preferred (2)	3	7.9	4	4.3	7	5.4	6	5.0	1	1.7	7	3.9	9	5.7	5	3.3	14	4.5
		Neither (3)	6	15.8	18	19.6	24	18.5	31	25.6	16	27.6	47	26.3	37	23.3	34	22.7	71	23.0
		Slightly Preferred (4)	4	10.5	14	15.2	18	13.8	19	15.7	14	24.1	33	18.4	23	14.5	28	18.7	51	16.5
		Highly Preferred (5)	2	5.3	4	4.3	6	4.6	14	11.6	10	17.2	24	13.4	16	10.1	14	9.3	30	9.7
		No opinion/response	16	42.1	44	47.8	60	46.2	22	18.2	9	15.5	31	17.3	38	23.9	53	35.3	91	29.4
		Total	38	100.0	92	100.0	130	100.0	121	100.0	58	100.0	179	100.0	159	100.0	150	100.0	309	100.0
	SSRA	Not Preferred at All (1)	1	10.0	closed	closed	1	10.0	3	10.0	closed	closed	3	10.0	4	10.0	closed	closed	4	10.0
		Slightly Not Preferred (2)	0	0.0	closed	closed	0	0.0	4	13.3	closed	closed	4	13.3	4	10.0	closed	closed	4	10.0
		Neither (3)	3	30.0	closed	closed	3	30.0	14	46.7	closed	closed	14	46.7	17	42.5	closed	closed	17	42.5
		Slightly Preferred (4)	0	0.0	closed	closed	0	0.0	5	16.7	closed	closed	5	16.7	5	12.5	closed	closed	5	12.5
		Highly Preferred (5)	4	40.0	closed	closed	4	40.0	1	3.3	closed	closed	1	3.3	5	12.5	closed	closed	5	12.5
		No opinion/response	2	20.0	closed	closed	2	20.0	3	10.0	closed	closed	3	10.0	5	12.5	closed	closed	5	12.5
		Total	10	100.0	closed	closed	10	100.0	30	100.0	closed	closed	30	100.0	40	100.0	closed	closed	40	100.0
	Total	Not Preferred at All (1)	8	16.7	8	8.7	16	11.4	32	21.2	8	13.8	40	19.1	40	20.1	16	10.7	56	16.0
		Slightly Not Preferred (2)	3	6.3	4	4.3	7	5.0	10	6.6	1	1.7	11	5.3	13	6.5	5	3.3	18	5.2
		Neither (3)	9	18.8	18	19.6	27	19.3	45	29.8	16	27.6	61	29.2	54	27.1	34	22.7	88	25.2
		Slightly Preferred (4)	4	8.3	14	15.2	18	12.9	24	15.9	14	24.1	38	18.2	28	14.1	28	18.7	56	16.0
		Highly Preferred (5)	6	12.5	4	4.3	10	7.1	15	9.9	10	17.2	25	12.0	21	10.6	14	9.3	35	10.0
		No opinion/response	18	37.5	44	47.8	62	44.3	25	16.6	9	15.5	34	16.3	43	21.6	53	35.3	96	27.5
		Total	48	100.0	92	100.0	140	100.0	151	100.0	58	100.0	209	100.0	199	100.0	150	100.0	349	100.0

Question 25: Please rate your preference for a new or improved FOOT TRAILS AROUND THE SHORELINE.

Facility Improvement	Recreation Area	Preference Response (5-Point Scale)	Day-use Visitors						Overnight Visitors						All Visitors					
			Peak Season		Off Peak Season		Overall		Peak Season		Off Peak Season		Overall		Peak Season		Off Peak Season		Overall	
			#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%
New or Improved Foot Trails Around the Shoreline	NSRA	Not Preferred at All (1)	8	21.1	7	7.6	15	11.5	32	26.4	9	15.5	41	22.9	40	25.2	16	10.7	56	18.1
		Slightly Not Preferred (2)	3	7.9	4	4.3	7	5.4	6	5.0	2	3.4	8	4.5	9	5.7	6	4.0	15	4.9
		Neither (3)	6	15.8	19	20.7	25	19.2	29	24.0	15	25.9	44	24.6	35	22.0	34	22.7	69	22.3
		Slightly Preferred (4)	2	5.3	12	13.0	14	10.8	22	18.2	12	20.7	34	19.0	24	15.1	24	16.0	48	15.5
		Highly Preferred (5)	2	5.3	6	6.5	8	6.2	13	10.7	11	19.0	24	13.4	15	9.4	17	11.3	32	10.4
		No opinion/response	17	44.7	44	47.8	61	46.9	19	15.7	9	15.5	28	15.6	36	22.6	53	35.3	89	28.8
		Total	38	100.0	92	100.0	130	100.0	121	100.0	58	100.0	179	100.0	159	100.0	150	100.0	309	100.0
	SSRA	Not Preferred at All (1)	1	10.0	closed	closed	1	10.0	4	13.3	closed	closed	4	13.3	5	12.5	closed	closed	5	12.5
		Slightly Not Preferred (2)	0	0.0	closed	closed	0	0.0	3	10.0	closed	closed	3	10.0	3	7.5	closed	closed	3	7.5
		Neither (3)	3	30.0	closed	closed	3	30.0	13	43.3	closed	closed	13	43.3	16	40.0	closed	closed	16	40.0
		Slightly Preferred (4)	0	0.0	closed	closed	0	0.0	5	16.7	closed	closed	5	16.7	5	12.5	closed	closed	5	12.5
		Highly Preferred (5)	4	40.0	closed	closed	4	40.0	2	6.7	closed	closed	2	6.7	6	15.0	closed	closed	6	15.0
		No opinion/response	2	20.0	closed	closed	2	20.0	3	10.0	closed	closed	3	10.0	5	12.5	closed	closed	5	12.5
		Total	10	100.0	closed	closed	10	100.0	30	100.0	closed	closed	30	100.0	40	100.0	closed	closed	40	100.0
	Total	Not Preferred at All (1)	9	18.8	7	7.6	16	11.4	36	23.8	9	15.5	45	21.5	45	22.6	16	10.7	61	17.5
		Slightly Not Preferred (2)	3	6.3	4	4.3	7	5.0	9	6.0	2	3.4	11	5.3	12	6.0	6	4.0	18	5.2
		Neither (3)	9	18.8	19	20.7	28	20.0	42	27.8	15	25.9	57	27.3	51	25.6	34	22.7	85	24.4
		Slightly Preferred (4)	2	4.2	12	13.0	14	10.0	27	17.9	12	20.7	39	18.7	29	14.6	24	16.0	53	15.2
		Highly Preferred (5)	6	12.5	6	6.5	12	8.6	15	9.9	11	19.0	26	12.4	21	10.6	17	11.3	38	10.9
		No opinion/response	19	39.6	44	47.8	63	45.0	22	14.6	9	15.5	31	14.8	41	20.6	53	35.3	94	26.9
		Total	48	100.0	92	100.0	140	100.0	151	100.0	58	100.0	209	100.0	199	100.0	150	100.0	349	100.0

Question 25: Please rate your preference for a new or improved SIGNAGE WITHIN THE RECREATION AREA.

Facility Improvement	Recreation Area	Preference Response (5-Point Scale)	Day-use Visitors						Overnight Visitors						All Visitors					
			Peak Season		Off Peak Season		Overall		Peak Season		Off Peak Season		Overall		Peak Season		Off Peak Season		Overall	
			#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%
New or Improved Signage in the Recreation Area	NSRA	Not Preferred at All (1)	9	23.7	12	13.0	21	16.2	25	20.7	7	12.1	32	17.9	34	21.4	19	12.7	53	17.2
		Slightly Not Preferred (2)	3	7.9	10	10.9	13	10.0	10	8.3	3	5.2	13	7.3	13	8.2	13	8.7	26	8.4
		Neither (3)	6	15.8	29	31.5	35	26.9	27	22.3	16	27.6	43	24.0	33	20.8	45	30.0	78	25.2
		Slightly Preferred (4)	7	18.4	14	15.2	21	16.2	24	19.8	17	29.3	41	22.9	31	19.5	31	20.7	62	20.1
		Highly Preferred (5)	1	2.6	9	9.8	10	7.7	19	15.7	11	19.0	30	16.8	20	12.6	20	13.3	40	12.9
		No opinion/response	12	31.6	18	19.6	30	23.1	16	13.2	4	6.9	20	11.2	28	17.6	22	14.7	50	16.2
		Total	38	100.0	92	100.0	130	100.0	121	100.0	58	100.0	179	100.0	159	100.0	150	100.0	309	100.0
	SSRA	Not Preferred at All (1)	1	10.0	closed	closed	1	10.0	2	6.7	closed	closed	2	6.7	3	7.5	closed	closed	3	7.5
		Slightly Not Preferred (2)	0	0.0	closed	closed	0	0.0	3	10.0	closed	closed	3	10.0	3	7.5	closed	closed	3	7.5
		Neither (3)	4	40.0	closed	closed	4	40.0	15	50.0	closed	closed	15	50.0	19	47.5	closed	closed	19	47.5
		Slightly Preferred (4)	2	20.0	closed	closed	2	20.0	6	20.0	closed	closed	6	20.0	8	20.0	closed	closed	8	20.0
		Highly Preferred (5)	2	20.0	closed	closed	2	20.0	3	10.0	closed	closed	3	10.0	5	12.5	closed	closed	5	12.5
		No opinion/response	1	10.0	closed	closed	1	10.0	1	3.3	closed	closed	1	3.3	2	5.0	closed	closed	2	5.0
		Total	10	100.0	closed	closed	10	100.0	30	100.0	closed	closed	30	100.0	40	100.0	closed	closed	40	100.0
	Total	Not Preferred at All (1)	10	20.8	12	13.0	22	15.7	27	17.9	7	12.1	34	16.3	37	18.6	19	12.7	56	16.0
		Slightly Not Preferred (2)	3	6.3	10	10.9	13	9.3	13	8.6	3	5.2	16	7.7	16	8.0	13	8.7	29	8.3
		Neither (3)	10	20.8	29	31.5	39	27.9	42	27.8	16	27.6	58	27.8	52	26.1	45	30.0	97	27.8
		Slightly Preferred (4)	9	18.8	14	15.2	23	16.4	30	19.9	17	29.3	47	22.5	39	19.6	31	20.7	70	20.1
		Highly Preferred (5)	3	6.3	9	9.8	12	8.6	22	14.6	11	19.0	33	15.8	25	12.6	20	13.3	45	12.9
		No opinion/response	13	27.1	18	19.6	31	22.1	17	11.3	4	6.9	21	10.0	30	15.1	22	14.7	52	14.9
		Total	48	100.0	92	100.0	140	100.0	151	100.0	58	100.0	209	100.0	199	100.0	150	100.0	349	100.0

Question 26: How did you learn about this recreation area?

Response	Recreation Area	Statistic	Day-use Visitors			Overnight Visitors			All Visitors		
			Peak Season	Off Peak Season	Overall	Peak Season	Off Peak Season	Overall	Peak Season	Off Peak Season	Overall
Word of mouth	NSRA	Number	32	68	100	104	49	153	136	117	253
		Percent	20.1	45.3	32.4	65.4	32.7	49.5	85.5	78.0	81.9
	SSRA	Number	7	closed	7	28	closed	28	35	closed	35
		Percent	17.5	closed	17.5	70.0	closed	70.0	87.5	closed	87.5
	Total	Number	39	68	107	132	49	181	171	117	288
		Percent	19.6	45.3	30.7	66.3	32.7	51.9	85.9	78.0	82.5
Internet	NSRA	Number	0	4	4	3	2	5	3	6	9
		Percent	0.0	2.7	1.3	1.9	1.3	1.6	1.9	4.0	2.9
	SSRA	Number	1	closed	1	2	closed	2	3	closed	3
		Percent	2.5	closed	2.5	5.0	closed	5.0	7.5	closed	7.5
	Total	Number	1	4	5	5	2	7	6	6	12
		Percent	0.5	2.7	1.4	2.5	1.3	2.0	3.0	4.0	3.4
Newspaper	NSRA	Number	1	0	1	0	0	0	1	0	1
		Percent	0.6	0.0	0.3	0.0	0.0	0.0	0.6	0.0	0.3
	SSRA	Number	0	closed	0	0	closed	0	0	closed	0
		Percent	0.0	closed	0.0	0.0	closed	0.0	0.0	closed	0.0
	Total	Number	1	0	1	0	0	0	1	0	1
		Percent	0.5	0.0	0.3	0.0	0.0	0.0	0.5	0.0	0.3
Other	NSRA	Number	4	15	19	13	6	19	17	21	38
		Percent	2.5	10.0	6.1	8.2	4.0	6.1	10.7	14.0	12.3
	SSRA	Number	2	closed	2	0	closed	0	2	closed	2
		Percent	5.0	closed	5.0	0.0	closed	0.0	5.0	closed	5.0
	Total	Number	6	15	21	13	6	19	19	21	40
		Percent	3.0	10.0	6.0	6.5	4.0	5.4	9.5	14.0	11.5
No response	NSRA	Number	1	5	6	1	1	2	2	6	8
		Percent	0.6	3.3	1.9	0.6	0.7	0.6	1.3	4.0	2.6
	SSRA	Number	0	closed	0	0	closed	0	0	closed	0
		Percent	0.0	closed	0.0	0.0	closed	0.0	0.0	closed	0.0
	Total	Number	1	5	6	1	1	2	2	6	8
		Percent	0.5	3.3	1.7	0.5	0.7	0.6	1.0	4.0	2.3
Total	NSRA	Number	38	92	130	121	58	179	159	150	309
		Percent	23.9	61.3	42.1	76.1	38.7	57.9	100.0	100.0	100.0
	SSRA	Number	10	closed	10	30	closed	30	40	closed	40
		Percent	25.0	closed	25.0	75.0	closed	75.0	100.0	closed	100.0
	Total	Number	48	92	140	151	58	209	199	150	349
		Percent	24.1	61.3	40.1	75.9	38.7	59.9	100.0	100.0	100.0

Question 27a: What is your age?

Recreation Area	AVERAGE AGE OF VISITORS SURVEYED								
	Day-use Visitors			Overnight Visitors			All Visitors		
	Peak	Off Peak	Total	Peak	Off Peak	Total	Peak	Off Peak	Total
NSRA	43.1	47.6	46.2	38.9	38.7	38.8	39.9	44.1	41.9
SSRA	45.0	closed	45.0	38.9	closed	38.9	40.5	closed	40.5
Total	43.5	47.6	46.2	38.9	38.7	38.8	40.0	44.1	41.8

Question 27b: What is your gender?

Response	Recreation Area	Statistic	Day-use Visitors			Overnight Visitors			All Visitors		
			Peak	Off Peak	Total	Peak	Off Peak	Total	Peak	Off Peak	Total
Male	NSRA	Number	23	73	96	71	42	113	94	115	209
		Percent	14.5	48.7	31.1	44.7	28.0	36.6	59.1	76.7	67.6
	SSRA	Number	6	closed	6	19	closed	19	25	closed	25
		Percent	15.0	closed	15.0	47.5	closed	47.5	62.5	closed	62.5
	Total	Number	29	73	102	90	42	132	119	115	234
		Percent	14.6	48.7	29.2	45.2	28.0	37.8	59.8	76.7	67.0
Female	NSRA	Number	14	19	33	48	16	64	62	35	97
		Percent	8.8	12.7	10.7	30.2	10.7	20.7	39.0	23.3	31.4
	SSRA	Number	4	closed	4	11	closed	11	15	closed	15
		Percent	10.0	closed	10.0	27.5	closed	27.5	37.5	closed	37.5
	Total	Number	18	19	37	59	16	75	77	35	112
		Percent	9.0	12.7	10.6	29.6	10.7	21.5	38.7	23.3	32.1
No response	NSRA	Number	1	0	1	2	0	2	3	0	3
		Percent	0.6	0.0	0.3	1.3	0.0	0.6	1.9	0.0	1.0
	SSRA	Number	0	closed	0	0	closed	0	0	closed	0
		Percent	0.0	closed	0.0	0.0	closed	0.0	0.0	closed	0.0
	Total	Number	1	0	1	2	0	2	3	0	3
		Percent	0.5	0.0	0.3	1.0	0.0	0.6	1.5	0.0	0.9
Total	NSRA	Number	38	92	130	121	58	179	159	150	309
		Percent	23.9	61.3	42.1	76.1	38.7	57.9	100.0	100.0	100.0
	SSRA	Number	10	closed	10	30	closed	30	40	closed	40
		Percent	25.0	closed	25.0	75.0	closed	75.0	100.0	closed	100.0
	Total	Number	48	92	140	151	58	209	199	150	349
		Percent	24.1	61.3	40.1	75.9	38.7	59.9	100.0	100.0	100.0

Question 27c: What is your ethnicity?

Response	Recreation Area	Statistic	Day-use Visitors			Overnight Visitors			All Visitors		
			Peak Season	Off Peak Season	Overall	Peak Season	Off Peak Season	Overall	Peak Season	Off Peak Season	Overall
American Indian/ Alaskan Native	NSRA	Number	2	6	8	2	2	4	4	8	12
		Percent	1.3%	4.0%	2.6%	1.3%	1.3%	1.3%	2.5%	5.3%	3.9%
	SSRA	Number	0	closed	0	1	closed	1	1	closed	1
		Percent	0.0%	closed	0.0%	2.5%	closed	2.5%	2.5%	closed	2.5%
	Total	Number	2	6	8	3	2	5	5	8	13
		Percent	1.0%	4.0%	2.3%	1.5%	1.3%	1.4%	2.5%	5.3%	3.7%
Hispanic/ Latino	NSRA	Number	5	7	12	15	5	20	20	12	32
		Percent	3.1%	4.7%	3.9%	9.4%	3.3%	6.5%	12.6%	8.0%	10.4%
	SSRA	Number	3	closed	3	5	closed	5	8	closed	8
		Percent	7.5%	closed	7.5%	12.5%	closed	12.5%	20.0%	closed	20.0%
	Total	Number	8	7	15	20	5	25	28	12	40
		Percent	4.0%	4.7%	4.3%	10.1%	3.3%	7.2%	14.1%	8.0%	11.5%
Spanish Hispanic or Latino	NSRA	Number	1	0	1	7	0	7	8	0	8
		Percent	0.6%	0.0%	0.3%	4.4%	0.0%	2.3%	5.0%	0.0%	2.6%
	SSRA	Number	0	closed	0	3	closed	3	3	closed	3
		Percent	0.0%	closed	0.0%	7.5%	closed	7.5%	7.5%	closed	7.5%
	Total	Number	1	0	1	10	0	10	11	0	11
		Percent	0.5%	0.0%	0.3%	5.0%	0.0%	2.9%	5.5%	0.0%	3.2%
Asian	NSRA	Number	2	2	4	3	0	3	5	2	7
		Percent	1.3%	1.3%	1.3%	1.9%	0.0%	1.0%	3.1%	1.3%	2.3%
	SSRA	Number	1	closed	1	0	closed	0	1	closed	1
		Percent	2.5%	closed	2.5%	0.0%	closed	0.0%	2.5%	closed	2.5%
	Total	Number	3	2	5	3	0	3	6	2	8
		Percent	1.5%	1.3%	1.4%	1.5%	0.0%	0.9%	3.0%	1.3%	2.3%
Black/ African-American	NSRA	Number	2	0	2	1	0	1	3	0	3
		Percent	1.3%	0.0%	0.6%	0.6%	0.0%	0.3%	1.9%	0.0%	1.0%
	SSRA	Number	0	closed	0	0	closed	0	0	closed	0
		Percent	0.0%	closed	0.0%	0.0%	closed	0.0%	0.0%	closed	0.0%
	Total	Number	2	0	2	1	0	1	3	0	3
		Percent	1.0%	0.0%	0.6%	0.5%	0.0%	0.3%	1.5%	0.0%	0.9%
White	NSRA	Number	24	73	97	87	47	134	111	120	231
		Percent	15.1%	48.7%	31.4%	54.7%	31.3%	43.4%	69.8%	80.0%	74.8%
	SSRA	Number	6	closed	6	20	closed	20	26	closed	26
		Percent	15.0%	closed	15.0%	50.0%	closed	50.0%	65.0%	closed	65.0%
	Total	Number	30	73	103	107	47	154	137	120	257
		Percent	15.1%	48.7%	29.5%	53.8%	31.3%	44.1%	68.8%	80.0%	73.6%
Native Hawaiin/ Other Pacific Islander	NSRA	Number	0	0	0	2	1	3	2	1	3
		Percent	0.0%	0.0%	0.0%	1.3%	0.7%	1.0%	1.3%	0.7%	1.0%
	SSRA	Number	0	closed	0	1	closed	1	1	closed	1
		Percent	0.0%	closed	0.0%	2.5%	closed	2.5%	2.5%	closed	2.5%
	Total	Number	0	0	0	3	1	4	3	1	4
		Percent	0.0%	0.0%	0.0%	1.5%	0.7%	1.1%	1.5%	0.7%	1.1%
Other	NSRA	Number	0	2	2	0	2	2	0	4	4
		Percent	0.0%	1.3%	0.6%	0.0%	1.3%	0.6%	0.0%	2.7%	1.3%
	SSRA	Number	0	closed	0	0	closed	0	0	closed	0
		Percent	0.0%	closed	0.0%	0.0%	closed	0.0%	0.0%	closed	0.0%
	Total	Number	0	2	2	0	2	2	0	4	4
		Percent	0.0%	1.3%	0.6%	0.0%	1.3%	0.6%	0.0%	2.7%	1.1%
No response	NSRA	Number	2	2	4	4	1	5	6	3	9
		Percent	1.3%	1.3%	1.3%	2.5%	0.7%	1.6%	3.8%	2.0%	2.9%
	SSRA	Number	0	closed	0	0	closed	0	0	closed	0
		Percent	0.0%	closed	0.0%	0.0%	closed	0.0%	0.0%	closed	0.0%
	Total	Number	2	2	4	4	1	5	6	3	9
		Percent	1.0%	1.3%	1.1%	2.0%	0.7%	1.4%	3.0%	2.0%	2.6%
Total	NSRA	Number	38	92	130	121	58	179	159	150	309
		Percent	23.9%	61.3%	42.1%	76.1%	38.7%	57.9%	100.0%	100.0%	100.0%
	SSRA	Number	10	closed	10	30	closed	30	40	closed	40
		Percent	25.0%	closed	25.0%	75.0%	closed	75.0%	100.0%	closed	100.0%
	Total	Number	48	92	140	151	58	209	199	150	349
		Percent	24.1%	61.3%	40.1%	75.9%	38.7%	59.9%	100.0%	100.0%	100.0%

Question 27d: What is your primary spoken language?

Response	Recreation Area	Statistic	Day-use Visitors Peak Season	Day-use Visitors Off Peak Season	Day-use Visitors Overall	Overnight Visitors Peak Season	Overnight Visitors Off Peak Season	Overnight Visitors Overall	All Visitors Peak Season	All Visitors Off Peak Season	All Visitors Overall
English	NSRA	Number	35	87	122	107	53	160	142	140	282
		Percent	22.0	58.0	39.5	67.3	35.3	51.8	89.3	93.3	91.3
	SSRA	Number	8	closed	8	26	closed	26	34	closed	34
		Percent	20.0	closed	20.0	65.0	closed	65.0	85.0	closed	85.0
	Total	Number	43	87	130	133	53	186	176	140	316
		Percent	21.6	58.0	37.2	66.8	35.3	53.3	88.4	93.3	90.5
Spanish	NSRA	Number	1	2	3	11	2	13	12	4	16
		Percent	0.6	1.3	1.0	6.9	1.3	4.2	7.5	2.7	5.2
	SSRA	Number	1	closed	1	4	closed	4	5	closed	5
		Percent	2.5	closed	2.5	10.0	closed	10.0	12.5	closed	12.5
	Total	Number	2	2	4	15	2	17	17	4	21
		Percent	1.0	1.3	1.1	7.5	1.3	4.9	8.5	2.7	6.0
Russian	NSRA	Number	1	1	2	0	1	1	1	2	3
		Percent	0.6	0.7	0.6	0.0	0.7	0.3	0.6	1.3	1.0
	SSRA	Number	0	closed	0	0	closed	0	0	closed	0
		Percent	0.0	closed	0.0	0.0	closed	0.0	0.0	closed	0.0
	Total	Number	1	1	2	0	1	1	1	2	3
		Percent	0.5	0.7	0.6	0.0	0.7	0.3	0.5	1.3	0.9
Ukranian	NSRA	Number	0	0	0	0	1	1	0	1	1
		Percent	0.0	0.0	0.0	0.0	0.7	0.3	0.0	0.7	0.3
	SSRA	Number	0	closed	0	0	closed	0	0	closed	0
		Percent	0.0	closed	0.0	0.0	closed	0.0	0.0	closed	0.0
	Total	Number	0	0	0	0	1	1	0	1	1
		Percent	0.0	0.0	0.0	0.0	0.7	0.3	0.0	0.7	0.3
Japanese	NSRA	Number	0	2	2	1	0	1	1	2	3
		Percent	0.0	1.3	0.6	0.6	0.0	0.3	0.6	1.3	1.0
	SSRA	Number	1	closed	1	0	closed	0	1	closed	1
		Percent	2.5	closed	2.5	0.0	closed	0.0	2.5	closed	2.5
	Total	Number	1	2	3	1	0	1	2	2	4
		Percent	0.5	1.3	0.9	0.5	0.0	0.3	1.0	1.3	1.1
Laoatian	NSRA	Number	0	0	0	1	0	1	1	0	1
		Percent	0.0	0.0	0.0	0.6	0.0	0.3	0.6	0.0	0.3
	SSRA	Number	0	closed	0	0	closed	0	0	closed	0
		Percent	0.0	closed	0.0	0.0	closed	0.0	0.0	closed	0.0
	Total	Number	0	0	0	1	0	1	1	0	1
		Percent	0.0	0.0	0.0	0.5	0.0	0.3	0.5	0.0	0.3
Romanian	NSRA	Number	0	0	0	1	0	1	1	0	1
		Percent	0.0	0.0	0.0	0.6	0.0	0.3	0.6	0.0	0.3
	SSRA	Number	0	closed	0	0	closed	0	0	closed	0
		Percent	0.0	closed	0.0	0.0	closed	0.0	0.0	closed	0.0
	Total	Number	0	0	0	1	0	1	1	0	1
		Percent	0.0	0.0	0.0	0.5	0.0	0.3	0.5	0.0	0.3
No response	NSRA	Number	1	0	1	0	1	1	1	1	2
		Percent	0.6	0.0	0.3	0.0	0.7	0.3	0.6	0.7	0.6
	SSRA	Number	0	closed	0	0	closed	0	0	closed	0
		Percent	0.0	closed	0.0	0.0	closed	0.0	0.0	closed	0.0
	Total	Number	1	0	1	0	1	1	1	1	2
		Percent	0.5	0.0	0.3	0.0	0.7	0.3	0.5	0.7	0.6
Total	NSRA	Number	38	92	130	121	58	179	159	150	309
		Percent	23.9	61.3	42.1	76.1	38.7	57.9	100.0	100.0	100.0
	SSRA	Number	10	closed	10	30	closed	30	40	closed	40
		Percent	25.0	closed	25.0	75.0	closed	75.0	100.0	closed	100.0
	Total	Number	48	92	140	151	58	209	199	150	349
		Percent	24.1	61.3	40.1	75.9	38.7	59.9	100.0	100.0	100.0

Question 27e: What is the zip code of your primary residence?

Recreation Area	County	Day-use Visitors		Overnight Visitors		All Visitors	
		Number	Percent	Number	Percent	Number	Percent
NSRA	Alameda	0	0.0%	3	1.0%	3	1.0%
	Butte	1	0.3%	2	0.6%	3	1.0%
	Contra Costa	1	0.3%	5	1.6%	6	1.9%
	Davis	0	0.0%	2	0.6%	2	0.6%
	Dickson	0	0.0%	1	0.3%	1	0.3%
	El Dorado	1	0.3%	3	1.0%	4	1.3%
	International	0	0.0%	1	0.3%	1	0.3%
	Nevada	1	0.3%	1	0.3%	2	0.6%
	Pierce	0	0.0%	1	0.3%	1	0.3%
	Placer	50	16.2%	29	9.4%	79	25.6%
	Plumas	1	0.3%	0	0.0%	1	0.3%
	Sacramento	29	9.4%	71	23.0%	100	32.4%
	San Francisco	0	0.0%	2	0.6%	2	0.6%
	San Joaquin	0	0.0%	6	1.9%	6	1.9%
	Santa Clara	0	0.0%	2	0.6%	2	0.6%
	Solano	0	0.0%	1	0.3%	1	0.3%
	Sutter	9	2.9%	13	4.2%	22	7.1%
	Tulare	0	0.0%	1	0.3%	1	0.3%
	Tuolumne	1	0.3%	0	0.0%	1	0.3%
	Washoe	0	0.0%	4	1.3%	4	1.3%
	Yolo	2	0.6%	5	1.6%	7	2.3%
	Yuba	22	7.1%	19	6.1%	41	13.3%
	Invalid zip code provided	0	0.0%	1	0.3%	1	0.3%
	No response	12	3.9%	6	1.9%	18	5.8%
	Total	130	42.1%	179	57.9%	309	100.0%
SSRA	Alameda	0	0.0%	1	2.5%	1	2.5%
	Contra Costa	0	0.0%	1	2.5%	1	2.5%
	Glenn	1	2.5%	0	0.0%	1	2.5%
	Nevada	0	0.0%	1	2.5%	1	2.5%
	Placer	7	17.5%	7	17.5%	14	35.0%
	Sacramento	0	0.0%	11	27.5%	11	27.5%
	San Mateo	0	0.0%	1	2.5%	1	2.5%
	Stanislaus	0	0.0%	1	2.5%	1	2.5%
	Sutter	1	2.5%	2	5.0%	3	7.5%
	Yuba	1	2.5%	3	7.5%	4	10.0%
	Invalid zip code provided	0	0.0%	2	5.0%	2	5.0%
	No response	0	0.0%	0	0.0%	0	0.0%
	Total	10	25.0%	30	75.0%	40	100.0%

Question 28a: General Comments by Day-use Visitors at NSRA during Off Peak Season.

Comment	Number of Responses
$20 fee seems too high for just launching a boat for a few hours	1
Bathrooms need tending; kids play area would be nice	1
Better bathrooms; better potable water; fishing piers or docks would be nice	1
Better bathrooms; block off for boats and jet skis near shore	1
Boat rentals are a plus	1
Coming from a state where recreational activities are actually valued, I am astounded at the lack of lake management, not only at this lake, but at the majority of the lakes in this area. But, as we all know, it's not about recreation whe it comes to water in Cal. Please, if you are going to drain the lake, year after year, after year, extend the friggin boat ramp so we don't have to launch in teh mud from October to December, putting on waders and spreading towels in our boat to minimize the mess.	1
Day use fee is high; entry is slow when popular days	1
Earliest gate entrance as possible	1
Enforce alcohol ban on lake - very important; would prefer no alcohol sales for safest boating	1
Enforce Coast Guard rules for safe boating operation	1
Enforce noise ordinance on jet/power boats; employ a moveable floating dock as the lake levels drop below the existing boat ramps; late summer through spring we launch off the old dam service road-mud/no dock.	1
Equestrian center; zipline	1
Expand gate closing hours - later better.	1
Experiences have always been good; signage could be better; roads need upgrading	1
Gas station	1
Gates open 24 hours	1
Good the way it is!	1
Great as is	1
I feel very comfortable with the whole experience	1
I've reported an attacking dog in campground, but staff doesn't seem to care enough about enforcement within campground	1
Improve boat launch area	1
Improve roads all over rec area	1
Improve store and bathrooms. Stop smoking by concessionaires inside store	1
Improved roads coming into the recreation area; no problem within	1
Keep fees as low as possible; would love to be able to buy gasoline at NSRA	1
Leave it as is	1
Less crowded boat launch during summer	1
Lower boat launch fees	1
Lower day use fees	1
More bass tournaments	1
Open the gates earlier	1
Open the gates earlier than today; actually opened at 6:00 am	1
Plant some Florida strain largemouth Bass. Also plant Coho Salmon during the winter.	1
Post or verbally indicate use sites and offer maps/pamphlets; restrooms and roads in facility could be better	1

Question 28a (continued): General Comments by Day-use Visitors at NSRA during Off Peak Season.

Comment	Number of Responses
Prices are high and charge for dogs and kayaks. No showers	1
Restrooms could be cleaner	1
Sheriffs patrol	1
Signage in water for hazards/rocks and to control speed near launch for tournaments	1
South Shore Rec Area open more often; convenience shops to have more options/supply	1
Teen drinking patrols - out of control adolescent partying during peak season	1
This is a small lake utilized primarily for irrigation. There appears to be no lake management. 90% of the fish caught from this lake are Spotted Bass in the 10-13 inch length, which should probably be removed. This might allow what few Largemouth that are in the lake to grow and improve the recreational experience.	1
We enjoy fishing here. It would be nice to have an area to drop boat and separate to pick up. In the spring/summer lots of recreational boaters who are slow on the ramps.	1
It would be nice to see some fish management on this lake. There appears to be none at this time. Make the removal of any spotted bass caught under 12 inches mandatory. There are very few large fish caught from this lake, and even fewer Largemouth Bass. The lake is completely dominated by the Spotted Bass species.	2
Total	44

Question 28b: Comments by Day-use Visitors at NSRA during Peak Season.

Comment	Number of Responses
Add sand along shoreline swim areas; add water line near restrooms (drinking); add lifeguards	1
All we want is for rock islands and trees to be marked so we don't ruin our boat by driving over them	1
Better her than most other lakes - laid back attitude and fewer obstacles; nice lake overall	1
Better marking of hidden obstacles under water.	1
Better service for campsites and restrooms	1
Better trails to restrooms; potable water would be nice	1
Boat launch needs more water	1
Cheaper for disabled vets	1
I liked it the way it is; was not too crowded	1
Improve beach area/smooth out; provide more day use beach area	1
Leave the water levels up for recreational uses as long as possible	1
Like it as it is	1
Lower the prices; teach other boaters propoer etiquette - a guy tied up and left jet ski in a way that others coudn't launch their boats	1
More water and overhangs	1
Opening the gate 1 hour before safe light	1
Possibly free admission to locals or discounted rate for locals	1
Shore access very rocky, slippery	1
Signage outside rec area guiding to north/south areas; rentals would be nice (i.e., tents, boats)	1
Stock more mechanical items nearby so someone doesn't have to drive far for repairs	1
Stocking of fish	1
Very pleased	1
Total	21

Question 28c: Comments by Day-use Visitors at SSRA during Peak Season.

Comment	Number of Responses
Flushing toilets	1
More shady months and hours on the South Shore	1
We love CFW	1
Total	3

Question 28d: Comments by Overnight Visitors at NSRA during Off Peak Season.

Comment	Number of Responses
A higher water level would make swimming more comfortable	1
Adding site numbers to each campground site	1
Bathrooms	1
Bathrooms needed for campers in Jet Ski Cove area	1
Better restrooms and water	1
Buoys/signs for jet skiiers to avoid speeding and getting too close to children, etc; rules for boaters/jet skiers posted	1
Cheaper camping prices	1
Clean the restrooms/porta-potties and provide more of them	1
Cleaner bathrooms; level sites at full hookups	1
Everything is OK for the most part excpet the restrooms. They need new ones with showers.	1
Fix roads coming in	1
Good just the way it is	1
Great place, but only comment is the use of restrooms, at least put portable potties.	1
Just keep it the way it is.	1
Longer gate hours	1
More convenient entrance/ticket machine	1
More restrooms and showers; improve marking (i.e., arrows on roads); designate swim area free of rocks and debris	1
More sheriff and security (gunshots heard last night)	1
Open SSRA all weekdays too	1
Overall good. Just fix the bathrooms.	1
Please add camp tables, BBQ grills, WiFi and stock Coors regular	1
Potable water and flat, level RV sites.	1
Restroom in Horse Camp area (Boss Point currently closed)	1
Rudeness of campsite/store personnel	1
Showers	1
Showers and closer restrooms with clean tap water	1
Signage upgrade; enforce rules (dogs off leash/attacking); potable water sites near the water sites	1
Stock fish	1
Stock more fish	1
The store could be better stocked; were running low on a lot of stuff; entry fees were high and the gate closed too early	1
The water out of the spicket is dirty	1
To catch more fish	1
Total	32

Question 28e: Comments by Overnight Visitors at NSRA during Peak Season.

Comment	Number of Responses
Add fire pits and picnic tables at Jet Ski Cove	1
Add picnic tables and shade shelters; prices seem high and go up frequently	1
Bathrooms need upgrading. Horseshoe pits (more play areas)	1
BBQ pits in every campsite	1
Best improvement would be safer swim and fishing areas close to restrooms for families with little children. Signs for boat/jet ski users to not access areas designated for swimming/fishing.	1
Better bathroom facilities	1
Buoys marking safe swimming area would be nice.	1
Clean restrooms; lower fees	1
Clean water and bathrooms	1
Cleaner bathrooms	1
Cleaner restrooms	1
Cleaner restrooms; bigger tables; more space per campground	1
Enforce the rules in campsite (noise and how many cars per campsite); bathrooms need regular maintenance; showers would be helpful	1
Everything is great	1
Extra vehicle pay is almost the cost of a site. Wish extra vehicle fee were around $5-10 like other campgrounds I have stayed at.	1
Flatten a few spots for camping would be helpful; provide fire extinguishers on trees (saw small grass fire because fire ring inadequate at nearby campsite); improved fire pits would be nice too	1
For fires, keep dry grass mowed down; add speed bumps within camping area	1
Fresh water for drinking; more bathrooms	1
Gates not locked without being able to get out; fees are high and too much for some people with fees going up	1
Gates shut too early preventing needed errands	1
Get drinking water back	1
Great	1
Higher water levels in summer would be nice	1
Hot coin-op showers; low water markers-there are areas that are just under water surface in the middle of the lake on South Shore side	1
I prefer showers and potable water	1
I would like to have the water left in the lake throughout the summer and let out maybe in October. Leave the water for Northern California poeple to have fun.	1
If there was water at each campground; cleaner bathrooms	1
Install shower facilities; enclosed dog park for exercise	1
It would be great if less water was released so we can extend our camping during the summer months. It would also be nice to have an ice cream station.	1
Jet skis too close to swimmers (~25 ft from children; doing circles around kids)	1
Just need drinking water working please	1
Keep boats and jet skis away from shores	1
Keep it the way it is	1

Question 28e (continued): Comments by Overnight Visitors at NSRA during Peak Season.

Comment	Number of Responses
Level RV spaces; potable water	1
Leveling the RV sites	1
Lower areas to camp and BBQ during low water levels	1
Lower fees; clean porta-a-johns	1
Make restrooms cleaner, roomier; shoreline smoothed out, less rocky	1
Map provided didn't match up well with reality; more restrooms; person hung up on caller requiring 3 call backs	1
Mark off swim safe area for kids so boaters don't get too close; showers would be helpful	1
More water	1
Noticed some potholes on roads in area	1
Online reservations; improve restrooms	1
Other places we have seen maintenance cleaning garbage cans and bathrooms, but not here. Identify campsites better - hard to identify sites	1
Perfect as is here at Jet Ski Cove	1
Please slow the outflow of water and stabilize lake level	1
Porta-potties need toilet paper replenished; some additional shade would be nice	1
Prices are fair; lots of room; don't need to change anything	1
Prices seem high - hold the costs	1
Provide recycling bins; repave and restripe the parking lots	1
Repave the roads; jet skiers getting too close to swimmers	1
Restrooms and porta-potties added all over; reservations were accepted, then confirmed and rejected (unacceptable).	1
Restrooms need a lot of upgrading, improvement and cleaning. Potable water needs to be more available	1
Season pass holders should get some not all free camping	1
Shade trees and greenery would help; water hookups/potable water; fix the dump site (right side not useable-had to exit and come back to access other side)	1
Showers	1
Showers, better trails, cleaner bathrooms; no more shallow water rocks; kids get hurt we get hurt	1
Signage needs upgrading and better maps; roads need to be leveled/smoothed out; prices are a little high here	1
Swimming beaches seem very rocky; improved ventilation and cleaning of bathrooms; showers would be nice	1
Too much noise and parties. There should be a 10 pm quiet time. Another dock. Cost too much to camp and not sleep.	1
Water level could be higher	1
Water spigots desired; more porta-potties and sanitation staitons	1
Wet t-shirt contests	1
Wish we had more tables	1
Would like to see a permanent restroom installed in the Boss Point area	1
Would like to see Gary and Brandi more	1
Showers would be nice	2
Total	68

Question 28f: Comments by Overnight Visitors at SSRA during Peak Season.

Comment	**Number of Responses**
Add more BBQ grills	1
Beach access, swimming areas, more warnings on underwater hazards	1
Beach areas	1
Better bathrooms; wireless desirable; emergency exit/contact info on each campsite	1
Better signage indicating location; Porta-potties need to be maintained better	1
Cheaper fees; better roads	1
Cleaner restrooms	1
Improve restrooms; stock more fish	1
Less noise at night; more flushing restrooms; potable water	1
Love it here. Just needs a few improvements (i.e., potable water, swim platform and some new restrooms). Overall, a fun lake with friends and family	1
Need drinking water at lake	1
Need marina with gas. Let water out of lake later in season. Water level really low. Lower fees for camping. Showers.	1
New toilets and fix the potable water problem	1
No complaints other than lack of drinking water. Boat ramp on south side needs upgrades as its getting old	1
Opening times would be good on the South Shore, better than just weekends; more real bathrooms	1
Prices could be lower	1
Restrooms upkeep better	1
Showers	1
Unleashed dogs	1
Upgrading restrooms; more showers available	1
Total	20

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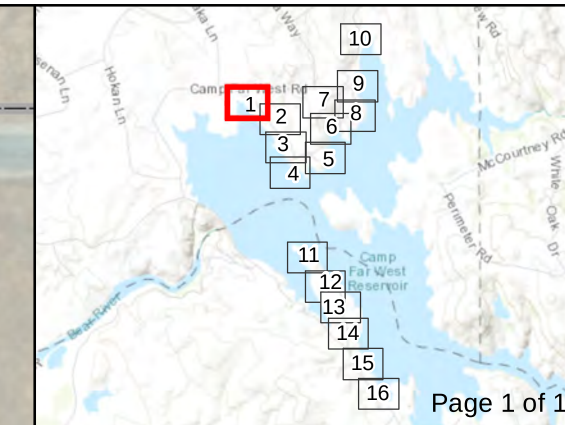
Attachment 3.3.6B

Pool Raise Recreation Impact Figures



Legend

- Gate
- Entrance
- Paved Road
- Unpaved Road (dirt)
- FERC Boundary 2997
- Normal Maximum Water Surface Elevation (300 ft)
- Pool Raise Elevation 305 ft
- Impacted area due to pool raise

N

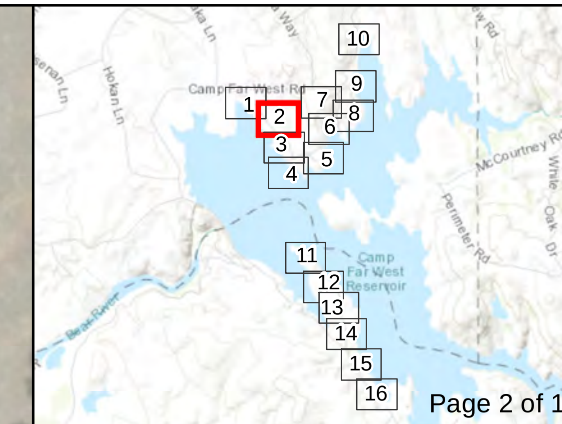
0 50 100 200 Feet

0 25 50 Meters

Recreation Area Impacts
Due to 305’ Pool Raise

SSWD Camp Far West Hydroelectric
Project No. 2997

Map information was compiled from the best available sources. No warranty is made for its accuracy or completeness.
Projection: CASPz2 NAD83



Legend

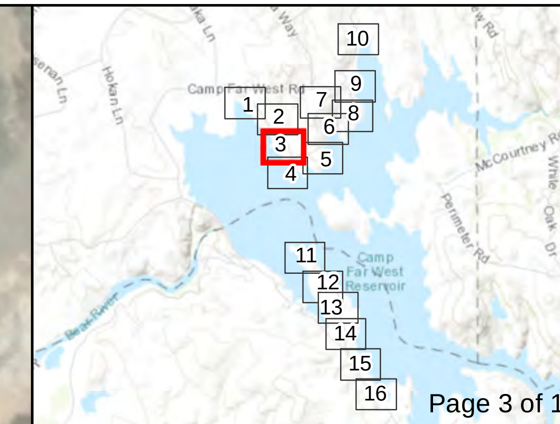
- Paved Road
- Unpaved Road (dirt)
- Water-Sewage Pond
- FERC Boundary 2997
- Normal Maximum Water Surface Elevation (300 ft)
- Pool Raise Elevation 305 ft
- Impacted area due to pool raise

0 50 100 200 Feet
0 25 50 Meters

Recreation Area Impacts
Due to 305' Pool Raise

SSWD Camp Far West Hydroelectric
Project No. 2997

Map information was compiled from the best available sources. No warranty is made for its accuracy or completeness.
Projection: CASPz2 NAD83



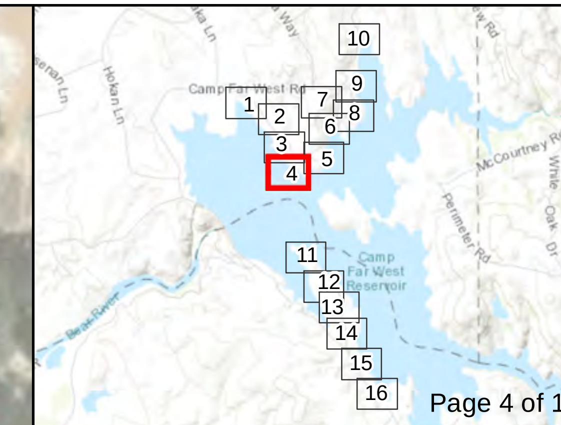
Legend

- Boat Ramp
- Campsite-Group
- Campsite-RV
- Campsite-Standard
- Fire Ring
- Grill
- Manhole
- Picnic Site
- Restroom
- Sewage Pump
- Shack; Store
- Table
- Water-Hydrant
- Paved Road
- Unpaved Road (dirt)
- Parking Area (paved)
- Ranger
- Restroom
- Concession Stand; Store
- FERC Boundary 2997
- Normal Maximum Water Surface Elevation (300 ft)
- Pool Raise Elevation 305 ft
- Impacted area due to pool raise

0 50 100 200 Feet
0 25 50 Meters

Recreation Area Impacts
Due to 305' Pool Raise
SSWD Camp Far West Hydroelectric
Project No. 2997

Map information was compiled from the best available sources. No warranty is made for its accuracy or completeness.
Projection: CASPz2 NAD83



Legend

- Boat Ramp
- Campsite-Standard
- Grill
- Picnic Site
- Restroom
- Shack; Store
- Water-Hydrant
- Paved Road
- Unpaved Road (dirt)
- Boat Ramp
- Parking Area (paved)
- Restroom
- Concession Stand; Store
- FERC Boundary 2997
- Normal Maximum Water Surface Elevation (300 ft)
- Pool Raise Elevation 305 ft
- Impacted area due to pool raise

0 50 100 200 Feet

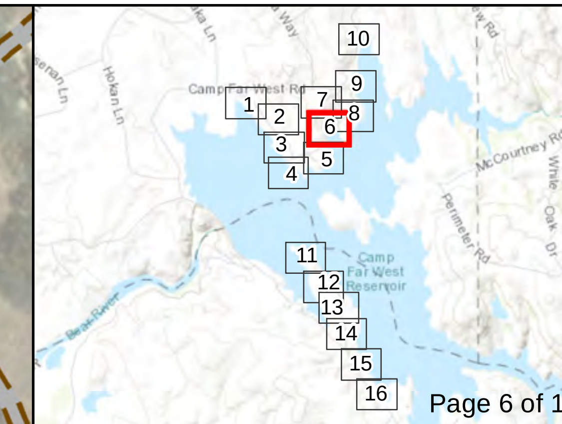
0 25 50 Meters

Recreation Area Impacts Due to 305' Pool Raise

SSWD Camp Far West Hydroelectric Project No. 2997

Projection: CASPz2 NAD83


To Boss Point Dispersed Use Area
Family Campground
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 18.5 19 19.5 20 21 22 23 24 25
26 27 29 31 32 34 35 38 39 40 41 42 43 45
Page 5 of 16
Legend
Campsite-Standard
Gate
RV Dump Station
Restroom
Water-Hydrant
Paved Road
Unpaved Road (dirt)
Parking Area
FERC Boundary 2997
Normal Maximum Water Surface Elevation (300 ft)
Pool Raise Elevation 305 ft
Impacted area due to pool raise
0 50 100 200 Feet
0 25 50 Meters
N
Recreation Area Impacts
Due to 305' Pool Raise
SSWD Camp Far West Hydroelectric
Project No. 2997
Map information was compiled from the best available sources. No warranty is made for its accuracy or completeness.
Projection: CASPz2 NAD83
Map Prepared by: HDR | © 2018 South Sutter Water District



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Legend

- Hitching Post
- Unpaved Road (dirt)
- FERC Boundary 2997
- Normal Maximum Water Surface Elevation (300 ft)
- Pool Raise Elevation 305 ft
- Impacted area due to pool raise

0 50 100 200 Feet

0 25 50 Meters

Recreation Area Impacts
Due to 305' Pool Raise

SSWD Camp Far West Hydroelectric
Project No. 2997

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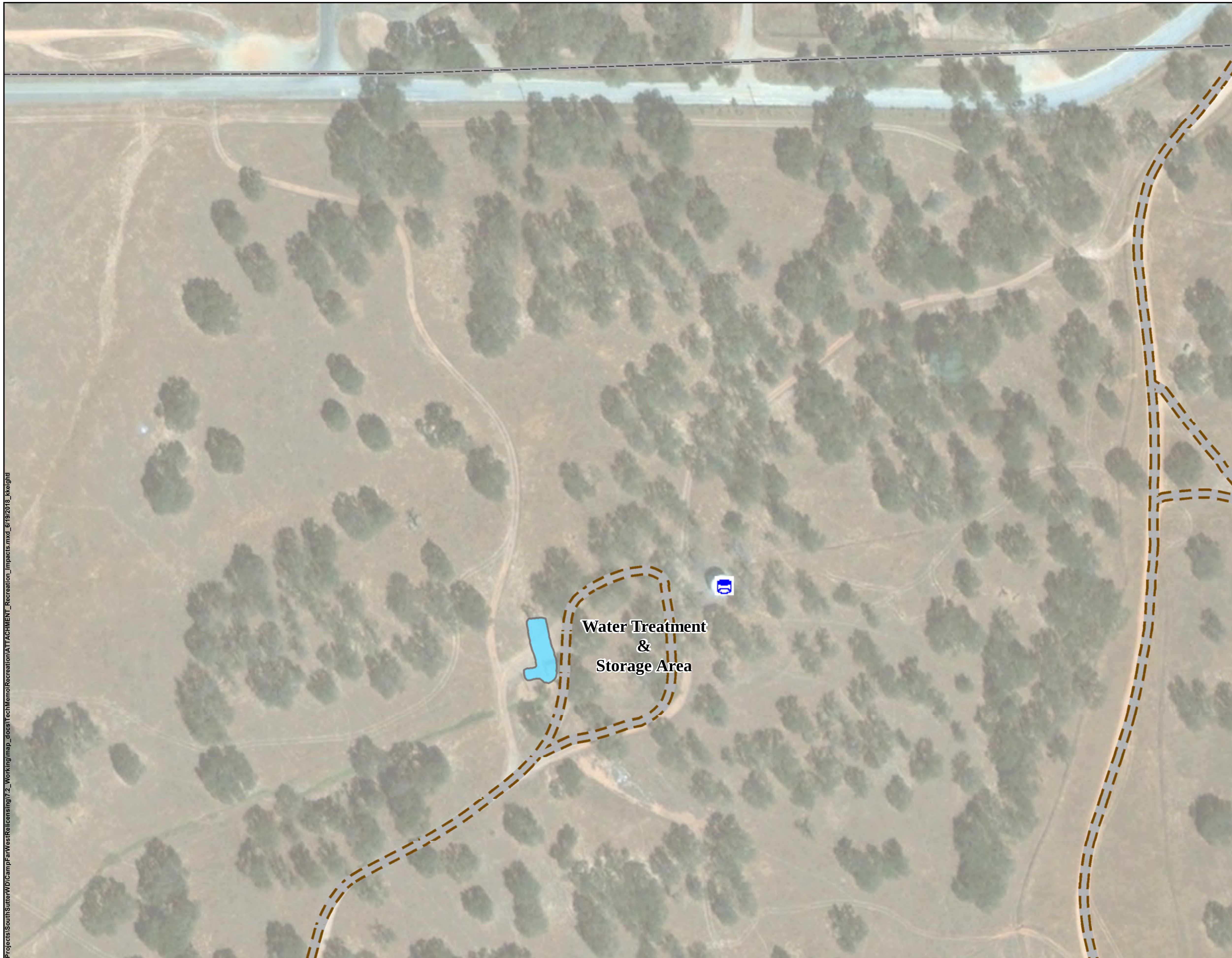
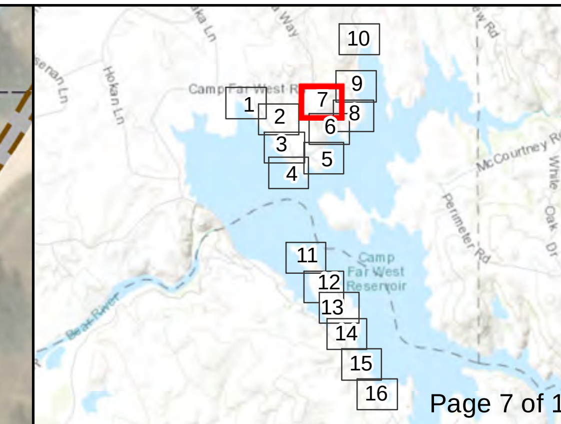




Legend

- Water-Tank
- Unpaved Road (dirt)
- Water-Treatment Plant
- FERC Boundary 2997

N

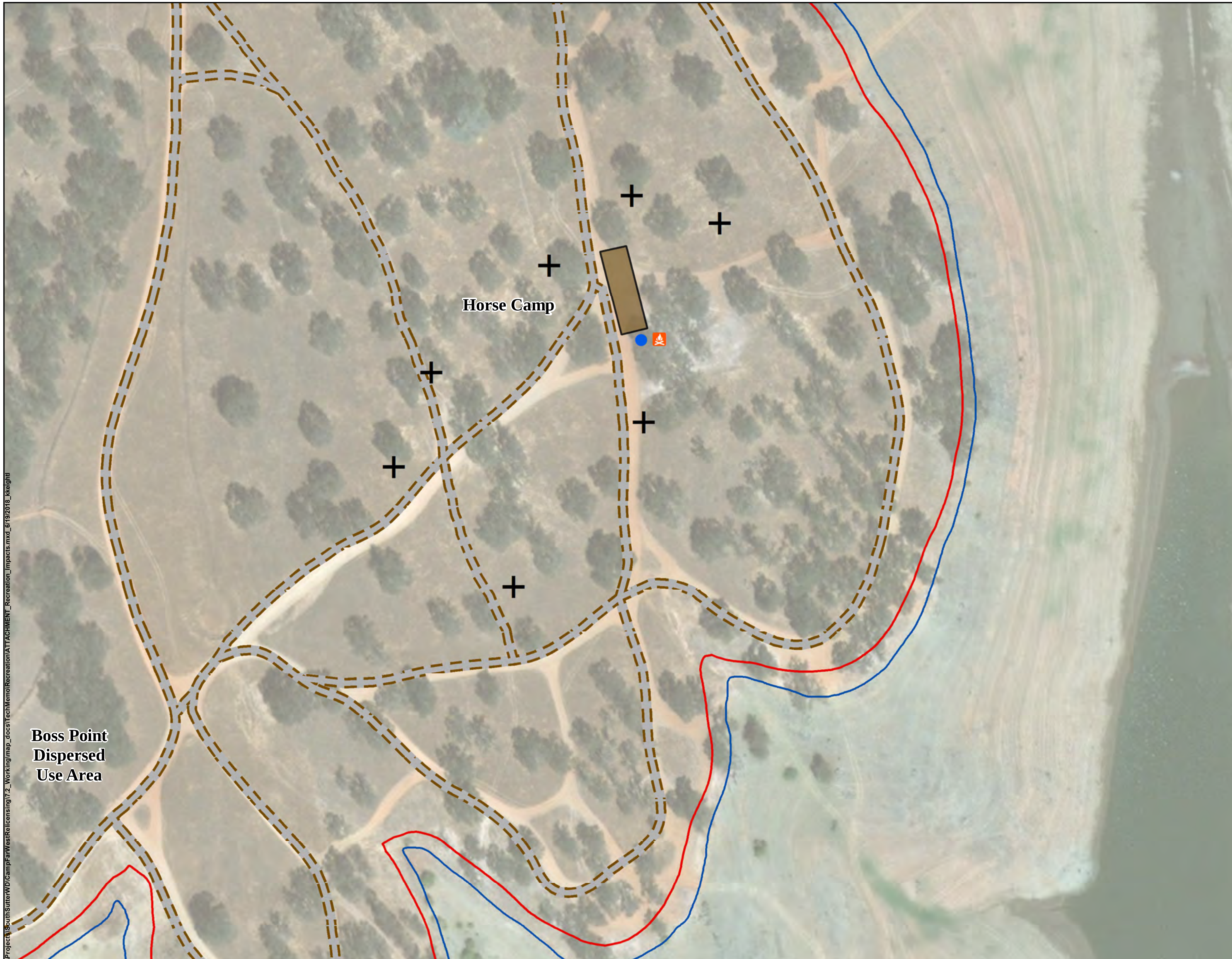
0 50 100 200 Feet

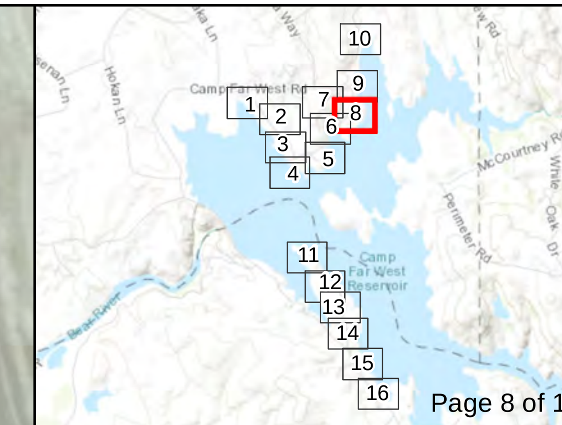
0 25 50 Meters

Recreation Area Impacts
Due to 305' Pool Raise

SSWD Camp Far West Hydroelectric
Project No. 2997

Projection: CASPz2 NAD83





Legend

- Fire Ring
- Hitching Post
- Water-Hydrant
- Unpaved Road (dirt)
- Parking Area (dirt)
- FERC Boundary 2997
- Normal Maximum Water Surface Elevation (300 ft)
- Pool Raise Elevation 305 ft

N

0 50 100 200 Feet

0 25 50 Meters

Recreation Area Impacts Due to 305' Pool Raise

SSWD Camp Far West Hydroelectric Project No. 2997

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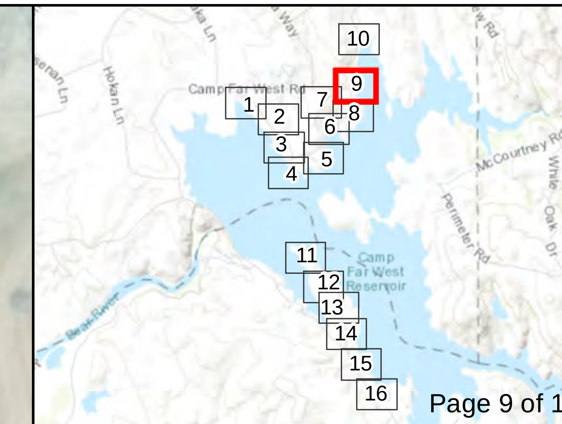

Legend

- Unpaved Road (dirt)
- FERC Boundary 2997
- Normal Maximum Water Surface Elevation (300 ft)
- Pool Raise Elevation 305 ft
- Impacted area due to pool raise

N

0 50 100 200 Feet

0 25 50 Meters

Recreation Area Impacts
Due to 305’ Pool Raise

SSWD Camp Far West Hydroelectric
Project No. 2997

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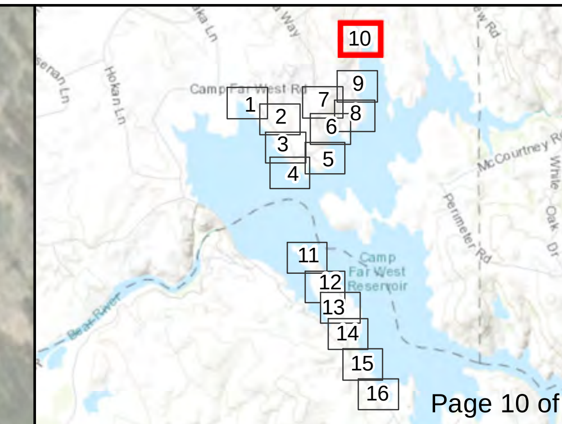

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Legend

- Gate
- Unpaved Road (dirt)
- FERC Boundary 2997
- Normal Maximum Water Surface Elevation (300 ft)
- Pool Raise Elevation 305 ft
- Impacted area due to pool raise

N

0 50 100 200 Feet

0 25 50 Meters

Recreation Area Impacts
Due to 305' Pool Raise

SSWD Camp Far West Hydroelectric
Project No. 2997

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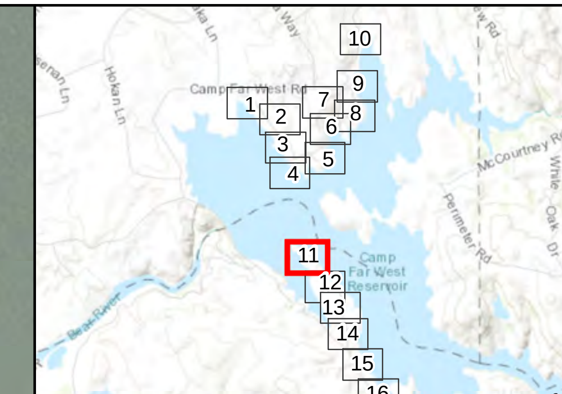
Projection: CASPz2 NAD83



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Legend

- Campsite-Standard
- Restroom
- Stage
- Water-Hydrant
- Paved Road
- Unpaved Road (dirt)
- Parking Area (paved)
- Restroom
- Swim Beach
- FERC Boundary 2997
- Normal Maximum Water Surface Elevation (300 ft)
- Pool Raise Elevation 305 ft
- Impacted area due to pool raise

N

0 50 100 200 Feet

0 25 50 Meters

Recreation Area Impacts
Due to 305' Pool Raise

SSWD Camp Far West Hydroelectric
Project No. 2997

Map information was compiled from the best available sources. No warranty is made for its accuracy or completeness.
Projection: CASPz2 NAD83

Map Prepared by: HDR | © 2018 South Sutter Water District

Recreation Area Impacts Due to 305' Pool Raise

SSWD Camp Far West Hydroelectric Project No. 2997

Map information was compiled from the best available sources. No warranty is made for its accuracy or completeness.
Projection: CASPz2 NAD83

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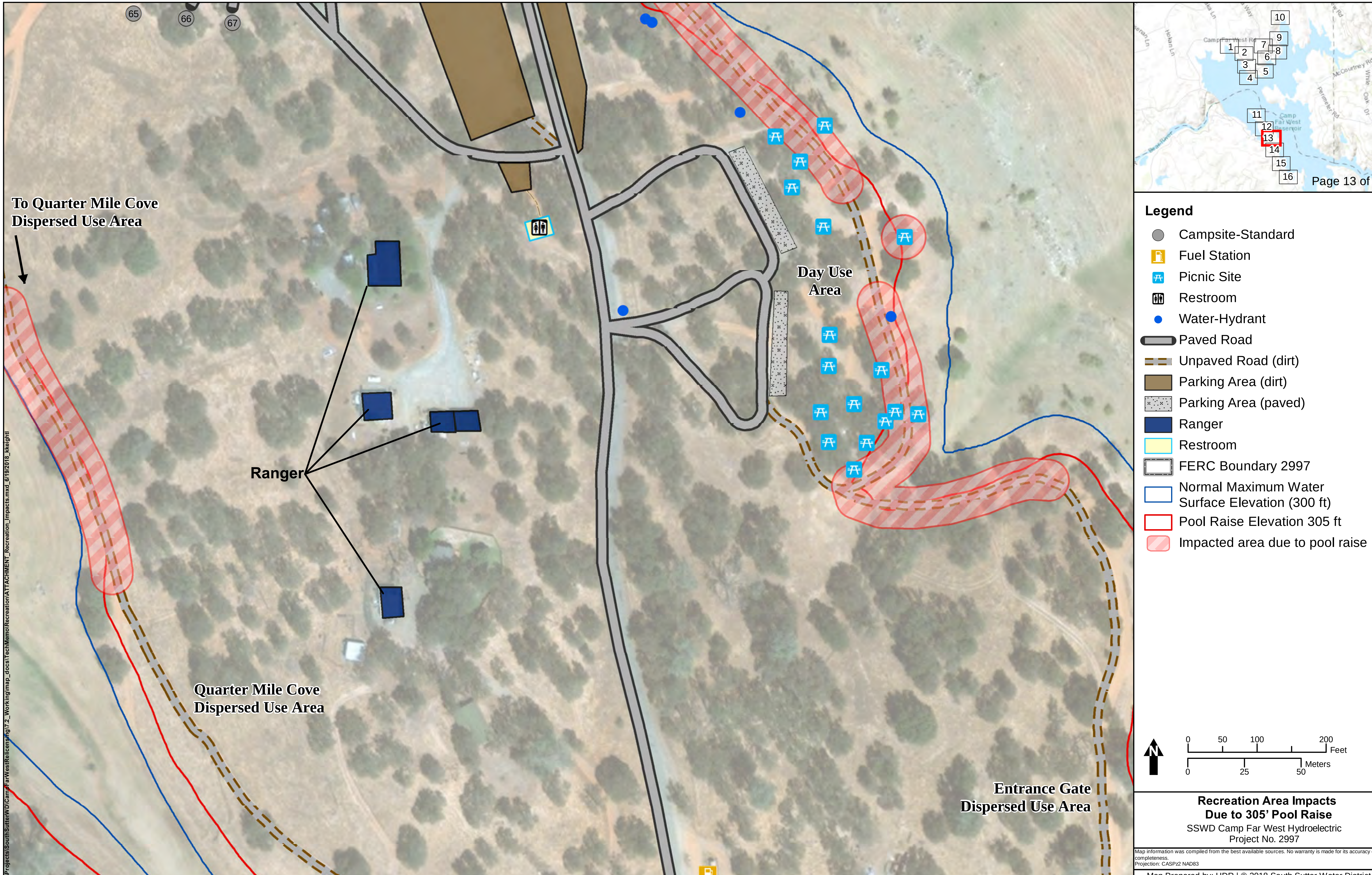

Recreation Area Impacts Due to 305' Pool Raise

SSWD Camp Far West Hydroelectric Project No. 2997

Map information was compiled from the best available sources. No warranty is made for its accuracy or completeness.
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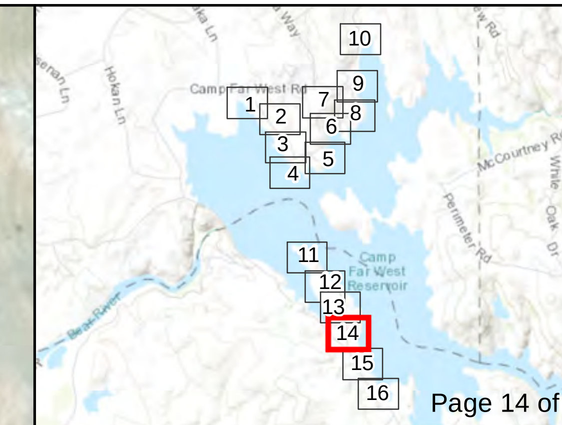
Map Prepared by: HDR | © 2018 South Sutter Water District



Legend

- Fuel Station
- Gate
- RV Dump Station
- Paved Road
- Unpaved Road (dirt)
- Parking Area (paved)
- Concession Stand; Store
- Water-Sewage Pond
- FERC Boundary 2997
- Normal Maximum Water Surface Elevation (300 ft)
- Pool Raise Elevation 305 ft
- Impacted area due to pool raise

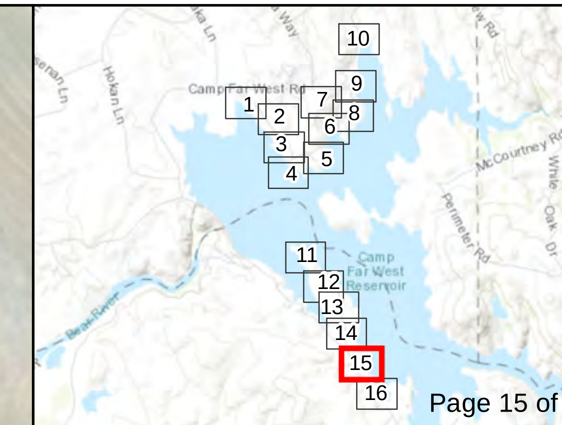
N

0 50 100 200 Feet
0 25 50 Meters

Recreation Area Impacts
Due to 305' Pool Raise

SSWD Camp Far West Hydroelectric
Project No. 2997

Map information was compiled from the best available sources. No warranty is made for its accuracy or completeness.
Projection: CASPz2 NAD83



Legend

- Unpaved Road (dirt)
- FERC Boundary 2997
- Normal Maximum Water Surface Elevation (300 ft)
- Pool Raise Elevation 305 ft
- Impacted area due to pool raise

N

0 50 100 200 Feet

0 25 50 Meters

Recreation Area Impacts Due to 305' Pool Raise

SSWD Camp Far West Hydroelectric Project No. 2997

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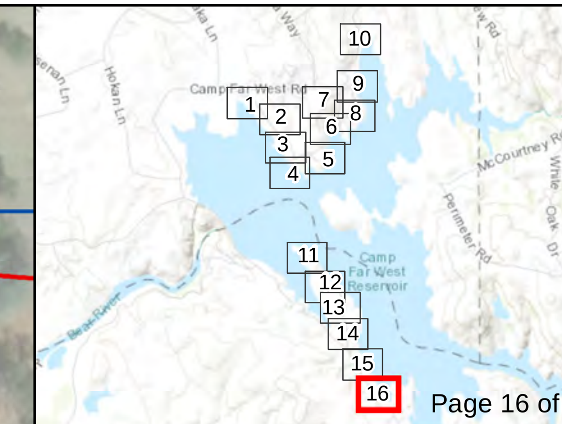
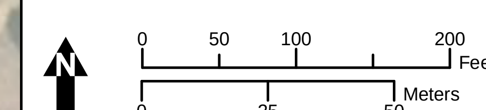
Projection: CASPz2 NAD83



Legend

- Unpaved Road (dirt)
- FERC Boundary 2997
- Normal Maximum Water Surface Elevation (300 ft)
- Pool Raise Elevation 305 ft
- Impacted area due to pool raise



Recreation Area Impacts
Due to 305’ Pool Raise

SSWD Camp Far West Hydroelectric
Project No. 2997

Map information was compiled from the best available sources. No warranty is made for its accuracy or completeness.
Projection: CASPz2 NAD83

3.3.7 Land Use

The discussion of land use is divided into three sections. The affected environment is discussed in Section 3.3.7.1, environmental effects of the Project are discussed in Section 3.3.7.2, and unavoidable adverse effects are addressed in Section 3.3.7.3.

Existing, relevant, and reasonably available information was sufficient to determine the potential effects of the Project on land use, and SSWD did not perform any studies related to land use.

3.3.7.1 Affected Environment

This section describes existing land use conditions and is divided into the following eight areas: 1) land ownership within the FERC Project Boundary; 2) land use; 3) land management; 4) Project-related land use permits and easements; 5) SSWD's vehicular access routes to Project facilities; 6) known Project-related wildfires and SSWD's policies regarding fire prevention and suppression; 7) law enforcement in the Project Area; and 8) restricted public access to Project waters and lands.

3.3.7.1.1 Land Ownership within the FERC Project Boundary

The existing FERC Project Boundary encompasses 2,863.7 ac of land. SSWD owns 95 percent (2,710.5 ac) of the land within the boundary, and the remaining 5 percent (153.2 ac) of the land is owned by private parties – no federal or state land occurs within or adjacent to the FERC Project Boundary or on the Bear River downstream of the Project.

3.3.7.1.2 Land Use

The Project is located in Yuba, Placer and Nevada counties, California. The land within the FERC Project Boundary in Yuba, Placer and Nevada counties is shown in Table 3.3.7-1, with the majority of Project land in Yuba County.

Table 3.3.7-1. Summary of county land within the existing FERC Project Boundary.

Yuba County (ac)	Placer County (ac)	Nevada County (ac)	Total	
			(ac)	(%)
1,719.7 (60%)	972.7 (34%)	171.3 (6%)	2,863.7	100.0%

Public and private land ownership and land use within these three counties is summarized below.

Yuba County

Of the 475,723 ac of land comprising Yuba County, 75 percent is in private ownership and the remaining 25 percent is administered by public agencies (Table 3.3.7-2). The amount of Yuba County land within the existing FERC Project Boundary represents 0.36 percent of the total land within the county.

Table 3.3.7-2. Distribution of public and private lands in Yuba County.

Public Agency or Private Ownership	Number of Parcels	Total Acreage per Agency/Owner	Ownership as a Percentage of County
Bureau of Land Management	82	19,136	4.02%
United States Army Corps of Engineers	3	64	0.01%
Department of Defense	298	24,610	5.17%
Forest Service	531	53,461	11.24%
State of California	82	18,642	3.92%
South Sutter Water District	12	1,961	0.41%
Private (or other)	32,424	357,849	75.23%
Total	**33,432**	**475,723**	**100.00%**

Source: BLM 2015, Yuba County 2015

The predominant land uses in Yuba County are agriculture (80,943 ac), forested lands (56,000 ac), and open space/grazing lands (198,000 ac) (Yuba County 1994).

Placer County

Of the 906,912 ac of land comprising Placer County, 57 percent is in private ownership and the remaining 43 percent is administered by public agencies (Table 3.3.7-3). The amount of Placer County land within the existing FERC Project Boundary represents 0.11 percent of the total land within the county.

Table 3.3.7-3. Distribution of public and private lands in Placer County.

Public Agency or Private Ownership	Number of Parcels	Total Acreage per Agency/Owner	Ownership as a Percentage of County
Bureau of Land Management	313	23,810	2.63%
Department of Defense	35	374	0.04%
Forest Service	2,233	356,691	39.33%
State of California	386	4,376	0.48%
South Sutter Water District	18	949	0.10%
Private (or other)	164,367	520,712	57.42%
Total	**167,352**	**906,912**	**100.00%**

Source: BLM 2015, Placer County 2015

The predominant land uses in Placer County are timberland (700,785), agriculture (15,925), city (90,069), and rural residential (103,642) (Placer County, 2015a).

Nevada County

Of the 629,097 ac of land comprising Nevada County, 66 percent is in private ownership and the remaining 34 percent is administered by public agencies (Table 3.3.7-4). The amount of Nevada County land within the existing FERC Project Boundary represents 0.04 percent of the total land within the county.

Table 3.3.7-4. Distribution of public and private lands in Nevada County.

Public Agency or Private Ownership	Number of Parcels	Total Acreage per Agency/Owner	Ownership as a Percentage of County
Bureau of Land Management	324	16,873	2.68%
Department of Defense	20	858	0.14%
Forest Service	954	187,210	29.76%
State of California	170	10,128	1.61%
South Sutter Water District	2	275	0.04%
Private (or other)	64,891	413,753	65.78%
Total	**66,069**	**629,097**	**100.00%**

Source: BLM 2015, Nevada County 2015

The predominant land uses in Nevada County are forest (349,968 ac); rural (184,436 ac); open space (26,906 ac); estate (17,580 ac); planned development (10,649 ac); and residential (10,081 ac) (Nevada County 2014a).

Zoning Ordinances

Private land use is managed in accordance with the Yuba County 2030 General Plan, Placer County General Plan, Nevada County General Plan and the county zoning ordinances. Table 3.3.7-5 shows the Zoning Ordinances for all of the land within the Project Vicinity.

Table 3.3.7-5. Zoning Ordinance land use categories in the Project Vicinity.

Land Use Categories	County	Description
EA– Exclusive Agricultural Zone 10	Yuba	Growing and harvesting of forest products, grazing of livestock, single-family residence, and accessory buildings.
GA – General Agricultural 40	Nevada	Provide low intensity recreational opportunity that also maintains natural environment.
F-B – Farm Building Zone	Placer	Implement the Forest Taxation Reform Act (1976) and the California Timberland Productivity Act (1982).
RES – Resort		Apply to mountainous areas, water-oriented, or other areas with significant natural amenities and commercial recreational potential, with good access to major highways.

Source: Yuba County 2010b, Nevada County 2012, Placer County 2014a

Public Land

Federal and state-owned public lands are generally not subject to county jurisdiction, however, no public land occurs within the existing FERC Project Boundary.

Wild and Scenic Rivers, Wilderness Areas, and National Scenic Trails

There are no federal Wild and Scenic Rivers or Wilderness Areas in the Project Vicinity.

An area designated as the California National Historic Trail runs through the FERC Project Boundary and crosses Camp Far West Reservoir in two locations of the upstream, northern portion of the reservoir, where the building of the initial reservoir 'drowned' sections of the historic emigrant trail (Figure 3.3.7-1). The trail covers over 2,000 mi across 10 states (i.e., California, Colorado, Idaho, Kansas, Missouri, Nebraska, Nevada, Oregon, Utah and Wyoming) and follows the paths of the 250,000 emigrants who came to California in the 1840s and 1850s. The trail was authorized in 1992 and is administered by the National Park Service. Along the route are pieces of the pioneer trail, graves, monuments, historic structures and other traces (NPS 2015). California Historic Landmark No. 799-3, Overland Emigrant Trail, commemorating the Pioneer trail on Spenceville Road, lies approximately 3.5 mi outside of Wheatland (OHP 2015). The section within the FERC Project Boundary is not a 'developed' trail.

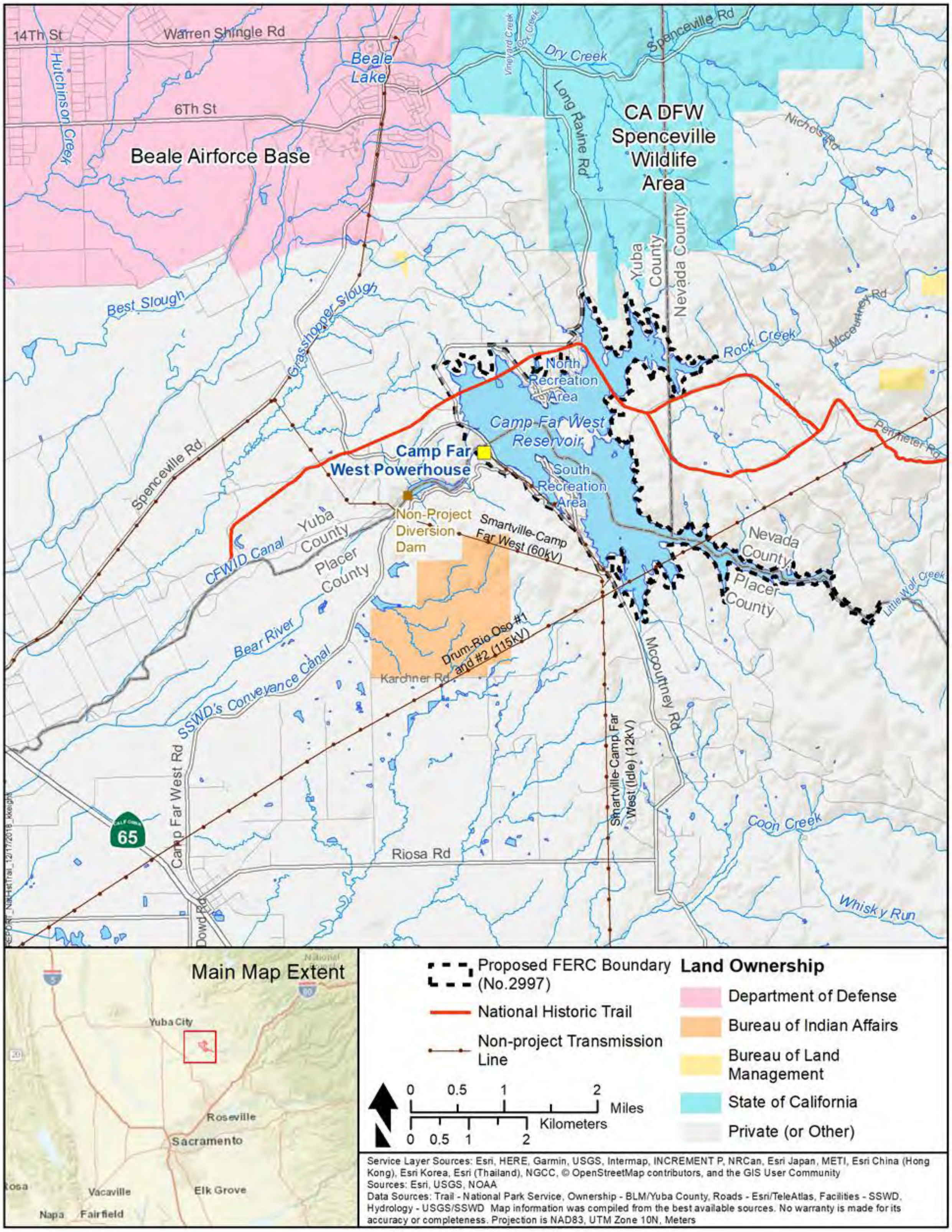


Figure 3.3.7-1. California National Historic Trail in relation to the proposed FERC Project Boundary.

Nationwide Rivers Inventory

The NRI is a listing of more than 3,400 free-flowing river segments in the U.S. that are believed to possess one or more "outstandingly remarkable" natural or cultural values judged to be of more than local or regional significance (NPS 2011). The NRI is a source of information for statewide river assessments and federal agencies involved with stream-related projects. None of the NRI-listed river segments occur in the Project Area or downstream of the Project.

United States Army Corps of Engineers Jurisdictional Wetlands

Wetlands that meet the criteria of "waters of the United States" are managed under the jurisdiction of the USACE and the United States Environmental Protection Agency (EPA) pursuant to Section 404 of the Clean Water Act (CWA). The definition developed by the USACE considers those areas which "*...are inundated or saturated by surface or ground water at a frequency and duration to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions"* as wetlands. Under the USACE definition, all three of the following conditions must be present (CWIS 1998):

- a dominance of wetland plants
- hydric soils, those soils that are sufficiently wet in the upper part to develop anaerobic conditions during the growing season
- wetland hydrology

Wetlands that meet these criteria may exist within the Project Vicinity and are within the jurisdiction of the USACE. Wetland types and acreages are discussed in Section 3.3.4.3.

FEMA Floodplains

FEMA floodplains within the Project Vicinity are shown in Figure 3.3.7-2. A review of the FEMA flood maps within the existing FERC Project Boundary indicated that 2,079.6 ac or 73 percent of the total area within the boundary are within the FEMA 100-year floodplain (Data.gov 2009).

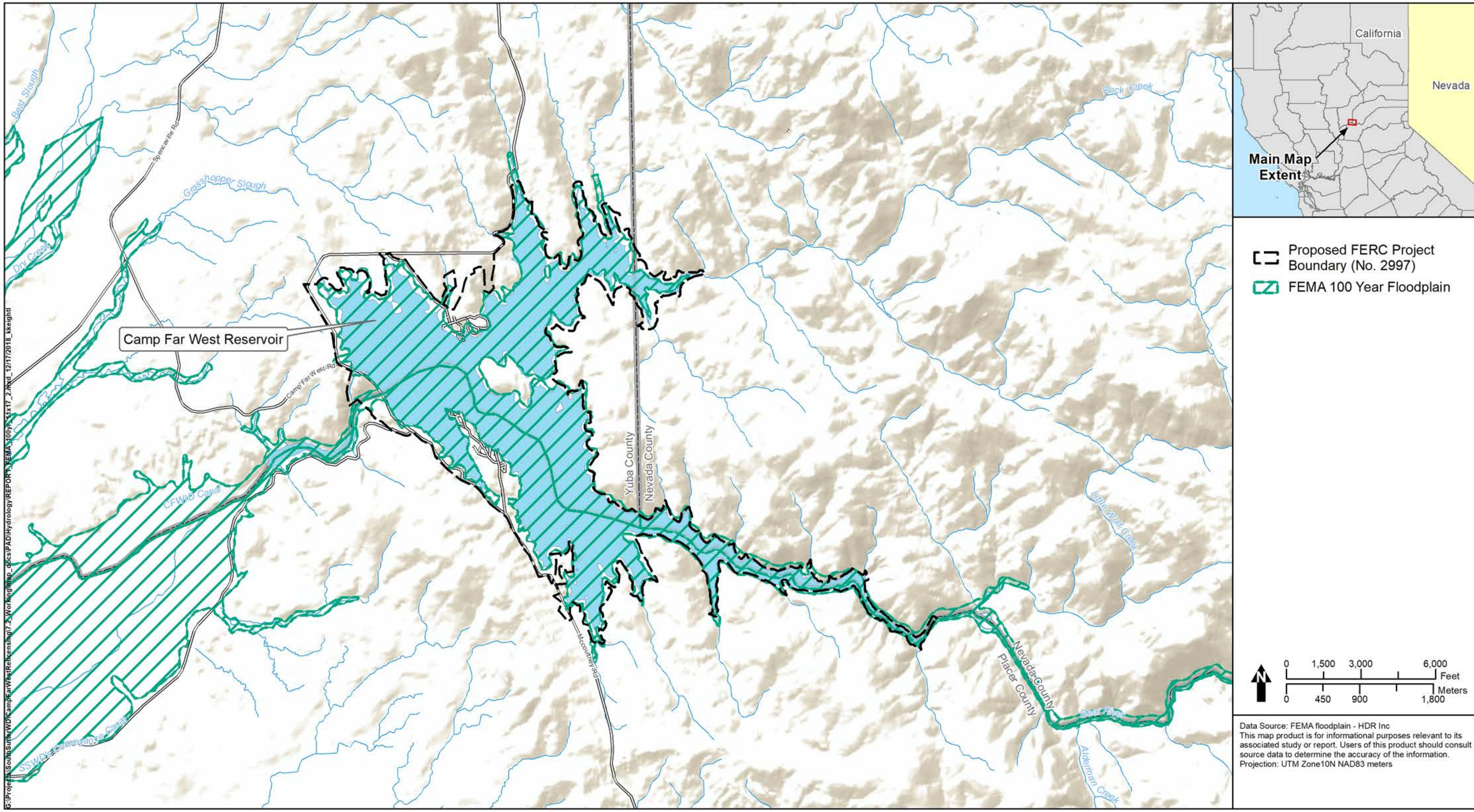


Figure 3.3.7-2. FEMA floodplains within a 1-mile wide buffer of the proposed FERC Project Boundary.

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Other Public Lands

There are additional public lands within the Project Vicinity, managed for land conservation, which are discussed below.

Cal Fish and Wildlife's Spenceville Wildlife Area
The Spenceville Wildlife Area is managed by the State of California and comprised of approximately 11,900 ac of blue oak – gray pine woodland, which are characteristic of the Sierra Foothills. The elevation of the area varies from 200 to 1,200 ft. The wildlife area is bordered on the west by Beale Air Force Base and on the north, south, and east by privately-owned ranches. There are numerous ponds, creeks, trails and riparian zones in the area (CDFW 2015p).

Placer County's Kirk Ranch Conservation Easement
In June 2000, Placer County adopted the Placer Legacy Program. The Placer Legacy Program is a program designed to protect and conserve open space and agricultural lands. The program was developed to implement the goals, policies and programs of the 1994 Placer County General Plan. As of September 2012, Kirk Ranch is 1 of 12 Placer Legacy County Acquisitions. The Kirk Ranch Property was acquired in summer 2007 for a total of 281 ac as use for a conservation easement and development rights (Placer County 2012).

The Kirk Ranch property is located in western Placer County near Camp Far West Reservoir. It is considered protected through the purchase of a conservation easement, thus preserving the property's long-standing history of agricultural activities and a large tract of rangeland. Property assets include dense stands of blue oak woodland, grassland/dry pasture, perennial and seasonal creeks, and scenic views. This particular easement allows for no public access (Placer County 2012).

Figure 3.3.7-3 shows the location of Cal Fish and Wildlife's Spenceville Wildlife Area and Placer County's Kirk Ranch Conservation Easement area in relation to Camp Far West Reservoir.

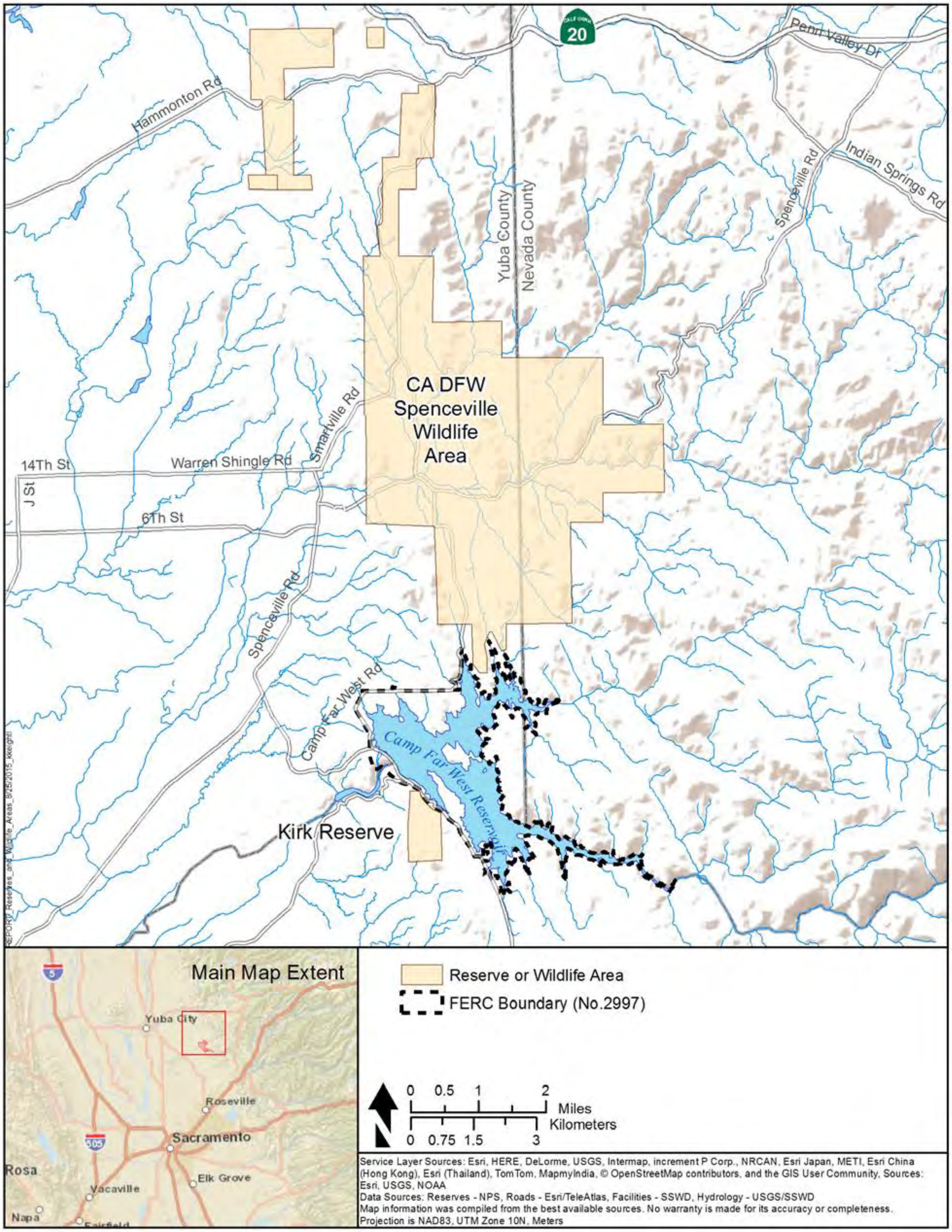

Figure 3.3.7-3. Location of Cal Fish and Wildlife's Spenceville Wildlife Area and Placer County's Kirk Ranch Conservation Easement area.

3.3.7.1.3 Land Management

Land use management for each county in which the Project occurs is summarized below. No federal of state land occurs within or adjacent to the FERC Project boundary or on the Bear River downstream of the Project. With respect to county land designations, the county designates land within its boundaries to be used in ways that are consistent with the resources found in that area.

Table 3.3.7-6 provides a summary of the Yuba County, Placer County and Nevada County land use designations within and adjacent to the Project.

Table 3.3.7-6. Land Use Designations in counties for Camp Far West facilities.

Camp Far West Facilities	Land Use Designation
YUBA COUNTY	
Camp Far West Dam	Exclusive Agricultural Zone 10
Camp Far West Reservoir	Exclusive Agricultural Zone 10
North Recreation Area	Exclusive Agricultural Zone 10
PLACER COUNTY	
Camp Far West Dam	Farm Building Zone
Camp Far West Reservoir	Farm Building Zone
Camp Far West Powerhouse	Farm Building Zone
Camp Far West Transmission Line/Switchyard	Farm Building Zone
South Recreation Area	Resort
NEVADA COUNTY	
Camp Far West Reservoir	General Agricultural 40

Source: Yuba County 2005, Placer County 2014b, Nevada County 2014b

3.3.7.1.4 Project-Related Land Use Permits and Easements

SSWD does not require or hold any land use permits or easements for the Project, other than from the few private landowners within the Project Boundry..

3.3.7.1.5 SSWD's Vehicular Access to Project Facilities for Operation and Maintenance

SSWD obtains vehicular access to Project facilities from its office in Trowbridge over State of California roads, county roads, and private roads. From Trowbridge, SSWD employees take Spenceville Road (public) to Camp Far West Road (public) to the reservoir. SSWD employees also use Camp Far West Road, McCourtney Road (public), and a short private access road (gated and locked) to access the powerhouse and dam.

The NSRA is accessible by vehicle from the west and north via Camp Far West Road and Spenceville Road. A gated, paved, two-way access road, owned and maintained by SSWD, leads to the recreation area off of Camp Far West Road.

The SSRA is accessible by vehicle from the north and south via McCourtney Road. A gated, paved, two-way access road, owned and maintained by SSWD, leads to the recreation area. When the recreation areas are closed, the gates are closed and locked. Otherwise the gates are open to allow the public access to the recreation areas.

3.3.7.1.6 Known Project-Related Wildfires and SSWD's Policy Regarding Fire Prevention and Suppression

SSWD does not have a formal policy regarding wildfire prevention and suppression. SSWD's staff is not trained in wildfire suppression and is not required to fight fires, but instead notifies appropriate response agencies in the event of such an emergency.

SSWD adheres to local, State, and federal rules and regulations and best management practices during work. If work includes burning debris, SSWD obtains necessary permits and approvals from the appropriate agency, which may require SSWD to have specialized equipment on-site and restrict burning to specific times of the year.

Technical Approach to Wildfire Analysis

The period from 1967 to 2016 was analyzed using available fire occurrence data collected from CAL FIRE. Fire occurrences were analyzed within a 1-mi wide buffer zone of the existing FERC Project Boundary, which represents an analysis area that identifies not only those fires that may have occurred in the Project, but also those fires that present a realistic threat to the Project's infrastructure. Fire occurrence data was analyzed for the following:

- Individual ignition by size, cause, and date
- Total ignitions within fire occurrence analysis area
- Total percent ignition by cause within fire occurrence analysis area
- Total ac burned by cause within fire occurrence analysis area, where available
- Total percent ac burned by cause within fire occurrence analysis area, where available

The CAL FIRE database was used to identify, analyze, and evaluate current and historic sources of fire ignition.

Fire Occurrence Analysis Results

From 1967 through 2016, four fire ignitions were reported to occur within the Project Vicinity (Table 3.3.7-7). The most recent wildfire, the 2014 Perimeter Fire, damaged roughly 10 ac, all outside of the existing FERC Project Boundary, and was contained on May 9, 2014.

Table 3.3.7-7. Fires within the Camp Far West Project Vicinity from 1967 through 2016.

Fire Name	Fire Year	Cause	Total Acres Burned	Acres Within a 1-Mile Buffer Zone
Capehart	1967	Unknown / Unidentified	1,063.4	588.5
Camp Far West	1970	Unknown / Unidentified	588.7	674.9
PG&E #5	1981	Non-Project Equipment Use	812.5	476.3
Perimeter	2014	Non-Project Debris Burning	9.6	9.6
Total	--	--	**2,474.2**	**1,749.3**

GIS Source: CAL FIRE 2017

Three of the four reported fires burned acreage within the existing FERC Project Boundary (Table 3.3.7-8). The Capehart Fire, ignited on October 14, 1967, damaged 89.7 ac within the existing FERC Project Boundary. The cause of the fire was unidentified. The Camp Far West Fire, ignited on June 27, 1970, damaged 15.1 ac within the existing FERC Project Boundary. This fire was also started by an unknown cause. The PG&E #5 Fire, ignited on June 14, 1981, damaged 2.1 ac within the FERC Project Boundary. The fire was sparked by PG&E equipment use. Approximately 107 ac of the fire-damaged lands from these three fires were within the existing FERC Project Boundary.

Table 3.3.7-8. Fires within the Camp Far West existing FERC Project Boundary from 1967 through 2016.

Fire Name	Fire Year	Cause	Reported Acres Within FERC Boundary
Capehart	1967	Unknown / Unidentified	89.7
Camp Far West	1970	Unknown / Unidentified	15.1
PG&E #5	1981	Equipment Use	2.1
Perimeter	2014	Non-Project Debris Burning	0.0
Total	--	--	**106.9**

GIS Source: CAL FIRE 2017

Fire ignitions, shown in Figure 3.3.7-4, include all four of the reported fire ignitions that have occurred within the Project Vicinity. All four reported incidences (i.e., Capehart, Camp Far West, PG&E #5, and Perimeter) occurred within the 1-mi buffer zone. There was no record of any fire ignitions resulting from Project O&M activities or Project-related recreation.

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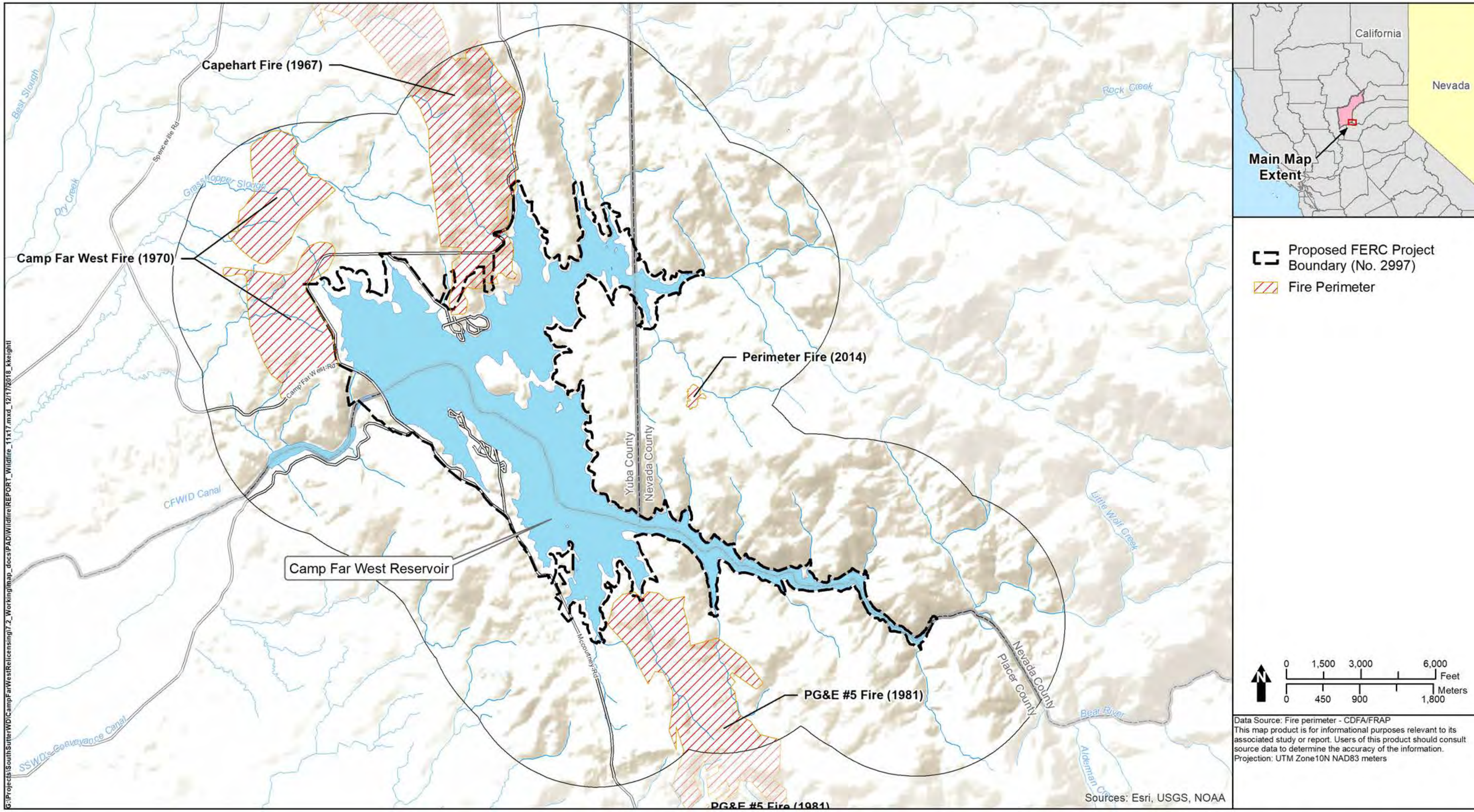

Figure 3.3.7-4. Fire ignitions within the proposed Project Vicinity.

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Fire Occurrence Trend Analysis

The Project-specific fire occurrence analysis also included a statistical trend analysis of the fire ignition/fire cause history. This analysis served to ascertain causes for historical fires and occurrence patterns that define the historic presence and impacts of fires, including project-induced fires, within the proposed Project Area. There was no record of any fire ignitions resulting from Project O&M activities or Project-related recreation. Table 3.3.7-9 below represents a statistical summary of all fire ignitions identified in the fire occurrence analysis.

Table 3.3.7-9. Fire occurrence analysis statistics by cause from 1967 through 2014.

Cause	Total Ignitions	Percent of Cause
Non-Project Debris Burning	1	25%
Unknown/Unidentified/Undetermined	2	50%
Non-Project Equipment Use	1	25%
Total	**4**	**100%**

The Project Area remains at risk from high-intensity wildfires that typically start outside of the existing FERC Project Boundary, but can rapidly escalate to threaten Project infrastructure. These high-threat fires typically burn in heavy fuel and steep topography, and resist aggressive fire suppression efforts over prolonged periods of time, particularly at the Camp Far West Powerhouse.

3.3.7.1.7 Law Enforcement

Local law enforcement provides for all needs at the Project. SSWD is unaware of any unique law enforcement issues that would be unusual for recreation areas similar to those at Camp Far West Reservoir, or unusual for the other areas of the Project.

3.3.7.1.8 Restricted Public Access to Project Waters and Land

The Project reservoir and lands are accessible to the public with minor exceptions, such as restricted access to dams, powerhouses, and switchyards for public safety reasons. SSWD is unaware of any complaints regarding access to Project waters and lands.

3.3.7.2 Environmental Effects

This section discusses the potential environmental effects of SSWD's proposed Project, as described in Section 2.2 of this Exhibit E. As part of the Project relicensing, SSWD proposes a Pool Raise of 5 feet, modifications of existing recreation facilities, and modification of the existing Project boundary. SSWD proposes to include in the new license one measure related to land use. Measure RR1 would require SSWD to implement a Recreation Management Plan.

To mitigate effects to land use resources during construction of the Pool Raise, SSWD will obtain and implement all permits required for construction. The effects to land use during construction will be temporary as staging areas and other construction-related areas will be returned to pre-construction form.

SSWD's proposed Project Boundary changes are twofold: 1) the addition and removal of lands for changes that are essentially corrections to the existing FERC Project Boundary; and 2) changes to the existing FERC Project Boundary around the Project reservoir from surveyed coordinates to a contour located above the NMWSE or to a distance of 200 ft from NMWSE. The proposed Boundary changes provide clarification of lands actually needed and used for O&M of the proposed Project and would have a less than significant effect on land use resources.

SSWD's proposed Project does not include any significant changes in operations other than management of the additional 5 ft of reservoir pool following completion of the Pool Raise. Maintenance of proposed Project facilities on private lands, 95 percent of which are owned by SSWD, would have a less than significant effect. SSWD does not propose significant changes to existing Project facilities or how they are maintained and operated.

Condition RR1 will implement a Recreation Management Plan that includes relocation, re-routing or re-alignment of recreation features that will be inundated by the Pool Raise. The majority of construction at recreation facilities would occur outside the peak recreation season (i.e., after the Labor Day holiday weekend and before the Memorial Day holiday weekend).

Over the past 15 years, SSWD's existing Project has not had a significant effect on fire occurrence. SSWD does not propose significant changes to the facilities or how they are maintained and operated, so the proposed Project would not increase the risk of Project-related fires.

3.3.7.3 Unavoidable Adverse Effects

The proposed Project would have both short- and long-term minor impacts on land use resources that are unavoidable. Project facilities will continue to be a long-term, committed land use. Their initial construction represented a major, short-term impact to land use resources, but as most of the facilities have been in place for many years, their impact is now relatively minor, and part of the baseline condition. The proposed Pool Raise will have a minor, short-term effect in respect to construction, and will result in seasonal inundation of an additional 160.1 ac of land.

Project O&M activities and associated road use will continue to have a long-term, minor effect on fire risk. In the past 15 years, no Project O&M or road-use activities have caused a fire. Use of roads for Project purposes will continue to have a minor, short-term effect on the road facilities themselves (e.g., road surfaces and culverts), and associated resource areas.

3.3.8 Aesthetic Resources

The discussion of aesthetic resources is divided into three sections. The affected environment is discussed in Section 3.3.8.1, environmental effects of the Project are discussed in Section 3.3.8.2, and unavoidable adverse effects are addressed in Section 3.3.8.3.

Existing, relevant, and reasonably available information is sufficient to determine the potential effects of the Project on aesthetic resources, and SSWD did not perform any studies related to aesthetic resources.

3.3.8.1 Affected Environment

This section is divided into two subsections: 1) regulatory context; and 2) existing aesthetic character.

3.3.8.1.1 Regulatory Context

SSWD owns 95 percent of the land within the boundary and the remaining 5 percent of the land is owned by private parties. No federal or state land occurs within or adjacent to the FERC Project Boundary or on the Bear River downstream of the Project. Thus, the only guiding documents for aesthetic resources are the County general plans, including the Nevada County, Placer County and Yuba County general plans. These general plans provide broad goals and direction for aesthetic resources with a general emphasis on protecting and maintaining natural scenic resources related to open space, natural vegetation, and bodies of water. However, these three counties do not have specific visual quality objectives and there are no federal lands associated with this Project that require visual quality objectives. It is clear from the various county general plan’s goals and policies that natural scenic values should be protected wherever possible. It is important to note that the Project pre-dates the plans and therefore the general plans were developed with the Project in place.

Yuba County General Plan

A major portion of the Project Area lies within Yuba County. The Yuba County General Plan was updated in 2011 (Yuba County 2011). As part of the plan, goals for aesthetic resources that may be applicable to the Project are described as follows:

> Policy NR9.1 – New developments near the Yuba, Bear, and Feather Rivers should be designed and located in a way that retains or enhances scenic views of these important visual resources.
>
> Policy NR9.3 – Development in rural communities should be designed to preserve important scenic resources, landmarks, and icons that positively contribute to the rural character.
>
> Policy NR9.4 – New buildings in areas of natural and scenic beauty should be placed in and designed in a way to preserve scenic vistas available from public right-of-way, parks, and other public viewing areas.

Placer County General Plan

The southwestern shoreline of Camp Far West Reservoir, the powerhouse, and the southern portion of the dam lies within Placer County. In the Placer County General Plan (Placer County 2013) under Part 2, *Goals, Policies, and Implementation Programs*, Section 6, *Natural Resources*, there are goals and policies indirectly associated with aesthetic values for county lands. These are:

> Goal 6.A - to protect and enhance the natural qualities of Placer County's rivers, streams, creeks and ground water.
>
> > Policy 6.A.14 - the County shall help ensure that open space located in reservoir is preserved and protected to ensure adequate performance of these reservoirs. Camp Far West Reservoir is listed as an immediate key watershed.
>
> Goal 6.E - to preserve and enhance open space lands to maintain the natural resources of the County.
>
> > Policy 6.E.1 - the County shall support the preservation and enhancement of natural land forms, natural vegetation and natural resources as open space to the maximum extent feasible.

Nevada County General Plan

The northeastern portion of Camp Far West Reservoir lies within Nevada County. In the Nevada County General Plan (Nevada County 2014), the following aesthetic goals were described for county lands:

> To promote and provide for aesthetic design in new development that reflects existing character.
>
> To protect and preserve important scenic resources.

3.3.8.1.2 Aesthetic Character in the Project Area

The following section provides a description of the existing visual resources found in the Project Area.

Regional Context

The Project is located primarily in southwestern Yuba County and northwestern Placer County with a small portion in southwestern Nevada County, California. This Project is located along the Bear River. SSWD is the major private landowner in the Project Area. Camp Far West Reservoir, the only Project impoundment, is located 17 mi southeast of Marysville, California, in Yuba County and 7 mi northeast of Wheatland, California, in Yuba County. McCourtney Road provides paved access from the south to Camp Far West Reservoir. Camp Far West Road provides paved access from the west to the reservoir, including crossing the dam, and provides views of the reservoir and access to the main recreation facilities associated with the reservoir.

The reservoir can also be accessed from the north by Camp Far West and Spenceville roads and from the east by Long Ravine and McCourtney roads in Nevada County. Portions of these roads are gravel.

Scattered grazing, agriculture, residential sites and wildlife management are the primary land uses in the Project Vicinity. Beale Air Force Base is approximately 3 mi to the northwest of the reservoir and Spenceville Wildlife Management and Recreation Area is 2 mi due north. In addition, recreation uses such as boating, fishing, camping, and picnicking are focused at Camp Far West Reservoir (Section 3.2.6). Hydroelectric generating facilities are located below the dam, but are a modest part of the landscape setting.

The visual character of the landscape setting encompasses rolling hills covered with oak woodlands, scattered oaks, and grasslands within the Project Area. This terrain is typical for lower elevations in the Sierra foothills and is characterized by rolling hills, scattered rock outcroppings, and incised river canyons. Oak woodlands and grasslands interspersed with chaparral, dominate the vegetative pattern, with alder and willow occurring along the riparian corridors (Yuba County 1994). The oaks maintain their dark olive green color year round while the grasslands are a bright yellow green in the springtime and then turn to a light yellow tan in the summer and fall. Elevations within the Project Vicinity range from 300 ft at the reservoir surface to around 600 ft at the top of the surrounding hills beyond the existing FERC Project Boundary. Three mi east of the reservoir is Rock Mountain at an elevation of 1,409 ft. Camp Far West Reservoir is a visual attraction due to the wide expanse of water and interesting shoreline that provides many coves and inlets. Camp Far West Reservoir is also associated with camping and boating recreation opportunities.

The visibility of Project facilities to the public varies widely. Camp Far West Dam and Reservoir are highly visible due to road access and the use of the reservoir for boating, fishing, and water skiing. The dam is visible from the main access road, the main campgrounds, boat launches, swimming beaches, and from the water surface. The powerhouse and associated facilities are generally not visible with the exception of passengers in cars heading south over the dam, and only if they look downstream below the dam.

Camp Far West Reservoir

Camp Far West Reservoir is located on the Bear River 18.2 mi upriver from the confluence with the Feather River. It is a medium-sized reservoir, which at NMWSE covers 1,886 ac and creates a shoreline of 29 mi. The NMWSE is 300 ft and the reservoir extends upstream on the Bear River for 5.5 mi from the dam. The water surface is fairly open near the boat ramps and dam, and then slowly narrows into a canyon as it meets the Bear River. The reservoir is visually attractive to the public even with the low water level because the shoreline has an undulating shape and provides several coves and inlets to explore. The surrounding environment of the reservoir is almost completely natural with the exception of the Camp Far West Dam and Spillway and some of the recreation facilities. Users of the reservoir drive through a mix of agriculture, small ranches, and scattered homes before they arrive at the reservoir.

Oak woodland and grasslands are the dominant vegetation types. Nearly all lands (~95%) around the reservoir and within the existing FERC Project Boundary are owned by SSWD; the rest are owned by private landowners. No federal lands are associated with the Project. The NSRA is open year-round, while the SSRA is open intermittently during the high use season. Additional details on the recreation facilities are provided in Section 3.3.6.

The major access roads to Camp Far West Reservoir are McCourtney Road from the south and Camp Far West Road from the southwest in Placer County. Camp Far West Road continues north across the dam and provides access to the NSRA. This road was listed in the Yuba County General Plan as a scenic road with direction to be managed as a scenic corridor. There are local gravel roads that provide access to areas north and east of the reservoir. These roads provide some public views of the reservoir, but not near Project facilities. The primary views of the reservoir are from McCourtney Road as it parallels the west side of the reservoir and Camp Far West Road as it crosses the dam and continues to the NSRA. Other key views of the reservoir are from the NSRA including the boat launch and swimming beach as well as the SSRA. The main viewing opportunity of the reservoir is by boaters using the water surface for fishing, water skiing, and boating.

Camp Far West Dam and Spillway

The Camp Far West Dam and Spillway are located on the Bear River at the far west end of the reservoir. The dam is 2,070 ft long and transitions to a south wing dam that is 1,060 ft long, a north wing dam that is 1,440 ft long and a northern dike which is 1,145 ft long. All the dams are covered with dark boulders with a maximum diameter of 3 ft. The spillway is 300 ft wide at an elevation of 300 ft and constructed with concrete. The spillway does not have gates and is spanned by a 302.5-ft single span, steel-truss bridge that allows for traffic to continue on Camp Far West Road. Even at low water levels, the visual contrast is low to moderate due to the boulders matching rock outcroppings along the reservoir shoreline. The bridge across the spillway has some visual contrast due to the geometric patterns of an engineered steel bridge. However, at a middle ground distance the bridge contrast is minimal due to the size of members and non-reflective nature of the bridge surfaces.

Camp Far West Powerhouse

The powerhouse is located below the dam and has a gated paved road for access. The building is aboveground, built with reinforced concrete, and white in color. The powerhouse is only seen by passengers traveling in vehicles heading south across the dam. It takes an effort to see the powerhouse below the dam, particularly if the vehicle is traveling at a normal speed (e.g., 25 to 45 m.p.h.). The visual contrast is high for the few people who make the effort to look at the powerhouse in the foreground. However, from any other viewpoint there is no visual contrast because the powerhouse is not seen.

The aesthetic character of Project features within the Project is summarized in Table 3.3.8-1.

Table 3.3.8-1. Aesthetic character of Project features within the Camp Far West Project Area.

Existing Project Feature	Elevation (ft)	Form of Access	Relationship to Land Form	Predominant Vegetation	Visibility from Surrounding Areas	Relative Number of Viewers	County Plan Direction
Camp Far West Dam and Spillway	Dam crest 320 ft Spillway 300 ft	Camp Far West Road from Hwy. 65	Inundated stream valley	Oak woodland and grasslands	Seen from roads, recreation area, and reservoir surface	High	Placer and Yuba counties: Protect and enhance natural scenic values
Camp Far West Powerhouse and facilities	Approx. 150 ft	Gated paved road	Stream valley	Oak woodland and grasslands	Seen from south bound lane of Dam road. Not seen from anywhere else	Low/ Medium	Placer County: Protect and enhance natural scenic values
Camp Far West Reservoir	300 ft at NMWSE	McCourtney road and Camp Far West Road	Inundated stream valley	Oak woodland and grasslands	Seen from McCourtney Road, Camp Far West Road, the recreation areas, and reservoir surface	High	Placer, Yuba, and Nevada counties: Protect and enhance natural scenic values

3.3.8.2 Environmental Effects

This section discusses the potential environmental effects of SSWD's proposed Project, as described in Section 2.2 of this Exhibit E. As part of the Project relicensing, SSWD proposes a Pool Raise of 5 ft, modifications of existing recreation facilities, and modification of the existing Project boundary. SSWD is not proposing any measures that would impact aesthetic resources.

3.3.8.2.1 Effects of Construction-Related Activities

Construction during the Pool Raise would have a less-than-significant effect on aesthetic resources. The work near the dam and at the laydown areas would be noticeable, but of short duration and in areas near the dam where the public is accustomed to viewing dam features. Outside of the short-term visibility of the construction equipment and staff near the dam, the work on SSWD lands, would remain consistent with Yuba County and Placer County's general aesthetic goals, which generally emphasizes protecting and maintaining natural scenic resources. Once completed, the work would not impact the existing scenic views of Camp Far West Reservoir and the downstream river canyon from Camp Far West Road. SSWD would obtain all necessary permits and approvals for the work, and would adhere to all permit terms and conditions, which is expected to mitigate any aesthetic impacts.

Construction of the various recreation facility rehabilitations and enhancements would have a minor effect on aesthetic resources. Specific locations undergoing major rehabilitation and construction would be closed during construction. Most recreational users would be in other areas and likely at separate recreation area, which are typically visually screened by vegetation and/or terrain from construction activities. In addition, facility rehabilitations and enhancements projects would be scheduled outside of the peak season, whenever possible, when the public visitation is significantly lower, further reducing impacts to aesthetic resources related to public visitation.

3.3.8.2.2 Effects of Proposed Project Operations and Maintenance

SSWD's proposed Project does not include any significant changes in operations other than management of the Pool Raise. Most of the existing Project facilities have been in place for almost 50 years, and the limited aesthetic guiding documents (county general plans) were developed with the Project in place and under current Project operations and maintenance. None of the counties' general plans provide specific management direction for aesthetic resources. Thus, the existing Project facilities are in compliance with the general goals and policies of the counties' general plans. Continued Project operations and maintenance would have a less than significant effect on aesthetic resources. SSWD does not propose significant changes to existing Project facilities or how they are maintained and operated.

3.3.8.3 Unavoidable Adverse Effects

Constructed related effects on aesthetic resources, which are unavoidable, are expected to be less-than-significant. They will be short-term and very local, and, in most cases, they will be consistent with the character of the area and viewable in a narrow viewshed. The Pool Raise will have a permanent impact on the viewshed at Camp Far West Reservoir but will be less-than-significant since the overall appearance of the reservoir will remain unchanged. Continued Project operation and maintenance would not have adverse impacts on aesthetic resources.

3.3.9 Socioeconomic Resources

The discussion of socioeconomic resources is divided into three sections. The affected environment is discussed in Section 3.3.9.1, environmental effects of the Project are discussed in Section 3.3.9.2, and unavoidable adverse effects are addressed in Section 3.3.9.3.

Existing, relevant, and reasonably available information is sufficient to determine the potential effects of the Project on socioeconomic resources, and SSWD did not perform any studies related to socioeconomics.

3.3.9.1 Affected Environment

This section is divided into four parts. The first three parts describe existing socioeconomic conditions in Yuba, Placer and Nevada counties, California, the counties in which the Project is located. The fourth part describes socioeconomic considerations for the Project.

3.3.9.1.1 Socioeconomic Conditions in Yuba County

The Project Area is located approximately 7 mi east of the town of Wheaton in southern Yuba County. Project Facilities are easily accessed from Wheaton by Spenceville Road to Camp Far West Road. Population patterns of Yuba County are summarized below.

Population Size

The population of Yuba County in 2010 was 72,155. Yuba County's annual percent change in population since 2010 has averaged 0.86 percent, almost identical to the annual average of 0.87 percent population increase experienced in the State of California since 2010 (U.S. Census Bureau 2018). The California Department of Finance has forecasted that by the year 2020,[1] Yuba County's population will reach 79,087 residents (CDOF 2017).

Towns and Cities

The city of Marysville is the county seat of Yuba County. Marysville is the largest community in the county with a population of 12,072 in 2010. The nearest major population center outside the area is Sacramento, located about 40 mi to the south.

Population Density and Housing Distribution

In 2010, with 72,155 residents, 27,750 housing units, and a land area of 631.84 sq mi, Yuba County had 114.2 residents and 43.9 housing units per sq mi. From 1990 to 2000 and from 2000 to 2010, the population of Yuba County increased by 3.4, and 19.8 percent, respectively. During these two periods, the number of housing units also increased at 6.5 percent and 22.6 percent, respectively. From 1970 to 2010, Yuba County experienced a housing unit increase of

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[1] Based on available projected information when the Application for New License is filed.

approximately 96.3 percent (CDOF 2012; U.S. Census Bureau 2010, 1990). Table 3.3.9-1 shows a summary of population and housing units from 1970-2010 in Yuba County.

Table 3.3.9-1. Summary of Yuba County population and housing units, 1970-2010.

Yuba County	2010	2000	1990	1980	1970
Population	72,155	60,219	58,228	49,733	44,736
Housing Units	27,750	22,636	21,245	19,128	14,135

Source: CDOF 2012; U.S. Census Bureau 2010, 1990

As shown in Table 3.3.9-2, most of the Yuba County population (43,988, or 60.8%) in 2010 was between the ages of 18 and 65. Age groups within the county have similar distributions to the State of California.

Table 3.3.9-2. Summary of Yuba County by age group in Yuba County and the State of California, 2010.

Population: Age	Yuba County	California
Persons under 5 years old	6,197	2,531,133
Persons under 5 years old, percent	8.6%	6.5%
Persons 5 to <18 years old	14,813	7,920,709
Persons 5 to <18 years old, percent	20.5%	23.9%
Persons 18 to <65 years old	43,988	22,235,030
Persons 18 to <65 years old, percent	60.8%	57.1%
Persons 65 years old and over	7,317	3,479,543
Persons 65 years old and over, percent	10.1%	12.5%

Source: U.S. Census Bureau 2010

Households/Family Distribution and Income

For the period 2012 – 2016, Table 3.3.9-3 summarizes household units (i.e., number of units, net change for a given period, and % change for a given period), homeownership rate, median home value, income, and poverty for Yuba County. County data are also compared to the same data available for the state of California.

Table 3.3.9-3. Summary of household units and income in Yuba County and the State of California.

Household Information	Yuba County	California
Housing units, 2016	28,357	14,060,525
Homeownership rate, 2012-2016	52.7%	54.1%
Median value of owner-occupied housing units, 2012-2016	$210,200	$409,300
Households, 2012-2016	22,112	12,807,387
Persons per household, 2012-2016	2.96	2.95
Median household income, 2012-2016	$50,788	$63,783
Per capita income, 2012-2016	$23,200	$31,458
Persons below poverty, percent, 2012-2016	18.3%	14.3%

Source: U.S. Census Bureau 2018

Ethnicity

Yuba County is generally less ethnically diverse than the state of California. The county is predominantly White, with persons of Hispanic or Latino origin being the second largest group. Table 3.3.9-4 provides a summary of population by race for Yuba County and the State of California for the year 2010.

Table 3.3.9-4. Summary of population by gender and race in Yuba County and the State of California, 2010.

Population: Gender/Race	Yuba County	California
Female persons	35,803	18,932,713
Female persons, percent	49.6%	50.3%
White persons[1]	49,332	21,453,934
White persons,[1] percent	68.4%	57.6%
Black or African American persons [1]	2,361	2,299,072
Black or African American persons,[1] percent	3.3%	6.2%
American Indian and Alaska Native persons[1]	1,675	362,801
American Indian and Alaska Native persons,[1] percent	2.3%	1.0%
Asian persons[1]	4,862	4,861,007
Asian persons,[1] percent	6.7%	13.0%
Native Hawaiian and Other Pacific Islander persons[1]	293	144,386
Native Hawaiian and Other Pacific Islander persons,[1] percent	0.4%	0.4%
Persons reporting some other race[1]	8,545	6,317,382
Persons reporting some other race,[1] percent	11.8%	17.0%
Persons reporting two or more races	5,087	1,815,384
Persons reporting two or more races, percent	7.1%	4.9%
Persons of Hispanic or Latino origin[2]	18,051	14,013,719
Persons of Hispanic or Latino origin,[2] percent	25.0%	37.6%

Source: U.S. Census Bureau 2010
[1] Includes persons reporting only one race.
[2] Hispanics may be of any race; therefore, Hispanics are also included in applicable race categories.

Education

For the period 2012 – 2016, a total of 82.2 percent of Yuba County's population is educated through high school, with 15.5 percent of the population having obtained a Bachelor's degree or higher. When compared to the State of California (82.1% and 32.0%, respectively), Yuba County has a similar percentage of high school graduates but lower percentage of individuals with a Bachelor's degree or higher (U.S. Census Bureau 2018).

Labor Force

Initially, all of Yuba County's settlements and economy were based on the discovery of gold in the middle 1800s. Today, Yuba County has a diverse economic base and labor force that includes agriculture, mining, manufacturing, transportation, utilities, trade, finance, insurance, real estate services, and government. According to the EDD, the annual average unemployment rate for Yuba County in 2017 was about 8.6 percent, which is higher than the State of California's average of 4.6 percent (EDD 2018a).

Industry

Yuba County is located at the northern end of California's famed Mother Lode, which shaped the region's economy in the mid-to-late 1800s. Since the end of the California gold rush, the economic base has grown to include timber and tourism, with mining playing a greatly reduced role in the county's economic viability. In 2016, the largest employment sectors in Yuba County were: 1) Government (35.9%; 2) Education and Health Services (19.2%); and 3) Trade, Transportation and Public Utilities (14.4%) (EDD 2018b). The Government sector had the greatest earnings for the county (Table 3.3.9-5).

Table 3.3.9-5. Summary of industry statistics for Yuba County, 2016.

Industry	Yuba County	
	Number of Employees	Percent
Mining, Logging and Construction	800	4.8%
Manufacturing	700	4.2%
Trade, Transportation and Public Utilities	2,400	14.4%
Information Services	100	0.6%
Financial Activities	200	1.2%
Professional and Business Services	1,100	6.6%
Education and Health Services	3,200	19.2%
Leisure and Hospitality	1,500	9.0%
Other Services	400	2.4%
Government (Federal, State and Local)	6,000	35.9%

Source: EDD 2018b

3.3.9.1.2 Socioeconomic Conditions in Placer County

The Project Area is located approximately 17 mi northwest of the city of Auburn in western Placer County. Population patterns of Placer County are summarized below.

Population Size

The 2010 census indicates the population of Placer County was 348,494. Placer County has a population density of 247.6 persons per square mi. Placer County's annual percent change in population since 2010 has averaged 1.29 percent, which is higher than the annual average of 0.87 percent population increase experienced in the state of California since 2010 (U.S Census Bureau 2018). The California Department of Finance has forecast that by the year 2020,[2] Placer County's population will reach 397,368 residents (CDOF 2018).

Towns and Cities

Incorporated in 1851, the City of Auburn is the county seat of Placer County and is located at an elevation of 1,300 ft on Interstate 80. Placer County is relatively rural, with the majority of the county population residing in the greater Roseville and Auburn areas. Besides Roseville and Auburn, Placer County contains five other incorporated cities: 1) Colfax; 2) Lincoln; 3) Roseville; 4) Rocklin; and 5) Loomis. The nearest major population center outside the county is Sacramento, located about 32 mi to the south and west. The closest major population center in the county, Auburn, is approximately 17 mi from the Project.

Population Density and Housing Distribution

The Placer County population in 2010 was 348,494 residents, with a total of 155,873 housing units, and a land area of 1,407.01 sq mi, Placer County has 248.8 residents per sq mi and 110.8 housing units per sq mi. From 1990 to 2000 and 2000 to 2010, the population of Placer County increased by 43.8 and 40.1 percent, respectively. During those two same periods, the number of housing units also increased at 37.8 and 45.3 percent, respectively. From 1970 to 2010, Placer County has experienced a population and housing unit increase of greater than 400 percent (U.S.

[2] Based on available projected information when draft license application is filed.

Census Bureau 2010, 1990; CDOF 2012). Table 3.3.9-6 shows a summary of population and housing units from 1970-2010 in Placer County.

Table 3.3.9-6. Summary of Placer County population and housing units, 1970 - 2010.

Placer County	2010	2000	1990	1980	1970
Population	348.432	248,399	172,796	177,247	77,306
Housing Units	155,873	107,302	77,879	54,014	30,441

Source: CDOF 2012; U.S. Census Bureau 2010, 1990

As shown in Table 3.3.9-7, most of the Placer County population (211,284, or 60.4%) in 2010 was between the ages of 18 and 65. The age groups within the county have a similar distribution as the State of California.

Table 3.3.9-7. Summary of population by age in Placer County and the State of California, 2010.

Population: Age	Placer County	California
Population under 5 years old	20,727	2,531,133
Persons under 5 years old, percent	5.9%	6.5%
Persons 5 to <18 years old	63,610	7,920,709
Persons 5 to <18 years old, percent	18.2%	23.9%
Persons 18 to <65 years old	211,284	22,235,030
Persons 18 to <65 years old, percent	60.4	57.1
Persons 65 years old and over	54,419	3,479,543
Persons 65 years old and over, percent	15.5%	12.5%

Source: U.S. Census Bureau 2010

Households/Family Distribution and Income

Table 3.3.9-8 summarizes household units (i.e., number of units and net change for a given period of time), homeownership rate, median home value, income and poverty for Placer County. County data are also compared to the same data available for the State of California.

Table 3.3.9-8. Summary of household units and income in Placer County and the State of California.

Household Information	Placer County	California
Housing units, 2016	161,415	14,060,525
Homeownership rate, percent, 2012-2016	70.1%	54.1%
Median value of owner-occupied housing units, 2012-2016	$380,900	$409,300
Households, 2012-2016	136,730	12,807,387
Persons per household, 2012-2016	2.68	2.95
Median household income, 2012-2016	$76,926	$63,783
Per capita income, 2012-2016	$37,912	$31,458
Persons below poverty, percent, 2012-2016	7.2%	14.3%

Source: U.S. Census Bureau 2018

Ethnicity

When compared to the State of California, Placer County is relatively homogeneous with respect to ethnic diversity. The county is predominantly White, with persons of Hispanic or Latino origin the second largest group. Table 3.3.9-9 provides a summary of population by race for Placer County and the State of California.

Table 3.3.9-9. Summary of population by gender and race in Placer County and the State of California, 2010.

Population: Gender/Race	Placer County	California
Female persons	178,281	18,932,713
Female persons, percent	51.2%	50.3%
White persons[1]	290,977	21,453,934
White persons, percent[1]	83.5%	57.6%
Black or African American persons[1]	4,751	2,299,072
Black or African American persons, percent[1]	1.4%	6.2%
American Indian and Alaska Native persons[1]	3,011	362,801
American Indian and Alaska Native persons, percent[1]	0.9%	1.0%
Asian persons[1]	20,435	4,861,007
Asian persons, percent[1]	5.9%	13.0%
Native Hawaiian and Other Pacific Islander persons[1]	788	144,386
Native Hawaiian and Other Pacific Islander, percent[1]	0.2%	0.4%
Persons reporting some other race[1]	13,375	6,317,382
Persons reporting some other race, percent[a1]	3.8%	17.0%
Persons reporting two or more races	15,105	1,815,384
Persons reporting two or more races, percent	3.8%	4.9%
Persons of Hispanic or Latino origin[2]	44,710	14,013,719
Persons of Hispanic or Latino origin, percent[2]	12.8%	37.6%

Source: U.S. Census Bureau 2010
[1] Includes persons reporting only one race.
[2] Hispanics may be of any race, so also are included in applicable race categories.

Education

For the period 2012 – 2016, a total of 94.2 percent of Placer County's population is educated through high school, with 36.9 percent of the population having obtained a Bachelor's degree or higher. When compared to the State of California (82.1% and 32.0%, respectively), Placer County has a higher percentage of both high school graduates and individuals who have received a Bachelor's degree or higher (U.S. Census Bureau 2018).

Labor Force

Placer County's settlements and their economies were based initially on the discovery of gold in the middle 1800s. Today, Placer County has a diverse economic base and labor force that includes construction, mining, manufacturing, transportation, utilities, trade, finance, insurance, real estate services, and government. According to the California Employment Development Department (EDD), the annual average unemployment rate was 4.9 percent in Placer County during 2015, which is less than the State of California's average of 6.4 percent (EDD 2015a).

Based on average monthly labor statistics from the EDD, Placer County's unemployment dropped to 5.2 percent during December 2014, reaching the lowest point since 2007. This rate was the twelfth lowest among California, which was 6.7 percent (Placer County 2015).

Industry

In 2016, the following sectors were the largest employers in Placer County as shown in Table 3.3.9-10: 1): Trade, Transportation and Public Utilities (20.9%); 2) Education and Healthcare Services (15.5%); and 3) Government (14.2%). These industries combined make up almost half of Placer County's economy (Placer County 2014).

Table 3.3.9-10. Summary of industry statistics for Placer County, 2016.

Industry	Placer County	
	Number of Employees	Percent
Agriculture	300	0.2%
Mining and Logging	100	<0.1%
Construction	13,600	8.4%
Manufacturing	6,500	4.0%
Trade, Transportation & Public Utilities	31,700	19.5%
Information	2,500	1.5%
Financial Activities	12,400	7.6%
Professional & Business Services	20,500	12.6%
Leisure & Hospitality	22,300	13.7%
Education and Healthcare Services	27,100	16.7%
Other Services	5,600	3.4%
Government	19,800	12.2%
Total	**162,400**	**100%**

Sources: EDD 2018b

3.3.9.1.3 Socioeconomic Conditions in Nevada County

The Project Area is located approximately 18 mi southwest of the city of Grass Valley in western Nevada County. Population patterns of Nevada County are summarized below.

Population Size

The population of Nevada County in 2010 was 98,764 (U.S. Census Bureau 2015). Nevada County's annual percent change in population since 2010 has averaged -0.01 percent, which was lower than the 0.87 percent population increase experienced in the State of California for the same period (CDOF 2018). The California Department of Finance has forecast that by the year 2020,[3] Nevada County's population will reach 99,548 residents (CDOF 2018).

Towns and Cities

Nevada County is a rural county. There are three towns in Nevada County with populations over 3,000: Truckee, Grass Valley and Nevada City. Truckee had a population of 16,180 in 2010 and 16,165 in 2013 (U.S. Census Bureau 2015), a decrease of 0.9 percent. Grass Valley had a population of 12,860 in 2010 and 12,793 in 2013 (U.S. Census Bureau 2015), a decrease of 0.5 percent. Nevada City had a population of 3,068 in 2010 and 3,136 in 2017 (U.S. Census Bureau 2017), essentially no change. Major population centers around Nevada County are Sacramento, which is 56 mi southwest of Grass Valley; and Reno, Nevada, which is 32 mi northeast of Truckee. The nearest population center in the county, Grass Valley, is approximately 18 mi from the Project.

Population Density and Housing Distribution

With a population of 98,764 residents, 52,590 housing units, and a land area of 957,77 sq mi, Nevada County had 103.1 residents and 54.9 housing units per sq mi in 2010 (U.S. Census Bureau 2015). From 1990 to 2000 and from 2000 to 2010, the population of Nevada County

[3] Based on available projected information when draft license application is filed.

increased by 26 percent, and decreased 0.16 percent respectively. During those same periods, the number of housing units increased at a rate of 18.6 percent and 18.8 percent, respectively (CDOF 2012, U.S. Census Bureau 2010, 1990). Table 3.3.9-11 shows a summary of population and housing units from 1970-2010 in Nevada County.

Table 3.3.9-11. Summary of Nevada County population and housing units, 1970-2010.

Nevada County	2010	2000	1990	1980	1970
Population	98,764	98,938	78,510	51,645	26,346
Housing Units	52,590	44,282	37,352	24,759	11,960

Source: CDOF 2012; U.S. Census Bureau 2010, 1990

Table 3.3.9-12 shows that most of the Nevada County population (60,292, or 61.2%) falls between the ages of 18 and 65. The age demographics of Nevada County's population is a bit older than that of the State of California.

Table 3.3.9-12. Summary of population by age group in Nevada County and the State of California, 2010.

Population: Age	Nevada County	California
Population under 5 years old	4,346	2,531,133
Persons under 5 years old, percent	4.4%	6.5%
Persons 5 to <18 years old	14,570	7,920,709
Persons 5 to <18 years old, percent	14.8%	23.9%
Persons 18 to <65 years old	60,292	22,235,030
Persons 18 to <65 years old, percent	61.2	57.1
Persons 65 years old and over	19,318	3,479,543
Persons 65 years old and over, percent	19.6%	12.5%

Source: U.S. Census Bureau 2010

Households/Family Distribution and Income

Table 3.3.9-13 summarizes household units (i.e., number of units, net change for a given period, and % change for a given period), homeownership rate, median home value, income, and poverty for Nevada County. County data are comparable to that for the State of California.

Table 3.3.9-13. Summary of household units, homeownership, home value, and income in Nevada County and the State of California.

Household Information	Nevada County	California
Housing units, 2016	53,535	14,060,525
Homeownership rate, percent, 2012-2016	72.1%	54.1%
Median value of owner-occupied housing units, 2012-2016	$355,900	$409,300
Households, 2012-2016	40,587	12,807,387
Persons per household, 2012-2016	2.40	2.95
Median household income, 2012-2016	$57,429	$63,783
Per capita income, 2012-2016	$33,385	$31,458
Persons below poverty, percent, 2012-2016	10.9%	14.3%

Source: U.S. Census Bureau 2018

Ethnicity

When compared to the State of California, Nevada County is relatively homogeneous with respect to ethnic diversity. The County is predominantly White, with persons of Hispanic or

Latino origin being the second largest group. Table 3.3.9-14 provides a summary of population by race for Nevada County and the State of California for the year 2010.

Table 3.3.9-14. Summary of population by gender and race in Nevada County and the State of California, 2010.

Population: Gender/Race	Nevada County	California
Female persons	49,929	18,932,713
Female persons, percent	50.6%	50.3%
White persons[1]	90,233	21,453,934
White persons,[1] percent	91.4%	57.6%
Black or African American persons[1]	389	2,299,072
Black or African American persons,[1] percent	0.4%	6.2%
American Indian and Alaska Native persons[1]	1,044	362,801
American Indian and Alaska Native persons,[1] percent	1.1%	1.0%
Asian persons[1]	1,187	4,861,007
Asian persons,[1] percent	1.2%	13.0%
Native Hawaiian and Other Pacific Islander persons[1]	110	144,386
Native Hawaiian and Other Pacific Islander persons,[1] percent	0.1%	0.4%
Persons reporting some other race[1]	2,678	6,317,382
Persons reporting some other race,[1] percent	2.7%	17.0%
Persons reporting two or more races	3,123	1,815,384
Persons reporting two or more races, percent	3.2%	4.9%
Persons of Hispanic or Latino origin[2]	8,439	14,013,719
Persons of Hispanic or Latino origin,[2] percent	8.5%	37.6%

Source: U.S. Census Bureau 2010

1 Includes persons reporting only one race.

2 Hispanics may be of any race; therefore, Hispanics are also included in applicable race categories.

Education

For the period 2012 – 2016, a total of 93.3 percent of Nevada County's population is educated through high school with 34.4 percent of the population having obtained a Bachelor's degree or higher. When compared to the State of California (82.1% and 32.0%, respectively), Nevada County has a higher percentage of both high school graduates and individuals with a Bachelor's degree or higher. (U.S. Census Bureau 2018.)

Labor Force

Initially, all of Nevada County's settlements and economy were based on the discovery of gold in the mid-1800s. Today, the county has a small, yet diverse, economic base and labor force that includes construction, mining, manufacturing, transportation, utilities, trade, finance, insurance, real estate services and government. According to the EDD, the annual average unemployment rate was 9.7 percent for Nevada County during 2012 (EDD 2018c). Comparatively, the average unemployment rates for 2005 and 2009 were, respectively, about 4.8 percent and 10.3 percent (EDD 2018c). These rates are comparable to those for the State of California, which had an approximately 5.4 percent unemployment rate for the year 2005, 11.2 percent for the year 2009, and 10.4 percent for 2012 (EDD 2018c).

Industry

Table 3.3.9-15 shows that in 2016, the largest employment sectors in Nevada County were: 1) Government (20.2%); 2) Education and Health Services (17.5%); and 3) Leisure and Hospitality (16.0 %) (EDD 2018b).

Table 3.3.9-15. Summary of industry statistics for Nevada County, 2016.

Industry	Nevada County	
	Number of Employees	Percent
Mining, Logging, and Construction	2,990	8.6%
Manufacturing	1,410	4.4%
Trade, Transportation & Utilities	4,990	15.6%
Information	280	0.9%
Financial Activities	1,360	4.2%
Professional and Business Services	2,140	6.7%
Education and Health Services	5,600	17.5%
Leisure and Hospitality	5,130	16.0%
Other Services	1,890	5.9%
Government	6,470	20.2%

Source: EDD 2018b

3.3.9.1.4 Project-Specific Information

Established in 1954, SSWD, is a State of California public agency formed under California Water District Law, California Water Code Section 34000 et seq. to develop, store, and distribute surface water supplies for irrigation uses in SSWD's service area. In addition, Section 34000 et seq. authorizes SSWD to develop hydroelectric power in connection with SSWD's projects. SSWD is governed by a Board of Directors, whose seven members are elected by landowners within SSWD's service area. The Camp Far West Dam was completed in 1964 and the powerhouse was completed in 1981.

SSWD is headquartered in Trowbridge, California, and has nine full-time employees, two of which work directly on the Project on a day-to-day basis, and are dispatched from Trowbridge.

SSWD pays almost $100,000 each year to federal, State, and local governments for Project-related support services and property taxes. Table 3.3.10-16 provides a list of these annual fees.

Table 3.3.9-16. Federal, State, and local agencies Licensee pays annually for Project-related services.

Agency	Description	Approximate Annual Payment
Federal Energy Regulatory Commission	Administration	$8,555
United States Geological Survey	Stream Gaging	$3,800
California Division of Safety of Dams	Dam Safety	$31,196
California Department of Water Resources	Water Rights	$27,730
California State Water Resources Control Board	Annual Fees	$1,996
Regional Water Quality Control Board	Reservoir	$22,393
Penn Valley Fire Department	Fire	$35
Nevada County	Property Tax	$1,792
Placer County	Property Tax	$1,730
	Total	**$99,227**

In addition, SSWD pays sales tax for all equipment and supplies.

3.3.9.2 Environmental Effects

This section discusses the potential environmental effects of SSWD's proposed Project, as described in Section 2.2 of this Exhibit E. As part of the Project relicensing, SSWD proposes a Pool Raise, modifications of existing recreation facilities, and modification of the existing Project Boundary. SSWD's proposed measures do not related specifically to socio-economic resources, however, many of them require actions that may be performed by businesses located within approximately 1 hour of the Project.

Minimal adverse impacts to socioeconomic resources are expected during construction of the Pool Raise. While the recreation areas at Camp Far West will remain open during construction, the bridge over the spillway will need to be closed to through-traffic which may impact visitor use at the recreation areas. In general, construction for the Pool Raise and modification of associated facilities would provide a brief, small economic benefit to the region in the form of additional construction-related jobs during the period of construction.

No impacts to socioeconomic resources are expected due to continued Project O&M. Rather, SSWD's proposed Project upgrades and enhancements to the recreation facilities would provide an economic benefit to the region due to increased recreational use of the upgraded and expanded recreation facilities. SSWD's proposed measures will provide minimal socioeconomic benefit by creating environmental and/or engineering related jobs needed to implement various measures.

Importantly, the Proposed Project would enhance and preserve water supply, which are critical for the socioeconomic health of the region. Under existing conditions in dryer years, SSWD does not meet its full water delivery, which affects socioeconomic conditions in Sutter and Placer counties. At this time, SSWD proposes to continue to operate the Project as it has for the past 5 years, along with some modifications of operations for management of the additional water storage of 9,836 ac ft that will be developed after completion of the proposed Pool Raise. The changes in operations to manage the additional water storage would improve the reliability of water deliveries as compared to the No Action Alternative, so socioeconomic resources would be improved under the proposed Project.

3.3.9.3 Unavoidable Adverse Effects

Continued O&M of the Project, including Project-related recreation, would require some commitment of local law enforcement resources. In addition, while there have been few, if any Project-related wildfires, should a fire occur, local fire response services would be needed. These impacts are considered short-term because they are only needed in cases of emergencies. Also, when compared to the overall economic benefit of the Project, in terms of employment and tourism and fees SSWD pays to federal, state and local agencies, these impacts are minor.

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3.3.10 Cultural Resources

The discussion of cultural interests is divided into three sections. The affected environment is discussed in Section 3.3.10.1, environmental effects of the Project are discussed in Section 3.3.10.2, and unavoidable adverse effects are addressed in Section 3.3.10.3.

Existing, relevant, and reasonably available information was not sufficient to determine the potential effects of the Project on cultural resources so SSWD conducted one study, Study 10-1, *Cultural Resources Study*.

3.3.10.1 Affected Environment

Relicensing the Project with FERC is considered to be a federal undertaking, subject to compliance with Section 106 of the NHPA of 1966 (Section 106), as amended, and its implementing regulations at 36 C.F.R. Part 800. Section 106 requires federal agencies to take into account the effects of their undertakings on historic properties (i.e., cultural resources listed on or eligible for listing on the NRHP). On May 13, 2016, FERC designated SSWD as its non-federal representative for purposes of consultation under Section 106 in accordance with 36 C.F.R. 800.2(c)(4). SSWD contracted HDR to conduct the *Cultural Resources Study* to assist FERC in identifying and assessing Project-related effects to historic properties, pursuant to meeting its Section 106 compliance requirements.

The *Cultural Resources Study* was conducted to identify, describe, and evaluate archaeological and built environment resources as potential historic properties in the Project relicensing APE. The California State Historic Preservation Officer (SHPO) agreed with the delineation of the Project relicensing APE in a letter dated September 2, 2016 (SHPO Reference Number: FERC_2016_0701_001). A separate study (Study 11-1, *Tribal Interests Study*) was conducted to investigate areas of tribal interest, including Traditional Cultural Properties, Indian Trust Assets, and tribal agreements as potential historic properties and is discussed in Section 3.3.11.

A *Cultural Resources Study* report is being prepared to document the study efforts and findings. The results of the *Cultural Resources Study* are presented in this section. SSWD anticipates that the study report will be finalized and filed with FERC by April 30, 2019. The study report will include a public version that summarizes the methods and results of the *Cultural Resources Study* and will include, as an attachment, a non-public version that presents the complete methods and results of the *Cultural Resources Study*. The public version of the report will be made available to the public as part of the Application for New License. The non-public version will be Confidential/Privileged and will only be made available to potentially-affected Native American tribes, FERC, SHPO, and the North Central Information Center (NCIC). SSWD will submit the study report to potentially affected Native American tribes for review first, after which the report will be submitted to the SHPO for review and concurrence and then filed with FERC and the NCIC.

The remainder of this section summarizes the preliminary results of the *Cultural Resources Study*. This section is organized into two parts: 1) resources identified and 2) on-going Project-related effects. The first part is organized by resource type (i.e., archaeological and built environment) and summarizes the cultural resources identified during the *Cultural Resources Study.* The second part summarizes the existing or on-going Project-related effects to those resources identified during the *Cultural Resources Study* as potential historic properties.

3.3.10.1.1 Archaeological and Built Environment Resources Identified

Archaeological Resources

The *Cultural Resources Study* resulted in the identification of 90 archaeological sites within the APE. Of these 90 sites, 56 were newly recorded and 34 were previously recorded. These 90 sites include 39 historical sites, 33 prehistoric sites, and 18 multi-component sites that are comprised of both historical and prehistoric components. In addition to these archaeological sites, one archaeological district was identified. As defined at 36 C.F.R. 60.3, "A district is a geographically definable area, urban or rural, possessing a significant concentration, linkage, or continuity of sites, buildings, structures, or objects united by past events or aesthetically by plan or physical development. A district may also comprise individual elements separated geographically but linked by association or history." A brief summary of these archaeological resources is provided below, followed by Table 3.3.10-1, which lists all 90 archaeological sites.

<u>Prehistoric Sites</u>
Of the 90 archaeological sites identified within the APE, 33 are prehistoric. These 33 prehistoric sites include short-term habitation sites (N[1] = 11), milling station features (N = 10), lithic scatters (N = 9), long-term habitation sites (N=2), and one site comprised of possible rock art (N=1). Sixteen of these 33 prehistoric sites identified within the APE remain unevaluated with regards to their eligibility for listing on the NRHP, 15 have been evaluated as ineligible for inclusion on the NRHP, and two have been evaluated as eligible for the NRHP as part of the *Cultural Resources Study*.

<u>Historical Sites</u>
Of the 90 archaeological sites identified within the APE, 39 are historical. These 39 historical sites include transportation sites (N = 16), mining sites (N = 12), habitation sites with associated features (N = 4), trash scatters sites (N = 4), one water control site (N = 1), and two other sites that do not fit into a specific site type (N = 2). Seven of these 39 historical sites identified within the APE remain unevaluated with regards to their eligibility for listing on the NRHP, and 31 have been evaluated as ineligible for inclusion on the NRHP as part of the *Cultural Resources Study* (three of the ineligible sites were previously determined ineligible and SHPO concurred with these determinations). One site has already been determined eligible for the NRHP (SHPO has previously concurred with this evaluation), but the portion within the APE is evaluated as a non-contributing component to this eligible site as part of the *Cultural Resources Study*.

<u>Multicomponent Sites</u>
A total of 18 multicomponent sites were identified within the APE. The prehistoric components of these 18 sites include short-term habitation locations (N = 9), lithic scatters (N = 6), milling station

[1] "N" means "number" and refers to the number of elements in a sample.

features (N = 2), and long-term habitation locations (N = 1). The historical components include refuse scatters (N = 11), mining sites (N = 3), habitation sites (N = 3), and one other site that does not fit into a specific site type (N = 1). Two of the multicomponent sites have been evaluated as eligible for inclusion on the NRHP, nine have been evaluated as ineligible for inclusion on the NRHP, and the other seven remain unevaluated for inclusion on the NRHP.

Archaeological District

One prehistoric archaeological district, the Lower Bear River Prehistoric Archaeological District, was identified within the APE during the *Cultural Resources Study*. This discontiguous archaeological district consists of all prehistoric archaeological sites and components located along the foothill reach of the Bear River and its tributaries within the APE (this includes both prehistoric sites and the prehistoric components of the multi-component sites; N=51). This district has been evaluated as eligible for inclusion on the NRHP as part of the *Cultural Resources Study*. Of the 51 district elements, 23 remain unevaluated with regards to whether or not they contribute the district's NRHP eligibility, 22 have been evaluated as non-contributing elements, and six have been evaluated as contributing elements.

Table 3.3.10-1. Summary table of all archaeological sites identified within the APE.

Count	Site No. (Primary/ Trinomial/ Temp. No.)	Age	Type	Description	Individual NRHP Eligibility	Lower Bear River Prehistoric Archaeological District[1]
1	HDR-CFWH-01	P	Short-Term Habitation	Lithic scatter comprised of one CCS flake, one biface fragment, and one handstone. Age unknown.	Ineligible	NC
2	HDR-CFWH-02	H	Other	Historic pipeline and concrete foundation box with metal pulley and a metal pipe. This site is likely associated with the North Shore Recreation Area, putting the age of the site circa 1960s.	Ineligible	N/A
3	HDR-CFWH-04	P	Milling Feature	Bedrock milling station with three milling surfaces (Features 1-3) and two artifacts, a milling slab fragment and a handstone fragment. Age unknown.	Unevaluated	Unevaluated
4	HDR-CFWH-05	H	Transportation	Historic road segment that appears to correspond to a historic road segment that appears on the 1951 Camp Far West, California 7.5' U.S.G.S topographic quadrangle, and branches off of another historical road (P-58-2570). Contains one feature, a metal culvert pipe which is 8 inches in diameter, and traverses beneath the historical road segment near its center and is about 36 ft long.	Ineligible	N/A
5	HDR-CFWH-06	H	Other	Historic waterline pipe with 2 repurposed railroad car couplings. This site is likely associated with the South Shore Recreation Area, putting the age of the site circa 1960s.	Ineligible	N/A
6	HDR-CFWH-07	P	Milling Feature	Bedrock milling station with two mortar cups. Age unknown. Silt appears to be protecting site from impacts.	Unevaluated	Unevaluated
7	HDR-CFWH-08	H	Trash Scatter	Historic trash scatter. Artifacts present include: cast iron ornamental curtain rod end, two shards of thick brown bottle glass from a square bottle, four concrete fragments with large aggregate, four terracotta water pipe fragments, and one clear glass bottle base fragment with an Owens Illinois maker's mark. Age post-1956.	Ineligible	N/A
8	HDR-CFWH-10	M	P: Lithic Scatter H: Trash Scatter	This multicomponent site consists of three basalt projectile points and four historic glass fragments (two amethyst and two aqua). The historic component dates to pre-1919 and the prehistoric component dates to between 3,000 B.C. and contact.	Ineligible	P: NC H: N/A
9	HDR-CFWH-11	H	Transportation	Historical road segments. Segment A is currently being used as a paved boat ramp; segment B is a paved road segment. Age c. 1920s – 1940s.	Ineligible	N/A
10	HDR-CFWH-12	P	Short-Term Habitation	This site is a prehistoric short-term habitation site comprised of five features, sixteen artifacts, and a prehistoric lithic scatter. The features include three milling stations (Features 1-3), and two panels of possible petroglyph rock art (Features 4-5). The artifacts include 11 handstones, two projectile points, one milling slab fragment, one complete stone bowl mortar, and one fragment of a stone bowl mortar. The lithic scatter includes seven flakes. Dates between 3,000 and 500 B.C.	Eligible	C
11	HDR-CFWH-14	H	Habitation	Homestead site with structural remnants and an artifact scatter. An historic gravesite just outside the APE was noted. The site consists of 2 features (one structural depression and one rock alignment), one artifact concentration, and a sparse scatter of general site artifacts. Dates to c. 1860s -1880s.	Unevaluated	N/A
12	HDR-CFWH-15	H	Transportation	Historic road. This site appears to be the original route of Camp Far West Road before the reservoir existed and the road was rerouted around the reservoir. No features or artifacts observed. Dates to c. 1940s.	Ineligible	N/A
13	HDR-CFWH-16	P	Milling Feature	Two milling station features. Feature 1 has two conical mortars, Feature 2 has one conical mortar. Age unknown.	Unevaluated	Unevaluated

Table 3.3.10-1. (continued)

Count	Site No. (Primary/ Trinomial/ Temp. No.)	Age	Type	Description	Individual NRHP Eligibility	Lower Bear River Prehistoric Archaeological District[1]
14	HDR-CFWH-17	H	Transportation	Historical road comprised of three dirt road segments (A-C) and two features, remnants of a concrete bridge and culvert underneath road. Dates to c. 1880-1960s.	Ineligible	N/A
15	HDR-CFWH-19	H	Trash Scatter	Historical roadside trash scatter with one possibly unassociated feature. This site includes a discrete scatter of six tin cans, one fuel can, two bundles of barbed wire, one bundle of hog wire, one bundle of chicken wire, one 25 gallon metal drum, a stove pipe, paint can, bed frame, sheet metal, and two pieces of milled lumber with a rectangular depression (Feature 1) located nearby. Age unknown, post c.1904.	Ineligible	N/A
16	HDR-CFWH-20	P	Short-Term Habitation	Prehistoric lithic scatter with 8 artifacts (flaked, ground, and battered stone) and 30+ debitage flakes. Age unknown.	Unevaluated	Unevaluated
17	HDR-CFWH-23	H	Transportation	Historic road with one feature, a cut that bisects the road. Dates to pre-1964.	Ineligible	N/A
18	HDR-CFWH-24	H	Transportation	Historic road segments (A, B, and C). Dates to pre-1949.	Ineligible	N/A
19	HDR-CFWH-25	H	Habitation	Historic habitation site with three features: structural foundation, metal rod, and circular depression. Artifact 1 is a body fragment of an olive green bottle. Dates to c. 1860s-1880s.	Unevaluated	N/A
20	HDR-CFWH-26	H	Transportation	Historic site composed of two segments of a historic road (Segment A and B) and a culvert. Much of the recorded road segments traverse below the high waterline of Camp Far West Reservoir, except for the north portion of Segment A. This road first appears on the official Yuba County map from 1861, as McCourtney Road and was in use until the construction of the new Camp Far West Dam in 1963 when much of the road was inundated.	Ineligible	N/A
21	HDR-CFWH-27	H	Transportation	Historic site composed of two segments of a historic road (Segment A and B). A third segment was identified between Segment A and Segment B, but was not recorded due to rising water levels of Camp Far West Reservoir. No features or artifacts were observed alongside either segment. Dates to pre-1960s.	Ineligible	N/A
22	HDR-CFWH-28	P	Short-term Habitation	Sparse and dispersed prehistoric lithic scatter composed of one milling slab fragment, one unifacial cobble, two projectile points, and one possible portable petroglyph rock art stone. Lithic debitage observed in the site consists of six flakes. Age is Unknown.	Eligible	C
23	HDR-CFWH-29	P	Short-term Habitation	Prehistoric lithic scatter with nine tools including one hammerstone, three granite handstones, two lithic cores, two bifaces, and one modified flake. Other cultural constituents include 50+ fire cracked rock, and up to 50 fragments of lithic debitage. Age is unknown.	Unevaluated	Unevaluated
24	HDR-CFWH-30	P	Short-term Habitation	This prehistoric site is comprised of 30+ basalt and cryptocrystalline silicate (CCS) flakes, 18 possible incised stones that are in two concentrations (Concentration 1 and Concentration 2), three handstones, two projectile points, one biface, one drill, and one milling stone. Additionally, two features were identified: a milling station (Feature 1) and a possible petroglyph rock art panel (Feature 2). Dates between 3,000 and 500 B.C.	Unevaluated	Unevaluated

Table 3.3.10-1. (continued)

Count	Site No. (Primary/ Trinomial/ Temp. No.)	Age	Type	Description	Individual NRHP Eligibility	Lower Bear River Prehistoric Archaeological District[1]
25	HDR-CFWH-31	H	Habitation	Historic structural foundation and one olive green bottle base fragment. This structure does not appear on any historic aerials or topographic maps. Age is unknown.	Unevaluated	N/A
26	HDR-CFWH-32	M	P: Short-term Habitation H: Habitation	Historic structural foundation with domestic debris consisting of approximately 100 red bricks, white ware fragments, terra cotta pipe fragments, historic glass fragments (amethyst, black, cobalt, aqua), square and wire nails, solder seam tin cans, porcelain, earthenware, a bicycle pedal, metal spikes, bolts, and notched hinges. Two prehistoric artifacts: one milling slab and one modified cobble. Historic component dates to c. 1860s-1910s. Prehistoric age is unknown.	Unevaluated	P: Unevaluated H: N/A
27	HDR-CFWH-34	M	P: Short-Term Habitation H: Trash Scatter	Multicomponent site. Prehistoric component consists of a milling station with 5 conical mortars, possible hunting blind, possible petroglyph rock art panel, handstone fragment, a tested cobble, and no more than 20 basalt flakes. Historic component consists of glass fragments. Age is unknown.	P: Unevaluated H: Ineligible	P: Unevaluated H: N/A
28	HDR-CFWH-35	H	Transportation	Historic road segments (A and B). No features or artifacts were observed in association with these segments. The road does not appear on historic aerial or topographic maps. Age in unknown.	Ineligible	N/A
29	HDR-CFWH-36	M	P: Lithic Scatter H: Trash Scatter	Prehistoric component consists of seven possible petrogylph rock art panels and one biface. Historic component consists of two parts of the same lock. The historic lock dates to 1836-1869. Prehistoric age is unknown.	P: Unevaluated H: Ineligible	P: Unevaluated H: N/A
30	HDR-CFWH-37	H	Mining	Historic mining complex with two drainages with placer tailings, two ditch features, two prospect pits, and a stacked/piled rock feature. One artifact was observed; a piece of sheet metal. Age is unknown.	Ineligible	N/A
31	HDR-CFWH-38	H	Transportation	Historic road segment. No features or artifacts were observed in association with this site. This road does not appear on any historic aerials or topographic maps. Age is unknown.	Ineligible	N/A
32	HDR-CFWH-40	P	Milling Feature	Prehistoric bedrock mortar with one mortar cup. No other features or artifacts were observed in association with the site. Age is unknown.	Unevaluated	Unevaluated
33	HDR-CFWH-42	M	P: Short-Term Habitation H: Trash Scatter	Multicomponent site with 10 prehistoric features and a unifacial granite handstone. Prehistoric features consist of possible petroglyph rock art panels. Historic component includes two horseshoes, glass and stoneware fragments. Age unknown.	Unevaluated	P: Unevaluated H: N/A
34	HDR-CFWH-43	P	Milling Feature	Prehistoric milling station with five saucer mortars. No artifacts or other features were observed. Age Unknown.	Unevaluated	Unevaluated
35	HDR-CFWH-44	P	Rock Art	Possible prehistoric petroglyph rock art. No associated artifacts were observed. Age unknown.	Unevaluated	Unevaluated
36	HDR-CFWH-46	P	Lithic Scatter	Prehistoric lithic scatter including a tested cobble with a battered end, a biface midsection, a bifacially reduced basalt cobble, and 2 basalt flakes. Age unknown.	Ineligible	NC
37	HDR-CFWH-48	P	Milling Feature	Prehistoric milling site with three milling stations. No associated artifacts were observed. Age unknown.	Unevaluated	Unevaluated
38	HDR-CFWH-51	H	Transportation	Historic dirt road segment. This road does not appear on any historic maps. Age unknown.	Ineligible	N/A

Table 3.3.10-1. (continued)

Count	Site No. (Primary/ Trinomial/ Temp. No.)	Age	Type	Description	Individual NRHP Eligibility	Lower Bear River Prehistoric Archaeological District[1]
39	HDR-CFWH-53	H	Transportation	Historic road segments (A and B). Segment A is unimproved, not maintained, and located below the high waterline of Camp Far West Reservoir. Segment B is unimproved, maintained, and located above the high water line of Camp Far West Reservoir. The road appears on a 1951 historic map.	Ineligible	N/A
40	HDR-CFWH-55	P	Lithic Scatter	Prehistoric site containing 6 stones with possible petroglyph rock art, 1 hammerstone fragment, 1 tested basalt cobble, and 1 basalt flake. Age unknown.	Unevaluated	Unevaluated
41	HDR-CFWH-56	M	H: Trash Scatter P: Lithic Scatter	Historic trash scatter with seven large stoneware fragments, glass bottle fragments, and one prehistoric secondary cryptocrystalline flake. Age unknown.	Ineligible	P:N/C H: N/A
42	HDR-CFWH-57	P	Milling Feature	Prehistoric site with one milling station feature containing two conical mortars. No associated artifacts were observed. Age unknown.	Ineligible	NC
43	HDR-CFWH-59	P	Milling Feature	Prehistoric milling station with 2 mortar cups. A granite pestle was found in association with this milling feature. No other features or artifact observed in association with this site.	Ineligible	NC
44	HDR-CFWH-60	P	Short-term Habitation	One large granite pestle, one CCS contracted stem projectile point, and one CCS flake. Dates to between 5,000 and 500 B.C.	Unevaluated	Unevaluated
45	HDR-CFWH-64	M	P: Short-term Habitation H: Trash Scatter	Multicomponent site. Prehistoric component consists of a lithic scatter with 20+ flakes and 2 handstones. Historic component consists of a refuse scatter with 2 artifact concentrations (possible looters pile, glass fragments). Age unknown.	Ineligible	P: NC H: N/A
46	HDR-CFWH-65	H	Water Control	Historic ditch broken up into two segments (Segment A and Segment B). Age unknown.	Ineligible	N/A
47	HDR-CFWH-67	H	Habitation	Historic site consisting of six features and a general scatter of historic refuse across the site. The six features are comprised of two rock foundations, two depressions, and two rock or dirt piles. Site may be related to "Grahams Hotel" or "Store" which is on the 1861 Historic Yuba County map approximately at the site location. Dates between 1860s and 1880s.	Unevaluated	N/A
48	HDR-CFWH-68	H	Mining	Historic mining site consisting of one prospect trench and two waste rock piles, and six tin cans. Dates between c. 1850 and 1940.	Ineligible	N/A
49	HDR-CFWH-69	M	P: Milling Feature H: Mining	Multicomponent site. Prehistoric component consists of a single bedrock milling station with one mortar cup. Historic component consists of mining related pile of rocks. Age Unknown.	Ineligible	P: NC H: N/A
50	HDR-CFWH-70	M	P: Milling Feature H: Habitation	Multicomponent site. Prehistoric component consists of a single bedrock milling station with three mortar cups. Historic component consists of historic residence complex. There are eight features: one prehistoric milling station, one depression with stacked rock, one water catchment feature, one metal pipe sticking out of the ground, one rock foundation, three concrete foundations, and one rock pile. Six historic artifacts observed. Prehistoric age: Unknown. Historic age: c. 1900-1940s.	Unevaluated	P: Unevaluated H: N/A
51	HDR-CFWH-71	H	Transportation	Historic road segment. Road appears on 1868 GLO plat as "Road to Lincoln". Dates to 1860s.	Ineligible	N/A
52	HDR-CFWH-72	H	Mining	Historic site consisting of 11 prospect pits/ circular depressions and one mound. No artifacts or other features observed. Age Unknown.	Ineligible	N/A

Table 3.3.10-1. (continued)

Count	Site No. (Primary/ Trinomial/ Temp. No.)	Age	Type	Description	Individual NRHP Eligibility	Lower Bear River Prehistoric Archaeological District[1]
53	HDR-CFWH-73	H	Mining	Historic site consisting of five prospect pits/ circular depressions. No artifacts or other features observed. Age Unknown.	Ineligible	N/A
54	HDR-CFWH-74	H	Mining	Historic site consisting of four prospect pits/ circular depressions. No artifacts or other features observed. Age Unknown.	Ineligible	N/A
55	HDR-CFWH-76	H	Mining	Two prospect pits. Age unknown.	Ineligible	N/A
56	HDR-CFWH-199	P	Milling Feature	Prehistoric bedrock milling station with two mortar cups. Age Unknown.	Unevaluated	Unevaluated
57	P-29-0543/ CA-NEV-485H	H	Mining	Originally recorded in 1979 and updated in 1985. Site is a placer mining site with an intermittent ground sluice/ditch and three rock dams/retaining walls along a seasonal drainage. This site was not revisited during 2016-2017 field survey because it is located on private land and permission to access this land was not granted. Age unknown.	Unevaluated	N/A
58	P-29-2915	H	Mining	Previously recorded in 1979 as a mining site with fourteen mining pits and test pits. Site was revisited and found to be fairly consistent with previous record, though some additional pits were observed and some of the previously recorded pits could be inundated by the reservoir or eroded away. In total, twenty-two prospect pits and trenches and one artifact, a modified coffee pot, were observed and recorded. Dates between c. 1870s and 1945.	Ineligible	N/A
59	P-29-2917	H	Mining	Previously recorded in 1979 as a placer mining site with cut channel, four test pits, and stacked waste rock retainer walls. Only the south end of the site is within Project APE and was revisited 01/16/2017. One feature, a line of piled cobbles and boulders along a dug out drainage, was recorded. No artifacts were observed. Age unknown	Ineligible	N/A
60	P-29-4459/ CA-NEV-2190/ SRI-CFW-2	P	Long-Term Habitation	Previously recorded as seven bedrock mortar cups with an estimated 30+ more submerged inundated by Bear River. Site revisited but was inundated by Bear River at time of survey. Age unknown.	Unevaluated	Unevaluated
61	P-29-4460/ CA-NEV-2191/ SRI-CFW-24	P	Short-Term Habitation	Lithic scatter of 25 flaked, battered, and groundstone artifacts including nine cobble unifaces, two hammerstones, two cobble bifaces, two pieces of tested material, two cores, one anvil, five flakes, a cobble half, and one handstone. Age is unknown.	Ineligible	NC
62	P-29-4461/ CA-NEV-2192/ SRI-CFW-25	P	Lithic Scatter	Lithic scatter of 14 flaked and battered stone artifacts to include five tested cobbles, two cobble bifaces, one edge-modified flake, one hammerstone, and three flakes. Age is unknown.	Ineligible	NC

Table 3.3.10-1. (continued)

Count	Site No. (Primary/ Trinomial/ Temp. No.)	Age	Type	Description	Individual NRHP Eligibility	Lower Bear River Prehistoric Archaeological District[1]
63	P-31-5744/ CA-PLA-1179/H/ SRI-CFW-3	M	P: Short-term Habitation H: Mining	Previously recorded in 2013 as a multicomponent site. Prehistoric component consisted of two bedrock mortars and a lithic scatter; historic component consisted of the historic hard rock Dairy Farm Mine, which included 12 mining features (prospect pits, tailings, mine shaft, rock retaining wall, concrete foundations, concrete pads, and concrete pedestals) and five historic artifact concentrations. Site was revisited November 2016 and was updated to include five historic features (prospect pit, two waste rock tailing, retention dam, and possible smelting building) and a prehistoric stage IV biface. Historic component dates from the 1900s to the 1940s. The prehistoric component dates to pre- and post-contact given the presence of glass trade beads.	Eligible	P: C H: N/A
64	P-31-5745/ CA-PLA-1180/H/ SRI-CFW-4	M	P: Lithic Scatter H: Mining	Prehistoric lithic scatter with 10 flaked and battered stone artifacts (two cores, a tested cobble, cobble biface fragment, two hammerstones, and four flakes); Historic waste rock pile, likely from a mine shaft that has been filled in, and two depressions. Age of each component is unknown.	Ineligible	P: NC H: N/A
65	P-31-5746/ CA-PLA-1876/H/ SRI-CFW-5	M	P: Short-Term Habitation H: Trash Scatter	Prehistoric lithic scatter with eight flaked stone artifacts (four cobble unifaces, a cobble biface, two pieces of tested material, and a tabular stone with a bifacially flaked edge) and one groundstone artifact (pointed cobble with a highly polished tip); Historic component consists of one fragment of amethyst glass dating to between the 1880s and 1920. Age of the prehistoric component is unknown.	Ineligible	P: NC H: N/A
66	P-31-5747/ CA-PLA-1886/H/ SRI-CFW-6	M	P: Lithic Scatter H: Trash Scatter	Previously recorded in 2013 as a multicomponent site with a prehistoric lithic scatter with 9 flaked stone artifacts, historic concrete foundation, 36 historic glass and ceramic fragments. Revisited in 2016. One prehistoric primary flake, one terra cotta pipe fragment, and concrete fragments were added to the record. Age unknown.	Ineligible	P: NC H: N/A
67	P-31-5748/ CA-PLA-1887/ SRI-CFW-7	P	Milling Feature	Previously recorded in 2013 as one bedrock mortar with one mortar cup. Site was revisited and was updated to include a second mortar cup and previously recorded mortar cup dimensions were corrected.	Ineligible	NC
68	P-31-5749/ CA-PLA-1888/ SRI-CFW-8	M	P: Short-Term Habitation H: Habitation	Previously recorded as a prehistoric lithic scatter with 37 flaked and ground stone artifacts. Revisited in 2016 and updated to reflect multicomponent site. Historic component consists of historic trash scatter, walls and foundation of historic well, and two artifact concentrations. Prehistoric component updated to include a milling station with mortar cup, one milling slab, one biface fragment, and a pestle. Historic component may date to ca. 1915, based on historic maps. Prehistoric age unknown.	Unevaluated	P: Unevaluated H: N/A
69	P-58-1024/ CA-YUB-1006H	H	Trash Scatter	Previously recorded in 1979 as a possible homestead site dating to c. 1890-1910 with a dump with glass, ceramic, and metal artifacts, and a short canal segment. This site was not relocated during survey in 2016.	Unevaluated	N/A
70	P-58-1032/ CA-YUB-1014H	H	Mining	Previously recorded in 1979 as a placer mining operation with numerous quartz waste rock piles and associated bedrock depressions and holes along both sides of a small drainage. This site was not relocated during survey in 2016. Age unknown.	Unevaluated	N/A
71	P-58-1235/ CA-YUB-1216	P	Long-Term Habitation	Previously recorded in 1960 as a prehistoric habitation site with midden, cremated human remains, pestle, shell and trade beads, Martis and desert-side notched projectile points, and obsidian flakes. This site was not revisited during 2016 survey due to inundation by the reservoir. Age unknown.	Unevaluated	Unevaluated

Table 3.3.10-1. (continued)

Count	Site No. (Primary/ Trinomial/ Temp. No.)	Age	Type	Description	Individual NRHP Eligibility	Lower Bear River Prehistoric Archaeological District[1]
72	P-58-2570/ CA-YUB-1930H/ HDR-CFWH-03/ HDR-CFWH-22	H	Transportation	Overland Emigrant Trail – portions are now McCourtney Road. Newly recorded 5 segments (A-E) of the site. Dates from 1841 to the present.	Eligible (Criterion A; portion within APE is a non-contributing element)	N/A
73	P-58-2868/ CA-YUB-1812/H/ SRI-CFW-1	M	P: Lithic Scatter H: Trash Scatter	Historic artifact scatter dating to c. 1867 – 1920, including ceramic, glass, and metal domestic refuse, and one prehistoric isolated chert flake. Age of prehistoric component is unknown.	Ineligible	P: NC H: N/A
74	P-58-2872/ CA-YUB-1813/ SRI-CFW-9	P	Short-Term Habitation	Previously recorded in 2013 as a lithic scatter with 73 flaked and ground stone artifacts. Site revisited in 2016, no significant changes to the site were observed. Age unknown.	Ineligible	C
75	P-58-2873/ CA-YUB-1814/ SRI-CFW-10	M	P: Short-Term Habitation H: Other	Previously recorded in 2013 as a large lithic scatter with 99 flaked, battered, and ground stone artifacts. Site was revisited in 2016 and was updated to include a historical structural depression and a wooden pole.	Ineligible	P: C H: N/A
76	P-58-2874/ CA-YUB-1815/ SRI-CFW-11	P	Lithic Scatter	Lithic scatter with 21 flaked and battered stone artifacts to include seven cobble unifaces, three cobble bifaces, two core fragments, four tested cobbles, one hammerstone, one edge-modified piece, and three pieces of debitage. Age is unknown.	Ineligible	NC
77	P-58-2875/ CA-YUB-1816/ SRI-CFW-12	M	P: Short-Term Habitation H: Trash Scatter	Previously recorded in 2013 as a lithic scatter with 25 flaked and battered stone artifacts in two concentrations. Site was revisited in 2016 and was updated to include the addition of six possible portable petroglyph rock art stones, four bifaces, one side notched and stemmed projectile point, one milling stone, and a basalt handstone. There are three fragments of historic refuse observed in the site: one clear bottle glass with bubbles, and two white ware ceramic fragments. Historic age is unknown. Prehistoric component dates between the Late Archaic and contact periods.	Unevaluated	P: Unevaluated H: N/A
78	P-58-2876/ CA-YUB-1817/ SRI-CFW-13	P	Lithic Scatter	Lithic scatter with seven lithic artifacts, to include one flake, one cobble biface, two cobble unifaces, two cores, one piece of assayed material. Age is unknown.	Ineligible	NC
79	P-58-2877/ CA-YUB-1818/ SRI-CFW-14	P	Lithic Scatter	Lithic scatter with 16 flaked and battered stone artifacts: six cobble unifaces, three cobble bifaces, two pieces of tested material, one core/hammerstone, three cores, and one flake. Age is unknown.	Ineligible	NC
80	P-58-2878/ CA-YUB-1819/ SRI-CFW-15	P	Short-Term Habitation	Previously recorded in 2013 as a prehistoric lithic scatter with nine flaked stone artifacts. Site was revisited in 2016 and was updated to include a unifacial milling slab.	Ineligible	NC

Table 3.3.10-1. (continued)

Count	Site No. (Primary/ Trinomial/ Temp. No.)	Age	Type	Description	Individual NRHP Eligibility	Lower Bear River Prehistoric Archaeological District[1]
81	P-58-2879/ CA-YUB-1820H/ SRI-CFW-16	H	Mining	Mining site with three prospect pits and three fragments of dark green glass. Age is unknown.	Ineligible	N/A
82	P-58-2880/ CA-YUB-1821H/ SRI-CFW-17	H	Mining	Mining site with one prospect pit with an associated waste rock pile. Age is unknown.	Ineligible	N/A
83	P-58-2881/ CA-YUB-1822/ SRI-CFW-18	P	Lithic Scatter	Lithic scatter with 17 flaked and battered stone artifacts include five cobble unifaces, four pieces of tested material, four cores, one cobble uniface/hammerstone, one hammerstone, one anvil, and one flake. Age is unknown.	Ineligible	NC
84	P-58-2882/ CA-YUB-1823/ SRI-CFW-19	P	Lithic Scatter	Previously recorded in 2013 as a prehistoric lithic scatter with 30 flaked and battered stone artifacts. None of the previously recorded artifacts were relocated during 2016 survey. Age unknown.	Ineligible	NC
85	P-58-2883/2884/2886/2887/2888/2889 CA-YUB-1824/1825/1827/1828/1829/1830 HDR-CFWH-33	M	P: Long-Term Habitation H: Trash Scatter	Multicomponent site with eight loci. Prehistoric component: consists of numerous milling stations (one milling station is cupule rock art), flakes stone tools, flakes, possible house pits, and several projectile points. Appears to represent a large prehistoric village site. Historic component consists of glass fragments, depressions. Historic age unknown. Prehistoric age 3,000 B.C. to contact.	P: Eligible H: Ineligible	P: C H: N/A
86	P-58-2885/ CA-YUB-1826/ SRI-CFW-22	P	Short-Term Habitation	Previously recorded in 2013 as a prehistoric lithic scatter with seven flaked stone artifacts. Site was revisited in 2016 and updated to include a milling station with 6 mortar cups. Age unknown.	Unevaluated	Unevaluated
87	P-58-2890/ CA-YUB-1831/ SRI-CFW-29	P	Lithic Scatter	Lithic scatter with 11 flaked and battered stone artifacts including six cobble unifaces, two hammerstones, one core, one biface, and one cobble biface. Age is unknown.	Ineligible	NC
88	P-58-3069/ CA-YUB-1927H/ HDR-CFWH-58	H	Trash Scatter	Historic refuse pile, including metal can fragments and a handle to a barber's whisk brush. Dates between 1900s and 1940.	Ineligible	N/A

Table 3.3.10-1. (continued)

Count	Site No. (Primary/ Trinomial/ Temp. No.)	Age	Type	Description	Individual NRHP Eligibility	Lower Bear River Prehistoric Archaeological District[1]
89	P-58-3070/ CA-YUB-1926H/ HDR-CFWH-13	H	Transportation	Historical road segments. The road is currently paved and is used by the public. Site includes parts of McCourtney Road, Blackford Road, and Camp Far West Road. Dates between c. 1964 and 1973.	Ineligible	N/A
90	P-58-3071/ CA-YUB-1925H/ HDR-CFWH-09	H	Transportation	Historic road segment serves as an access road to the North Shore Recreation Area. Features 1-3 are culverts. Dates to c. 1960s.	Ineligible	N/A

[1]C = Contributing; NC = Non-Contributing; N/A = Not-Applicable; Unevaluated = unevaluated as a contributing/non-contributing element.

Built Environment Resources

The built environment investigation completed as part of the *Cultural Resources Study* resulted in the identification of 11 built environment resources within the APE. These 11 resources include dam and irrigation system resources, recreation resources, and a California Department of Water Resources monitoring station. Of these 11 built environment resources, all 11 are evaluated as ineligible for inclusion in the NRHP, or have already been determined ineligible during previous work. Additionally, as a grouping of resources, the dam and irrigation resources lack a significant linkage to any specific events, people, or engineering feats, and as a whole do not represent a cohesive district and do not gain significance when grouped together. Accordingly, it was found that these resources do not represent a historic district that would require evaluation for listing in the NRHP.

Table 3.3.10-2 below provides a summary of the built environment resources located and documented within the APE, as well as their eligibility evaluations.

Table 3.3.10-2. Summary table of all built environment resources identified within the APE.

Building/Structure (Field Designation)	NRHP Eligibility
CAMP FAR WEST PROJECT DAM AND IRRIGATION SYSTEM RESOURCES	
Camp Far West Dam	Not Eligible (SHPO has concurred)
Camp Far West North Wing Dam	Not Eligible (SHPO has concurred)
Camp Far West South Wing Dam	Not Eligible (SHPO has concurred)
Camp Far West North Dike	Not Eligible (SHPO has concurred)
Camp Far West Reservoir	Not Eligible (SHPO has concurred)
Bridge 16C0081 (OHP Primary No. P-58-002624)	Not Eligible (SHPO has concurred)
Camp Far West Irrigation Intake Structure	Not Eligible (SHPO has concurred)
Camp Far West Spillway	Not Eligible (SHPO has concurred)
CAMP FAR WEST RESERVOIR RECREATION RESOURCES	
Camp Far West Lake North Shore Recreation Facility	Not Eligible
Camp Far West Lake South Shore Recreation Facility	Not Eligible (SHPO has concurred)
GOVERNMENT PROPERTY IN PROJECT APE	
DWR Monitoring Station	Not Eligible
Total	**0 Eligible, 11 Not Eligible**

3.3.10.1.2 On-going Project-Related Effects Identified During Relicensing Studies

Of the 90 archaeological sites identified within the APE, 55 have been or are being evaluated as ineligible for inclusion on the NRHP as part of SSWD's *Cultural Resources Study*. Thus, pending SHPO concurrence on those sites that still require SHPO concurrence, these 55 sites will require no further consideration because they will not be historic properties. One other site has been determined eligible for the NRHP, with SHPO concurrence. However, the portion of this site within the APE is evaluated as non-contributing in the *Cultural Resources Study*. Pending SHPO concurrence on this assessment, this site also will require no further consideration.

Of the remaining 34 sites that are either evaluated as eligible for the NRHP or are unevaluated, and thus are potential historic properties, 25 are being impacted by Project-related effects (primarily erosion caused by fluctuating water levels and wave action of the reservoir). The effects for three sites are unknown and six sites are not being affected by Project-related effects. All 34 sites that could be historic properties will be managed under the Historic Properties

Management Plan (HPMP) so that Project-related effects can be considered and/or resolved. Table 3.3.10-3 summarizes the 34 archaeological sites that are potential historic properties and identifies those that are or will be impacted by Project-related effects.

Table 3.3.10-3. Summary table of eligible or unevaluated archaeological sites identified within the APE.

Count	Site No. (Primary/ Trinomial/ Temp. No.)	Age	Type	Camp Far West Hydroelectric Project Related Effects (Y/N)	Type of Project Effects	Individual NRHP Eligibility
1	P-31-5744/ CA-PLA-1179/H/ SRI-CFW-3	M	P: Short-term Habitation H: Mining	Y	Fluctuating Water Levels	Eligible
2	HDR-CFWH-12	P	Short-Term Habitation	Y	Fluctuating Water Levels	Eligible
3	HDR-CFWH-28	P	Short-term Habitation	Y	Fluctuating Water Levels	Eligible
4	P-58-2883/2884/2886/2887/2888/2889 CA-YUB-1824/1825/1827/1828/1829/1830 HDR-CFWH-33	M	P: Long-Term Habitation H: Trash Scatter	Y	Fluctuating Water Levels; Recreation	P: Eligible H: Ineligible
5	HDR-CFWH-34	M	P: Short-Term Habitation H: Trash Scatter	Y	Fluctuating Water Levels	P: Unevaluated H: Ineligible
6	HDR-CFWH-36	M	P: Lithic Scatter H: Trash Scatter	Y	Fluctuating Water Levels; Recreation	P: Unevaluated H: Ineligible
7	P-58-1024/ CA-YUB-1006H	H	Trash Scatter	N	N/A	Unevaluated
8	P-58-1032/ CA-YUB-1014H	H	Mining	N	N/A	Unevaluated
9	HDR-CFWH-70	M	P: Milling Feature H: Habitation	N	N/A	Unevaluated
10	HDR-CFWH-07	P	Milling Feature	N	N/A	Unevaluated
11	HDR-CFWH-199	P	Milling Feature	N	N/A	Unevaluated
12	P-29-0543/ CA-NEV-485H	H	Mining	Unknown	Unknown	Unevaluated
13	P-29-4459/ CA-NEV-2190/ SRI-CFW-2	P	Long-Term Habitation	Unknown	Unknown	Unevaluated
14	P-58-1235/ CA-YUB-1216	P	Long-Term Habitation	Unknown	Unknown	Unevaluated
15	HDR-CFWH-14	H	Habitation	Y	Fluctuating Water Levels	Unevaluated
16	HDR-CFWH-25	H	Habitation	Y	Fluctuating Water Levels; Recreation	Unevaluated
17	HDR-CFWH-31	H	Habitation	Y	Fluctuating Water Levels	Unevaluated
18	HDR-CFWH-67	H	Habitation	Y	Recreation	Unevaluated
19	HDR-CFWH-32	M	P: Short-term Habitation H: Habitation	Y	Fluctuating Water Levels; Recreation	Unevaluated

Table 3.3.10-3. (continued)

Count	Site No. (Primary/ Trinomial/ Temp. No.)	Age	Type	Camp Far West Hydroelectric Project Related Effects (Y/N)	Type of Project Effects	Individual NRHP Eligibility
20	HDR-CFWH-42	M	P: Short-Term Habitation H: Trash Scatter	Y	Fluctuating Water Levels	Unevaluated
21	P-31-5749/ CA-PLA-1888/ SRI-CFW-8	M	P: Short-Term Habitation H: Habitation	Y	Fluctuating Water Levels	Unevaluated
22	P-58-2875/ CA-YUB-1816/ SRI-CFW-12	M	P: Short-Term Habitation H: Trash Scatter	Y	Fluctuating Water Levels	Unevaluated
23	HDR-CFWH-04	P	Milling Feature	Y	Fluctuating Water Levels	Unevaluated
24	HDR-CFWH-16	P	Milling Feature	Y	Fluctuating Water Levels	Unevaluated
25	HDR-CFWH-20	P	Short-Term Habitation	Y	Fluctuating Water Levels	Unevaluated
26	HDR-CFWH-29	P	Short-term Habitation	Y	Fluctuating Water Levels	Unevaluated
27	HDR-CFWH-30	P	Short-term Habitation	Y	Fluctuating Water Levels	Unevaluated
28	HDR-CFWH-40	P	Milling Feature	Y	Fluctuating Water Levels	Unevaluated
29	HDR-CFWH-43	P	Milling Feature	Y	Fluctuating Water Levels	Unevaluated
30	HDR-CFWH-44	P	Rock Art	Y	Fluctuating Water Levels	Unevaluated
31	HDR-CFWH-48	P	Milling Feature	N	N/A	Unevaluated
32	HDR-CFWH-55	P	Lithic Scatter	Y	Fluctuating Water Levels	Unevaluated
33	HDR-CFWH-60	P	Short-term Habitation	Y	Fluctuating Water Levels	Unevaluated
34	P-58-2885/ CA-YUB-1826/ SRI-CFW-22	P	Short-Term Habitation	Y	Fluctuating Water Levels	Unevaluated

In addition to the archaeological sites discussed above, the one archaeological district identified during SSWD's *Cultural Resources Study*, the Lower Bear River Prehistoric Archaeological District, is also being impacted by Project-related effects. This resource has been evaluated as eligible for inclusion in the NRHP, thus, pending SHPO concurrence on this eligibility determination, this resource will be considered a historic property, the management of which will follow the procedures outlined in the HPMP for considering and resolving adverse effects to historic properties.

All 11 of the built environment resources identified within the APE have been evaluated or determined ineligible for the NRHP. Thus, pending SHPO concurrence on those few built environment resources that still require SHPO concurrence, these resources will require no further consideration because they will not be historic properties.

3.3.10.2 Environmental Effects

This section discusses the potential resource effects of SSWD's proposed Project, as described in Section 2.2 of this Exhibit E. As part of the Project relicensing, SSWD proposes a Pool Raise modifications of existing recreation facilities, and modification of the existing Project boundary. SSWD proposes to include in the new license one measure related to cultural resources, implementation of the HPMP. The purpose of an HPMP is to outline actions and processes to manage historic properties within the APE under the new license. It is intended to serve as a guide for the SSWD when performing necessary O&M activities and identify resource treatments designed to address potential ongoing and future effects to historic properties. Resource-specific management measures included in the HPMP for treatment of historic properties include avoidance and monitoring, NRHP evaluation efforts, and mitigation measures for resolving adverse effects. An HPMP also describes a process of consultation with appropriate state and federal agencies, as well as with Native Americans who may have interests in historic properties within the APE. Following the *Guidelines for the Development of Historic Properties Management Plans for FERC Hydroelectric Projects* issued by FERC and ACHP in 2002 (ACHP and FERC 2002), the HPMP includes: management measures; training for all O&M staff; routine monitoring of known cultural resources, and periodic review and revision of the HPMP.

Continued O&M of the Project and/or changes to the Project as proposed under the relicensing efforts may affect cultural resources that are listed on or eligible for listing on the NRHP (i.e., historic properties). The effect may be direct (e.g., result of ground disturbing activities), indirect (e.g., public access to recreation areas), or cumulative (e.g., caused by a Project activity in combination with other non-Project activities).

Adverse effects are activities that may alter those characteristics of an historic property that contribute to its NRHP eligibility in a manner diminishing the integrity of the property's location, design, setting, materials, workmanship, feeling, or association. Examples of adverse effects would include road maintenance that affects a previously undisturbed archaeological deposit, or a facilities upgrade that removes the windows or doors of an historic powerhouse and does not replace them in kind, with new windows and doors of a similar style and material. There are a number of such Project activities that could potentially affect historic properties within the APE, including use and Project maintenance of Project facilities and roads, maintenance to historic buildings or other structures, vegetation management activities, recreational site use, issuance of grazing leases, emergency actions, looting/vandalism, and erosion caused by wave action and fluctuating water levels of the reservoir. In addition, certain kinds of Project-related activities may not have a direct impact on historic properties, but may create the conditions by which damage occurs. For example, a Project road may not directly impact historic properties, but may enable public access to areas that contain historic properties.

By contrast, there are Project activities that may not have an adverse effect on historic properties and there may also be historic properties within the APE that are not subject to Project activities. For example, the continued use of a paved access road that is closed to the public and travels through an historic property that is an archaeological site, would likely not be considered an adverse effect. As well, a historic property comprised of a recreation facility would likely not be adversely affected by continued use and maintenance of the facility, if the facility is used as it has been in the past and any maintenance activities maintain the existing integrity of the facility. Furthermore, there may be historic properties located within the APE that are substantially above the NMWSE of the Camp Far West Reservoir and nowhere near any other Project facility or within the vicinity of Project activities. Subsequently, Project activities may not adversely affect these historic properties.

The following three sections describe in more detail how SSWD's proposed Project, as described in Section 2.2 of this Exhibit E, may affect historic properties. The section that follows provides the schedule for developing the final HPMP, which will be used to manage and consider effects to historic properties under SSWD's proposed Project.

3.3.10.2.1 Effects of FERC Project Boundary Changes

In addition to the construction-related activities and the O&M activities discussed below, SSWD is proposing several changes to the existing FERC Project Boundary, including both additions and deletions to the boundary (all privately owned lands). As described below, these FERC Project Boundary changes will have no adverse effect to cultural resources that are historic properties or potential historic properties.

Of the additions to the FERC Project Boundary, all but roughly 18 ac of land were already included in the APE and were considered during the *Cultural Resources Study*. The roughly 18 ac that were not included in the APE will be inventoried for cultural resources under the HPMP when the new license is issued. If any historic properties or potential historic properties are identified, they will be managed according to the protocols that will be outlined in the HPMP for treatment of historic properties.

For the lands being removed from the FERC Project Boundary, this will only affect two sites (P-58-1024 and HDR-CFWH-67). Site P-58-1024 was previously recorded in 1979 as a possible homestead site dating to c. 1890-1910. It was previously described as containing a refuse scatter and possible canal segment. This site was not relocated during the *Cultural Resources Study* and is assumed to have been destroyed by either road improvements/maintenance for the adjacent Camp Far West Road, or was simply miss-mapped and is not located within the APE. As this site appears to either no longer exist and/or not be within the APE, the removal of its previously mapped location from the FERC Project Boundary will have no affect on this archaeological site.

Site HDR-CFWH-67 was newly identified and recorded during the *Cultural Resources Study*. It is a historical site consisting of six features and a general scatter of historic refuse across the site. The six features are comprised of two rock foundations, two depressions, and two rock or dirt piles. Site may be related to "Grahams Hotel" or "Store" which appears on mid to late 1800s historical maps of the area. The boundary removal will only remove a small portion of this site from the FERC Project Boundary. As such, this site will still be within the FERC Project Boundary and will be managed under the HPMP.

3.3.10.2.2 Effects of Construction-Related Activities

SSWD's proposed Project, as described in Section 2.2 of this Exhibit E, includes two construction-related activities: 1) the Pool Raise and 2) proposed changes to the recreational facilities. Ground disturbing activities and impacts to the viewscape as a result of these construction-related activities has the potential to adversely affect historic properties in the area where these activities are taking place. As described in Section 3.3.10.1.2, there are only 34 archaeological sites and one prehistoric archaeological district that have been identified during the *Cultural Resources Study* as potential historic properties. Of these 35 resources, five of the archaeological sites (see Table 3.3.10-4) and the prehistoric archaeological district would be adversely affected by the construction-related activities (i.e., the Pool Raise only). The effect would be a direct effect caused by ground disturbing activities and/or erosion from fluctuating water levels once the reservoir pool level is raised. These effects will be considered and resolved, as appropriate, through the implementation of the HPMP.

Table 3.3.10-4. Summary table of eligible or unevaluated archaeological sites identified within the APE.

Count	Site No. (Primary/Trinomial/Temp. No.)	Age	Type	Individual NRHP Eligibility
1	P-31-5744/ CA-PLA-1179/H/ SRI-CFW-3	M	P: Short-term Habitation H: Mining	Eligible
2	P-58-2883/2884/2886/2887/2888/2889 CA-YUB-1824/1825/1827/1828/1829/1830 HDR-CFWH-33	M	P: Long-Term Habitation H: Trash Scatter	P: Eligible H: Ineligible
3	P-58-2875/ CA-YUB-1816/ SRI-CFW-12	M	P: Short-Term Habitation H: Trash Scatter	Unevaluated
4	HDR-CFWH-48	P	Milling Feature	Unevaluated
5	P-58-2885/ CA-YUB-1826/ SRI-CFW-22	P	Short-Term Habitation	Unevaluated

3.3.10.2.3 Effects of Proposed Project Operations and Maintenance

SSWD's proposed Project, as described in Section 2.2 of this Exhibit E, includes continued O&M of the Project. O&M activities that have the potential to adversely affect historic properties include routine operation and maintenance of buildings and structures, reservoir inundation and fluctuations, vegetation management, road maintenance, recreation, looting and vandalism, and activities related to emergency repairs. The effects could be direct, indirect, or cumulative. The on-going Project O&M affects to cultural resources that are historic properties or potential historic properties are identified in Section 3.3.10.1.2. These effects will be considered and resolved, as appropriate, through the implementation of the HPMP.

3.3.10.2.4 Schedule for Final HPMP Development

As described above, the *Cultural Resources Study* has identified potential historic properties within the APE that are being or will be adversely affected by Project-related activities. As well, additional such resources could be identified in the future and could be potentially affected by the Project. Accordingly, SSWD is developing an HPMP in consultation with Native American tribes and SHPO to manage potential effects on historic properties throughout the term of any new license. FERC typically completes Section 106 by entering into a Programmatic Agreement (PA) or Memorandum of Agreement (MOA) with the licensee, the Advisory Council on Historic Preservation (ACHP), if it chooses to participate, and the SHPO that requires the licensee to develop and implement an HPMP. Additionally, FERC requires the licensee to consult with various federal, state, tribal, and non-government parties in the development of any HPMP.

SSWD anticipates the following schedule for completion of the final HPMP (all dates provided are for 2019):

- February 15 submit draft HPMP to Native American tribes for 30-day review
- April 1 submit draft HPMP to SHPO for 30-day review and concurrence
- May 17 resubmit HPMP to SHPO for 30-day review and concurrence, assuming SHPO provides comments at the end of the first review period
- June 30 include final HPMP in the final Application for New License to be filed with FERC

3.3.10.3 Unavoidable Adverse Effects

In compliance with Section 106, and as described above, the Project as proposed will unavoidably adversely affect cultural resources that are historic properties. However, implementation of the HPMP, which, once finalized, will include treatment measures for managing historic properties under the new FERC license, will resolve these adverse effects.

3.3.11 Tribal Interests

The discussion of tribal interests is divided into three sections. The affected environment (environmental baseline) is discussed in Section 3.3.11.1, environmental effects of the Project are discussed in Section 3.3.11.2, and unavoidable adverse effects are addressed in Section 3.3.11.3.

Existing, relevant, and reasonably available information was not sufficient to determine the potential effects of the Project on tribal interests so SSWD conducted one study; Study 11-1, *Tribal Interests Study*.

3.3.11.1 Affected Environment

Relicensing the Project with FERC is considered to be a federal undertaking, subject to compliance with Section 106 of the NHPA of 1966 (Section 106), as amended, and its implementing regulations at 36 C.F.R. Part 800. Section 106 requires federal agencies to take into account the effects of their undertakings on historic properties. On May 13, 2016, FERC designated SSWD as its non-federal representative for purposes of consultation under Section 106 in accordance with 36 C.F.R. 800.2(c)(4). SSWD contracted HDR to oversee and manage the *Tribal Interests Study* to assist FERC in identifying and assessing Project-related effects to historic properties, pursuant to meeting its Section 106 compliance requirements and Albion Environmental, Inc. (Albion) to implement the *Tribal Interests Study*.

The *Tribal Interests Study* was conducted to investigate, describe, and evaluate areas of tribal interest, including Traditional Cultural Properties (TCPs),[1] Indian Trust Assets (ITAs),[2] and tribal agreements[3] as potential historic properties in the Project relicensing APE. The California State Historic Preservation Officer (SHPO) agreed with the delineation of the Project relicensing APE in a letter dated September 2, 2016 (SHPO Reference Number: FERC_2016_0701_001). A separate study (Study 10-1, *Cultural Resources Study*) was conducted to investigate other cultural resource types (i.e., archaeological and built environment resources) as potential historic properties and is discussed in Section 3.3.10.

The *Tribal Interests Study* report, provided in Attachment 3.3.11A, documents the study efforts and findings. The *Tribal Interests Study* report includes a public version that summarizes the methods and results of the *Tribal Interests Study* and includes, as an attachment, a non-public version that presents the complete methods and results of the *Tribal Interests Study*. The public version of the report has been made available to the public as part of this Application for New

[1] A TCP is a property "that is eligible for inclusion in the National Register [NRHP] 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" (Parker and King 1998:1).

[2] ITAs are legal interests in property held in trust by the United States (U.S.) for Indian tribes or individual Native Americans. The U.S. Secretary of the Interior, acting as the trustee, holds many assets in trust. ITAs can be real property, physical assets, or intangible property rights. Examples of ITAs are lands, including reservations and public domain allotments; mineral or water rights; hunting and fishing rights; other natural resources; and money or claims.

[3] Agreements that are considered tribal interests consist of contracts between a tribe and private land owner or land-managing agency that provide tribes with access to a landowner or agency's property for fishing, gathering of traditional plants, or other tribal practices.

License. The non-public version is confidential/Privileged and will only be made available to potentially-affected Native American tribes, FERC, SHPO, and the North Central Information Center (NCIC). The *Tribal Interests Study* report, including the confidential/Privileged version, was submitted to potentially-affected Native American tribes on August 11, 2018. United Auburn Indian Community (UAIC) contacted SSWD with concerns regarding the *Tribal Interests Study* report findings on August 30, 2018. No other tribes commented or responded to the report submittal. SSWD is currently working with UAIC to address their concerns, after which the report will be submitted to the SHPO for review and concurrence and then filed with FERC and the NCIC. SSWD expects the final Study report to be filed with FERC on or before February 22, 2019.

The *Tribal Interests Study* was initiated with a "kick-off" meeting held on June 29, 2016. SSWD invited Native American tribes, SHPO, and FERC to participate. Attendees included HDR and Albion, on behalf of SSWD, FERC, a SHPO representative, UAIC representatives, and representatives of the Nevada City Rancheria. The *Tribal Interests Study* Plan, prepared by SSWD and included in the PAD filed with FERC, was reviewed at the meeting.[4] The plan outlines the steps for implementing and completing the *Tribal Interests Study*. The Albion research team was also introduced at that meeting.

Following the kick-off meeting, Albion sent follow-up emails and made phone calls in September and October 2016 to determine interest in *Tribal Interests Study* participation. Three tribal groups, UAIC, Nevada City Rancheria, and the Colfax-Todds Valley Consolidated Tribe, chose to participate in the *Tribal Interests Study*. Albion conducted several one-on-one and group interviews with tribal respondents in 2017. To supplement respondent interviews and provide background information on tribal interests in the Project APE, Albion ethnographers conducted extensive archival research, focusing on the notes and manuscripts of pioneering ethnographers, who worked with the Native American communities in the Project area early in the Twentieth Century, and on ethnohistoric accounts of Native Americans in the area during the time of contact.

The extensive archival research and interviews conducted for the *Tribal Interests Study* identified no tribal interests (i.e., TCPs, ITAs, or tribal agreements) within the Project APE. Although no tribal interests were identified, tribal interviews revealed a general concern about the treatment and preservation of archaeological sites and other cultural resources important to the tribal groups. All respondents wish to be included in the long-term preservation of these places. Moreover, many of the respondents wish to connect or reconnect to the spiritual power inherent in the APE and Project Area, values that they believe have not been diminished by historical events or the construction of the Project.

There is always the possibility that new evidence of properties that fit the criteria of a TCP or other tribal interest may come to light. This may come through new archival sources containing location-specific information about traditional places or through oral testimony from someone who has not come forward during the initial investigation. Regular communications with tribal members and open lines of dialogue is essential for the long-term management of cultural

[4] The *Tribal Interests Study* Plan was modified slightly after the kick-off meeting and re-filed with FERC in January 2017 (none of the steps outlined in the plan for implementing the study changed).

resources. The future management of the cultural resources within the Project APE should include continued involvement of the interested Native communities that value the area.

3.3.11.2 Environmental Effects

This section discusses the potential resource effects of SSWD's proposed Project, as described in Section 2.2 of this Exhibit E. As part of the Project relicensing, SSWD proposes a Pool Raise of 5 feet, modifications of existing recreation facilities, and modification of the existing Project boundary. SSWD proposes to include in the new license one measure related to tribal interests, implementation of the HPMP. The purpose of an HPMP is to outline actions and processes to manage historic properties within the APE under the new license. It is intended to serve as a guide for the licensee's operating personnel when performing necessary O&M activities and identify resource treatments designed to address potential ongoing and future effects to historic properties. Resource-specific management measures included in the HPMP for treatment of historic properties include avoidance and monitoring, NRHP evaluation efforts, and mitigation measures for resolving adverse effects. An HPMP should also describe a process of consultation with appropriate state and federal agencies, as well as with Native Americans who may have interests in historic properties within the APE. Following the *Guidelines for the Development of Historic Properties Management Plans for FERC Hydroelectric Projects* issued by FERC and ACHP in 2002 (ACHP and FERC 2002), an HPMP should include: management measures; training for all O&M staff; routine monitoring of known cultural resources, and periodic review and revision of the HPMP.

Continued operation and maintenance (O&M) of the Project and/or proposed changes to the Project may affect tribal interests that are listed on or eligible for listing on the NRHP (i.e., historic properties). The effect may be direct (e.g., result of ground disturbing activities), indirect (e.g., public access to recreation areas), or cumulative (e.g., caused by a Project activity in combination with other non-Project activities).

Adverse effects are activities that may alter those characteristics of an historic property that contribute to its NRHP eligibility in a manner diminishing the integrity of the property's location, design, setting, materials, workmanship, feeling, or association. Examples of adverse effects would include road maintenance that affects a previously undisturbed archaeological deposit, or a facilities upgrade that removes the windows or doors of an historic powerhouse and does not replace them in kind, with new windows and doors of a similar style and material. There are a number of such activities that could potentially affect historic properties within the APE, including use and maintenance of Project facilities and roads, maintenance to historic buildings or other structures, vegetation management activities, recreational site use, issuance of grazing leases, emergency actions, looting/vandalism, and erosion caused by wave action and fluctuating water levels of the reservoir. In addition, certain kinds of Project-related activities may not have a direct impact on historic properties, but may create the conditions by which damage occurs. For example, a Project road may not directly impact historic properties, but may enable public access to areas that contain historic properties.

By contrast, there are Project activities that may not have an adverse effect on historic properties and there may also be historic properties within the APE that are not subject to Project activities. For example, the continued use of a paved access road that is closed to the public and travels through an historic property that is an archaeological site, will likely not be considered an adverse effect. As well, a historic property comprised of a recreation facility will likely not be adversely affected by continued use and maintenance of the facility, if the facility is used as it has been in the past and any maintenance activities maintain the existing integrity of the facility. Furthermore, there may be historic properties located within the APE that are substantially above the high waterline of the Camp Far West Reservoir and nowhere near any other Project facility or within the vicinity of Project activities. Subsequently, Project activities may not adversely affect these historic properties.

As there are currently no tribal interests identified within the APE that are historic properties or potential historic properties, SSWD's proposed Project, as described in Section 2.2 of this Exhibit E, will not effect any tribal interests that are historic properties or potential historic properties.

3.3.11.2.1 Schedule for Final HPMP Development

Though no tribal interests that are historic properties have been identified within the APE, such resources could be identified in the future (e.g., the tribes may offer new information, or new individuals that have pertinent information on tribal interests may come forward) and could be potentially affected by the Project. Accordingly, SSWD is developing a Historic Properties Management Plan (HPMP) in consultation with Native American tribes and SHPO to manage potential effects on historic properties throughout the term of any new license. FERC typically completes Section 106 by entering into a Programmatic Agreement (PA) or Memorandum of Agreement (MOA) with the licensee, the Advisory Council on Historic Preservation (ACHP), if it chooses to participate, and the SHPO that requires the licensee to develop and implement an HPMP. Additionally, FERC requires the licensee to consult with various federal, state, tribal, and non-government parties in the development of any HPMP.

SSWD anticipates the following schedule for completion of the final HPMP (all dates provided are for 2019):

- February 15 submit draft HPMP to Native American tribes for 30-day review;
- April 1 submit draft HPMP to SHPO for 30-day review and concurrence;
- May 17 resubmit HPMP to SHPO for 30-day review and concurrence, assuming SHPO provides comments at the end of the first review period;
- June 30 include final HPMP in the final Application for New License to be filed with FERC.

3.3.11.3 Unavoidable Adverse Effects

There are no unavoidable adverse effects to tribal interests. No tribal interests, including TCPs, ITAs, or tribal agreements occur in the APE. Therefore, no tribal interests that are historic properties have been identified within the APE and there are no unavoidable adverse impacts to such properties.

3.3.11.4 List of Attachments

Attachment 3.3.11A Tribal Interests Study Report

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Attachment 3.3.11A

Tribal Interests Study Report

TRIBAL INTERESTS STUDY FOR THE CAMP FAR WEST HYDROELECTRIC PROJECT FERC PROJECT NO. 2997 NEVADA, PLACER AND YUBA COUNTIES, CALIFORNIA

SECURITY LEVEL: PUBLIC

Prepared for
South Sutter Water District
2464 Pacific Avenue
Trowbridge, CA 95659

July 2018

TRIBAL INTERESTS STUDY FOR THE CAMP FAR WEST HYDROELECTRIC PROJECT NEVADA, PLACER AND YUBA COUNTIES, CALIFORNIA (FERC No. 2997)

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Key Words: Federal Energy Regulatory Commission, Section 106, Historic Properties, Traditional Cultural Properties, Indian Trust Assets, National Register of Historic Places, Camp Far West Hydroelectric Project, Nevada County, Placer County, Yuba County. 7.5' Topographic Quadrangles (California): Camp Far West 1995, Wolf 1995.

MANAGEMENT SUMMARY

South Sutter Water District (SSWD) is the existing licensee and current owner and operator of the 6.8 megawatt (MW) Camp Far West Hydroelectric Project (the Project) located on the Bear River in Nevada, Placer, and Yuba counties, California. The current Federal Energy Regulatory Commission (FERC) license for the Project (FERC No. 2997) was issued to SSWD by FERC with an effective date of July 1, 1981 for a period of 40 years. SSWD began the relicensing process by filing a Pre-Application Document (PAD) and a Notice of Intent with FERC in March 2016.

Relicensing the Project with FERC is considered to be a federal undertaking, subject to compliance with Section 106 of the National Historic Preservation Act (NHPA) of 1966 (Section 106), as amended, and its implementing regulations at 36 Code of Federal Regulation (CFR) Part 800. Section 106 requires federal agencies to take into account the effects of their undertakings on historic properties. On May 13, 2016, FERC designated SSWD as its non-federal representative for purposes of consultation under Section 106 in accordance with 36 CFR 800.2(c)(4). SSWD subsequently contracted HDR, Inc. (HDR) to oversee and manage a Tribal Interests Study (Study) to assist FERC in identifying and assessing Project-related effects to historic properties, pursuant to meeting its Section 106 compliance requirements. HDR contracted Albion Environmental, Inc. (Albion) to implement the Study.

The Study was conducted to investigate, describe, and evaluate areas of tribal interest, including Traditional Cultural Properties (TCPs) and Indian Trust Assets (ITAs), as potential historic properties in the Project relicensing Area of Potential Effects (APE). The California State Historic Preservation Officer (SHPO) agreed with the delineation of the Project relicensing APE in a letter dated September 2, 2016 (SHPO Reference #: FERC_2016_0701_001). It is anticipated that the findings of the Study will be incorporated into a Historic Properties Management Plan prepared to manage and consider historic properties throughout the life of the new license to be issued by FERC for the Project. A separate study (the Cultural Resources Study) was conducted to investigate other cultural resource types (archaeological and built environment resources) as potential historic properties and is reported on in a separate document.

The present report summarizes the methods and results of the Study and includes, as an attachment, the Study report prepared by Albion that presents the complete methods and results of the Study. This summary report, excluding Albion's Study report, will be made available to the public. Albion's Study report is confidential/Privileged and will only be made available to potentially affected Native American tribes, FERC, SHPO, and the North Central Information Center (NCIC).

The Study was initiated with Study "kick-off" meeting held on June 29, 2016. Native American tribes, SHPO, FERC, HDR, and Albion were invited to participate. Attendees included HDR, on behalf of SSWD, Albion, FERC, a SHPO representative, UAIC representatives, and representatives of the Nevada City Rancheria. The Tribal Interests Study Plan (Study Plan), prepared by SSWD and included in the PAD filed with FERC, was reviewed at the meeting. The

Study Plan outlines the steps for implementing and completing the Study. The Albion research team was also introduced at that meeting.

Following the kick-off meeting, Albion sent follow-up emails and made phone calls in September and October 2016 to determine interest in Study participation. Three tribal groups, UAIC, Nevada City Rancheria, and the Colfax-Todds Valley Consolidated Tribe, chose to participate in the Study. Albion conducted several one-on-one and group interviews with tribal respondents in 2017. To supplement respondent interviews and provide background information on tribal interests in the Project APE, Albion ethnographers conducted extensive archival research, focusing on the notes and manuscripts of pioneering ethnographers, who worked with the Native American communities in the Project area early in the twentieth century, and on ethnohistoric accounts of Native Americans in the area during the time of contact.

The extensive archival research and interviews conducted for the Study identified no tribal interests (i.e., TCPs, ITAs, or tribal agreements) within the Project APE. Though no tribal interests were identified, tribal interviews did revealed a general concern about the treatment and preservation of archaeological sites and other cultural resources important to the tribal groups. All respondents wish to be included in the long-term preservation of these places. Moreover, many of the respondents wish to connect or reconnect to the spiritual power inherent in the APE and Project area, values that they believe have not been diminished by historical events or the construction of the Project.

There is always the possibility that new evidence of properties that fit the criteria of a TCP or other tribal interest may come to light. This may come through new archival sources containing location-specific information about traditional places or through oral testimony from someone who has not come forward during this investigation. Regular communications with tribal members and open lines of dialogue is essential for the long-term management of cultural resources. The future management of the cultural resources within the Project APE should include continued involvement of the interested Native communities that value the area.

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1.0 INTRODUCTION

The South Sutter Water District (SSWD) is the existing licensee and current owner and operator of the 6.8 megawatt (MW) Camp Far West Hydroelectric Project (the Project) located on the Bear River in Nevada, Placer, and Yuba counties, California (Figure 1-1). The current Federal Energy Regulatory Commission (FERC) license for the Project (FERC No. 2997) was issued to SSWD by FERC with an effective date of July 1, 1981 for a period of 40 years. SSWD began the relicensing process by filing a Pre-Application Document (PAD) and a Notice of Intent with FERC in March 2016.

Relicensing the Project with FERC is considered to be a federal undertaking, subject to compliance with Section 106 of the National Historic Preservation Act (NHPA) of 1966 (Section 106), as amended, and its implementing regulations at 36 Code of Federal Regulation (CFR) Part 800. Section 106 requires federal agencies to take into account the effects of their undertakings on historic properties. Historic properties are any prehistoric or historic district, site, building, structure, or object included in or eligible for inclusion in the National Register of Historic Places (NRHP). SSWD's continued operation and maintenance (O&M) of the Project, and any Project facility modifications or construction activities, conducted under the new FERC license may affect historic properties. The effect may be direct (e.g., result of ground disturbing activities), indirect (e.g., public access to recreation areas), or cumulative (e.g., caused by a Project activity in combination with other non-Project activities).

On May 13, 2016, FERC designated SSWD as its non-federal representative for purposes of consultation under Section 106 in accordance with 36 CFR 800.2(c)(4). SSWD subsequently contracted HDR, Inc. (HDR) to oversee and manage a Tribal Interests Study (Study) to assist FERC in identifying and assessing Project-related effects to historic properties, pursuant to meeting its Section 106 compliance requirements. HDR contracted Albion Environmental, Inc. (Albion) to implement the Study. The Study was conducted to investigate, describe, and evaluate areas of tribal interest, including Traditional Cultural Properties (TCPs), Indian Trust Assets (ITAs), and agreements that may exist between tribes and other entities, as potential historic properties in the Project relicensing Area of Potential Effects (APE). The California State Historic Preservation Officer (SHPO) agreed with the delineation of the Project relicensing APE in a letter dated September 2, 2016 (SHPO Reference #: FERC_2016_0701_001). It is anticipated that the findings of the Study will be incorporated into a Historic Properties Management Plan prepared to manage and consider historic properties throughout the life of the new license to be issued by FERC for the Project. A separate study (the Cultural Resources Study) was conducted to investigate other cultural resource types (archaeological and built environment resources) as potential historic properties and is reported on in a separate document.

The present report summarizes the methods and results of the Study and includes, as an attachment (Attachment A), the Study report prepared by Albion that presents the complete methods and results of the Study. This summary report, excluding Albion's Study report, will be made available to the public. Albion's Study report is confidential/Privileged and will only be made available to potentially affected Native American tribes, FERC, SHPO, and the North Central Information Center (NCIC).

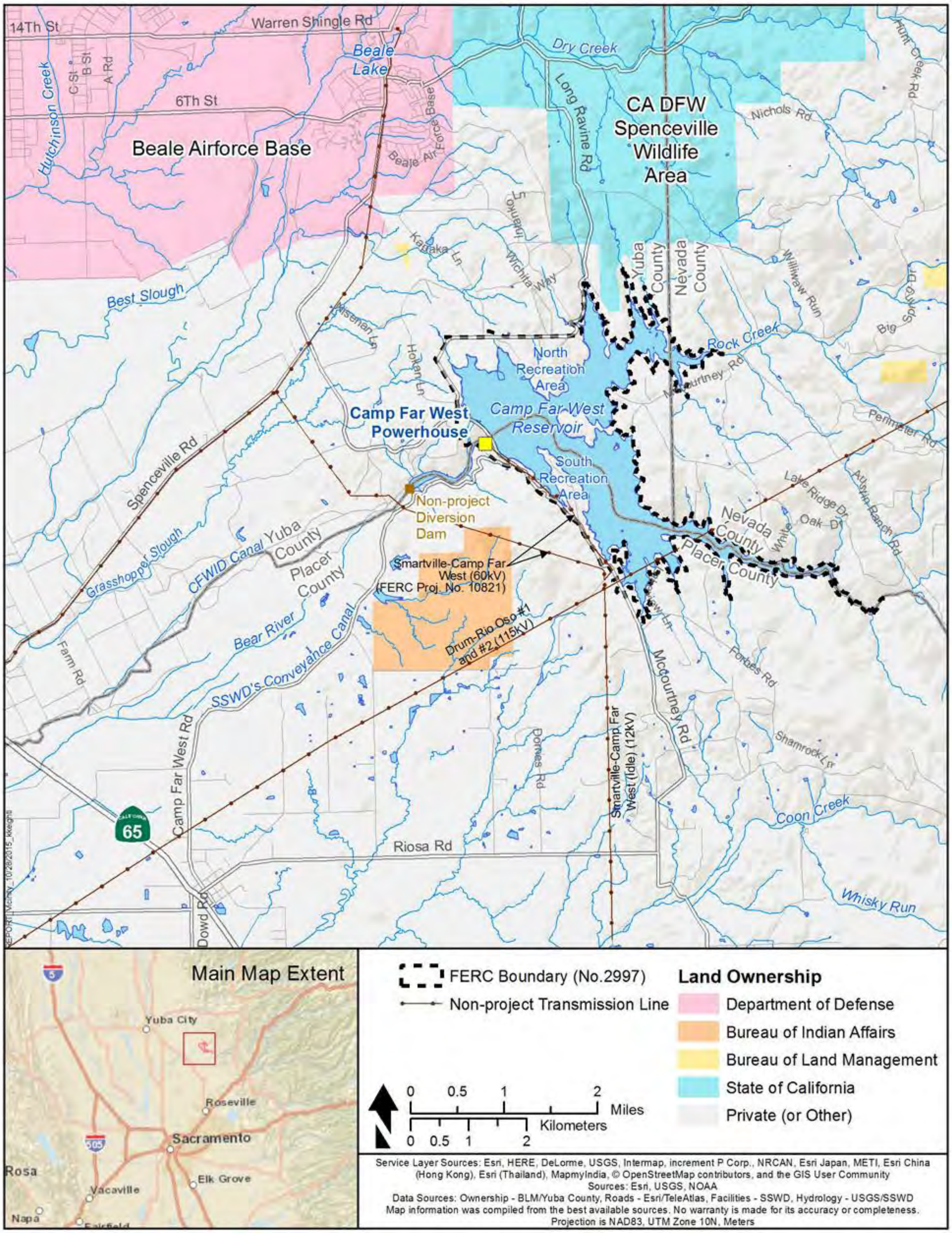

Figure 1-1. SSWD's Camp Far West Hydroelectric Project and Project Vicinity.

1.1 South Sutter Water District and the Camp Far West Hydroelectric Project

Established in 1954, SSWD, located in Trowbridge, California, is a State of California public agency formed under California Water District Law, California Water Code Section 34000 et seq. to develop, store, and distribute surface water supplies for irrigation uses in SSWD's service area. In addition, Section 34000 et seq. authorizes SSWD to develop hydroelectric power in connection with SSWD's projects. SSWD is governed by a Board of Directors, whose seven members are elected by landowners within SSWD's service area. SSWD's service area encompasses a total gross area of 63,972 acres, of which 6,960 acres are excluded, for a net area of 57,012 acres. Approximately 40,107 acres are located in Sutter County and 16,905 acres are in Placer County. In a typical non-drought year, over 35,500 acres within SSWD's service area are under irrigation, with approximately 29,110 acres (82 percent) in rice production, 3,905 acres (11 percent) in orchards, 2,130 acres (6 percent) in irrigated pastures, and 355 acres (1 percent) in miscellaneous row and field crops.

The Project ranges in elevation from 150 feet to 320 feet. The Project includes a single development whose principal facilities and features consist of: the 170-foot high Camp Far West Dam; the 93,740 acre-foot Camp Far West Reservoir; the 6.8 MW Camp Far West Powerhouse at the base of the Camp Far West Dam; and two recreation areas on the shoreline of Camp Far West Reservoir.

The existing FERC Project boundary (see Figure 1.1) includes 2,863.7 acres of land. SSWD owns over 95 percent (2,710.5 acres) of the land within the boundary, and the remaining 5 percent (153.2 acres) of land is owned by private parties; no federal or state land occurs within or adjacent to the FERC Project boundary or on the Bear River downstream of the Project. The Project does not include any open-water conveyance facilities, transmission lines[1], or active borrow or spoil areas. SSWD proposes two changes to existing Project facilities to be completed under the new FERC license: 1) raising the normal maximum water surface elevation (NMWSE) of Camp Far West Reservoir by 5 feet from an elevation of 300 feet to an elevation of 305 feet (pool raise); and 2) modifying Project recreation facilities at Camp Far West Reservoir. In addition, SSWD proposes to modify the existing FERC Project boundary. The effects of these activities, along with regular O&M activities, will be considered for any identified or potential (i.e., cultural resources unevaluated for the National Register) historic properties.

1.2 Tribal Interests

This Study focuses on tribal interests, including ITAs, TCPs, and tribal agreements. ITAs are legal interests in property held in trust by the United States (U.S.) for Indian tribes or individual Native Americans. The U.S. Secretary of the Interior, acting as the trustee, holds many assets in trust. ITAs can be real property, physical assets, or intangible property rights. Examples of ITAs are lands, including reservations and public domain allotments; mineral or water rights;

[1] The original license for the Project included a short 60 kilovolt transmission line. However, on April 2, 1991 the transmission line was removed from the Project FERC license and added to Pacific Gas and Electric Company's Camp Far West Transmission Line project (FERC Project No. 10821).

hunting and fishing rights; other natural resources; and money or claims. While most ITAs are on reservations, they may also be found off-reservation. A characteristic of an ITA is that it cannot be sold, leased, or otherwise alienated without the U.S. government's approval. ITAs do not include things in which a tribe or individuals have no legal interest. For example, off-reservation sacred lands or archaeological sites in which a tribe has no legal interest are not ITAs.

TCPs are explained and defined in Parker and King (1998:1) as follows:

> One kind of cultural significance a property may possess, and that may make it eligible for inclusion in the [National] Register, is traditional cultural significance. "Traditional" in this context refers to those beliefs, customs, and practices of a living community of people that have been passed down through the generations, usually orally or through practice. The traditional cultural significance of a historic property, then, is significance derived from the role the property plays in a community's historically rooted beliefs, customs, and practices. Examples of properties possessing such significance include:
>
> - a location associated with the traditional beliefs of a Native American group about its origins, its cultural history, or the nature of the world;
> - a rural community whose organization, buildings and structures, or patterns of land use reflect the cultural traditions valued by its long-term residents;
> - an urban neighborhood that is the traditional home of a particular cultural group, and that reflects its beliefs and practices;
> - a location where Native American religious practitioners have historically gone, and are known or thought to go today, to perform ceremonial activities in accordance with traditional cultural rules of practice; and
> - a location where a community has traditionally carried out economic, artistic, or other cultural practices important in maintaining its historic identity.
>
> A traditional cultural property, then, can be defined generally as one that is eligible for inclusion in the National Register 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.

Agreements that are considered tribal interests consist of contracts between a tribe and private land owner or land-managing agency that provide tribes with access to a landowner or agency's property for fishing, gathering of traditional plants, or other tribal practices.

1.3 Regulatory Context

Section 106 requires FERC to take into account the effects of its undertakings on historic properties. ITAs, TCPs, and agreements that may exist between tribes and other entities, all have the potential to be a historic property. The relicensing of the Project is considered a federal undertaking (36 CFR 800.16[y]) and therefore must comply with Section 106. Pursuant to the applicable regulations found at 36 CFR 800.16, an undertaking is defined as a project, activity, or program funded in whole or in part under the direct or indirect jurisdiction of a federal agency, including those requiring a federal permit, license or approval. In this case, the undertaking is FERC's issuance of a new license for the Project. Potential effects that may be associated with this undertaking include any Project-related effects associated with continued O&M of the Project, and any Project facility modifications or construction activities, conducted under the new FERC license.

Because it is not possible to determine all of the effects of various activities that may occur over the course of a license, FERC typically completes Section 106 by entering into a Programmatic Agreement (PA) or Memorandum of Agreement (MOA) with SHPO and the Advisory Council on Historic Preservation (ACHP), if they choose to participate, that requires the licensee to develop and implement a Historic Properties Management Plan (HPMP). SSWD plans to develop a HPMP in consultation with Section 106 consulting parties, including tribes and the SHPO, to manage potential effects on historic properties throughout the term of the new license issued by FERC. Accordingly, SSWD will use the data gathered as part of this study to prepare and submit a draft HPMP to Tribes and agencies for review and to SHPO for review and concurrence.

In addition to the NHPA, other laws, regulations, and executive orders that the Project also must comply with, as applicable, include: the National Environmental Policy Act (42 U.S.C. 4231); Executive Order 13175 (Consultation and Coordination with Indian Tribal Governments) of 2000; California Environmental Quality Act of 1970, as amended, (CEQA; California Public Resources Code [CPRC] 21000) and State CEQA Guidelines (CCR 15000); and California Health and Safety Code [CH&SC] 7050.5, 7051, and 7054.

1.4 Study Goals and Objectives

The goal of the Study was to determine if relicensing of the Project and continued Project O&M, along with other Project activities proposed under the new license, will affect tribal interests. The objective of the Study was to gather the information necessary to meet the Study goal by filling gaps in the existing data using field and research methods to identify tribal interests, evaluate their eligibility to the NRHP, and identify Project-related activities that may affect those interests within the Project's APE. Subsequently, the ultimate purpose of the Study is to assist FERC in identifying and assessing Project-related effects to historic properties, pursuant to meeting its Section 106 compliance requirements.

SSWD, as part of the FERC relicensing efforts for the Project, prepared a Tribal Interests Study Plan (Study Plan; Study 11.1), which is included as an attachment to the Study report provided in Attachment A. The Study Plan was included in the PAD filed with FERC in 2016. Following a comment period and public meetings held with concerned stakeholders, the Study Plan was revised and filed with FERC on January 9, 2017. The Study Plan outlines the steps for implementing and completing the Study.

1.5 Area of Potential Effects

The area investigated to accomplish the Study is the APE. As defined in the applicable regulations found at 36 CFR 800.16(d), the APE is "...the geographic area or areas within which an undertaking may directly or indirectly cause changes in the character or use of historical properties, if any such properties exist." The APE for the Project has been defined so as to incorporate all potential direct and indirect impacts that might occur during the Project's O&M. Much of the APE can be described as all lands within in the FERC boundary (2,863.7 ac), and generally follows the 320 foot elevation contour around Camp Far West Reservoir with the exception of the additional lands included at the northwest end of the reservoir that include the North Shore Recreation Area (NSRA) and lands included at the southwest end of the reservoir that include the South Shore Recreation Area (SSRA). There are two areas where the APE extends beyond the FERC boundary; adjacent to the Camp Far West Powerhouse, where the powerhouse access road extends slightly outside of the FERC boundary, and at the northeast edge of the NSRA, where a campground road extends slightly outside the FERC boundary. A map of the APE is provided in Attachment B. SHPO agreed with this APE in a letter dated September 2, 2016 (SHPO Reference #: FERC_2016_0701_001).

It is possible that studies implemented as part of the relicensing process may identify Project-related activities that have the potential to affect historic properties outside the original APE. It is also possible that during relicensing, Project improvements may be proposed that are outside the original APE. If such areas are identified, the APE will expand to address these other areas or activities.

1.6 Study Personnel and Report Organization

This summary report has been prepared by the following HDR personnel: Dawn Ramsey Ford, M.A., Danielle Risse, M.A., and Owen Ford, B.A. The summary report summarizes the findings of the Study report prepared by Albion and included in Attachment A. The Study report prepared by Albion was authored by Shelly Tiley, Ph.D. (of Tiley Research, under contract to Albion), Thomas Garlinghouse, Ph.D., and Clinton Blount, M.A. The cultural context presented in this summary report is excerpted from Albion's Study report.

This summary report is organized into five parts. Section 1.0 presents the introduction and includes a description of the Project, the Study, the regulatory context, the Study goals and objectives, the APE, and the report organization. Section 2.0 describes the methods used to implement the Study. Section 3.0 presents the results of the Study and describes the results of the archival research efforts, including presenting a condensed version of the cultural context that resulted from the Study, the tribal consultation efforts, site visits, and ultimately the results of the tribal interests identification and evaluation efforts. Section 4.0 discusses any variances that occurred from the Study Plan, and Section 5.0 presents the references cited. This summary report also includes, as attachments, Albion's Study report (Attachment A), the APE map (Attachment

B), and copies of California Native American Heritage Commission letters (NAHC) (Attachment C). As described above, Albion's Study report is confidential/Privileged and will only be made available to potentially affected Native American tribes, FERC, SHPO, and the NCIC.

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2.0 METHODS

The Study was conducted in conformance with the Study Plan (Study Plan 11.1) for the Camp Far West Hydroelectric Project relicensing that was filed with FERC on January 9, 2017. The Study was conducted with no variances from the Study Plan, except for one. As provided in the Study Plan, the schedule for completing the Study report was July 2017. However, a much larger amount of data was available in the ethnographic/ethnohistoric record than initially expected. As well, the number of Native American participants and subsequent coordination required to speak with these participants was also greater than expected. Both of these unexpected circumstances have resulted in additional time needed to process the data collected for this Study. Accordingly, the one variance to the Study Plan is a change in schedule for completion of the Study report. The Study report is now expected to be completed with and included in the DLA, which is due to be filed with FERC in December 2018.

The methods used to conduct this Study follow those presented in the Study Plan prepared for the Project relicensing and included as an attachment to the Study report included in Attachment A. To accomplish the goals and objective of the Study, as described in Section 1.0, archival research, consultation, evaluation, and reporting were undertaken in accordance with Section 106 and consistent with National Register Bulletin No. 38, *Guidelines for Evaluating and Documenting Identification of Traditional Cultural Properties* (Parker and King 1998).

The Study approach consisted of five steps: 1) archival research; 2) tribal consultation and identification of resources; 3) site visits; 4) identify and assess potential Project effects on tribal interests; and 5) reporting. The Study required hiring a qualified professional ethnographer who meets the standards for ethnography as defined in Appendix II of *National Register Bulletin No. 38* to: 1) assess potential tribal interests in the APE; 2) conduct interviews with knowledgeable tribal members; 3) organize field visits; and 4) incorporate the results of the ethnographic/ethnohistoric research, tribal interviews, and field visits into a technical report.

2.1 Archival Research

Under Step 1 of the Study Plan, archival research was to be conducted to augment existing data already presented in the PAD. Additionally, the archival research was conducted to help identify tribal interests and to evaluate them for the NRHP.

> For a property to qualify for the National Register it must meet one of the National Register Criteria for Evaluation by:
>
> - Being associated with an important historic context and
> - Retaining historic integrity of those features necessary to convey its significance (USDOI 2006:3).

And the significance of a historic property can only be determined when it is evaluated within its historic context.

> Historic contexts are those patterns or trends in history by which a specific occurrence, property, or site is understood and its meaning (and ultimately its significance) within history or prehistory is made clear (USDOI 2006:7).

In 2017, Dr. Shelly Tiley and Dr. Thomas Garlinghouse, of Tiley Research and Albion, conducted archival research at various repositories for additional information pertaining to the ethnohistory and ethnography of the Nisenan in and around the APE. This included the California State University, Sacramento Library; the California State Archives: the California State Library; the Bancroft Library at the University of California Berkeley; online resources of the Smithsonian Institution; the Yuba County Library; the California Room of the Marysville Library; and the Searls Library in Nevada City. The C. Hart Merriam ethnographic and ethnogeographic field notes were available online, as were the Smithsonian Institution's copies of John. P. Harrington's field notes. Newspaper articles from the 1850s and 1860s at the California State Library were also reviewed. In addition to these materials and repositories, other scholarly articles, manuscripts, and books available online and/or in the researchers' personal libraries, were also reviewed. A number of different sources were examined, including publications, manuscripts (published and unpublished), field notes, old maps, Mexican land grant maps (*disenos*) and photographs.

2.2 Tribal Consultation and Identification of Resources

Following archival research, Step 2 of the Study Plan required identifying potential tribal interests through extensive tribal consultation. As specified under 36 CFR 800.16(f): "*Consultation* means the process of seeking, discussing, and considering the views of other participants and where feasible, seeking agreement with them regarding matters arising in the section 106 process." Consultation and coordination throughout the entire Section 106 process conducted for FERC relicensing of the Project is a key objective for SSWD.

Section 106 requires that the lead federal agency responsible for complying with Section 106 seek concurrence from the SHPO on any determinations of NRHP eligibility and findings of effect to historic properties, and allow the ACHP an opportunity to comment on any finding of adverse effects. If Native American properties have been identified, Section 106 also requires that the lead federal agency also consult with interested Native American tribes that might attach religious or cultural significance to such properties (i.e., TCPs).

On May 13, 2016, FERC issued its *Notice of Intent to File License Application, Filing of Preapplication Document, Approving Use of the Traditional Licensing Process*. In this notice, FERC initiated the Section 106 process and designated SSWD as its non-federal representatives for purposes of consultation during relicensing under Section 106 of the NHPA. As FERC's non-federal representatives, SSWD has consulted throughout the relicensing effort with potentially affected tribes, and the SHPO, including seeking review and comment on the Study Plan and obtaining SHPO's concurrence on the APE.

In 2014, as part of PAD preparation, and again in 2018, SSWD contacted the NAHC to obtain a list of Native American tribes and tribal individuals who may have an interest in the Project relicensing, and for a list of sacred lands that may be within the APE. The NAHC replied to these requests on December 31, 2014 and on July 25, 2018, respectively. Table 2-1 lists all tribal representatives who have been identified by the NAHC. In its replies to SSWD, the NAHC did not identify any sacred lands that may be within the Project APE. Copies of the NAHC letters are provided in Attachment C.

Table 2-1. Tribes and tribal representatives identified by the NAHC who may have an interest in the Project.

Tribe	Tribal Representative
Colfax-Todds Valley Consolidated Tribe	Pamela Cubbler, Chairperson
	Judy Marks, Secretary
Tsi-Akim Maidu	Don Ryberg, Chairperson
	Eileen Moon, Vice Chairperson
	Grayson Coney, Cultural Director
United Auburn Indian Community of the Auburn Rancheria (UAIC)	Gene Whitehouse, Chairperson
	Matthew Moore (formerly Jason Camp), Tribal Historic Preservation Officer
	Marcos Guerrero, Cultural Resources Manager
Strawberry Valley Rancheria	Cathy Bishop, Chairperson

In addition, based on other recent activities at the Project, SSWD had reason to believe that the tribes and tribal individuals listed in Table 2-2 would also have knowledge of cultural resources and an interest in the relicensing.

Table 2-2. Additional tribes and tribal representatives who may have an interest in the Project.

Tribe	Tribal Representative
Enterprise Rancheria of Maidu Indians	Glenda Nelson, Chairperson
Mooretown Rancheria of Maidu Indians	Benjamin Clark (formerly Gary Archuleta), Chairperson
	Guy Taylor, Environmental Protection Officer
	Laura Winner, Executive Secretary
Nevada City Rancheria	Richard Johnson, Chairperson
	Shelly Covert, Secretary

On April 7, 2016, FERC initiated formal consultation with potentially affected tribes by sending letters to the following tribes: Enterprise Rancheria, Greenville Ranch Tribe of Maidu Indians, Mechoopda Indian Tribe of Chico Ranch, Mooretown Rancheria of Maidu Indians, Shingle Springs Rancheria, UAIC, and Washoe Tribe of Nevada and California. SSWD subsequently added Greenville Ranch Tribe of Maidu Indians (i.e., Greenville Rancheria), Mechoopda Indian Tribe of Chico Ranch, Shingle Springs Rancheria, and Washoe Tribe of Nevada and California to their list of tribal contacts for the relicensing. At FERC's request, the Colfax-Todds Valley Miwok-Maidu Cultural Foundation was also included in the list of tribal contacts.

Following the initial consultation efforts for the Project relicensing, a number of tribal groups deferred consultation to the other participating tribes. Those tribes that deferred consultation were Enterprise Rancheria, Mechoopda Indian Tribe of Chico Ranch, Shingle Springs Rancheria, and Washoe Tribe of Nevada and California. The final tribal consultation list for the Project relicensing, after those tribes that deferred were removed, is provided below in Table 2-3.

Table 2-3. Final tribal contact list for the Project relicensing compiled by SSWD.

Colfax-Todds Valley Consolidated Tribe		
Judy Marks	Secretary	1068 Silverton Circle Lincoln, CA 95648

Pamela Cubbler	Chairperson	PO Box 734 Auburn, CA 95604
Colfax-Todds Valley Miwok-Maidu Cultural Foundation		
Michelle Roper	Chairperson	PO Box 1490 Foresthill, CA 95631
Greenville Ranch Tribe of Maidu Indians		
Kyle Self	Chairperson	PO Box 279 140 Main St Greenville, CA 95947
Patty Allen	Tribal Administrator	PO Box 279 140 Main St Greenville, CA 95947
Mooretown Rancheria of Maidu Indians		
Benjamin Clark	Chairperson	#1 Alverda Drive Oroville, CA 95966
Nevada City Rancheria		
Richard Johnson	Chairperson	PO Box 574 Grass Valley, CA 95945
Shelly Covert	Secretary	641 S Auburn St Grass Valley, CA 95945
Tsi Akim Maidu		
Grayson Coney	Cultural Director	PO Box 1316 Colfax, CA 95713
Don Ryberg	Chairperson	11442 Butler Road Grass Valley, CA 95945
Eileen Moon	Vice Chairperson	PO Box 1246 Colfax, CA 95713
United Auburn Indian Community of the Auburn Rancheria (UAIC)		
Gene Whitehouse	Chairperson	10720 Indian Hill Road Auburn, CA 95603
Marcos Guerrero	Cultural Resources Manager	10720 Indian Hill Road Auburn, CA 95603
Matthew Moore	Tribal Historic Preservation Officer	10720 Indian Hill Road Auburn, CA 95603
Strawberry Valley Rancheria		
Cathy Bishop	Chairperson	P.O. Box 667 Marysville, CA, 95901

On behalf of SSWD, HDR retained Clinton Blount from Albion as a qualified, professional ethnographer, who meets the standards for ethnography as defined in Appendix II of *National Register Bulletin No. 38*, to implement the Study and complete the extensive tribal consultation required by the Study Plan. Clinton, in consultation with tribal representatives, determined the scope and breadth of interviews, and then contacted the appropriate tribe(s) and interested tribal/cultural stakeholders to arrange for interviews at a time and location acceptable to those tribal interviewees. Interviews with the ethnographer were conducted on a "one-on-one" basis and in groups. The oral traditions and information collected during the interviews were used to identify tribal interests, primarily TCPs, within the APE for the purpose of identifying historic properties (per 36 CFR§ 800.4) that need to be taken into account and managed by SSWD during the term of the new license, and to satisfy the Study purpose of assisting FERC in meeting its compliance requirements under Section 106.

Albion contacted those tribes on the final tribal contact list in September and October 2016 to determine interest in participating[2]. Several representatives did not respond, and two tribes, Greenville Rancheria and Mooretown Rancheria, verbally declined to participate. Ultimately,

[2] The Strawberry Valley Rancheria was not contacted in 2016 because they were not included on the initial NAHC contact list. Strawberry Valley Rancheria was only added as a tribal contact in 2018, after the second request to the NAHC was submitted and the NAHC responded with an updated list of potentially affected tribes that included the Strawberry Valley Rancheria. The Strawberry Valley Rancheria will be provided a copy of the Study report for review and comment, providing this group an opportunity to participate.

three tribal groups, UAIC, Nevada City Rancheria, and the Colfax-Todds Valley Consolidated Tribe, chose to participate in the Study.

Interviews began in May 2017. Seven interviews were conducted with individuals or groups of Native American participants to gain information on the APE and vicinity. Each of the respondents signed a release granting the one-time use of the interview materials for the purposes of the Study. The release contained provisions for review rights and protection of the respondent's name and likeness. Transcriptions of the interviews remain under the control of the individuals interviewed per the signed releases. Each of the respondents was compensated for their participation.

2.3 Site Visits

Step 3 of the Study Plan provided that the ethnographer would invite tribal interviewees or a physically capable tribal representative to visit cultural resource sites (i.e., locations containing artifacts, features, or other physical remains from past human activities) identified during the Study or during SSWD's Cultural Resources Study that focuses on identifying and evaluating archaeological and built environment resource as potential historic properties. The purpose of the visit would be to provide tribal representatives the opportunity to examine any sites of interest to the tribes that were encountered during the Cultural Resources Study, and to enable the ethnographer to obtain additional information on potential tribal interests that may be associated with the sites. If any tribal interest resources were identified during background research, SSWD would afford tribal representatives the opportunity to visit those locations as well. During or after the site visits, the interviewees and/or tribal representatives would have the opportunity to share with the ethnographer additional information regarding the resources.

UAIC tribal representatives and one independent Native American visited cultural resources site locations during the Study, when HDR archaeologists were completing a cultural resources inventory for the Cultural Resources Study; the ethnographer was not present during these visits. One on-site interview was also held with the ethnographer and one tribal participant, as discussed above, but there was no specific cultural resource site visited at that time. No other cultural resources sites or other locations at the Project APE were visited during the Study with tribal members.

2.4 Identify and Assess Effects on NRHP-Eligible Tribal Interests

As required under 36 CFR 800.5, SSWD will identify and assess, in consultation with the SHPO and potentially affected Native American tribes, any adverse effects resulting from the Project relicensing on tribal interests that are determined to be historic properties. Adverse effects are defined as follows:

> An adverse effect is found when an undertaking may alter, directly or indirectly, any of the characteristics of a historic property that qualify the property for inclusion in the National Register in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association. Consideration shall be given to all

qualifying characteristics of a historic property, including those that may have been identified subsequent to the original evaluation of the property's eligibility for the National Register. Adverse effects may include reasonably foreseeable effects caused by the undertaking that may occur later in time, be farther removed in distance or be cumulative (36 CFR 800.5[a][1]).

2.5 Reporting

Per Step 5 of the Study Plan, SSWD has prepared the current summary report based on the methods and results provided in Albion's Study report (Attachment A), that includes the following sections: 1) Study goals and objectives; 2) Methods; 3) Results of the Study; and 4) Variances from the Study Plan. This summary report excludes sensitive, confidential, and Privileged information for purposes of the public relicensing process.

The Study report (Attachment A) contains the sensitive, confidential, and Privileged information resulting from the Study. The Privileged report will be distributed to interested tribes for review and comment and to the SHPO for review and concurrence as part of the Section 106 consultation process. The final Study report will be filed with FERC and archived with the NCIC.

3.0 RESULTS OF THE STUDY

The results of archival research, tribal consultation and resource identification, site visits, and assessment of Project effects on NRHP-eligible tribal interests are summarized below.

3.1 Archival Research Results

Extensive archival research, as described in Section 2.1 above, was conducted during the Study. No ITAs, lands designated under tribal ownership, or any tribal agreements were encountered during this research. The research did, however, provide background relevant to the overall cultural context of the APE and region, as provided in Section 3.2.

The Study Plan provided for an aggressive archival review, under Step 1, that identified a number of primary and secondary ethnographic sources, as well archival repositories that were thought to contain information pertinent to the tribal presence in the Project APE. Archival research was predominantly focused on the field notes, manuscripts, and publications of the early anthropologists who worked with Nisenan descendants during the early twentieth century. These sources are invaluable because they record not only the traditional lifeways of the Nisenan, but also what was remembered of the locations of pre-contact villages, camps, and resource procurement. Even at that time, knowledge of settlement and subsistance locations was much diminished, due in large part to the catastrophic social, subsistence, and settlement disruption that resulted from the Gold Rush and continued through the second half of the nineteenth century. Valuable information was also obtained from other sources including historic maps and photographs.

3.2 Cultural Context

The context presented here is excerpted from portions of the Study report provided in Attachment A (Tiley et al. 2018). It should be noted that the Study report includes an ethnographic context prepared by Dr. Thomas Garlinghouse and an ethnohistoric context prepared by Dr. Shelly Tiley. The brief context provided below draws from both.

The ethnohistory of the Project Area is reflected in the documented traditions of the Nisenan, also known as the Southern Maidu. The Nisenan share a common language family and other traditions with neighboring groups, which are the Konkow (Northwestern Maidu) and Maidu to the northeast. The Bear River – the focus of the APE and immediate environs – is home to the Nisenan. The primary ethnographic sources about the Nisenan include Powers (1877), Faye (1923), Kroeber (1925, 1929), Littlejohn (1928), Gifford (1927), Beals (1933), Voegelin (1942), Uldall and Shipley (1966), Merriam (1966-7), and Wilson (1972). Collectively, these writers describe a hunter-gatherer society organized into the characteristic Californian "tribelet"[3], coined

[3] Of note, the term 'tribelet' can be considered pejorative to Californian native peoples. Per Leventhal (1994:299–300), "this term, almost universally accepted by anthropologists, historians, educators, and cultural resource management (CRM) archaeologists, is considered demeaning by Ohlone, Esselen and other California Indian people. Tribelet has been employed by many influential anthropologists and authors who have followed Kroeber (Heizer 1974, 1978; Levy 1978, Margolin 1978, Milliken 1995) maintaining an impression of extremely small and provincial cultures that lacked forms of large-scale organization."

by A. L. Kroeber (1925), and living in small, semi-permanent villages within a more or less specified geographic territory. It should be noted that all ethnographic studies of the Nisenan were conducted after native societies were effectively disrupted by Euro-American contact.

3.2.1 Geography and Demography

At the time of the earliest historic contact, the Nisenan occupied a portion of northeastern California that, since Euro-American times, has traditionally been known as the “Gold Country,” an area bordering the Sacramento River to the west and the Sierra Nevada to the east. The region includes parts of the modern counties of Yuba, Nevada, Placer, Sacramento, and El Dorado and centers around the modern cities of Nevada City, Auburn, and Folsom. From north to south, their territory encompassed an area from either the North Yuba River or the southern fork of the Feather River down to the Cosumnes River (Wilson and Towne 1978:388; Littlejohn 1928:23). The northern boundary has traditionally been difficult to define because it appears to have been a zone where the Nisenan’s northern neighbors, the Konkow, mingled linguistically and culturally with the Nisenan. On the southern bank of the Cosumnes River, lived the eastern branch of the Miwok, while just to the west were the Patwin.

According to Beals (1933:359), this territory was estimated at 5,340 square miles or over three million acres of land. Ecologically, Nisenan territory encompassed a region characterized by flat river bottomland along the Sacramento River to the 10,000 and 12,000 foot elevation Sierra Nevada divide. Between these two extremes were the gradually ascending Sierra foothills, an environment consisting of, among others, scattered oaks (especially interior live oak [Quercus wislizenii], blue oak [Quercus douglasii]), and California buckeye (Aesculus californica). These species are eventually superseded by gray pine (Pinus sabiniana) and California lilac (Ceanothus sp.) in the higher elevations. At even higher elevations, sugar pines (Pinus lambertiana) and yellow pine (Pinus ponderosa) are the dominant hardwood species. This region experienced dramatic fluctuations in climate and temperature. Summer months along the Sacramento River, for example, routinely reach into the high 90s and even 100s (degrees Fahrenheit), while the winter months in the high elevations experience snow, frost, and below-freezing temperatures.

Estimates of pre-contact Nisenan population size have been notoriously difficult to define (Beals 1933; Kroeber 1925), as much of their population had been decimated prior to the twentieth century. Kroeber (1925) argues for a total pre-contact Maidu population of 9,000, though he admitted the figure was decidedly liberal. By the time Kroeber and other ethnographers began to study the Nisenan in the early twentieth century, there were only an estimated 1,100 Nisenan and those of mixed-Nisenan heritage (Beals 1933:335). This dramatic decline in population was largely the result of early contact introduction of disease followed by events unleashed primarily by the California Gold Rush. The epidemic of 1833 (Peterson 1977:6; Cook 1955:308) along with subsequent outbreaks of cholera, malaria, influenza and smallpox greatly impacted Nisenan population just like all other native California groups. The subsequent discovery of gold in the lands of the Nisenan and the contact between whites and Native Americans, much of which was of a violent nature, played a significant role in further reducing overall Nisenan population numbers.

3.2.2 Subsistence and Material Culture

Like many native Californian groups, the Nisenan engaged in a seasonal round of food gathering, which included the exploitation of a wide range of plants and animals. In general, the division of labor in Nisenan society followed a pattern whereby men hunted and fished and women gathered, though both sexes were apparently involved in acorn and pine nut gathering. Terrestrial game such as deer, elk, antelope, bear, wildcat, rabbit and a wide variety of birds along with other small and medium animals (e.g., rodents), were commonly consumed. Deer was a major staple of the Nisenan diet and were stalked individually or in communal deer drives (Beals 1933:346), the latter frequently involving the participation of several villages. Individual hunters stalked deer with bows and arrows, sometimes utilizing deer-head decoys. Deer hides were used for a variety of purposes including blankets, clothing, and house floor matting. Rabbits and insects like grasshoppers were also commonly gathered through communal drives (Wilson 1972). A variety of birds were hunted including quail, grouse, ducks, geese, and even blue jays. Quail were especially prized with some men specialized in the hunting of quail almost to the exclusion of other activities.

Fish, such as trout and salmon, formed another substantial and readily accessible part of the Nisenan diet. They were acquired in a variety of ways, from hook-and-line to the use of natural poisons. Fishhooks were bi-pointed and typically made from the bones of rodents (Wilson 1972:35). Fish could be consumed immediately or dried for later consumption. Women commonly pounded the dried fish into a meal that was stored in baskets. Perhaps one of the most common ways of obtaining large catches of fish was through the use of poison in the form of processed soaproot. Soaproot effectively stunned fish through oxygen deprivation and then could be gathered en masse. Fish were also harvested with bone-pointed spears, dip nets, and weirs.

Vegetal foods provided the most important sources of calories and carbohydrates for the Nisenan. Various nuts, seeds, roots, tubers, bulbs, acorns, berries, wild grapes and other greens were gathered. Like many other native California groups, an integral food source for subsistence was acorns (Beals 1933:351; Wilson 1972:36-37). According to Beals (1933:351), between six or seven varieties of acorns were recognized by the Nisenan as suitable for consumption, including the prized black oak acorn. Acorn harvesting typically occurred during the fall when the acorns were ripe and the trees heavily laden. Trees that were known to provide lots of acorns were frequented over and over again and may have been owned by or associated with particular families (Wilson 1972:37, Beals 1933:363). The acorns were shelled and then ground into a flour, the latter process facilitated by the use of either bedrock or portable mortars and pestles. The flour was leached with warm water to remove the toxic tannic acid. The meal was then stored in baskets, and eventually made into soup or bread. When a crop was particularly abundant, the acorns were stockpiled in a granary and occasionally traded with other groups.

In order to exploit and process many of the foregoing resources, the Nisenan employed a diverse array of implements, including many tools made of stone. The most important stones were obsidian, basalt, steatite, chalcedony, and jasper. Obsidian and steatite were highly prized and imported into Nisenan territory from outside sources, the former from the "north" (Kroeber 1925:399) and the latter most likely from coastal contexts. The other stone types were procured from local or nearby sources. Beals (1933:340) also mentions the use of quartz to make knives, though this was probably much rarer. Stones were worked through a combination of percussion and pressure flaking to produce such items as arrowheads, knives, scrapers, drills, and various other tools. Pipes, called o'nk'ula or k'ula, were also made, usually from steatite (Beals 1933:341). The preferred type of tobacco, according to Kroeber (1925:419), was coyote tobacco (Nicotiana attenuata). Littlejohn (1928:30) notes that plots of tobacco were carefully tended and jealously guarded. Other utilitarian items, such as bows, arrows, awls, game pieces, ornaments, and musical instruments were made of wood or bone. Sturdy, well-made sinew-backed bows were typically made of yew (Taxus brevifolia), which was obtained in the mountains, though cedar was also used. Wood was also used in the construction of arrows and spear shafts.

In order to navigate the many streams, rivers, and lakes in their territory, the Nisenan constructed watercraft (Kroeber 1929:260). These were typically of two kinds. The most common was the tule balsa, called a ku'ye', which consisted of tule bundled together. These rafts likely differed little from the balsa rafts of other Native Californians. The second, less common, type of raft was made from a single log or two logs lashed together by grapevine. The preferred wood was redwood, and the planks were shaped and flattened, though not hollowed. They were large enough to stand on and were propelled by paddles or poles, the latter used if the water was shallow.

In the mountains and foothills, Nisenan villages were generally located on knolls or on elevated benches on high ground between rivers. In the valleys, villages were similarly built on natural rises or knolls along streams or rivers. Most of the time, this was for the purpose of avoiding seasonal flooding. When a naturally elevated knoll was not found, members built their own mounds, which often stood some 10 or 12 feet over the surrounding land (Peper 2009:11).

Dwellings were dome-shaped and made of brush or bark lashed over an oak pole frame. They were between 10 and 15 feet in diameter, and any village might contain between 7 or 50 houses. The floors of the dwelling were sunk a few feet into the ground and covered over with pine needles or leaves. Hearths were situated in the center of the room. Larger villages had dance houses (k'um) and acorn granaries. The former were relatively elaborate, semi-subterranean structures built with heavy beams and between two or four main posts, depending on size of the house. These houses were used for ceremonies, gatherings, feasts, and various assemblies (Beals 1933:344).

Like many other California Indians, the Nisenan were adept at basketry. It was primarily a female activity, with all girls learning the skill at a young age. Kroeber (1925:414) describes Nisenan baskets as coiled, typically in a clockwise pattern. Willow (Salix lasiolepis) and redbud (Cercis occidentalis) were the preferred plants. Several different types of baskets were made. These included carrying baskets, platters, seed beaters, storage baskets, drinking baskets, and cooking baskets. Some baskets were also apparently simply made for "show."

Beads were highly prized and imported into Nisenan territory from western groups. Typical bead material included steatite, clamshell (probably Saxidomus sp.), and purple olive shell (Olivella sp.). These were strung together to form necklaces. Abalone (Haliotis sp.) was also used, especially in the manufacture of pendants. Beads were important indicators of wealth. Mid-late nineteenth century photographs of Captain Tom Lewis and his wife Jane Lewis show both individuals wearing bead ornaments, the former an abalone pendant, and the latter a necklace of clam shell beads. Captain Lewis was the reputed headman of the Nisenan community around Auburn, California. Beads were also used in various commercial transactions, including the purchase of various, everyday commodities, as payment to shamans, or as compensation for transgressions. At the death of an individual, the person's shell beads were typically burned.

3.2.3 Social and Political Organization

Like many native groups in California, the Nisenan were organized into what has been termed the "tribelet." As previously mentioned, the term and concept were derived from the writings of A.L. Kroeber, who in 1932, observed that the dizzying array of different social and political groupings in native California was far different from other parts of North America. The concept of the tribe, used with ubiquity elsewhere in North America, was simply not an adequate description of the many and varied social groupings in California. As a result, Kroeber coined the term "tribelet" to explain the basic social and political organization of a majority of California's native peoples, including the Nisenan. The tribelet was defined as a social aggregation consisting of one or more household groups that included immediate family members (i.e., parents and children) and any associated relatives (i.e., either collateral, lineal, or affinal living together in a village or community). In some circumstances the concept of tribelet could be applied to larger populations to include two or more villages. These households were gathered together on the basis of a shared language, culture, and identity. Typically, tribelets defined communal territorial boundaries and engaged in regularized intergroup relations such as hunting and gathering and ritual observances. The tribelet, moreover, was autonomous, self-governing, and independent.

Relations between villages were usually friendly, though sometimes disputes would erupt over such things as trespass, hunting rights, ceremonial obligations, or accusations of sorcery. If these disputes were not resolved, feuds could easily erupt between villages. Surprise attacks and organized raids were the most common types of warfare (Beals 1933:366), though occasionally pitched battles took place. Weapons included bows and arrows, spears, clubs, and slings. Usually, however, these battles did not result in many casualties.

Beals (1933:359), following the lead of Kroeber, characterized chiefs, or more accurately headmen, in Nisenan society (called huk) as possessing "little direct authority, but often possessing much influence, depending on their support by public opinion." Chieftainship was hereditary in certain lineages but always subject to the approbation of villagers. If an heir proved incapable of fulfilling the duties of a huk, a new headman was elected by the older men and woman of the community (Littlejohn 1928:22). Traits most important for chiefs to possess included the ability to persuade and settle disputes.

Recent work by Tatsch (2006) has painted a different portrait of Nisenan social and political structure. In general, her work emphasizes more complex political and social cohesion, and a developed sense of identity and land ownership. Tatsch (2006:52) argued, following statements made by Jim Dick, headman for the Auburn region in 1928, that there were at least two levels of political leadership in Nisenan society. In addition to identifying headmen (huk) as leaders of tribelets, Dick pointed to lesser, "local leaders" who were the spokespeople for smaller communities. Each village, moreover, was an autonomous political unit, headed by a hereditary leader who could be either a man or a woman. These units could, and frequently did, coalesce into larger political organizations (see Wilson and Towne 1978:387; Tatsch 2006:59). Tatsch (2006:vi) has suggested that the Nisenan were fully aware of concepts like land ownership. She argues that Nisenan society was characterized by a number of “political districts” or “zones” that viewed the surrounding region in proprietary terms.

3.2.4 Religious Beliefs

Religious beliefs among the Nisenan remain little understood beyond only a broad context. However, the little that is known suggests that Nisenan religion shares many characteristics with the beliefs of other indigenous Californians. Although Beals (1933:379) stressed a certain lack of uniformity in the religious beliefs of his Nisenan informants, they were nonetheless united in their belief that there existed a supernatural realm peopled by spiritual beings, some of whom possessed great powers. They also believed that all natural objects were endowed with supernatural powers. This belief, which permeates many other indigenous groups worldwide, is best classified as animism – a belief in both the existence of spiritual beings and the notion that all natural objects are animated by spirits.

Like other native Californian groups, the Nisenan placed great importance on shamans. In Nisenan society, both men and women commonly occupied the role of shaman. There were two main types of shamans. The more common were specialists in native medicine and curing, and less frequent were those who had direct contact with the supernatural realm. The Kuksu cult played an important role in some geographic regions of Nisenan society. According to Gifford (1927:214-215) and Kroeber (1929:312), only the valley Nisenan was involved in the cult; the hill Nisenan apparently did not practice Kuksu. The cult was expressed among the valley Nisenan by the existence of two separate organizations. The first of these, called Akit, allowed only men, while the second, called Teme’ya, allowed a limited number of men and women. The first organization was a general dancing society where initiates, mostly boys or young men, were taught specific dances over a period of time. The second organization involved dances where the performers impersonated spirits and wore elaborate costumes, especially the very large headdress characteristic of Kuksu performers.

3.2.5 Historic Encounters

Although Spain claimed Alta California as part of its New World possessions, the area north of what today is the San Francisco Bay Area witnessed little overt Spanish influence. The 21 missions, which were intended to demonstrate the claim of the Spanish empire to what is now modern-day California, only extended as far north as modern Sonoma County. In fact, Spain only had a tenuous hold on northern California, though at least a few researchers have surmised that some native inhabitants of the region, including some Nisenan, were likely forced into the Spanish mission system (see Forbes 1969:32; Angel 1882; and Wilson and Towne 1978:396). The three colonialist nations, Russia, Great Britain, and the U.S., vied with Spain, and each other, over possession of the region. Fort Ross, in modern-day Mendocino County, for example, was established by the Russians in 1812 and was considered its farthest-flung New World outpost.

When Alta California was ceded to Mexico in 1822, the far northern half of California remained in dispute. Although technically a possession of Mexico, it soon bore witness to the intrusions of many different foreign expeditions, including British and American fur trappers. These forays were done often without the knowledge or certainly the approval of the Mexican authorities. As a consequence of these and other expeditions, virulent epidemics were introduced among the native populations of the region. As previously mentioned, perhaps the most devastating of these occurred in 1833 and was apparently a result of either smallpox or malaria (Peterson 1977:6; Cook 1955:308). By one estimate, this epidemic may have wiped out perhaps as much as 75 percent of the valley Nisenan population (Cook 1976).

The 1839 establishment of New Helvetia (often referred to as Sutter's Fort) was the first non-indigenous settlement in California's central valley. It had a profound effect on Nisenan people throughout the region. Setting himself up as a feudal lord, John Sutter obtained a Mexican Land Grand for 48,400 acres of Miwok and Nisenan land, and gathered 600-800 local Indians to provide the labor for his enterprise. Participation in this new economy was not necessarily voluntary: Sutter rewarded cooperating groups with trade goods, punished reluctant groups, and kept a "harem" of Indian women to solidify ties to local groups (Stengel 2004:45). Eventually, he established a military force of Nisenan and Miwok Indians to force unwilling Indians to labor (Hurtado 1988:34). Several former employees under Sutter would go on to obtain regional land grants and continued to utilize and impact the Nisenan and other local groups.

The annexation of California by the U.S. in 1849/50 resulted in continued negative impacts for the Nisenan and neighboring groups in the area. Not only did disease take a massive toll on their population, but the violence by miners and settlers who entered their territory in the 1840s and 1850s also had a significant and devastating effect on their population. Initially, following the discovery of gold at Sutter's Mill in 1848, Native Americans became laborers working the gold field of the Sierras (Chamberlain and Wells 1879). By the end of 1849, miners and settlers flooded into northern California, increasingly expropriating native lands. Many of the streams and creeks the various Indian groups had used and relied upon for generations became polluted and befouled as the prospectors overran the area in their search for gold. This prompted angry responses from the region's native inhabitants, and hostilities between the two groups became commonplace. There were numerous violent incidents – raids, retaliatory killings, rapes, and outright massacres – between the two opposing groups during this time. Periodicals from the latter half of the nineteenth century were replete with reports of these violent encounters.

Despite resistance on the part of the Nisenan, the eventual outcome of this clash between European and native culture was inevitable. The Nisenan were simply no match for the superior numbers, technology, and organization of the American invaders. During the latter half of the nineteenth century, the native groups that had occupied the area were gradually and inexorably displaced, killed off by disease or violence, or forced into hiding and seclusion. As outsiders settled on their lands, the few surviving Nisenan were continually pushed to the margins of society, at which time many were eventually absorbed into the dominant economic system. Many Nisenan found work in agriculture, logging, ranching, and domestic pursuits (Wilson and Towne 1978).

The issue of landless Indians (i.e., those not living on reservations) in California became a problem that aroused the interest of the Federal government at the turn-of-the-century. In order to ascertain the number of Native Americans living outside the reservation system, a San Jose attorney named Charles E. Kelsey was appointed by the Bureau of Indian Affairs to conduct a comprehensive survey. He was tasked with enumerating the numbers of landless Indians in California and investigating their need for land. Between 1905 and 1906, Kelsey traveled throughout California, gathering a long list of names, ages, and locations or residences of living Indian peoples. Kelsey's work yielded a depressingly small number living in the Project area. For all of Nevada County, Kelsey's 1906 census listed only 27 families and 75 Indian people; in Yuba County he documented 11 families and 50 people (Kelsey 1906).

3.2.6 Present Day Native American Communities

The late nineteenth and early twentieth centuries proved to be an extremely difficult period for California's Native American communities. The unratified treaties of the early 1850s left virtually the entire Native population without a land base, forcing surviving tribes into refuge enclaves, often living as laborers on ranches or in other rural settings. The Dawes or General Allotment Act of 1887 began the long process of forced self-sufficiency and acculturation that was to become the overriding federal government policy well into the 1950s. The Dawes Act provided homestead-like land allotments to Native Americans, without the trust relationship with the federal government common to treaty-based reservations. The Dawes Act is seen generally as a failure, and by the early twentieth century, the "plight of the landless Indian" had become a moral crisis. As noted above, the federal government, along with charitable organizations, began to examine the situation with an eye to providing some form of land base through which the surviving tribes could sustain themselves. This effort led to the establishment of some 50 rancherias in California, usually small tracks of land, often lacking resources and employment or agricultural opportunities. Some rancheria communities maintained their populations although many saw a decline as residents were forced to move away to earn livings in urban environments.

The federal government maintained an active legislative program of acculturation during the first half of the twentieth century. Indian schools, such as those at Carson City, Nevada, and Riverside, California, trained Indian children in domestic service and the trades, usually separating them from their tribes and natal families for the majority of their childhood years. The drive to acculturate Native Americans and end their trust relationship with the federal government came to a head in California with the California Rancheria Termination Act of 1958 (the Rancheria Act). Rancheria lands were offered to residents in what were to be privately owned parcels, while at the same time the government terminated any trust responsibilities to the rancherias, including assistance with health care, education, or subsistence. The Rancheria Act was seen as a failure largely because the rancheria communities were unprepared for the change. Privately owned parcels were quickly lost due to unpaid taxes and sales to non-Indians. Many rancherias fought the Rancheria Act and many were able to "unterminate" their rancherias, and reestablish trust status with the federal government. Of particular importance was the judgment rendered in the Tillie Hardwick class action suit begun in 1978, which held that 17 rancherias had been wrongfully terminated. Many of the rancherias in the case remained in terminated status, often because there were no longer tribal members living on private parcels on the former rancheria lands.

The result of this tangled and often unsavory history is that many tribal communities have maintained or reclaimed their lands under trust status with the federal government and many have not. Those tribes that are “federally recognized” have access to the benefits of that trust status, including opportunities for economic improvement, in some cases gaming. So-called “unrecognized tribes” have taken many paths to reclaim or establish their status with the federal government, although the various processes may take years, with questionable chances of success. The economic disparity between recognized and unrecognized has become stark, as recognized realize the rewards of casino gaming and its attendant opportunities for education and health care, and economic and political influence.

Three modern tribal entities within the Project area include Nevada City Rancheria, Colfax-Todds Valley Consolidated Tribe, and United Auburn Indian Community. Each of these weathered the twentieth century with different outcomes for their tribal members.

3.2.6.1 Nevada City Rancheria

Dispossessed of their ancient tribal lands, Nisenan people in the APE and vicinity were landless in the 1880s. Assisted by the Native Sons and Daughters of the Golden West and other concerned citizens, Nisenan Chief Charlie Culley obtained a 75-acre allotment on Cement Hill in Nevada City in 1887 to provide a land base for his people. It became the Nevada City Rancheria at Chief Cully’s death in 1911 by an Executive Order signed by President Woodrow Wilson. This made it federal trust land and provided federal recognition for the Nevada City group. This status proved to be temporary, however; the Rancheria Act of 1958 terminated trust responsibility for many Indian lands, including the Nevada City Rancheria, in exchange for promises of greatly improved infrastructure.

At Nevada City, there was an active effort to depopulate the rancheria. All of the children were removed from the rancheria in the 1950s and placed in foster care. In the end, all but Louis Kelley’s family moved to Auburn. The last residents were Pete and Margaret Johnson. Their house was burned down when the rancheria was formally terminated (Johnson n.d.). Nevada City Rancheria’s termination in 1967 removed the group’s federal recognition, denying future generations the essential access to federal support for housing, education, standing in the courts, and health care. In many other California cases, terminations under the Rancheria Act were found to be illegal since the promised infrastructure improvements never materialized, and the tribes’ recognitions were restored. This was not the case for the Nevada City Rancheria. Members continue to strive to reinstate their federal status and maintain protection for their lost lands. They are also active in preserving their culture through oral histories, a tribal library, and language classes, and maintaining important cultural events, as well as forming a 501(c)(3) non-profit to further their goals.

3.2.6.2 Colfax-Todds Valley Consolidated Tribe

The Colfax-Todds Valley Consolidated Tribe consists of Nisenan and Miwok families who have associated with the Colfax/Foresthill area for generations. This was a center of population concentration at the time of Kelsey's census, and the U.S. government purchased rancheria land for this group in 1915. The Tribe suffered a fate similar to that of the Nevada City group, losing their land and their federal recognition under protest in 1966. They continue to seek federal recognition and actively interface with state and federal agencies to protect their ancestral lands and cultural resources.

3.2.6.3 United Auburn Indian Community

Kelsey's survey and Department of the Interior documentation identified a band of Miwok and Maidu Indians in a village outside of Auburn. Twenty acres of federal trust land was acquired in 1917, with another 20 acres added in 1953, and the area became a formal rancheria on which people continued to live until 1967. The Auburn Band was terminated in 1967 and its lands sold, save for a tiny 2.8-acre parcel. A scant three years later, President Nixon declared termination a failure.

In 1991, Auburn Rancheria reorganized as the United Auburn Indian Community. They petitioned for restoration of their federal recognition, and Congress passed the Auburn Indian Restoration Act in 1994, which completed the process. The Tribe was allowed to purchase land in Placer County as a new land base.

As a result of federal recognition, the status of Auburn Rancheria differs greatly from the other groups. With government-to-government relations with federal, state, and local governments, their ability to promote and preserve their culture is greatly enhanced. The Tribe's Thunder Valley Casino provides the resources for programs in educational services, economic development, and community giving.

3.3 Tribal Consultation and Identification of Resources

3.3.1 Tribal Consultation

HDR, on behalf of SSWD, invited FERC, SHPO, and potentially affected Native American tribes to attend a Study "kick-off" meeting that was held on June 29, 2016. The meeting was attended by HDR, on behalf of SSWD, Albion, FERC, a SHPO representative, UAIC representatives, and representatives of the Nevada City Rancheria. The Study Plan and the Albion research team were introduced at that meeting.

The kick-off meeting focused on UAIC concerns about archaeological and traditional resources, effects of the Project, treatment of ancestral remains, and relevant data already collected and archived by UAIC. The meeting also addressed UAIC's earlier response to the PAD for the Project relicensing that was filed with FERC in March 2016 and subsequently provided to relicensing participants, in which UAIC took exception to several statements in the PAD.

UAIC's response was provided in a letter dated April 14, 2016 sent from UAIC Vice Chairman, John L. Williams to Kimberly D. Bose, Secretary of FERC.

UAIC's concerns about the PAD document centered around what they deemed to be an underestimation of the importance of both prehistoric and cultural sites in the area. They contested the archaeological prediction that only short-term sites would be found, as they were aware of large, important villages. They disagreed with the notion that native sites in the area would be exclusively prehistoric in nature. They requested, in particular, a contextual treatment of continued native use of the area in historic and modern times. In addition, they advocated a recognition that all sites of concern might not be sacred sites or TCPs, but rather that the APE included a variety of site types of interest to them that would be directly or indirectly effected by the Project.

On September 14, 2016, Albion sent letters describing the Project and seeking participation in the Study to 14 tribal representatives. Groups contacted were UAIC, Colfax-Todds Valley Miwok-Maidu Cultural Foundation, Greenville Rancheria of Maidu Indians, Mooretown Rancheria of Maidu Indians, Tsi Akim Maidu, Nevada City Rancheria, and Colfax-Todds Valley Consolidated Tribe.

Albion sent follow-up emails and made phone calls in September and October 2016 to determine interest in participating. Several representatives did not respond, and two tribes, Greenville Rancheria and Mooretown Rancheria, verbally declined to participate, but reserved interest in future Project findings and recommendations. Ultimately, three tribal groups, UAIC, Nevada City Rancheria, and the Colfax-Todds Valley Consolidated Tribe, chose to participate in the Study.

Interviews began in May 2017 with an off-site meeting with descendent family members of a revered tribal elder who was born in or near the APE. This was followed by an on-site interview with an independent Nisenan respondent. All interviews were audio taped and the on-site interview was recorded on digital video. Interviews with two representatives of the Colfax-Todds Valley Consolidated Tribe followed on July 27, 2017. These interviews were not recorded, the respondents preferring field notes only. A group interview of three representatives of Nevada City Rancheria was conducted in their tribal headquarters on August 23, 2017. This lengthy group of interviews was audio recorded and fully transcribed.

3.3.2 Identification of Resources

Archival research for the Study did not provide information on any previously documented TCPs, ITAs, or tribal agreements within the Project APE. One-on-one and group interviews with tribal informants in 2017 conducted for the Study also did not reveal any new or previously documented TCPs, ITAs, or tribal agreements within the APE. UAIC owns nearby lands (0.75 miles to the southwest) held in trust by the Bureau of Indian Affairs, however, this property is located to the west of and outside of the Project APE. No other trust lands or resources subject to rights by treaty were identified within or near the Project APE.

3.4 Site Visit Results

UAIC tribal representatives and one independent Native American visited cultural resources site locations during the Study, when HDR archaeologists were completing a cultural resources inventory for the Cultural Resources Study; the ethnographer was not present during these visits. One on-site interview was also held with the ethnographer and one tribal participant, as discussed above, but there was no specific cultural resource site visited at that time. No other cultural resources sites or other locations at the Project APE were visited during the Study with tribal members. No resources meeting the definition of a TCP or other potential tribal interest resource were identified during these site visits.

3.5 Identifying and Assessing Effects on NRHP-Eligible Tribal Interests

No tribal interests, including TCPs, ITAs, or tribal agreements, were identified in the course of the Study; therefore, no properties were evaluated for their eligibility for listing in the NRHP, thus no NRHP-eligible properties were assessed for potential Project effects.

3.6 Discussion

Implementation of the Study included extensive archival research and a great deal of tribal consultation, including meetings, interviews, and numerous emails and phone calls to coordinate consultation efforts. The Study was implemented between 2016 and 2018 by Albion and, though no tribal interests were identified within the APE, the Study did find that the Nisenan people hold the Project region in great reverence and feel an enduring connection to the land and water and wish to connect or reconnect to the spiritual essence and power resident in the APE and surrounding region, values that they believe have *not* been diminished by historical events or the construction of the Project. The Study also revealed a general concern from Study respondents about the treatment and preservation of archaeological sites and other cultural resources important to the tribal groups. All respondents wished to be included in the long-term preservation of these places.

The Study concludes that the future management of the APE should include continued involvement of the Native communities that value the area. As suggested by Study respondents, this involvement could include Nisenan participation in the management of significant archaeological resources in the APE. To promote the Nisenan connection to the Lower Bear River, Study respondents also suggested organizing activities to encourage renewed Nisenan use of the landscape for traditional practices and ceremonies, and/or coordinating events that signify and support Nisenan identity. Implementation of this Study has provided a starting point for dialogue between land managers and Nisenan groups on ways to protect cultural sites, minimize the effects of the Project, and identify appropriate future mitigation strategies.

It must not be ruled out that the possibility of new evidence of properties that fit the criteria of a TCP or other tribal interest might arise. This may come through new archival sources containing location-specific information about traditional places in the APE, or it may come through oral testimony from a member of the tribal community who has not come forward during this investigation. Regular communications with tribal members and open lines of dialogue is essential for the long-term management of cultural resources. The future management of the cultural resources within the Project APE should include continued involvement of the Native communities that value the area.

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Tribal Interests Study

Attachment A

Tribal Interests Study Report

SECURITY LEVEL: PRIVILEGED AND CONFIDENTIAL (PROVIDED ONLY TO TRIBES, FERC, SHPO, AND THE NCIC)

Camp Far West Hydroelectric Project

FERC Project No. 2997

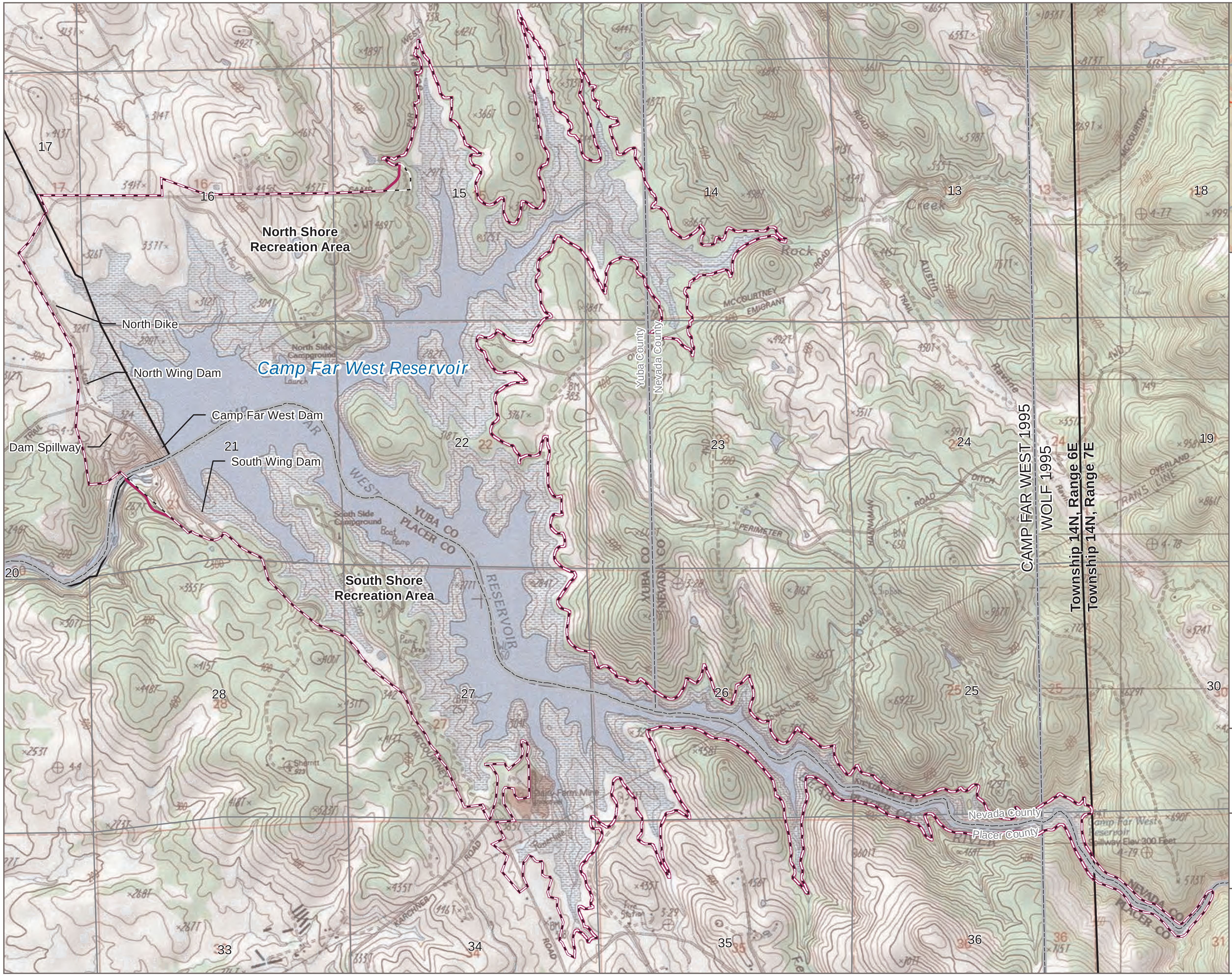
Tribal Interests Study

Attachment B

Area of Potential Effects Map

Camp Far West Hydroelectric Project

FERC Project No. 2997



LEGEND

- APE
- FERC Boundary (No.2997)
- County Boundary
- USGS 24K Topographic Map Boundary
- Township & Range

DATA SOURCES: APE - HDR Inc, FERC - SSWD, Service Layer Credits: Copyright:© 2013 National Geographic Society, i-cubed, Content may not reflect National Geographic's current map policy. Sources: National Geographic, Esri, DeLorme, HERE, UNEP-WCMC, USGS, NASA, ESA, METI, NRCAN, GEBCO, NOAA, increment P Corp.

DISCLAIMER: This map product is for informational purposes relevant to its associated study or report. Users of this product should consult source data to determine the accuracy of the information.

AREA OF POTENTIAL EFFECTS

CAMP FAR WEST RESERVOIR
SOUTH SUTTER WATER DISTRICT

N

0 2,000
FEET

HDR

PATH: G:\PROJECTS\SOUTHSUTTERWD\CAMPFARWESTRELICENSING\7.2_WORKING\MAP_DOCS\TECHMEMO\CULTURAL\REPORT_APE_AND_FERC.MXD - USER: KKEIGHTL - DATE: 6/6/2016

Tribal Interests Study

Attachment C

Copies of NAHC Letters

Camp Far West Hydroelectric Project

FERC Project No. 2997

STATE OF CALIFORNIA Edmund G. Brown, Jr., Governor

NATIVE AMERICAN HERITAGE COMMISSION
1550 Harbor Blvd., ROOM 100
West SACRAMENTO, CA 95691
(916) 373-3710
Fax (916) 373-5471

December 31, 2014

Monica Mackey
HDR
2379 Gateway Oaks Drive, Ste 200
Sacramento, CA 95833

RE: Relicensing of the South Sutter Water District's Camp Far West Hydroelectric Project,
Yuba, Nevada and Placer Counties
Sent by FAX: 916-679-8701
2 Pages

Ms. Mackey;

A record search of the sacred land file has failed to indicate the presence of Native American cultural resources in the immediate project area. The absence of specific site information in the sacred lands file does not indicate the absence of cultural resources in any project area. Other sources of cultural resources should also be contacted for information regarding known and recorded sites.

Enclosed is a list of Native Americans individuals/organizations who may have knowledge of cultural resources in the project area. The Commission makes no recommendation or preference of a single individual, or group over another. This list should provide a starting place in locating areas of potential adverse impact within the proposed project area. I suggest you contact all of those indicated, if they cannot supply information, they might recommend others with specific knowledge. By contacting all those listed, your organization will be better able to respond to claims of failure to consult with the appropriate tribe or group. If a response has not been received within two weeks of notification, the Commission requests that you follow-up with a telephone call to ensure that the project information has been received.

If you receive notification of change of addresses and phone numbers from any of these individuals or groups, please notify me. With your assistance we are able to assure that our lists contain current information. If you have any questions or need additional information, please contact me at (916) 373-3712.

Sincerely,

Katy Sanchez
Associated Government Program Analyst

Native American Contacts
Yuba, Nevada and Placer Counties
December 30, 2014

United Auburn Indian Community of the Auburn Rancheria
Gene Whitehouse, Chairperson
10720 Indian Hill Road — Maidu
Auburn , CA 95603 — Miwok
(530) 883-2390 Office
(530) 883-2380 Fax

Colfax-Todds Valley Consolidated Tribe
Judith Marks
1068 Silverton Circle — Miwok
Lincoln , Ca 95648 — Maidu
(916) 580-4078

T' si-Akim Maidu
Eileen Moon, Vice Chairperson
P.O. Box 1246 — Maidu
Grass Valley , CA 95945
(530) 274-7497

Colfax-Todds Valley Consolidated Tribe
Pamela Cubbler
P.O. Box 734 — Miwok
Foresthill , Ca 95631 — Maidu
(530) 320-3943
(530) 367-2093 home

T' si-Akim Maidu
Grayson Coney, Cultural Director
P.O. Box 1316 — Maidu
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akimmaidu@att.net
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United Auburn Indian Community of the Auburn Rancheria
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United Auburn Indian Community of the Auburn Rancheria
Marcos Guerrero, Tribal Preservation Committee
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T' si-Akim Maidu
Don Ryberg, Chairperson
P.O. Box 1246 — Maidu
Grass Valley , CA 95945
(530) 274-7497

This list is current only as of the date of this document.

Distribution of this list does not relieve any person of the statutory responsibility as defined in Section 7050.5 of the Health and Safety Code, Section 5097.94 of the Public Resources Code and Section 5097.98 of the Public Resources Code.

This list is only applicable for contacting locative Americans with regard to cultural resources for the proposed Relicensing of the South Sutter Water District's Camp Far West Hydroelectric Project, Yujba, Nevada and Placer Counties.

NATIVE AMERICAN HERITAGE COMMISSION
Cultural and Environmental Department
1550 Harbor Blvd., Suite 100
West Sacramento, CA 95691
(916) 373-3710

July 25, 2018

Monica Ruth
HDR Inc.

Sent by E-mail: monica.ruth@hdrinc.com

RE: Proposed Camp Far West Hydroelectric Project, near the City of Wheaton; Camp Far West USGS Quadrangle, Yuba, Nevada, and Placer Counties, California

Dear Ms. Ruth:

A record search of the Native American Heritage Commission (NAHC) *Sacred Lands File* was completed for the area of potential project effect (APE) referenced above with negative results however the area within the APE provided is sensitive for cultural resources. Please note that the absence of specific site information in the *Sacred Lands File* does not indicate the absence of Native American cultural resources in any APE.

Attached is a list of tribes culturally affiliated to the project area. I suggest you contact all of the listed Tribes. If they cannot supply information, they might recommend others with specific knowledge. The list should provide a starting place to locate areas of potential adverse impact within the APE. By contacting all those on the list, your organization will be better able to respond to claims of failure to consult. If a response has not been received within two weeks of notification, the NAHC requests that you follow-up with a telephone call to ensure that the project information has been received.

If you receive notification of change of addresses and phone numbers from any of these individuals or groups, please notify me. With your assistance we are able to assure that our lists contain current information. If you have any questions or need additional information, please contact via email: gayle.totton@nahc.ca.gov.

Sincerely,

Gayle Totton

Gayle Totton, M.A., PhD.
Associate Governmental Program Analyst
(916) 373-3714

Native American Heritage Commission
Native American Contact List
Placer, Yuba, Nevada Counties
7/25/2018

Estom Yumeka Maidu Tribe of the Enterprise Rancheria
Glenda Nelson, Chairperson
2133 Monte Vista Avenue — Maidu
Oroville, CA, 95966
Phone: (530) 532 - 9214
Fax: (530) 532-1768
info@enterpriserancheria.org

Mooretown Rancheria of Maidu Indians
Gary Archuleta, Chairperson
#1 Alverda Drive — KonKow
Oroville, CA, 95966 — Maidu
Phone: (530) 533 - 3625
Fax: (530) 533-3680
frontdesk@mooretown.org

Strawberry Valley Rancheria
Cathy Bishop, Chairperson
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Marysville, CA, 95901 — Miwok

Tsi Akim Maidu
Don Ryberg, Chairperson
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Tsi Akim Maidu
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Phone: (530) 383 - 7234
tsi-akim-maidu@att.net

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Fax: (530) 883-2380
bguth@auburnrancheria.com

Washoe Tribe of Nevada and California
Darrel Cruz, Cultural Resources Department
919 Highway 395 South — Washoe
Gardnerville, NV, 89410
Phone: (775) 265 - 8600
darrel.cruz@washoetribe.us

This list is current only as of the date of this document. Distribution of this list does not relieve any person of statutory responsibility as defined in Section 7050.5 of the Health and Safety Code, Section 5097.94 of the Public Resource Section 5097.98 of the Public Resources Code.

This list is only applicable for contacting local Native Americans with regard to cultural resources assessment for the proposed Camp Far West Hydroelectric Project, Placer, Yuba, Nevada Counties.

Native American Contact List
July 25, 2018
Yuba, Nevada, and Placer Counties

Colfax-Todds Valley Consolidated Tribe
Pamela Cubbler, Treasurer
P.O. Box 4884 — Miwok
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PCubbler@colfaxrancheria.com
(530) 320-3943

Colfax-Todds Valley Consolidated Tribe
Clyde Prout, Chairman
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This list is current only as of the date of this document and is based on the information available to the Commission on the date it was produced.

Distribution of this list does not relieve any person or agency of statutory responsibility as defined in Public Resources Code Sections 21080.3.1 Section 7050.5 of the Health and Safety Code, Section 5097.94 of the Public Resources Code and Section 5097.98 of the Public Resources Code.

This list is only applicable for contacting local Native Americans with regard to cultural resources for the proposed Camp Far West Hydroelectric Project,
Yuba, Nevada, and Placer Counties, California

SECTION 4.0

DEVELOPMENTAL ANALYSIS

This section analyzes the economic power benefits of the Projects, and estimates the annual cost of the Project, including costs for any construction, operation, maintenance, and environmental conditions. This section also discusses other development benefits.

Under the Commission's approach to evaluating the economics of hydropower projects as articulated in the Commission's Order Issuing a New License to the Mead Corporation (FERC 1995), the Commission employs a "current cost approach" in that all costs are presented in current dollars (e.g., no consideration for potential future power costs, inflation, escalation, or deflation beyond the license issuance date; and costs to be expended over the license term are summed and normalized as current dollars). The Commission's current cost economic analysis provides a general estimate of the potential developmental benefits and costs[1] and non-developmental benefits and costs of a project.[2] This section uses the Commission's current cost method.

4.1 Alternatives Considered in This Section

This section analyzes two alternatives.

- No Action Alternative.[3] This is the current operation of the Project under its existing license and the current waterway environment, with the exception that it assumes the flow requirements in FERC's 2014 FEIS for the upstream YB/DS projects are in place. SSWD considered this a reasonably foreseeable future action that should be included in the environmental baseline. Under the No Action Alternative, there are no changes to existing Project facilities, and no changes to existing Project operations.
  - Costs under the No Action Alternative are SSWD's best estimate of the costs to operate the Project in the future. While SSWD has relied somewhat on historic costs, it has not used those costs without adjustment for future considerations.
  - Project generation under the No Action Alternative is based on modeled generation from WY 1976 through WY 2014 using SSWD's Ops Model. Historic generation is also provided for context only.
  - Power generation benefits under the No Action Alternative are divided into two periods: 1) 2021, when the existing license expires, through 2031; and 2) 2032 through 2051. In the first period (i.e., 2021 through 2031), SSWD assumed the power costs paid to SSWD by SMUD under the SMUD Contract, which has a term of 50 years and expires on July 1, 2031, unless terminated earlier. In the second period

[1] Developmental benefits of the Project include power generation, water supply, flood control, irrigation and river navigation.
[2] Non-developmental benefits of a waterway include fish and wildlife resources, recreational opportunities and other aspects of environmental quality.
[3] The No Action Alternative is synonymous with the "environmental baseline" (FERC 1991). SSWD's Ops Model considers the No Action Alternative to be the "Base Case Scenario" or "Base Case Model Run."

(i.e., 2032 through 2051), SSWD estimated the unit value of power using published information in the current California electricity market for the unit value of the power.

- SSWD's Proposed Project. This is SSWD's Proposed Project and its assumes, like in the No Action Alternative, flow requirements in FERC's FEIS for the YB/DS Projects are in place. The Proposed Project is the same as the existing Project with the exception that SSWD proposes the Pool Raise, and SSWD proposes certain PM&E conditions, as described in SSWD's Application for New License.
  - Costs under SSWD's Proposed Project assume SSWD's proposed costs for operations of the Project as proposed by SSWD in its Application for New License.
  - Project generation under the Proposed Project is based on modeled generation from WY 1976 through WY 2014 using SSWD's Ops Model.
  - Power generation benefits under the Proposed Project used the same assumptions regarding value of power as used in the No Action Alternative.

4.2 Power and Developmental Benefits

Table 4.2-1 summarizes the assumptions and economic information used in this analysis that are common to both the No Action Alternative and SSWD's Proposed Project.

Table 4.2-1. Assumptions and cost items common to the No Action Alternative and SSWD's Proposed Project Alternative.

Assumption / Cost Item	Value or Average Annual Cost
Period of Analysis[1, 2]	30 Years
Term of Financing[2]	30 Years
Insurance Rate[2]	0%
Base Year for Costs and Benefits[2]	Calendar Year 2018, unless otherwise specified
Interest Rate[2]	2.0%
Discount Rate[2]	5.0%
Depreciated Plant In-Service Costs[3]	$0
Power Purchase Contract Costs[3]	$20,000
Local, State and Federal Fees and Payments Unrelated to Environmental and Recreation Measures[3]	$87,500
Capital Additions Costs Unrelated to Environmental and Recreation Measures[3]	$332,185
Normal O&M Costs Unrelated to Environmental and Recreation Measures[3]	$665,667
Recovery of FERC Licensing Application Costs[3]	$16,667
Operating Reserve[3]	$87,424
Transmission Costs[3]	$1,000
Authorized Installed Nameplate Capacity[4]	6,800 kW
Dependable Capacity[5]	0 kW

[1] While FERC's current cost approach requires an applicant to base costs in Exhibit D on a 30-year license term, SSWD requests, with good cause, from the Commission a new license with a term of 50 years.
[2] As described in Table 2.1-1 in Exhibit D of this Application for New License.
[3] As described in Tables 5.1-1 and 6.2-1 in Exhibit D of this Application for New License.
[4] As described in Section 5.2.1.1 and Section 6.3.1 in Exhibit D of this Application for New License.
[5] As described in Section 5.2.1.3 and Section 6.3.1 in Exhibit D of this Application for New License.

Table 4.2-2 summarizes the assumptions and economic information used in this analysis that are unique to either the No Action Alternative or to SSWD's Proposed Project.

Table 4.2-2. Assumptions and cost items not common to the No Action Alternative and SSWD's Proposed Project Alternative.

	Value or Average Annual Cost	
Assumption / Cost Item	**No Action Alternative**	**SSWD's Proposed Project**
Average Annual Energy	20,376 MWh	21,281 MWh
Average Annual Value of Energy[1]	$756,599	$778,187
Average Annual Environmental/Recreational Operating Costs ($2016/yr)[3]	$312,933	$440,433
Average Annual Pool Raise Costs[4]	--	$155,755

1 As described in Tables 5.2-7 and 6.3-2, respectively, in Exhibit D of this Application for New License.
2 As described in Tables 5.1-1 and 6.2-1, respectively, in Exhibit D of this Application for New license.
3 As described in Tables 5.1-1 and 6.2-2, respectively, in Exhibit D of this Application for New License.
4 As described in Section 6.1 in Exhibit D of this Application for New License.

SSWD's Proposed Project includes five Project-specific environmental/recreational resource management conditions, which are described in provided in Appendix E2 of Exhibit E. SSWD's estimate costs, including assumptions related to the costs for each of these measures is provided by condition in Table 4.2-3.

Table 4.2-3. SSWD's estimated costs in 2018 dollars related to implementation of SSWD's proposed conditions as part of continued operation of the Camp Far West Hydroelectric Project.

SSWD's Proposed Condition: Designation in This Application for New License	SSWD's Proposed Condition: Description	Total Capital Cost Over 30 Years[1] (2018 U.S. Dollars)	Total O&M Cost Over 30 Years (2018 U.S. Dollars)	Annualized Cost Over 30 Years[2] Excluding Energy (2018 U.S. Dollars)	Assumptions Over 30 Years
AR1	Flow Requirements	--	$10,000	$10,000	Same cost as under the existing conditions: continuation of flow requirements in existing license.
TR1	Bat Management	$50,000	$15,000	$3,000	Assumes a one-time effort (though could be spread over a couple of years) to erect bat exclusions in buildings not being replaced during recreation updates. Every five or ten years, some repairs and/or replacements of exclusions will be necessary. Assume on year 10, 20 and 30.
TR2	Develop Bald Eagle Management Plan	--	$75,000	$2,500	Assumes two bald eagle nests present each year, requiring a half-day spent by two SSWD employees to put up buoys and signs at each site during Limited Operating Period (LOP) and another half-day to remove them after LOP is complete.
RR1	Implement Recreation Facilities Plan	--	--	--	Rehabilitation or replacement of all existing facilities over the term of license; operation and maintenance of the North Shore and South Shore Recreation Areas. The costs to maintain and operate the Project recreation facilities would continue to be covered by the fees collected for use of the facilities.
	North Shore Recreation Area	$5,500,000	$0	$183,333	
	South Shore Recreation Area	$3,888,000	$0	$129,600	
CR1	Implement Historic Properties Management Plan	$100,000	$3,260,000	$112,000	Capital cost is based on data recovery at one site for a cost of $100,000. O&M cost is based on NRHP evaluation of 22 archeological sites at $40,000/site ($880,000); data recovery at 15 sites at $100,000/site ($1,500,000); data recovery at one archaeological district $200,000. Assumes annual costs of $5,000/yr for compliance report, $10,000/yr for monitoring 3 sites, and $5,000/yr for meetings with tribes and agencies ($20,000 x 30 = $600,000); and once every 10 years to review HPMP at a cost of $10,000/review ($10,000 x 3 = $30,000). Also, assumes access will be granted during the license to document three sites and survey previously inaccessible lands ($50,000).
	Total	**$9,538,000**	**$3,360,000**	--	--
	Annualized Over 30 Years	--	--	**$440,433**	--

1 Capital cost include new facilities or equipment or replacement of existing facilities or equipment with facilities or equipment that extend the life expectancy of the existing facilities or equipment.
2 Total annualized costs are calculated by summing Capital Cost and Total O&M Cost, and dividing the sum by 30.

4.3 Comparison of Alternatives

Table 4.3-1[4] compares the benefits (i.e., capacity, energy and ancillary services), costs (i.e., non-environmental/recreation and environmental/recreation) and net benefits of the No Action Alternative and SSWD's Proposed Project Alternative.

Table 4.3-1. Comparison of annual power benefits, costs net benefits between No Action Alternative and SSWD's Proposed Project.[4]

Value	No Action Alternative[1]	SSWD's Proposed Project[2]	Change[3]
AVERAGE ANNUAL GROSS POWER BENEFITS			
Capacity	--	--	--
Installed	6,800 MW	6,800 MW	No Change
Dependable	0 MW	0 MW	No Change
Subtotal - Value in 2018 Dollars	--	--	--
Energy	20,376 MWh	21,281 MWh	+905 MWh
Subtotal - Value in 2018 Dollars	*$756,599*	*$778,187*	*+$21,717*
Total – Value in 2018 Dollars	**$756,599**	**$778,187**	**+$21,717**
AVERAGE ANNUAL COSTS			
Non-Environmental/Recreational	$1,210,443	$1,210,443	No Change
Addition of Pool Raise	--	$155,755	-$155,755
Environmental/Recreational	$312,933	$440,433	-$127,500
Total - Costs in 2018 Dollars	**$1,522,443**	**$1,806,631**	**-$284,188**
AVERAGE ANNUAL NET BENEFIT			
Total – Net Benefit in 2018 U.S. Dollars	**-$765,884**	**-$1,028,444**	**-$262,560**

1 Calculate by subtracting SSWD's Proposed Project value from the No Action Alternative value: a plus means an increase over the No Action Alternative and a minus means a decrease over the No Action Alternative.

Under SSWD's Proposed Project as compared to the No Action Alternative, no change in installed capacity would occur and dependable capacity remains 0 kW. Average annual energy generation would be increased by 4 percent from 20,376 MWh to 21,281 MWh, with the greatest increase occurring in August. Average annual energy benefits would be increased by $21,717, or 4.7 percent. (Table 4.3-1.)

Under SSWD's Proposed Project as compared to the No Action Alternative, average annual Project costs would increase by $284,188 or 18.7 percent, with 54.8 percent of the increased cost related to the new Pool Raise and 45.2 percent related to the new environmental and recreation conditions (Table 4.3-1). SSWD meets Project costs by power and water sales and acquisitions of federal and State grants.

The overall average annual Project net benefit would decrease by $262,560, or by 33.0 percent (Table 4.3-1).

SSWD's Proposed Project would maintain the current installed capacity value of the Project and enhance a source of high-quality irrigation water to the region. SSWD's Proposed Project would also provide numerous environmental benefits, some of which include: enhancing fish habitat, which already supports robust and healthy anadromous fish populations; and providing the

4 Table 4.3-1 is essentially the same as Table 7.0-1 in Exhibit D of this Application for New License.

optimum development of recreational opportunity in the Project area consistent with the purpose of the Project.

4.4 Other Developmental and Non-Developmental Benefits

This section describes other developmental and non-development benefits.

4.4.1 Irrigation

SSWD's primary purpose is to provide a reliable and affordable supply of irrigation water to its service area, which encompasses a total gross area of 63,972 acres (ac), of which 6,960 ac are excluded, for a net area of 57,012 ac. Approximately 40,107 ac are in Sutter County and 16,905 ac are in Placer County. In a normal year, over 35,500 ac within SSWD's service area are under irrigation, with approximately 29,000 ac (82%) in rice production, 3,800 ac (11%) in orchards, 2,200 ac (6%) in irrigated pasture, and 500 ac (1%) in miscellaneous row and field crops. SSWD has done this by developing a distribution system to augment and provide alternatives to a declining groundwater table that was being tapped by private agricultural wells within SSWD's service area.

Today, the available water supply in Camp Far West Reservoir is totally allocated each year. However, the water supply still represents only a portion of SSWD's users' demands. Up to approximately 500 cfs of the water released from Camp Far West Reservoir is re-diverted from the Bear River during the irrigation season (i.e., typically, from mid-April through mid-October) at a 38-ft high diversion dam located approximately 1.25 miles (mi) downstream from Camp Far West Dam into SSWD's Conveyance Canal, which is located on the south bank and runs predominately north to south along the higher eastern border of SSWD's service area. Typically, water deliveries begin low in mid-April, peak in July, and then gradually decrease through mid-October. Through turnouts and head gates, water is directed from SSWD's Conveyance Canal into improved canals, one pipeline, and natural channels running from east to west, and distributed to water users. Depending upon the anticipated reservoir yield, the water user's allocations may range from 0 ac-ft per ac of irrigated land during a drought year to as much as 2.0 ac-ft per ac during a wet year. Perennial crops such as orchards and pasture receive a higher priority of allocation over seasonal crops, with rice growers receiving the lowest priority.

Besides serving its members its service territory, SSWD provides up to 13,000 ac-ft of water to the other users. In accordance with a 1957 agreement and a 1973 settlement agreement, SSWD provides to the Camp Far West Irrigation District (CFWID) 13,000 ac-ft of water from the Camp Far West Reservoir each year to satisfy CFWID's senior water rights on the Bear River.

Lastly, the value of Camp Far West Reservoir as augmenting California's Central Valley's water supply was clearly recognized in 1967 when the reservoir was enlarged as part of the California State Water Plan.

4.4.2 Bay-Delta Contributions

In February 2000, SSWD, DWR and the CFWID entered into the Bear Agreement (DWR, SSWD and CFWID 2000) to settle the responsibilities of SSWD, CFWID, and all other Bear River water rights, to implement the objectives in the Water Quality Control Plan for the San Francisco Bay/ Sacramento-San Joaquin Delta Estuary adopted May 22, 1995 (1995 Bay-Delta Plan).

To incorporate this agreement into SSWD's water rights, in July 2000, the SWRCB issued Order 2000-10 that amended SSWD's Water Right Licenses 11120 and 11118 to provide that:

> During releases of water in connection with the change of purpose of use and place of use of up to 4,400 acre-ft transferred to DWR during dry and critical years,[ ] Licensee shall increase flows in the lower Bear River by no more than 37 cfs from July through September. To avoid stranding impacts to anadromous fish in the Bear River below Camp Far West Reservoir, Licensee shall, by the end of a release period from the reservoir in connection with said change, ramp down flows from the reservoir at a rate not to exceed 25 cfs over a 24-hour period.

The required flow volume is in addition to the minimum flow requirement in the Project license, and is measured immediately downstream of the diversion dam as spill, over the diversion dam. SWRCB's Order 2000-10 states that this arrangement would terminate upon the termination of the Bear River Agreement on December 31, 2035, or sooner if the Bear River agreement was terminated sooner.

4.5 List of Attachments

None.

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SECTION 5.0
CONCLUSIONS

5.1 Comparison of Alternatives

This section compares the developmental and non-developmental effects of SSWD's Proposed Project and the No Action Alternative.

5.2 Comprehensive Development and Recommended Alternative

Sections 4(e) and 10(a) of the FPA (16 U.S.C. §§ 797(e) & 803(a)) require that the Commission give equal consideration to all uses of the waterway on which a project is located. When the Commission reviews a hydropower project, the Commission considers the water quality, fish and wildlife, recreational, and other non-developmental values of the involved waterway equally with its electric energy and other developmental values. Accordingly, any license issued will be best adapted to a comprehensive plan for improving or developing a waterway or waterways for all beneficial public uses.

FERC will complete this section in its draft EA or draft EIS, if FERC decides to prepare an EIS instead of an EA.

5.3 Unavoidable Adverse Effects

FERC will include this section in its draft EA or draft EIS, if FERC decides to prepare an EIS instead of an EA.

5.4 Consistency with Comprehensive Plans

Section 10(a)(2)(A) of the FPA (16 U.S.C. § 803(a)(2)(A)) requires the Commission to consider the extent to which a project is consistent with federal and state comprehensive plans for improving, developing, or conserving waterways affected by the Project. On April 27, 1988, FERC issued Order No. 481-A, which revised Order No. 481, issued on October 26, 1987. This order provides that FERC will give FPA Section 10(a)(2)(A) comprehensive plan status to any federal or state plan that meet each of the following three criteria: 1) it is a comprehensive study of one or more of the beneficial uses of a waterway or waterways; 2) it specifies the standards, the data, and the methodology used to develop the plan; and 3) it is filed with FERC.

FERC's Revised List of Comprehensive Plans, dated January 2018, can be found at FERC's eLibrary (http://www.ferc.gov/industries/hydropower/gen-info/licensing/complan.pdf). A review of this list shows that the Commission has listed, under FPA Section 10(a), 76 comprehensive plans for the State of California. SSWD determined that 21 of the Qualifying Plans may be relevant to the Proposed Project.

This section provides an explanation of how and why SSWD's Proposed Project would, would not, or should not be consistent with each of the 28 Qualifying Plans, or in some cases, directs the reader to the appropriate section of the Application for New License for an in-depth discussion of the proposed Project's consistency with the plan. To facilitate FERC's review, the plans are discussed below in the order presented by FERC its January 2018 Revised List of Comprehensive Plans, and the full reference for each plan is provided. As of the time of filing of the Application for New License with FERC, relevant resource agencies have not made determinations regarding the consistency of the Proposed Project with any Qualifying Plans.

5.4.1 California Department of Fish and Game. 2007. California Wildlife: Conservation Challenges, California's Wildlife Action Plan. Sacramento, California. 2007.

The California Wildlife Action Plan was developed in response to the State Wildlife Grants Program enacted by the U.S. Congress in 2000. Together, CDFW and the Wildlife Health Center, University of California, Davis, directed the development of the State's Wildlife Action Plan, *California Wildlife: Conservation Challenges*. Using practical management jurisdictions from state and federal wildlife and land-management agencies that are based roughly on distribution of biological resources, the report divides California into nine regions: Mojave Desert, Colorado Desert, South Coast, Central Coast, North Coast-Klamath, Modoc Plateau, Sierra Nevada and Cascades, Central Valley and Bay-Delta, and Marine. Within each region, species at risk, threats, and conservation actions are identified. The Proposed Project is located in the Sierra Nevada region, and none of the actions pertain specifically to the lower Bear River or SSWD. Therefore, the plan is not relevant to the Proposed Project.

5.4.2 California Department of Fish and Game. U.S. Fish and Wildlife Service. National Marine Fisheries Service. Bureau of Reclamation. 1988. Cooperative agreement to implement actions to benefit winter-run Chinook salmon in the Sacramento River Basin. Sacramento, California. May 20, 1988.

This cooperative agreement was made by the U.S. Department of the Interior, Bureau of Reclamation (Reclamation), USFWS, NMFS and CDFW. The purpose of the agreement was to implement actions that would improve the status of winter-run Chinook salmon in the Sacramento River basins. The agreement identified eight measures that would be followed by the identified parties. The measures generally included: a revised gate operation schedule for Red Bluff Diversion Dam, implementing a thermal control at Shasta Reservoir, correcting pollution from Spring Creek, restoring habitat in the Redding, CA area, correcting salmon-related problems at the Anderson-Cottonwood Irrigation District Diversion Dam, restricting in-river harvest of winter-run salmon, developing a winter-run propagation program at Coleman Hatchery, modifying the Keswick fish trap to prevent mortality of winter-run Chinook, expanding studies on winter-run Chinook, and developing fish passage alternatives to raising the Red Bluff Diversion Dam gates. The management plan also identified other ongoing measures that each participating party was undertaking to benefit winter-run salmon.

This agreement does not provide any guidance regarding management of fisheries populations on the Bear River, or any actions that pertain specifically to the Proposed Project or SSWD, and ESA-designated critical habitat for winter-run Chinook salmon does not occur in the Bear River. Therefore, this agreement is not relevant to the Proposed Project.

5.4.3 California Department of Fish and Game. 1990. Central Valley Salmon and Steelhead Restoration and Enhancement Plan. Sacramento, California. April 1990.

This plan was released by CDFG in April 1990. This plan is intended to outline CDFW's restoration and enhancement goals for salmon and steelhead resources of the Sacramento and San Joaquin river systems and to provide direction for various CDFW programs and activities. This plan is also intended to provide the understanding and persuasive arguments for the restoration and enhancement of the State's salmon and steelhead resources.

The Proposed Project would not adversely impact anadromous salmonid habitat in the Bear River or elsewhere in the Sacramento River Watershed. Therefore, the Proposed Project would not be inconsistent with this plan.

5.4.4 California Department of Fish and Game. 1993. Restoring Central Valley streams: A Plan for Action. Sacramento, California. November 1993.

This plan was released by CDFG in November 1993. The goals of the plan, all targeted toward anadromous fish, are to restore and protect California's aquatic ecosystems that support fish and wildlife, to protect threatened and endangered species, and to incorporate the State legislature mandate and policy to double populations of anadromous fish in California. The plan encompasses only Central Valley waters accessible to anadromous fish, excluding the Sacramento-San Joaquin Delta.

With regards to the Bear River, the plan states:

> The Bear River once supported substantial runs of salmon and steelhead, but due to inadequate flow releases at the South Sutter Irrigation District diversion dam, there are presently no self-sustaining runs of salmon or steelhead. Occasionally, when heavy fall rains and sufficient spillage occur at the South Sutter Irrigation District, hundreds of fall-run chinook salmon and steelhead may ascend and spawn in the Bear River.
>
> The Bear River could support sustainable populations of chinook salmon and steelhead if adequate flows were provided.[1]

[1] CDFW provided in the document no specific recommendations for "adequate flows".

The plan includes specific actions and the agencies responsible for achieving restoration objectives. The actions include upgrading screens on diversions, restoring habitat, target flows for critical life stages, and water quality objectives.

Refer to Sections 3.3.3 (Aquatic Resources) and 3.3.5 (ESA-Listed Species) in this Exhibit E for a discussion regarding the Proposed Project and anadromous fishes.

5.4.5 California Department of Fish and Game. 1996. Steelhead Restoration and Management Plan for California. February 1996.

This plan was released by CDFG in February 1996. This plan focuses on restoration of native and naturally produced (wild) stocks because these stocks have the greatest value for maintaining genetic and biological diversity. Goals for steelhead restoration and management are: 1) increase natural production, as mandated by *The Salmon, Steelhead Trout, and Anadromous Fisheries Program Act of 1988*, so that steelhead populations are self-sustaining and maintained in good condition; and 2) enhance angling opportunities and non-consumptive uses. While this plan described measures for the restoration of salmonids in California, no specific prescriptive comments were directed to the Bear River or to SSWD.

Refer to Section 3.3.5 (ESA-Listed Species) in this Exhibit E for a discussion regarding the Proposed Project and steelhead.

5.4.6 California Department of Fish and Wildlife. 2003. Strategic Plan for Trout Management: A Plan for 2004 and Beyond. Sacramento, California. November 2003.

This plan was released by CDFG in 2004. The plan focuses on identifying key issues and concerns related to trout resources in California. The scope of the plan included all resident forms of salmonids. The plan calls for an ecosystem-wide approach to trout management that recognizes how trout interact with other aquatic organisms. The plan outlines two major themes: 1) habitat and native species protection and management; and 2) recreational angling. The plan provides broad, wide ranging, statewide direction for CDFW's trout programs, but is intended to be a tool to be used for the development of specific watershed implementation plans.

This plan focuses on CDFW actions, and includes no specific actions that pertain to the Proposed Project or SSWD. Therefore, the plan is not relevant to the Proposed Project

5.4.7 California Department of Fish and Wildlife. 2008. California Aquatic Invasive Species Management Plan. Sacramento, California. January 18, 2008.

This California Aquatic Invasive Species Management Plan was released by CDFW in January 2008. Recreational equipment and activities have been identified as vectors for distributing some AIS and this plan proposes management actions for addressing AIS threats to the State of California. It focuses on the non-native algae, crabs, clams, fish, plants and other species that continue to invade California's creeks, wetlands, rivers, bays and coastal waters. The main purpose of the plan is to coordinate State programs, create a statewide decision-making structure and provide a shared baseline of data and agreed-upon actions so that state agencies may work together more efficiently. In addition, the plan provides the State's first comprehensive, coordinated effort to prevent new invasions, minimize impacts from established AIS and establish priorities for action statewide. Finally, the plan supports the State's first rapid response process for high-risk invaders.

Refer to Section 3.3.3 (Aquatic Resources) in this Exhibit E for a discussion regarding the Proposed Project and AIS.

5.4.8 California Department of Parks and Recreation. 1998. Public Opinions and Attitudes on Outdoor Recreation in California. Sacramento, California. March 1998.

California Department of Parks and Recreation's (CDPR) Public Opinions and Attitudes in Outdoor Recreation survey (POAOR), the most recent version of which is from 2012, provides information used in the development of the CDPR's Statewide California Outdoor Recreation Plan (SCORP). The POAOR identifies: 1) California's attitudes, opinions, and values with respect to outdoor recreation; and 2) demand for, and participation in, 42 selected outdoor recreation activities.

This document applies to recreation facilities owned and operated by the state or local parks and recreation agencies. Therefore, the plan is not relevant to the Proposed Project.

5.4.9 California Department of Parks and Recreation. 1980. Recreation Outlook in Planning District 3. Sacramento, California. June 1980. 82 pp.

CDPR advised SSWD that the document is out-of-date and irrelevant due to the SCORP documents that are revised every 4 years. CDPR stated that the SCORP documents are the primary recreation planning documents.

5.4.10 California Department of Parks and Recreation. 1994. Statewide California Outdoor Recreation Plan (SCORP). Sacramento, California. April 1994.

The objectives of CDPR's SCORP, the most recent version of which is dated 2015, are to determine outdoor recreation issues (problems and opportunities) most critical in California, and to explore the most appropriate actions that State of California and local agencies, which manage State and local parks, could take to address those issues. The 2015 SCORP summarizes key findings, introduces new GIS tools to assess local park needs, and establishes priorities for statewide actions. The SCORP establishes the following actions to address California's park and recreation needs: 1) inform decision-makers and communities of the importance of parks; 2) improve the use, safety, and condition of existing parks; 3) use GIS mapping technology to identify park deficient communities and neighborhoods; 4) increase park access for Californians including residents in underserved communities; and5) share and distribute success stories to advance park and recreation services.

The SCORP applies to State and local parks and recreation agencies, and does not apply to federal and private-sector recreational providers. Because none of the Project recreation facilities are State or local parks or recreation agency facilities, the SCORP is not relevant to the Proposed Project.

5.4.11 California Department of Water Resources. 1994. California Water Plan Update. Bulletin 160–93. Sacramento, California. October 1994. Two volumes and executive summary.

DWR first published the California Water Plan in 1957. The plan focused on the quantity and quality of water available to meet the State of California’s water needs, and management actions that could be implemented to improve the State’s water supply reliability. Since then, DWR has updated the plan numerous times, including in 1994, the reference used in FERC’s List of Comprehensive Plans. The most recent update was in December 2005. The Project’s reservoirs represent a portion of the water supply in the hydrologic region.

The Proposed Project would not be inconsistent with the California Water Plan, as updated. Continued operation and maintenance of the Project will maintain a continued, good quality water supply.

5.4.12 California Department of Water Resources. 2000. Final Programmatic Environmental Impact Statement/Environmental Impact Report for the CALFED Bay-Delta Program. Sacramento, California. July 2000. CD ROM, including associated plans.

The California Water Policy Council and the Federal Ecosystem Directorate united in June 1994 to form CALFED. In June 1995, CALFED established its Bay-Delta Program (Program) to develop a long-term, comprehensive solution to environmental issues in the Sacramento-San Joaquin Delta and San Francisco Bay. The Program is a cooperative, interagency effort involving 15 state and federal agencies with management and regulatory responsibilities in the San Francisco Bay-San Joaquin Delta Estuary (Bay-Delta).

Over several years and phases, CALFED developed plans in several program areas to address concerns related to the Bay-Delta. In August 2000, the state and federal CALFED agencies certified a programmatic environmental impact report (PEIR)/EIS and adopted a record of decision defining the program plans. They were in the areas of: 1) ecosystem restoration; 2) water quality; 3) water use efficiency; 4) water transfer; 5) levee system integrity; and 6) watershed

The goals of the Water Quality and Watershed programs under CALFED include improving overall water quality by reducing the loadings of many constituents of concern that enter Bay-Delta tributaries from point and non-point sources. Targeted constituents include heavy metals (such as mercury), pesticide residues, salts, selenium, pathogens, suspended sediments, adverse temperatures, and disinfection byproduct precursors such as bromide and total organic carbon (TOC). The remaining Program plans include the: 1) Implementation Plan; 2) Multi-species Conservation Strategy (MSCS); and 3) Comprehensive Monitoring, Assessment, and Research Program

The final PEIR/EIS described the broad environmental consequences of proposed actions and enabled decisions to be made regarding Program direction and content. The California Supreme Court upheld the final PEIR/EIS in a 2008 decision. (*In re Bay-Delta Programmatic Environmental Impact Report Coordinated Proceedings* (2008) 43 Cal.4th 1143.)

The CALFED Bay-Delta Program was managed by the California Bay-Delta Authority (CBDA), which was established by the California Legislature in 2002 legislation.

Following significant declines in the populations of certain Bay-Delta fish species beginning in 2000, however, the California Legislature replaced the CALFED program and the CBDA with new measures to address the Bay-Delta's issues. Specifically, in 2009, the Legislature enacted, and the Governor signed, the Sacramento-San Joaquin Delta Reform Act of 2009 (Delta Reform Act). (Cal. Water Code §§ 85000-85350.) That Act created a new state agency, the Delta Stewardship Council (DSC), repealed the act creating and governing the CBDA and transferred the CBDA's rights, obligations and contracts to the DSC (See Cal. Water Code §§ 85034, 85200; Cal. Statutes, 2009-2010 7th Extraordinary Session, Chapter 5, § 38 (repealing CBDA's authorizing act)).

The 2009 Delta Reform Act required the DSC to prepare a Delta Plan as a means of coordinating federal, state and local agencies' actions concerning the Bay-Delta. (Cal. Water Code § 85300.) Under the Act, the DSC has authority to review at least state and local agencies' actions concerning the Bay-Delta to determine whether they are consistent with the Delta Plan. (Cal. Water Code §§ 85225-85225.30.)

The Delta Plan, and the DSC's ability to determine consistency with that Plan, however, do not extend to SSWD's operation of its hydroelectric facilities because they are located outside of the Bay-Delta. The Delta Reform Act states that the DSC has the authority to determine the consistency of "covered actions" with the Delta Plan. (Cal. Water Code §§ 85225.10, 85225.25.) The Act defines "covered actions" as those that "[w]ill occur, in whole or in part, within the boundaries of the Delta or Suisun Marsh." (Cal. Water Code § 85057.5, subd. (a)(1).). The Delta Plan that the DSC adopted on May 16, 2013, acknowledges this limitation on the Delta Plan's scope, stating:

> To qualify as a covered action, a project must include one or more activities that take place at least partly within the Delta or Suisun Marsh. This means, for example, that the diversion and use of water in the Delta

> watershed that is entirely upstream of the statutory Delta or Suisun Marsh would not satisfy this criterion.

(Final Delta Plan (red-line version), p. 54 (available at http://deltacouncil.ca.gov/delta-plan-0)

While SSWD's operations of its hydroelectric facilities are not within the scope of the Delta Plan that has succeeded the CALFED program under the 2009 Delta Reform Act, YCWA's operations are consistent with the goals of that Act. In that Act, the Legislature enacted particular "coequal goals" and required that the Delta Plan "further the coequal goals" (Cal. Water Code §§ 85020, 85054, 85300, subd. (a)). The Act defines the coequal goals as follows: "Coequal goals" means the two goals of providing a more reliable water supply for California and protecting, restoring and enhancing the Delta ecosystem. (Cal. Water Code § 85054.) The Act also states certain "policy objectives" that "are inherent in the coequal goals…" (Cal. Water Code § 85020.) Those policy objectives include the following: 10 manage the Delta's water and environmental resources and the water resources of the state over the long term; 2) restore the Delta ecosystem, including its fisheries and wildlife, as the heart of a healthy estuary and wetland ecosystem; 3) promote statewide water conservation, water use efficiency, and sustainable water use; and 4) improve the water conveyance system and expand statewide water storage.

In February 2000, SSWD, DWR and the CFWID entered into the Bear Agreement (DWR, SSWD and CFWID 2000) to settle the responsibilities of SSWD, CFWID, and all other Bear River water rights, to implement the objectives in the Water Quality Control Plan for the San Francisco Bay/ Sacramento-San Joaquin Delta Estuary. To incorporate this agreement into SSWD's water rights, in July 2000, the SWRCB issued Order 2000-10 that amended SSWD's Water Right Licenses 11120 and 11118 to provide that:

> During releases of water in connection with the change of purpose of use and place of use of up to 4,400 acre-feet transferred to DWR during dry and critical years,[ ] Licensee shall increase flows in the lower Bear River by no more than 37 cfs from July through September. To avoid stranding impacts to anadromous fish in the Bear River below Camp Far West Reservoir, Licensee shall, by the end of a release period from the reservoir in connection with said change, ramp down flows from the reservoir at a rate not to exceed 25 cfs over a 24-hour period.

The required flow volume is in addition to the minimum flow requirement in the existing FERC license, and is measured immediately downstream of the diversion dam as spill over the diversion dam (i.e., SSWD installs notched boards on the diversion dam and controls the elevation of the diversion dam impoundment to provide the required flow).

For these reasons, SSWD concludes that the Proposed Project is consistent with California's Bay-Delta program that has superseded the CALFED program.

5.4.13 California State Water Resources Control Board. 1995. Water Quality Control Plan Report. Sacramento, California. Nine volumes.

This reference is to the water quality control plans adopted by the SWRCB pursuant to the CWA. The nine plans, which apply to different areas of California, formally designate existing and potential beneficial uses and water quality objectives. The water quality control plan that is applicable to the Project Area is the CVRWQCB's Water Quality Control Plan for the Sacramento River and San Joaquin river basins, which is referred to as the Basin Plan in this document. The SWRCB has updated the water quality control plans a number of times since 1995. The most recent version of the Sacramento River and San Joaquin River Basin Plan is 2011.

Refer to Section 3.3.2 (Water Resources) of Exhibit E includes a detailed discussion regarding compliance of the Proposed Project with the Basin Plan.

5.4.14 The Resources Agency. 1989. Upper Sacramento River Fisheries and Riparian Habitat Management Plan. Sacramento, California. January 1989.

The California Resource Agency is a state cabinet-level agency in the government of California that was appropriated funds through a bill (SB 1086) to develop a management plan for fisheries and riparian habitat resources of the Sacramento River. The purpose of the plan is to identify specific actions that will help restore the Sacramento River fishery and protect or restore riparian habitat. These identified actions provide a framework for regulating agencies to plan for future activities. The product of the plan identified the following conclusions: 1) stated that the Sacramento River is important for anadromous fish; 2) noted that winter- and spring-run salmon populations are at dangerously low levels and less than 5 percent of riparian habitat remains on the Sacramento River; 3) suggested restoration measures in the plan will restore anadromous fisheries and benefit other resources; 4) asserted that implementing the plan will require a significant commitment amongst state and federal regulators along with local funding; and, 5) stated that responsibility for the implementation is expected to be 75 percent federal and 25 percent state responsibility. The plan also provided four recommendations. These recommendations were: 1) state and federal legislation is needed soon to take action; 2) the State of California should seek funding through multiple propositions to share cost; 3) identified implementation measures should be conformed to by identified priorities; and 4) an Upper Sacramento River Advisory Council should be created with authority to implement the plan.

The plan applies to actions federal and State agencies should take, and did not identify any actions specific to the lower Bear River or SSWD. Therefore, the plan is not relevant to the Proposed Project.

5.4.15 National Marine Fisheries Service. 2014. Recovery Plan for the Evolutionary Significant Units of Sacramento River Winter-run Chinook salmon and Central Valley Spring-run Chinook salmon and the Distinct Population Segment of California Central Valley steelhead. Sacramento, California. July 2014.

The Recovery Plan for Central Valley (CV) winter-run Chinook salmon (*Oncorhynchus tshawytscha*) Evolutionary Significant Unit (ESU), CV spring-run Chinook salmon (*O. tshawytscha*) ESU and CV steelhead (*O. mykiss*) Distinct Population Segment (DPS) was published as a means to identify the actions that may be needed for the conservation and survival of these species. The Recovery Plan is a comprehensive document that serves as a road map for species recovery. The purpose of this Recovery Plan is to guide the implementation of species recovery by identifying and correcting threats to the species and ensuring viable CV Chinook salmon ESUs and the CV steelhead DPS.

The plan provides background history on the species, presents and justifies the recommended recovery strategy for each species including specific goals and objectives. Finally, the specific actions that should be taken to achieve recovery are presented.

The ultimate goal is the delisting of the CV Chinook salmon ESUs and the CV steelhead DPS.

A key element of the Recovery Plan is the focus of actions on watersheds that can support viable populations of ESA-listed salmonids and contribute to meeting Diversity Group[2] requirements for distribution and redundancy. To assess their potential to contribute to species recovery in the diversity group, the Recovery Plan places watersheds into three categories based on their potential to support populations with low risk of extinction. The three categories are Core 1, Core 2, and Core 3. If the watershed has no potential to support populations with low risk of extinction, it is not placed into one of the three categories. In addition, the Recovery Plan lists stressors to the populations by watershed.

For the CV winter-run and spring-run Chinook salmon ESUs, the Recovery Plan does not classify the Bear River as a Core 1, 2, or 3, stream, and does not list any Bear River-specific stressors.

[2] The Recovery Plan identifies four diversity groups, which are geographic areas that NMFS believes have supported historical populations of the ESA-listed anadromous salmonid. The Bear River is in the Recovery Plan's Northern Sierra Nevada Diversity Group, which is "*composed of streams tributary to the Sacramento River from the east, from Antelope Creek to the Mokelumne River*" (NMFS 2014, p. 68).

For the CV steelhead DPS, the Recovery Plan classifies the Bear River as a Core 3[3] stream and lists the following Bear River-specific stressors:[4]

- Water temperature during specific times of the year (primarily during the CV steelhead adult immigration, embryo incubation, and juvenile outmigration periods – spring, summer, and fall)
- Flow conditions during all CV steelhead lifestages because the Bear River is a highly managed river. Flow-dependent habitat availability is a concern during spawning and juvenile rearing and emigration. Low flows during adult immigration are a concern with respect to attraction and migratory cues.
- Entrainment of CV steelhead at unscreened diversions.
- Physical habitat alteration, which can lead to CV steelhead spawning habitat reduction.
- Loss of natural river morphology as a result of the managed flow regime.
- Loss of riparian habitat and instream cover as a result of the managed flow regime and adjacent agricultural production.
- Poor water quality primarily for CV steelhead embryo incubation and juvenile rearing and outmigration. Of particular concern are mercury from historic gold mining, and diazinon from agricultural runoff.

Additional stressors to the CV steelhead DPS listed in the Recovery Plan that are not specific to the Bear River but apply to the overall Northern Sierra Nevada Diversity Group include loss of floodplain habitat in the San Francisco Bay Delta, flow and water temperature issues in the Feather and Sacramento rivers, hatchery effects on genetic diversity, and predation of juvenile outmigrants.[5]

The Recovery Plan does not identify passage impediments in the Bear River as a stressor of high importance because, according to the Recovery Plan, Camp Far West Dam was constructed at the site of a natural historic barrier.[6]

Refer to Section 3.3.5 (ESA-Listed Species) in this Exhibit E for a discussion regarding ESA-listed anadromous fishes.

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[3] The Recovery Plan describes a Core 3 stream as in "*watersheds* [that] *have populations that are present on an intermittent basis and require straying from other nearby populations for their existence. These populations likely do not have the potential to meet the abundance criteria for moderate risk of extinction. Core 3 watersheds are important because, like Core 2 watersheds, they support populations that provide increased life history diversity to the ESU/DPS and are likely to buffer against local catastrophic occurrences that could affect other nearby populations. Dispersal connectivity between populations and genetic diversity may be enhanced by working to recover smaller Core 3 populations that serve as stepping stones for dispersal*."

[4] The Bear River Watershed Profile in the Recovery Plan begins on Page 49 in Appendix A and the Threats Matrix, which begins on Page C-94, in Attachment C to Appendix B, are the two main locations in the Recovery Plan for Bear River-specific stressors.

[5] The Northern Sierra Nevada Diversity Group stressor Matrix Results highlight the highest priority stressors for the Diversity Group that contains the Bear River starts on Page 4-135 in Appendix B of the Recovery Plan.

[6] As stated at page 4-135 in Appendix B, Section 4, of the Recovery Plan.

5.4.16 National Park Service. The Nationwide Rivers Inventory. Department of the Interior, Washington, D.C. 1993.

The Nationwide Rivers Inventory (NRI) is a listing by the National Park Service of more than 2,400 free-flowing river segments in the U.S. that are believed to possess one or more "outstandingly remarkable" natural or cultural values (ORVs) judged to be of more than local or regional significance. In addition to these eligibility criteria, river segments are divided into three classifications: Wild, Scenic, and Recreational river areas. Under a 1979 Presidential Directive and related Council on Environmental Quality procedures, all federal agencies must seek to avoid or mitigate actions that would adversely affect one or more NRI segments. Such adverse impacts could alter the river segment's eligibility for listing and/or alter their classification.

None of the NRI-listed river segments occur in the Project Area or downstream of the Proposed Project. Therefore, the NRI listed-rivers would not be affected by the Proposed Project.

5.4.17 State Water Resources Control Board. 1999. Water Quality Control Plans and Policies Adopted as Part of the State Comprehensive Plan. April 1999.

This citation in FERC's List of Comprehensive Plans refers to an April 1999 submittal by the SWRCB to FERC of a listing of all SWRCB plans and policies. The transmittal referenced that all of the listed plans and policies are part of the "State Comprehensive Plan," even though it does not exist as a single plan.

As described above, the most pertinent SWRCB plan or policy that applies to the proposed Project is the Basin Plan, and the proposed Project's compliance with the Basin Plan is discussed in detail in Section 3.3.2 (Water Resources).

Also, in connection with the FERC relicensing process, the SWRCB may condition the Project's operations to protect water quality and beneficial uses of water under Section 401 of the CWA and the Basin Plan through the SWRCB's water quality certification. This certification, or waiver thereof, will be a pre-requisite of issuance of a new FERC license, and will include conditions to ensure the Proposed Project will comply with the Basin Plan.

5.4.18 U.S. Fish and Wildlife Service. 1990. Central Valley Habitat Joint Venture Implementation Plan: A Component of the North American Waterfowl Management Plan. February 1990.

The California Central Valley Habitat Joint Venture (CVHJV) is one of 12 current joint ventures charged with implementation of the North American Waterfowl Management Plan. The CVHJV was formally established by a working agreement signed in July 1988 and is guided by an Implementation Board comprised of representatives from the California Waterfowl Association, Defenders of Wildlife, Ducks Unlimited, National Audubon Society, Waterfowl Habitat Owners

Alliance, and The Nature Conservancy. Technical assistance is provided to the Implementation Board by the USFWS, CDFG, California Department of Food and Agriculture, and other organizations and agencies.

The Central Valley of California is the most important wintering area for waterfowl in the Pacific Flyway, supporting 60 percent of the total population. Historically, the Central Valley contained more than 4 million ac of wetlands; however, only 291,555 ac remained in 1990 when the CVHJV was first implemented. The primary cause of this wetland loss was conversion to agriculture, flood control, and navigation projects, and urban expansion.

When completed, the CVHJV will: 1) protect 80,000 ac of existing wetlands through the fee acquisition or conservation easement; 2) restore 120,000 ac of former wetlands; 3) enhance 291,555 ac of existing wetlands; 4) enhance waterfowl habitat on 443,000 ac of private agricultural land; and 5) secure 402,450 ac-ft of water for existing State Wildlife Areas, National Wildlife Refuges, and the Grasslands Resource Conservation District. These habitat conservation efforts are intended to result in a fall flight of 1 million ducks and 4.7 million wintering ducks. The wintering birds will include 2.8 million pintails, a species whose wintering population is vitally dependent on the Central Valley.

The CVHJV is a regional approach to conservation and management of waterfowl populations in the Central Valley, but has no specific application to operation and management of the Proposed Project.

5.4.19 U.S. Fish and Wildlife Service. 2001. Final Restoration Plan for the Anadromous Fish Restoration Program. Department of the Interior, Sacramento, California. January 9, 2001.

The Central Valley Project Improvement Act directed the Secretary of DOI to develop and implement a program that makes all reasonable efforts to double natural production of anadromous fish in California Central Valley streams (Section 3406(b)(1)). The program is known as the Anadromous Fish Restoration Program. The 2001 plan was released by USFWS as a revised draft on May 30, 1997 and adopted as final on January 9, 2001. The plan identifies restoration actions that may increase natural production of anadromous fish in Central Valley streams. The plan is split up into watersheds within the Central Valley, and restoration actions are identified for each watershed. It also lists the involved parties, tools, priority rating, and evaluation of each restoration action. The plan encompasses only Central Valley streams accessible to anadromous fish, including the Sacramento-San Joaquin Delta.

In the plan, USFWS establishes a doubling goal for the Bear River salmon production through increased instream flows. Specifically, USFWS postulated that the average annual number of fall-run Chinook salmon in the Bear River from 1967 through 1991 was 639 fish, and USFWS established a doubling goal of 450 fish.[7] The goal was to be met by:

[7] USFWS provided in the document no evidence to document its estimate of 639 for the average annual number of fall-run Chinook salmon in the Bear River from 1967 through 1991, or rationale for its 450 fish per year doubling goal.

Supplement flows with water acquired from willing sellers consistent with applicable guidelines or negotiate agreements to improve conditions for all life history stages of chinook salmon and steelhead;

Provide adequate water temperatures for all life-stages of chinook salmon and steelhead, and screen all diversions to protect all life history stages of anadromous fish.

Refer to Sections 3.3.3 (Aquatic Resources) and 3.3.5 (ESA-Listed Species) in this Exhibit E for a discussion regarding ESA-listed anadromous fishes.

5.4.20 U.S. Fish and Wildlife Service. Canadian Wildlife Service. 1986. North American Waterfowl Management Plan. Department of the Interior. Environment Canada. May 1986.

The North American Waterfowl Management Plan (NAWMP) is an update of the Convention for the Protection of Migratory Birds, which was established between the United States and Canada in 1916. The plan is a guide for private and public entities in the conservation and management of waterfowl. The CVHJV Implementation Plan (USFWS et al. 1990) is an example of implementation of the guidelines established by the NAWMP. Goals and general recommendations are described for the protection of habitat, financing of research and managing harvest. The plan outlines a framework for separating the larger group of waterfowl into smaller guilds, dabbling ducks, diving ducks, sea ducks, and geese, which will benefit from similar management strategies.

The NAWMP leaves implementation to local conservation and management groups and has no specific application to operation and management of the Proposed Project.

5.4.21 U.S. Fish and Wildlife Service. n.d. Fisheries USA: The Recreational Fisheries Policy of the U.S. Fish and Wildlife Service. Washington, D.C.

This is a 12-page policy that was signed by John F. Turner, then Director of the USFWS, on December 5, 1989. Its purpose is to unite all of the USFWS' recreational fisheries capabilities under a single policy to enhance the nation's recreational fisheries. Regional and Assistant directors are responsible for implementing the policy by incorporating its goals and strategies into planning and day-to-day management efforts. The USFWS carries out this policy relative to FERC-licensed hydroelectric projects through such federal laws as the Fish and Wildlife Coordination Act, the Clean Water Act, the Endangered Species Act, NEPA and the FPA, among others.

The Proposed Project supports recreational fisheries in the Project's reservoir. In addition, the Proposed Project will comply with all federal and State laws.

5.5 List of Attachments

None.

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SECTION 6.0

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APPENDIX E1

SSWD's Operations and Water Temperature Models, Hydrology and Water Temperature Data, and Technical Memorandum

Appendix E1 includes SSWD's Water Balance/Operations Model, SSWD's Water Temperature Models, and technical memorandum. Specifically, the material in Appendix 1 includes:

- Water Balance/Operations Model. Version 3 dated November 20, 2018, and configured for the No Action Alternative. The Ops Model simulates a period of record of October 1975 through September 2014.
- Water Balance/Operations Model Documentation. The Ops-Model Documentation Validation Report, and dated February 2016.
- Temp Model GUI (graphical user interface). The GUI is in Microsoft^{TM} Excel format. It streamlines the process of performing a period of record (water years 1976 through 2014) water temperature model run, which takes Ops Model output and runs in series:
  - The Camp Far West Temp Model
  - The non-Project diversion dam Temp Model
  - The lower Bear River Temp Model

  The Temp Model GUI is configured for the No Action Alternative.
- Water Temperature Model Documentation. Tech Memo – Model Development.
- Historical Water Temperature Data. Reservoir water temperature profile data are provided in Microsoft^{TM} Excel format for New Bullards Bar and Englebright reservoirs for the period of record from April 2015 through January 2018. Stream temperature data are provided in HEC-DSS for a period of record from April 2015 through September 2018 for these locations:
  - Rock Creek above Camp Reservoir;
  - Bear River above Camp Far West Reservoir;
  - Bear River downstream of the Camp Far West powerhouse;
  - Bear River below the Camp Far West spillway;
  - Bear River below the non-Project diversion dam;
  - Bear River at Highway 65;
  - Bear River Pleasant Grove Bridge;
  - Dry Creek above Bear River;

  - ➢ Bear River at Highway 70;
  - ➢ Bear River above Feather River;
  - ➢ Feather River above Bear River; and
  - ➢ Feather River below Bear River.

- Simulated Water Temperature Data. HEC-DSS files with water temperature output from the simulated No Action Alternative, Proposed Project (Near-Term) Alternative, and the Proposed Project (Future) Alternative. Stream temperature data are provided for the modeling period of Record, October 1975 through September 2014, for every model segment in the lower Bear River.

- Hydrology Data. Includes HEC-DSS files of historical hydrology, unimpaired flow, without-project flow, No Action Alternative Ops Model output, Proposed Project (Near-Term) Ops Model output, and Proposed Project (Future) Ops Model output. Historical hydrology data are also presented in Exceedance plots, Haze charts, and as monthly summaries. Historical powerhouse generation data are also provide for 2005 through 2014.

Table E1-1 lists the contents of this appendix, including file type and total file size.

Table E1-1. Contents of Appendix E1.

Name	File Type(s) on Disc	Total File Size
OPS MODEL		
2018-11-20 Camp Far West Operations Model_V3	1 Microsoft Excel file	41.2 MB on DVD
Ops-Model Documentation Validation_Report	1 Adobe pdf file	5.6 MB on DVD
TEMP MODEL		
Tech Memo - Model Development	1 Adobe pdf file	4.2 MB on DVD
Appendix A – Bear River Hydrology Methods Memo	1 Adobe pdf file	0.7 MB on DVD
Appendix B - Temp Model Calibration and Validation Files	Calibration and Validation executable folders with data	221 MB on DVD
Appendix C - Temp Model GUI Configured for the Base Case	2 Microsoft Excel files, 1 DSS file, executable folders with data	1.44 GB on DVD
WATER TEMP DATA		
Historical Data	1 Microsoft Excel file, 1 DSS file	7.9 MB on DVD
Temp Model Output	3 DSS files	48.9 MB on DVD
HYDROLOGY DATA		
DSS Data Files	6 DSS files	2.3 MB on DVD
Exceedance Plots	2 Adobe pdf files	0.4 MB on DVD
Haze Charts	1 Adobe pdf file	0.8 MB on DVD
Monthly Summaries	1 Adobe pdf file	0.2 MB on DVD
Power Generation	1 Microsoft Excel file	0.2 MB on DVD
Stage-Storage Curves	2 Microsoft Excel files	0.1 MB on DVD

Appendix E1

Attachments

Due to the size and/or format of the material in this appendix, SSWD has filed with FERC these materials on digital versatile disc (DVD) as part of this Application for New License.

Copies of the material in this appendix on DVD may be obtained upon request by contacting:

Brad Arnold
General Manager/Secretary
SOUTH SUTTER WATER DISTRICT

APPENDIX E2

PROPOSED CONDITIONS

SSWD developed Proposed Conditions, including associated implementation plans, for the new licenses. These conditions are:

1. SSWD Proposed Conditions AR1, Implement Minimum Streamflows. The Licensee shall, beginning within 30 days of license issuance, maintain a continuous minimum flow of 25 cfs from April 1 through June 30 and 10 cfs from July 1 through March 31, or inflow to Camp Far West Reservoir, whichever is less, as measured immediately below the non-Project diversion dam downstream of Camp Far West Dam. The minimum flows may be temporarily modified if required by operating emergencies beyond the control of the Licensee or for short periods for fishery management purposes, upon mutual agreement between SSWD and CDFW.
2. SSWD Proposed Condition TR1, Develop and Implement a Bald Eagle Management Plan. The License shall, within 1 year of license issuance, develop in consultation with USFWS and CDFW a management plan for bald eagles at Camp Far West Reservoir. The planshall include annual monitoring of bald eagle nests on Camp Far Reservoir, and for each nest that monitoring shows is occupied, define and implement a Limited Operating Period (LOP) and buffer zone to prohibit from the zone Project and Project-related activities that have a potential to disturb nesting bald eagles. The plan shall describe water and land barriers and appropriate signage that shall be placed to designate the buffer zones.
3. SSWD Proposed Condition TR2, Implement Bat Management Measures. The Licensee shall, within 1 year of license issuance, install humane bat exclusion devices at Project facilities that bats can access. The devices shall be installed after bat fall migration has occurred and before bats return. The Licensee shall not install exclusion devices where day or night roosts occur, or at campground facilities that have been selected for replacement within 5 years of license issuance. At these locations, the Licensee shall implement a facilities design that is absent of suitable roosting features (i.e., sealed concrete structures lacking cavities or overhangs that may provide refuge to bats). Prior to installing bat exclusion devices, the Licensee shall conduct a daytime visual assessment and nighttime emergent survey at all Project facilities where exclusion devices are needed. In addition, the Licensee shall place at appropriate locations in Project recreation areas signage regarding bat-human interaction.
4. SSWD Proposed Condition RR1, Implement Recreation Facilities Plan. The Licensee shall, within 1 year of license issuance, implement the Recreation Facilities Plan included in the Licensee's Application for New License.
5. SSWD Proposed Condition CR1, Implement Historic Properties Management Plan. The Licensee shall, within 1 year of license issuance, implement the Historic Properties Management Plan included in the Licensee's Application for New License.

SSWD's proposed Recreation Facilities Plan and Historic Properties Management Plan are attached to this section.

APPENDIX E2

Attachment 1

Recreation Facilities Plan

Application for New License
Major Project – Existing Dam

Recreation Facilities Plan

Security Level: Public

Camp Far West Hydroelectric Project
FERC Project No. 2997

Prepared by:
South Sutter Water District
2464 Pacific Avenue
Trowbridge, CA 95659
www.southsutterwd.com

Draft - December 2018

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None.

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GLOSSARY - DEFINITION OF TERMS, ACRONYMS AND ABBREVIATIONS

ac	acre
Application	Application for New License
Capital Improvement	The construction, installation, or assembly of a new fixed asset, or the significant alteration, expansion, or extension of an existing fixed asset to accommodate a change of purpose.
DBAW	California Department of Boating and Waterways
Design Narrative	Describes the management objectives, design criteria, and constraints associated with the development or major rehabilitation of a recreation facility. The Design Narrative should include: (a) management objectives; (b) design criteria, including criteria on type and color of materials and accessibility; (c) existing physical conditions; (d) any rehabilitation and new construction; (e) anticipated management problems that design may minimize; (f) site capacity, durability, and protection; (g) user safety; and (h) interpretive services.
FERC or Commission	Federal Energy Regulatory Commission
ft	feet or foot
Major Rehabilitation Replacement Recondition Reconstruction	Making capital improvements and reconditioning or replacing an existing fixed asset or any of its components in order to restore the functionality or life of the asset. Replacement is the substitution or exchange of an existing fixed asset or component with one having essentially the same capacity and purpose. The decision to replace or rehabilitate a fixed asset or component is usually reached when replacement is more cost effective or more environmentally sound. Replacement of an asset or component usually occurs when it nears or has exceeded its useful life.
SSWD or Licensee	South Sutter Water District
mi	mile
Minor Rehabilitation	Minor rehabilitation includes repairs, and replacement of parts that result in fewer breakdowns and fewer premature replacements, and help achieve the expected life of the fixed asset. Minor rehabilitation does not include construction of new facilities or the replacement of an existing fixed asset. Minor rehabilitation activities will arrest deterioration and appreciably prolong the life of a property. Examples include: installing a new roof, new floor, or new siding, replacing electrical wiring or heating systems, repairing or replacing pipes, pumps and motors, and repairing the paths, walks, or walls of recreation facilities.
Non-Peak Season	Non-peak season extends from January up to the Memorial Day holiday weekend and after Labor Day through December.
NMWSE	Normal Maximum Water Surface Elevation
Operational Maintenance	Keeping fixed assets in acceptable condition, including repairs, painting, replacement of minor parts and minor structural components. Operation maintenance, or reconditioning, neither materially adds to the value of the property nor appreciably prolongs its life. Operational maintenance excludes activities aimed at expanding the capacity of an asset or otherwise upgrading it to serve needs different from, or significantly greater than those originally intended. The work serves only to keep the facility in an ordinary, efficient operation condition. Examples include: interior painting, repair of broken windows, light bulb replacement, cleaning, unplugging drains, greasing, servicing, inspecting, oiling, adjusting, tightening, aligning, sweeping, and general snow removal. Maintenance activities may include: work needed to meet laws, regulations, codes, and other legal direction (such as compliance with ADA) as long as the original intent or purpose of the fixed asset is not changed.
Peak Season	Peak season extends from the Memorial Day to Labor Day holiday weekends.
RA	Recreation Area
RD	Recreation Day: Each visit by a person to a development for recreation purposes during any portion of a 24-hour period.

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SECTION 1.0
INTRODUCTION

1.1 Background

In June 2019, the South Sutter Water District (SSWD or Licensee), pursuant to Sections (§§) 5.17 and 5.18 of Title 18 of the Code of Federal Regulations (C.F.R.), plans to file with the Federal Energy Regulatory Commission (FERC or Commission) an Application for a New License for Major Project – Existing Dam for SSWD's 6.8 megawatt Camp Far West Hydroelectric Project (Project), FERC Project No. 2997. The initial license for the Project was issued by FERC to SSWD on July 2, 1981, effective on July 1, 1981. In its Application for New License (Application), SSWD proposes to continue operating the Project for the next 40 years with one modification to the spillway, a reservoir pool raise of 5 feet (ft) (from 300.0 ft [Normal Maximum Water Surface Elevation] NMWSE to 305.0 ft NMWSE), and the adoption of the resource management measures proposed in its license application.

The existing and proposed Project consists of one development - Camp Far West – that, in total, includes: one main dam; one powerhouse with an associated switchyard with a capacity of 6.8 megawatts; and appurtenant facilities and structures, including recreation facilities and gages. Table 1.1-1 summarize key information for the Project's reservoir.

Table 1.1-1. Key information regarding Camp Far West Hydroelectric Project reservoirs.

Project Reservoir	NMWSE (ft)	Gross Storage[1] (ac-ft)	Usable Storage[2] (ac-ft)	Surface Area (ac)	Maximum Depth (ft)	Shoreline Length (mi)	Drainage Area At Dam (sq mi)
Camp Far West	300	93,737	92,430	1,886	155	29	284

The proposed FERC Project Boundary[1] encompasses 2,661.9 acres (ac) of land in Mariposa County, California. Within the boundary, SSWD is the major landholder with 2,515.2 ac (94.8% of the area within the FERC Project Boundary). The remaining lands (146.7 ac) are privately-owned lands. Neither the existing FERC Project Boundary nor the Proposed FERC Project Boundary includes federal lands. Figure 1.1-1 shows the Project Vicinity,[2] Project facilities, and the proposed FERC Project Boundary.

[1] The Federal Energy Regulatory Commission (FERC) Project Boundary encompasses all Project facilities and features as well as all land needed by SSWD for the normal operation and maintenance of the Project. The boundary is shown in Exhibit G of SSWD's Application for New License.
[2] In this Plan, "Project Vicinity" refers to the area surrounding the Project on the order of United States Geological Survey (USGS) 1:24,000 scale topographic quadrangle.

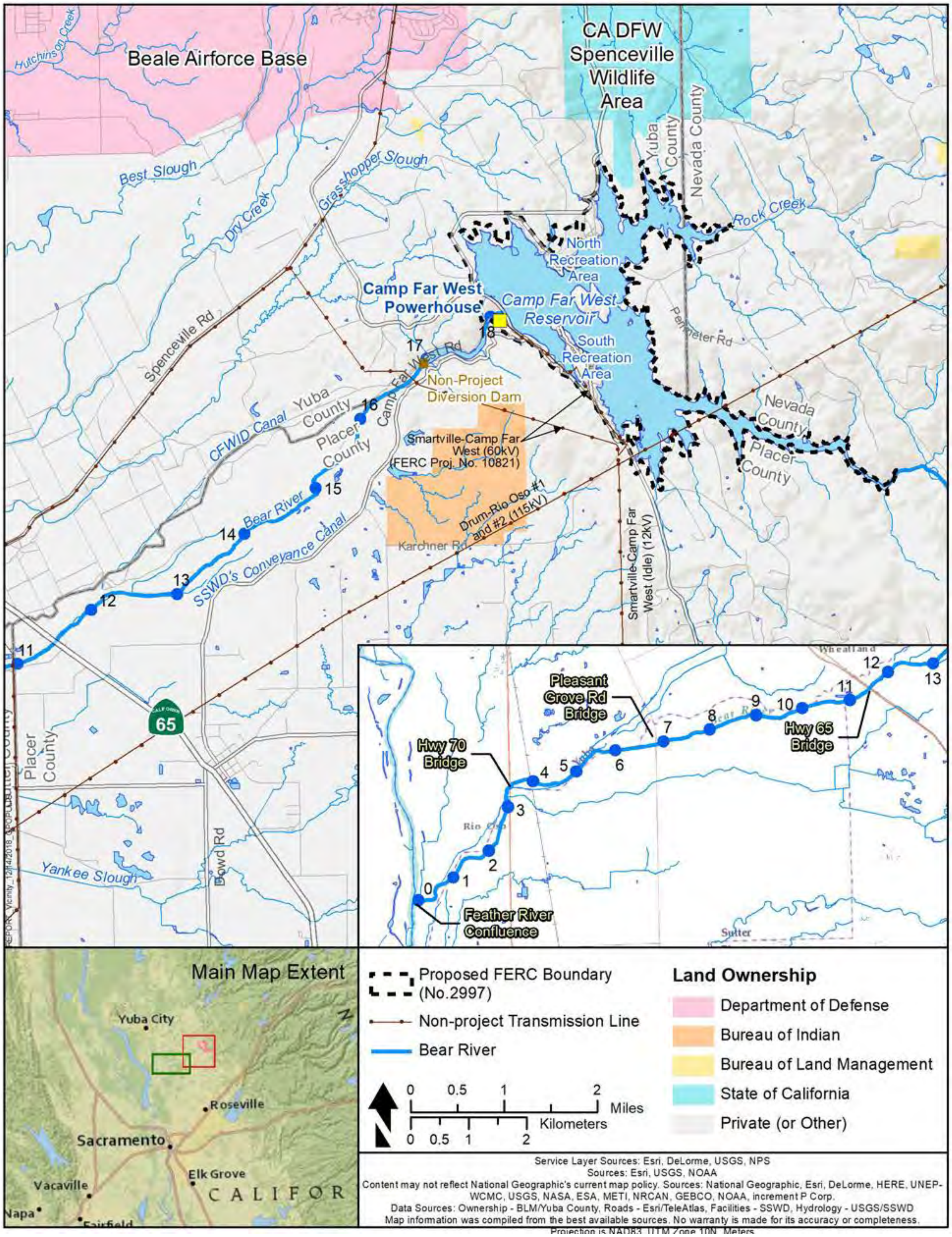

Figure 1.1-1. Camp Far West Hydroelectric Project and Project Vicinity.

1.2 Purpose of the Recreation Facilities Plan

As part of its Application, SSWD will continue to maintain and operate recreation facilities on the Project. Specifically, SSWD will include the following requirement in a new license for the Project: SSWD will implement this Recreation Facilities Plan (Plan), as outlined within to maintain, rehabilitate, and upgrade the existing Project recreation facilities over the course of the new license term. This Plan describes SSWD's responsibilities regarding recreation facilities under the new Project license.

1.3 Goals and Objectives of the Recreation Facilities Plan

The primary goal of the Plan is to guide public recreation use of the Project's recreation facilities over the term of the license, while minimizing recreation use impacts to natural, historic, and prehistoric resources within the Project Area. The Plan includes the following objectives to help achieve this goal:

1. To provide a description and plan for recreation facilities that meet the needs of Project recreation users and are designed to meet federal, state, and local legal requirements, as applicable.
2. To describe in detail SSWD's responsibilities regarding recreation facilities under the new license.

1.4 Contents of the Recreation Facilities Plan

- Section 1.0. Introduction. This section includes introductory information, including the purpose and goal of the Plan.
- Section 2.0. Existing Recreation Use and Facilities. This section describes the existing Project recreation facilities, including condition, land ownership, and 2017 use levels.
- Section 3.0. Facility Operation and Rehabilitation. This section describes the recreational facility annual operational maintenance and major rehabilitation guidelines.
- Section 4.0. Reporting and Plan Revisions. This section describes the Plan revision process.
- Section 5.0. References Cited. This section provides a bibliography of the references listed in this exhibit.

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SECTION 2.0
EXISTING RECREATION USE AND FACILITIES

The Project provides developed and undeveloped recreation opportunities at Camp Far West Reservoir. Water-related recreational opportunities include water skiing, wakeboarding, power boating, jet-skiing, wildlife viewing, non-motorized boating and warmwater fishing. Boating use and launching occurs year-round. Yuba County Ordinance 8.51.010 limits the speed of boats to 20 miles per hour on the reservoir (Yuba County 2010). Camp Far West Reservoir offers anglers shoreline and boat-based fishing opportunities for smallmouth bass, largemouth bass, striped bass, catfish and panfish (CDFW 2018a). The reservoir does not have any site-specific fishing regulations or limits (CDFW 2018b). Historically, Cal Fish and Wildlife stocked Camp Far West Reservoir with warmwater game fish species from 1964 to 1985 (CDFW 2015).

Land-based recreation opportunities provided in the Project Vicinity include camping, wildlife viewing, hiking, biking and horseback riding. Facilities developed to support camping and other land-based recreation activities are described below. While the recreation areas (RA) do not provide formal trails for hiking, biking and horseback riding, the dispersed use areas provide a network of unpaved roads that provide a trail experience for visitors. In addition, informal trails occur within the FERC Project Boundary, primarily near the NMWSE, which are a result of non-Project cattle and ranch trails as well as Project user-created trails and paths due to the gentle sloping terrain adjacent to the shoreline. Dispersed camping is allowed outside the developed RAs.

The concessionaire that operates the two developed RAs at Camp Far West Reservoir provides numerous and varied events at the RAs and reservoir, including bi-monthly fishing tournaments, boating and fishing club events, equestrian events and other group events.

As a condition of its FERC license, SSWD provides recreational opportunities and facilities within the FERC Project Boundary. Below is a description of the developed facilities and recreation opportunities at Camp Far West Reservoir. SSWD owns and maintains two developed recreation areas at Camp Far West Reservoir – the North Shore Recreation Area (NSRA) and South Shore Recreation Area (SSRA) (Table 2.0-1). The NSRA and SSRA are the only public vehicular access points to the reservoir for recreation due to private lands. Outside of the RAs, the remaining shoreline is only accessible by foot or boat. All of these facilities are located on SSWD-owned land and operated through a concessionaire. The recreation facilities were originally constructed using Davis-Grunsky Act funding and the NSRA boat ramp was reconstructed in 2005 using the California Division of Boating and Waterways (DBAW) boat launching facilities grant funding.

Table 2.0-1. Summary of the Camp Far West Hydroelectric Project recreation facilities.

Facility	Amenity	North Shore Recreation Area	South Shore Recreation Area
Family Campgrounds	No. Sites (standard)	70	67
	Sites (RV with hookups)	10	none
	Parking Spurs	1 spur per site	1 spur per site
	Overflow Parking Spaces	None	18 single
	Restrooms	2 flush	1 flush, 2 vault
Group Campgrounds	Sites	2, 25-person group sites, 1, 50-person horse camp site	1, 50-person group site
	Parking Spaces	None[1]	10
	Restrooms	4 portable chemical toilets	None[2]
Day Use Areas	Picnic Sites	20	33
	Swim Beaches	1	1
	Parking Spaces	None[3]	44
	Restrooms	1 flush	None[4]
Boat Ramps	Number	1, 4-lane concrete ramp	1, 2-lane concrete ramp
	Parking Spaces	82 single, 73 vehicle with trailer	52 vehicle with trailer
	Restrooms	1 flush	1 flush
Dispersed Use Areas[5]	Sites	2	2
	Restrooms	6 portable chemical toilets	6 portable chemical toilets
Other Facilities	Entrance Station	1	1
	Store	1	1
	RV Dump Station & Holding Pond	1	1
	Concessionaire Trailers	2	1
	Water Treatment Plant	1	None[6]
	Water Storage Tank	1, 60,000-gallon tank	None[6]

1 Parking is available in open areas adjacent to the group sites, but is not designated or defined.
2 The group campsites use the adjoining family campground restroom building.
3 The day use area (picnic area and swim beach) uses the adjoining boat ramp parking area for parking.
4 The picnic area uses the adjoining boat ramp restroom building.
5 The dispersed use areas provide day use and overnight opportunities with minimal facilities (roads, portable chemical toilets and trash cans).
6 Water is piped under the reservoir to South Shore Recreation Area from the North Shore Recreation Area treatment plant and storage tank.

2.1 Existing Project Recreation Use Levels

All of the Project's recreation facilities occur at the two Project RAs, and include overnight camping, picnicking, swimming and boating facilities. Recreation activities within the FERC Project Boundary are numerous and varied and include, but are not limited to, camping, fishing, boating, swimming, hiking, picnicking, sightseeing and wildlife viewing.

In 2017, the total Project recreation use was 78,641 Recreation Days (RDs) with the majority of that use occurring in the peak season (66.6% or 52,397 RDs) compared to the non-peak season (33.4% or 26,244 RDs) (Table 2.1-1). Day-use (70.6% or 55,5181RDs) accounted for the majority of total use as compared to overnight use (29.4% or 23,123 RDs); and this day-use-to-overnight use ratio was similar during both the peak and non-peak season. When comparing use by day type overall, total use was highest on the weekends (39,599 RDs) as compared to weekdays (26,217 RDs) and holidays (12,825 RDs). When comparing overall use by recreation, NSRA accounted for the highest percentage of use (81.9% or 64,429 RDs) compared to the SSRA (18.1% or 14,212 RDs), which was open on a limited bases in 2017 on select weekdays, weekends and holidays during the peak season. The SSRA was closed during the non-peak season.

Table 2.1-1. Project recreation use estimate in Recreation Days by season and day type.

Recreation Area	Day Type	Use Estimate in Recreation Days (RDs)								
		Peak Season			Non-peak Season			Overall[1]		
		Overnight Use	Day Use	Total Use	Overnight Use	Day Use	Total Use	Overnight Use	Day Use	Total Use
North Shore Recreation Area	**Overall**	**10,690**	**27,495**	**38,185**	**7,267**	**18,977**	**26,244**	**17,957**	**46,472**	**64,429**
	Weekday	5,602	7,665	13,267	4,214	5,417	9,631	9,816	13,082	22,898
	Weekend	2,937	12,207	15,144	3,053	13,560	16,613	5,990	25,767	31,757
	Holiday	2,151	7,623	9,774	n/a	n/a	n/a	2,151	7,623	9,774
South Shore Recreation Area	**Overall**	**5,166**	**9,046**	**14,212**	**closed**	**closed**	**closed**	**5,166**	**9,046**	**14,212**
	Weekday	2,408	911	3,319	closed	closed	closed	2,408	911	3,319
	Weekend	1,820	6,022	7,842	closed	closed	closed	1,820	6,022	7,842
	Holiday	938	2,113	3,051	closed	closed	closed	938	2,113	3,051
Project Total	**Overall**	**15,856**	**36,541**	**52,397**	**7,267**	**18,977**	**26,244**	**23,123**	**55,518**	**78,641**
	Weekday	8,010	8,576	16,586	4,214	5,417	9,631	12,224	13,993	26,217
	Weekend	4,757	18,229	22,986	3,053	13,560	16,613	7,810	31,789	39,599
	Holiday	3,089	9,736	12,825	n/a	n/a	n/a	3,089	9,736	12,825

Source: Camp Far West Reservoir recreation concessionaire entrance gate records (SSWD 2016).
Legend: n/a = no holidays during non-peak season.

2.2 Existing Project Recreation Facilities at Project Reservoirs

The following section includes a description of the existing Project recreation facilities and opportunities at each recreation area. This section also provides a brief summary of each primary recreation facility's (campground, picnic area, boat launch, etc.) condition based on a 2015 condition assessment by SSWD. Facilities and site elements (e.g., vehicle spurs, tables, fire rings, ramps) are in "good" condition if they are functional, well-maintained, showed no signs of deterioration and have the majority of their useful life remaining. Facilities and components are considered in "poor" condition if they are non-functional, had missing or broken parts and/or major structural damage is evident. A facility is considered to be in "fair" condition when it has some minor structural damage that could be repaired with ease or is functional, but shows signs of wear and tear (cracked wood, broken windows or door handles, etc.). Facilities in "fair" condition generally have a portion of their useful life remaining, but do not need immediate replacement.

2.2.1 North Shore Recreation Area

The NSRA is located on the north shoreline of the reservoir on a large peninsula. The NSRA is accessible by vehicle from the west and north via Camp Far West Road and Spenceville Road. The access road is gated and an entrance station is located along the access road that regulates public access to the recreation area. The NSRA consists of a family campground, group campground, day use area with swimming beach, boat ramp and dispersed use areas (Figure 2.2-1). The NSRA also includes a general store at the entrance station for use by the public. The NSRA is open year-round for day use and overnight recreation opportunities. The NSRA is set in a partially wooded oak and grassland setting. The oak trees provide substantial shading throughout the recreation area, especially within the campgrounds. Due to the predominant grasses and lack of other ground-level vegetation, there is minimal screening between the individual sites with the campgrounds and day use areas.

Figure 2.2-1. Aerial site map of the North Shore Recreation Area.

2.2.1.1 Family Campground

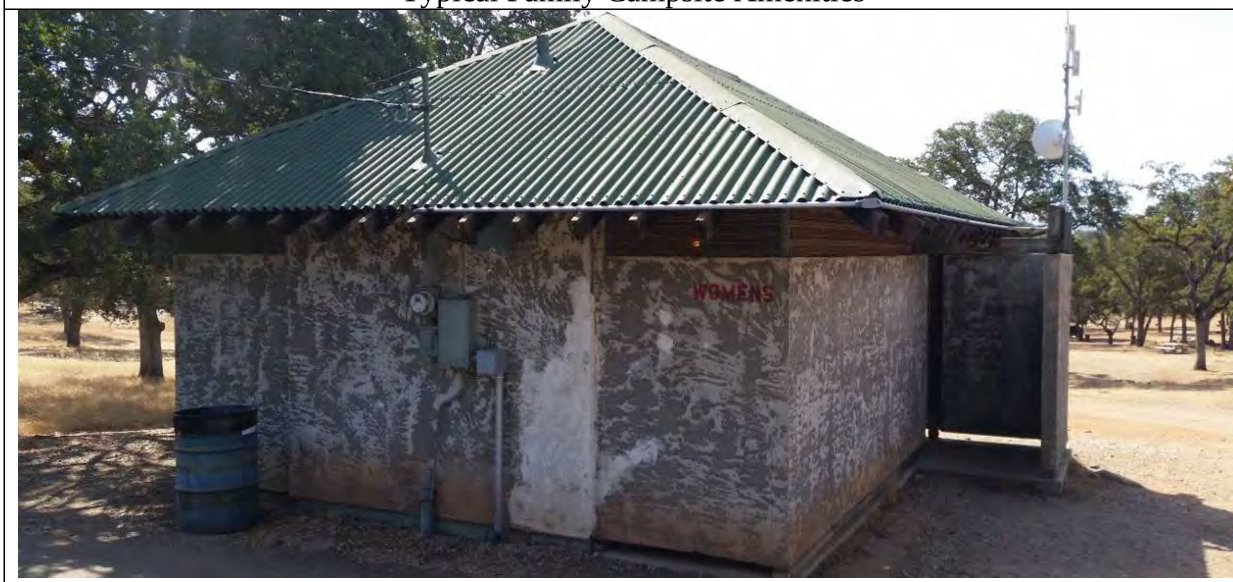
The family campground is located in a semi-forested setting along the south shoreline of the NSRA. The facility consists of a total of 80 campsites including 70 standard sites and 10 recreational vehicle (RV) sites with hookups. Representative photographs are provided in Figure 2.2-2. Each of the standard campsites consists of a table (i.e., concrete or wood-metal construction), a rock fire ring, a parking spur (i.e., dirt or gravel), several tent pads and a trash can. Most of the sites also have a pedestal grill. Overall, the campsite amenities are in fair condition, with the exception of the remaining wood-metal construction tables and most pedestal grills that are aging and in poor condition. Potable water[3] is provided at seven spigots dispersed throughout the campground. The facility includes two flush restroom buildings each with eight stalls (i.e., 7 toilets and 1 urinal) and four sinks; and both are in aging and in fair-to-poor condition. A typical campsite provides opportunities for tent or RV camping, but does not have hookups for water, electric or sewer. The circulation roads consist of one-way, 10-ft wide and two-way, 20-ft wide road segments; and are a combination of paved and dirt surfacing; and in fair condition overall (SSWD 2016).

The family campground also includes a loop with 10 RV sites each with full-service hookups including water, electric and sewer. In addition to the hookups, each site consists of a gravel spur, metal table, concrete fire ring, and a trash can. The RV campsites utilize a restroom facility at the adjacent standard campsite loop. The circulation road is a two-way, 20-ft wide paved road. Overall, the RV camping facilities are new construction and in good condition (SSWD 2016).


Typical Family Campsite

[3] Currently, temporary drinking restrictions are in place while SSWD completes water treatment infrastructure improvements.

Typical Family Campsite Amenities



Typical Restroom Building


Typical RV Campsite with Full Hookups

Typical Circulation Roads

Figure 2.2-2. Representative photographs (dated 7/21/15) of the family campground at the North Shore Recreation Area.

2.2.1.2 Group Campground

The group campground is located in an open setting along the west shoreline of the NSRA to the north of the boat ramp and day use area. The facility consists of two group campsites (i.e., Tree and Point sites) serving 25 people at one time (PAOT). Each of the campsites consists of a concrete table, rock fire ring, water spigot, portable chemical toilet, and two trash cans. The access road to the sites is a two-way dirt surface road. Overall, the facilities are aging and in fair-to-poor condition (SSWD 2016). Representative photographs are provided in Figure 2.2-3.

Tree Site

Figure 2.2-3. Representative photographs (dated 7/21/15) of the group campsites at the North Shore Recreation Area.

2.2.1.3 Day Use Area

The day use area is located in a semi-forested setting along the west shoreline of the NSRA to the north of the boat ramp. The facility consists of 20 picnic sites, a swim beach and shares a parking area with the boat ramp. Each picnic site consists of a table and a trash can. Pedestal grills and water spigots are also dispersed throughout the area. The swim beach is located between the picnic sites and the reservoir. The facility includes one flush restroom building with eight stalls (i.e., 7 toilets and 1 urinal) and four sinks. Overall, the facilities are aging and in fair condition (SSWD 2016). A representative photograph is provided in Figure 2.2-4.

Typical Picnic Site


Typical Picnic Site Amenities

Typical Restroom Building

Figure 2.2-4. Representative photographs (dated 7/21/15) of the day use area at the North Shore Recreation Area.

2.2.1.4 Boat Ramp

The boat ramp is located on the south shoreline between the family campground and the day use area. The facility consists of a boat launching ramp, parking area, restroom building and picnic site. The boat ramp is a 4-lane concrete ramp with a floating courtesy dock and a 4-lane boat preparation area. The end of the concrete ramp is at 236.0 ft elevation; however, informal boat launching is still available down to 188.0 ft elevation. The parking area is divided into three separate lots, all of which are paved with striped spaces; and provides a total of 82 single vehicle spaces, including two accessible spaces, and 73 vehicle with trailer spaces, including three accessible spaces. At lower water levels, parking is allowed adjacent to the boat ramp in dirt-surfaced parking areas. The facility includes one flush restroom building with four stalls, each with a toilet and sink. A water spigot, water fountain and trash receptacles are located at the restroom building. The accessible restroom building area includes an accessible picnic table connected by an accessible ramp. This facility was reconstructed in 2005 using a DBAW Boat Launch Facilities grant. The facilities are in good condition (SSWD 2016). Representative photographs are provided in Figure 2.2-5.

Ramp

Parking Area

Restroom and Picnic Site

Figure 2.2-5. Representative photographs (dated 7/21/15) of the boat ramp facilities at the North Shore Recreation Area.

2.2.1.5 Dispersed Use Areas

The NSRA has two dispersed use areas within the recreation area, which are accessed by one-way and two-way dirt roads. Jet Ski Cove dispersed use area is located on the northwest portion of the recreation area. Facilities include two portable chemical toilets and trash cans dispersed throughout the area. In all, Jet Ski Cove dispersed use area encompasses 15 ac with approximately 0.5-mi of shoreline. The second dispersed use area, Boss Point, is located in the northeast portion of the recreation area. Facilities include four portable chemical toilets and trash cans dispersed throughout the area. In addition, the Horse Camp is located in the midst of the Boss Point dispersed use area and includes hitch-and-post facilities, two portable chemical toilets, a large concrete fire ring and trash cans. In all, Boss Point dispersed use area encompasses 55 ac with approximately 1.6 mi of shoreline. The dispersed use areas provide for largely undeveloped, dispersed day-use opportunities and overnight camping with minimal facilities. Overall, the few facilities provided are in good condition (SSWD 2016). Representative photographs are provided in Figure 2.2-6.

Typical View of the Jet Ski Cove Dispersed Use Area

Typical View of the Boss Point Area Dispersed Use Area

Horse Camp

Figure 2.2-6. Representative photographs (dated 7/21/15) of the dispersed use areas at the North Shore Recreation Area.

2.2.1.6 Recreational Water System

A recreational water system provides water throughout the NSRA, excluding the dispersed use area. The water system source is the reservoir, where two pumps in the reservoir deliver water at 70 gallons/minute (5,000,000 gallons or 15.3 acre-feet per year) uphill via underground piping to the water treatment facility atop a hill within the NSRA. After being treated, the water is piped nearby to a 60,000-gallon storage tank constructed of belted steel and recently installed in 2011. From the storage tank, underground distribution piping sends the water throughout the NSRA, where water is accessible via water hydrants dispersed throughout the recreation area facilities. The system also includes a sewage holding pond with an aerator to handle the sanitary needs of the flush restroom buildings and the RV dump station. The sewage system uses a gravity-feed operation and is supplemented by a pump to get the sewage up to the holding pond. (Figure 2.2-7)

Overall, much of the major above-ground components (i.e., water treatment plants, water storage tank, sewage holding ponds and aeration facilities) are in good condition with the treatment plant and storage tank having been reconstructed or replaced recently (SSWD 2016). The below-ground components (i.e., distribution piping) are largely original construction are in fair condition; and the above-ground water hydrants and fountains are largely in poor condition (SSWD 2016).

Water Treatment Facility

Water Storage Tank

Sewage Holding Pond

Figure 2.2-7. Photographs (dated 4/2/18) of the recreational water system components.

2.2.1.7 Other Facilities

The NSRA also includes a general store, RV dump station, private ranger residences and maintenance buildings. The store is located near the entrance to the NSRA facilities and also serves as the entrance station for the NSRA. The RV dump station is located near the family campground and boat ramp; and provides a 1-lane facility connected to a sewer system for disposing of RV holding tanks. Overall, these facilities are in good condition (SSWD 2016). Private concessionaire residences are also located between the entrance station and the boat ramp facilities that include residences and maintenance buildings. Photographs of these facilities are provided in Figure 2.2-8.

General Store/Entrance Station

RV Dump Station

Figure 2.2-8. Photographs (dated 7/21/15) of the entrance station and RV dump station at the North Shore Recreation Area.

2.2.2 South Shore Recreation Area

The SSRA is located on the southwest shoreline of the reservoir on a long narrow peninsula. The SSRA is accessible by vehicle from the north and south via McCourtney Road. The access road is gated and an entrance station is located after the gate that regulates public access to the recreation area. The SSRA consists of a family campground, group campground, day use area, swim beach, boat ramp and dispersed use areas (Figure 2.2-9). The SSRA also includes a general store at the entrance station for use by the public located. The SSRA is generally open seasonally from April through October for day use and overnight recreation opportunities.[4] Similar to the NSRA, the SSRA is set in a partially wooded oak and grassland setting. The oak trees provide substantial shading throughout the recreation area. Due to the predominant grasses and lack of other ground-level vegetation there is minimal screening between the individual sites with the campgrounds and day use areas.

[4] The NSRA is open year-round for public use.

Figure 2.2-9. Aerial site map of the South Shore Recreation Area.

2.2.2.1 Family Campground

The family campground is located in a semi-forested setting on the north end of the recreation area. The facility consists of 67 standard campsites for either tent or RV camping, however, these sites do not provide RV hookups. Each campsite consists of a table (i.e., concrete or wood-metal construction), a rock fire ring, a parking spur (i.e., dirt or gravel), several tent pads and a trash can. Most of the sites also have a pedestal grill. Six of the sites include a pull-through parking spur, whereas the remaining sites utilize back-in parking spurs. Water is provided at 12 spigots dispersed throughout the campground. Overall, the campsite amenities are in good condition, with the exception of the wood-metal construction tables that are aging and in fair-to-poor condition (SSWD 2016). The facility also includes one flush restroom building (i.e., 7 toilets, 1 urinal and 4 sinks) and two vault restroom buildings (i.e., each with 4 toilets), all of which are aging and in fair condition overall. The facility includes two overflow parking areas (paved) for a total of 18 single vehicles. The circulation roads consist of one-way, 12-ft wide, and two-way, 20-ft wide paved roads. The parking areas and roads are in good condition (SSWD 2016). Representative photographs are provided in Figure 2.2-10.

Standard Campsite

Standard Campsite Table

Vault Restroom Building (4 stalls)

Figure 2.2-10. Photographs (dated 7/21/15) of the family campground at the South Shore Recreation Area.

2.2.2.2 Group Campsite

A single group campsite is located in a forested setting on a bluff along the west shoreline of the SSRA. The facility consists of one group campsite serving 50 PAOT. This site consists of a wood-metal table, large concrete fire ring, large food preparation table/area, a pedestal grill, trash cans and a gravel parking area for 10 vehicles. The access road to the sites is a two-way paved road. A water spigot is located at the start of the access road to the group campsite. Overall, the amenities are in good condition, with the exception of the wood-metal construction table that is in poor condition (SSWD 2016). A restroom building is available at the nearby family campground. A representative photograph of the facility is provided in Figure 2.2-11.

Group Campsite

Campsite Amenities

Parking Area

Figure 2.2-11. Photograph (dated 7/21/15) of the group campsite at the South Shore Recreation Area.

2.2.2.3 Picnic Area

The picnic area is located in a semi-forested setting along the east shoreline of the SSRA. The facility consists of 33 picnic sites, each with a table, and a parking area for 44 single vehicles. Pedestal grills, water spigots and trash cans are dispersed throughout the area for picnickers. The facility utilizes the boat ramp's flush restroom building (i.e., 7 toilets, 1 urinal and 4 sinks) located at the top of the boat ramp facility. Overall, the facilities are in good condition (SSWD 2016). Representative photographs of the facilities are provided in Figure 2.2-12.

Picnic Area

Picnic Site Amenities

Parking Area

Figure 2.2-12. Photographs (dated 7/21/15) of the picnic area at the South Shore Recreation Area.

2.2.2.4 Swim Beach

The swim beach is located in an open setting along the west shoreline of the SSRA in a cove commonly referred to as "Quarter Mile Cove" (Figure 2.2-13). The site provides direct water access for swimming and other water play activities for campground visitors. Trash cans are dispersed throughout the area. Overall, the few facilities provided (i.e., trash cans) are in good condition (SSWD 2016). The facility utilizes the family campground's vault restroom buildings located near the swim beach area.

Figure 2.2-13. Photograph (dated 7/21/15) of the swim beach at the South Shore Recreation Area.

2.2.2.5 Boat Ramp

The boat ramp is located on the northeast shoreline between the family campground and the day use area. The facility consists of a boat launching ramp, parking area and restroom building. The boat ramp is a 2-lane concrete and asphalt ramp with a floating courtesy dock. The end of the concrete/asphalt ramp is at 220.0 ft elevation and boat launching below this level is not advisable. The concrete section of the ramp and the courtesy dock are in good condition; whereas the lower asphalt section of the ramp is in poor condition with eroding edges and extensive cracking (SSWD 2016). The parking area provides space for a total of 52 vehicles with trailer spaces in a gravel lot, with paved lot paralleling the top of the ramp access road. The parking areas are in good condition (SSWD 2016). The facility includes one flush restroom building with seven toilets, one urinal and four sinks. The restroom building is in fair condition (SSWD 2016). Representative photographs of the facilities are provided in Figure 2.2-14.

Boat Ramp

Parking Area

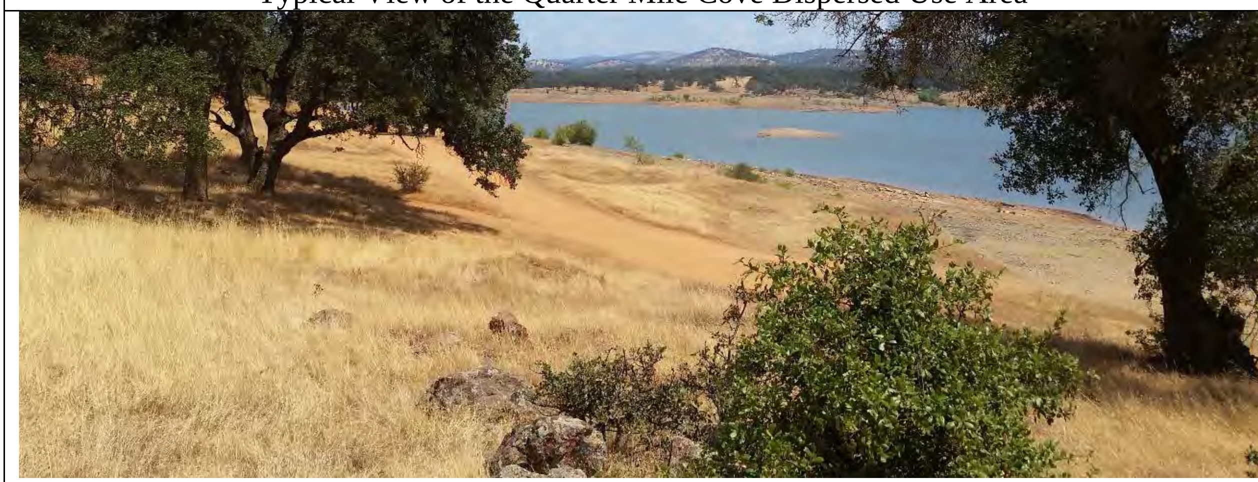
Restroom Building

Figure 2.2-14. Photographs (dated 7/21/15) of the boat ramp facility at the South Shore Recreation Area.

2.2.2.6 Dispersed Use Areas

The SSRA has two dispersed use areas located on the west shoreline (Quarter Mile Cove dispersed use area) and southeast shoreline adjacent to the entrance station (Entrance Gate dispersed use area). Both areas are accessed by one-way and two-way dirt roads. These areas allow for dispersed day use and overnight camping, and provide minimal facilities – roads, trash cans and six portable chemical toilets. Overall, the facilities are good condition (SSWD 2016). Representative photographs of the facilities are provided in Figure 2.2-15.

Typical View of the Quarter Mile Cove Dispersed Use Area



Typical View of the Entrance Gate Dispersed Use Area

Figure 2.2-15. Photographs (dated 7/21/15) of the dispersed use areas at the South Shore Recreation Area.

2.2.2.7 Recreational Water System

A recreational water system provides water throughout the SSRA, excluding the dispersed use area. The SSRA receives water from the NSRA water treatment plant and storage tank via two pipes located under the reservoir. The water is dispersed throughout the SSRA via underground distribution piping, where water is accessible via water hydrants dispersed throughout the recreation area facilities. The SSRA system also includes a sewage holding pond with an aerator to handle the sanitary needs of the flush restroom buildings and the RV dump station. The SSRA sewage system is a gravity-fed system. Overall, these facilities are in good condition (SSWD 2016).

2.2.2.8 Other Facilities

The SSRA also includes a general store, RV dump station, private ranger residences and maintenance buildings. The store is located near the entrance to the SSRA facilities and also serves as the entrance station for the recreation area. A fuel station is also located at the general store. The RV dump station is located across from the general store and provides a 1-lane facility connected to a sewer system for RV holding tank disposal. Overall, these facilities are in good condition (SSWD 2016). Private ranger residences are also located between the entrance station and the boat ramp facilities that include residences and maintenance buildings. Photographs of these facilities are provided in Figure 2.2-16.

General Store/Entrance Station with Fuel Station (in background)


RV Dump Station

Figure 2.2-16. Photographs (dated 7/21/15) of the entrance station and RV dump station at the South Shore Recreation Area.

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SECTION 3.0

FACILITY OPERATION & REHABILITATION

This section describes the recreation facility measures that will be implemented by SSWD for the Project during the new license. This section is divided into two sub-sections, including: 1) recreational facility annual operational maintenance and activities; and 2) recreational facility major rehabilitation.

3.1 Recreational Facility Operational Maintenance

3.1.1 Operational Maintenance Responsibility

SSWD shall be responsible for the annual maintenance, rehabilitation, and replacement of all the Project recreational facilities at the Camp Far West Reservoir Recreation Areas (RAs). SSWD intends to use a concessionaire for the administration, operation and maintenance of the Project's recreation facilities.

3.1.2 Operational Maintenance Activities

Operational maintenance activities keep permanent assets in an acceptable condition and include repairs, painting, replacement of minor parts and minor structural components. Operational maintenance, or reconditioning, neither materially adds to the value of the property nor appreciably prolongs its life. Operational maintenance excludes activities aimed at expanding the capacity of an asset or otherwise upgrading it to serve needs different from, or significantly greater than those originally intended. The work serves only to keep the facility in an ordinary, efficient operating condition.

Examples of regular or routine operational maintenance activities include, but are not limited to interior painting, repair of broken windows, light bulb replacement, cleaning, unplugging drains, greasing, servicing, inspecting, oiling, adjusting, tightening, aligning, sweeping and general snow removal. Maintenance activities may include work needed to meet applicable laws, regulations, codes, and other legal direction (such as compliance with the Americans with Disabilities Act) as long as the original intent or purpose of the fixed asset is not changed.

Annual operational maintenance includes those activities that are expected to occur on an annual or semi-annual schedule, as conditions warrant. Annual maintenance activities include, but are not limited to: straightening all vehicle barriers and signs, rehabilitating picnic tables, pumping or servicing vault or portable toilets, and conducting state and local required water quality testing of the water supply system.

3.1.3 Recreation Area Campfire Policy

SSWD will allow wood burning campfires when contained within approved fire containment "fire-rings" and/or burn-barrels, and may restrict such use based on existing conditions and other local agency fire restriction policies.

3.2 Recreational Facility Major Rehabilitation

This section identifies what and how SSWD will rehabilitate and replace the existing Project recreation facilities – all located on SSWD land. Rehabilitation includes reconditioning or replacing an existing fixed asset or any of its components in order to restore the functionality or life of the asset. Replacement is the substitution or exchange of an existing fixed asset or component with one having essentially the same capacity and purpose. The decision to replace or rehabilitate a fixed asset or component is usually reached when replacement is more cost effective or more environmentally sound. Replacement of an asset or component usually occurs when it nears or has exceeded its useful life.

SSWD shall be responsible for the full cost for major rehabilitation or replacement of existing recreation facilities listed in Section 2.2. SSWD shall be responsible for performing all needed rehabilitation activities through the provision of necessary personnel, equipment, materials and management. SSWD shall be responsible to replace/rehabilitate recreation features which currently exist at their recreation facilities. All the facilities are located on SSWD land, and all new, rehabilitated, and reconstructed Project recreation facilities will meet applicable standards in place at the time of design and construction including any applicable Americans with Disabilities Act guidelines and any other applicable accessibility guidelines at the time of design.

SSWD shall rehabilitate facilities the individual facilities and components at each Project RA facility in accordance with the specifications in Table 3.2-1 when the facilities near the end of their useful life.

Table 3.2-1. Major rehabilitation guidelines for Project recreation facilities.

Type of Facility or Component	Major Rehabilitation Guidelines
Roads, Parking Areas and Campground Vehicle Spurs	As needed, SSWD shall rehabilitate all existing roads and parking areas within the Project RAs. Specifically, SSWD shall: • Repave (asphalt) and re-stripe parking areas, including installing vehicle barriers at each parking area and accessible parking designation; • Repave/overlay existing asphalt circulation roads with asphalt; and install vehicle barriers, where necessary; • Grade all existing dirt circulation roads; and install vehicle barriers, where necessary. • Where unpaved, gravel or dirt parking areas exist, re-grade and clear the parking area and re-install vehicle barriers, as needed; and • Repave or overlay existing asphalt campsite spurs or grade existing dirt campsite spurs and install vehicle barriers at each new spur, as needed. Rehabilitation of roads, parking areas, and vehicle spurs shall occur on a site-by-site or facility-by-facility basis at all Project RAs. Roads, parking areas, and vehicle spurs shall be scheduled for rehabilitation near the end of their useful life based on the findings during regular or annual inspections.
Fire Rings, Grills, and Picnic Tables	SSWD will replace fire rings, grills, picnic tables, and other constructed features near the end of their useful life based on regular or annual inspections.

Table 3.2-1. (continued)

Type of Facility or Component	Major Rehabilitation Guidelines
Signs	SSWD shall replace all existing entrance signs, directional signs, information/bulletin signs and trailhead signs, as needed, near the end of their useful life based on regular or annual inspections. SSWD shall replace signs with a sign of a similar design, and at least to the same construction as currently exist. Alternative materials may be used (i.e. recycled plastic, metal, etc.).
Restroom and Sewage Holding Facilities	SSWD shall replace the existing restroom facilities, as needed, near the end of their useful life. Each restroom facility shall maintain the same general current footprint and number of toilets, sinks, and stalls, unless SSWD determines that the location and layout of the restroom facility should be modified. The flush restroom facilities throughout the Project RAs discharge to a sewer collection system that routes sewage to the respective RA sewage holding ponds. The sewage holding ponds are permitted by the State and include operating, monitoring and reporting requirements. Sewage holding ponds will be maintained in acceptable condition to meet permit requirements and upgraded as needed depending on equipment life and regulatory requirements.
Recreation Area Water Systems	SSWD shall maintained the recreational water system (i.e., distribution piping, system connections, water hydrants, storage tanks and treatment facility) in condition to meet permit requirements and upgrade the facilities as needed depending on equipment life and regulatory requirements.
Boat Launch Floating Boat Docks and Boat Ramps	SSWD shall replace the floating boat docks and concrete launch ramps as each facility nears the end of its useful life. At the NSRA boat launch facility (reconstructed in 2005 with DBAW grant funding), SSWD shall include the replacement of the existing floating boat dock and concrete launch ramp with structures that meet the DBAW standards at the time of design. At the SSRA boat launch facility, SSWD shall include the replacement of the existing floating boat dock and launch ramp with structures that consider user demand, resource concerns, reservoir drawdown, and design standards of the time.

Importantly, at any time during the new license when major rehabilitation is planned, the work and placement will not occur in sensitive resource areas (e.g. wetlands, culturally sensitive sites, critical wildlife habitats, sensitive botanical sites). In addition, for any ground disturbing work related to minor rehabilitation, major rehabilitation, or capital improvements, SSWD will follow the invasive weed prevention and vegetation management practices. Specifically, SSWD will follow all applicable measures related to invasive weed and aquatic invasive species prevention and revegetation of recreation facility lands.

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SECTION 4.0
PLAN REVISION

4.1 Plan Revision

SSWD will review, update, and/or revise the Plan if changes in recreation use or resources create the need to update the plan. A need may arise from day-to-day operation and maintenance of the Project, or, from other unanticipated events that may arise during the license period. Examples of such events that may trigger a need to update the plan include unforeseen recreation needs, new recreation technologies, or significant changes in the amount and types of recreation uses.

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SECTION 5.0

REFERENCES CITED

California Department of Fish and Wildlife (CDFW). 2018a. Online Fishing Guide. Sacramento, California. https://www.wildlife.ca.gov/Fishing/Guide. Accessed on June 20, 2018.

California Department of Fish and Wildlife (CDFW). 2018b. 2018-2019 California Freshwater Sport Fishing Regulations. Sacramento, California.

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Yuba County. 2010. Yuba County Code of Ordinances, Chapter 8.51 - Camp Far West Lake. Marysville, California. Adopted August 24, 2010.

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APPENDIX E2

Attachment 2

Historic Properties Management Plan

SECURITY LEVEL: PRIVILEGED AND CONFIDENTIAL

To be included in Final Application for New License