UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
West Coast Region
650 Capitol Mall, Suite 5-100
Sacramento, California 95814-4700

Refer to NMFS ECO#: WCRO-2020-00378

August 14, 2020

Mr. Ryan T. Larson
Chief – Levees and Channels Branch
U.S. Army Corps of Engineers
1325 J Street
Sacramento, California 95814-2922

Re: Endangered Species Act Section 7(a)(2) Biological Opinion and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Response for the Sun Pacific Yuba River Pump Station Project

Dear Mr. Larson:

Thank you for your letter of February 7, 2020, requesting initiation of consultation with NOAA's National Marine Fisheries Service (NMFS) pursuant to section 7 of the Endangered Species Act of 1973 (ESA) (16 U.S.C. 1531 *et seq*.) for the Sun Pacific Yuba River Pump Station Project. This consultation was conducted in accordance with the 2019 revised regulations that implement section 7 of the ESA (50 CFR 402; 84 FR 44976, 45016). Your letter requested concurrence with a not likely to adversely affect (NLAA) determination for listed fish and critical habitat; however, we determined that there may be adverse effects to listed fish and critical habitat and thus determined that formal consultation would be necessary for this project.

Thank you, also, for your request for consultation pursuant to the essential fish habitat (EFH) provisions in Section 305(b) of the Magnuson-Stevens Fishery Conservation and Management Act (MSA)(16 U.S.C. 1855(b)) for this action. NMFS concluded that the action would adversely affect the EFH of Pacific Coast Salmon. Therefore, we have included the results of that review in Section 3 of this document.

Based on the best available scientific and commercial information, the biological opinion concludes that the Sun Pacific Yuba River Pump Station Project is not likely to jeopardize the continued existence of the federally listed threatened Central Valley spring-run Chinook salmon evolutionarily significant unit (ESU) (*Oncorhynchus tshawytscha*), the threatened California Central Valley steelhead distinct population segment (DPS) (*O. mykiss*), or the threatened southern DPS of North American green sturgeon (*Acipenser medirostris*), and is not likely to destroy or adversely modify their designated critical habitats. For the above species, NMFS has included an incidental take statement with reasonable and prudent measures and non-discretionary terms and conditions that are necessary and appropriate to avoid, minimize, or monitor incidental take of listed species associated with the project.

As described in the terms and conditions section of the attached biological opinion, the U.S. Army Corps of Engineers (USACE) must provide NMFS with an annual report by June 1st following the construction season, describing any incidental take that occurred as a result of this project. Additionally, USACE must provide notification that the applicant provided the construction crew with the attached biological opinion outlining their requirements and obligations under this opinion. NMFS further requests that USACE provide us with a notice of implementation of any of the conservation recommendations provided.

Please contact Neal McIntosh at the NMFS California Central Valley Office at (916) 930-5647 or via email at neal.mcintosh@noaa.gov, if you have any questions concerning this consultation, or if you require additional information.

Sincerely,

A. Catherine Marcinkevage

Cathy Marcinkevage
Acting Assistant Regional Administrator
California Central Valley Office

Enclosure

cc: Copy to File No: 151422-WCR2020-SA00007

Mr. Brian Luke, USACE Natural Resources Specialist, brian.j.luke@usace.army.mil
Mr. Oren Ruffcorn, USACE Biologist, oren.m.ruffcorn@usace.army.mil

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Endangered Species Act Section 7(a)(2) Biological Opinion, Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Response, and Fish and Wildlife Coordination Act Recommendations

Sun Pacific Yuba River Pump Station Project

National Marine Fisheries Service Consultation Number: WCRO-2020-00378

Action Agency: United States Army Corps of Engineers

Affected Species and NMFS' Determinations:

ESA-Listed Species	Status	Is Action Likely to Adversely Affect Species?	Is Action Likely to Jeopardize the Species?	Is Action Likely to Adversely Affect Critical Habitat?	Is Action Likely to Destroy or Adversely Modify Critical Habitat?
Central Valley spring-run Chinook salmon (*O. tshawytscha*) evolutionarily significant unit (ESU)	Threatened	Yes	No	Yes	No
California Central Valley steelhead (*O. mykiss*) distinct population segment (DPS)	Threatened	Yes	No	Yes	No
Southern DPS (sDPS) of North American green sturgeon (*Acipenser medirostris*)	Threatened	Yes	No	Yes	No

Fishery Management Plan That Identifies Essential Fish Habitat (EFH) in the Project Area	Does Action Have an Adverse Effect on EFH?	Are EFH Conservation Recommendations Provided?
Pacific Coast Salmon	Yes	Yes

Consultation Conducted By: National Marine Fisheries Service, West Coast Region

Issued By: A. Catherine Marcinkevage

Cathy Marcinkevage
Acting Assistant Regional Administrator

Date: *August 14, 2020*

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LIST OF ACRONYMS AND ABBREVIATIONS

ACID – Anderson–Cottonwood Irrigation District
ADA – American Disabilities Act
BA – biological assessment
BMPs – best management practices
°C – degrees Celsius
CCV – California Central Valley
CCVO – California Central Valley Office
CDFW – California Department of Fish and Wildlife
CFR – Code of Federal Regulations
cfs – cubic feet per second
CV – Central Valley
CVP – Central Valley Project
CWA – Clean Water Act
DO – dissolved oxygen
DPS – distinct population segment
DQA – Data Quality Act
DWR – California Department of Water Resources
EFH – essential fish habitat
EPA – Environmental Protection Agency
ESA – Endangered Species Act
ESU – evolutionarily significant unit
°F – degrees Fahrenheit
FMP – Fishery Management Plan
FR – Federal Register
FWCA – Fish and Wildlife Coordination Act
GCID – Glenn–Colusa Irrigation District
HAPC – habitat area of particular concern
hr – hour
ITS – incidental take statement
IWM – instream woody material
kg – kilogram
l – liter
LSNFH – Livingston Stone National Fish Hatchery
LWM – large woody material
m – meter
mg – milligram
MSA – Magnuson-Stevens Fishery Conservation and Management Act
NMFS – National Marine Fisheries Service
NPCC – Northwest Power and Conservation Council
NOAA – National Oceanic and Atmospheric Administration
NTU – nephelometric turbidity units
O_2 – oxygen
OHWM – ordinary high water mark
opinion – biological opinion
PAH – polycyclic aromatic hydrocarbon

PBF – physical or biological feature
PCB – polychlorinated biphenyls
PCE – primary constituent element
ppt – parts per thousand
PVA – population viability analysis
RBDD – Red Bluff Diversion Dam
Reclamation – United States Bureau of Reclamation
RM – river mile
RMT – river management team
RPMs – reasonable and prudent measures
RSP – rock slope protection
SRCAF – Sacramento River Conservation Area Forum
SWE – snow water equivalent
SWRCB – State Water Resource Control Board
SWP – State Water Project
TCD – temperature control device
TCP – temperature compliance point
USACE – United States Army Corps of Engineers
USC – United States Code
USGS – United States Geological Survey
USFWS – United States Fish and Wildlife Service
VSP – viable salmonid population
WRO – Water Rights Order
YWA – Yuba Water Agency

1. INTRODUCTION

This Introduction section provides information relevant to the other sections of this document and is incorporated by reference into Sections 2 and 3 below.

1.1. Background

The National Marine Fisheries Service (NMFS) prepared the biological opinion (opinion) and incidental take statement (ITS) portions of this document in accordance with section 7(b) of the Endangered Species Act (ESA) of 1973 (16 USC 1531 *et seq.*), and implementing regulations at 50 CFR 402, as amended.

We also completed an essential fish habitat (EFH) consultation on the proposed action, in accordance with section 305(b)(2) of the Magnuson-Stevens Fishery Conservation and Management Act (MSA) (16 USC 1801 *et seq.*) and implementing regulations at 50 CFR 600.

We completed pre-dissemination review of this document using standards for utility, integrity, and objectivity in compliance with applicable guidelines issued under the Data Quality Act (DQA) (section 515 of the Treasury and General Government Appropriations Act for Fiscal Year 2001, Public Law 106-554). The document will be available within two weeks at the NOAA Library Institutional Repository [https://repository.library.noaa.gov/welcome]. A complete record of this consultation is on file at the NMFS California Central Valley Office (CCVO).

1.2. Consultation History

- On February 12, 2020, NMFS' CCVO received a consultation initiation request and biological assessment (BA) from the U.S. Army Corps of Engineers (USACE) for the effects of the Sun Pacific Yuba River Pump Station Project on Central Valley (CV) spring-run Chinook salmon evolutionarily significant unit (ESU), California Central Valley (CCV) steelhead distinct population segment (DPS), southern DPS of North American green sturgeon (sDPS green sturgeon), associated critical habitat for those listed species, and essential fish habitat (EFH) for Pacific salmon.

- On March 13, 2020, NMFS project biologist, Neal McIntosh, and USACE project manager, Brian Luke, discussed various aspects of this project. NMFS requested more information on this project that Mr. Luke requested from the applicant.

- On March 18, 2020, NMFS received more information from USACE. On this date, ESA and MSA consultation was initiated.

1.3. Proposed Federal Action

Under the ESA, "action" means all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by Federal agencies (50 CFR 402.02).

Under MSA, Federal action means any action authorized, funded, or undertaken, or proposed to be authorized, funded, or undertaken by a Federal agency (50 CFR 600.910).

The USACE proposes to issue a Section 408 permit through the Central Valley Flood Protection Board (CVFPB) to the Paramount Ranch Company (the applicant) to construct a pump station along the south bank of the Yuba River. Construction and installation of the pump will occur from April 1 to October 15 with an in-water work window of July 16 to August 31. The biological assessment (BA) proposed that work construction would likely occur during the 2019 summer construction window, however, given the submittal date of the BA on February 12, 2020, NMFS assumes work will likely occur in 2020 or 2021.

We considered whether or not the proposed action would cause any other activities that would have consequences on CV spring-run Chinook salmon ESU, CCV steelhead DPS, or sDPS green sturgeon, or their critical habitats and determined that it would cause operation of the new pump to occur and a diversion of flow from the Yuba River for the life of the pump. A consequence is caused by the proposed action if it would not occur but for the proposed action and it is reasonably certain to occur.

1.3.1. Project Location

The project site is located on the south bank of the Yuba River, northwest of the unincorporated area of Dantoni in Yuba County, California (39.1731° N, 121.5268° W). The site is within the Yuba City United States Geological Survey topographic quadrangle. The project site is located on the north side of Sun Pacific Farms at the end of Dantoni Road, 2.9 miles east of the intersection of Simpson Road and Simpson-Dantoni Roads. The action area consists of the project footprint and extends approximately 300 feet downstream from the construction area, due to sedimentation and turbidity effects.

The project site is comprised of a strip of disturbed annual grassland habitat along an access road, a narrow riparian zone along the bank of the Yuba River, and the riverine habitat of the riverbed where the pump will be installed. The upland area where the pump will be installed along the bank has been previously cleared of ground vegetation. The portions of the project site where vegetation is undisturbed are dominated by a dense shrub layer and a sparse tree canopy composed of typical riparian species. The project site is upstream of a rip-rap point that protrudes out 10 to 15 feet into the Yuba River. The rip-rap point creates a break in the current and an eddy that circulates back upstream at the proposed pump location.

1.3.2. Project Description

The USACE proposes to issue a Section 408 permit through the CVFPB to the Paramount Ranch Company to construct a pump station along the south bank of the Yuba River. Construction and installation of the pump will occur from April 1 to October 15 with an in-water work window of July 16 to August 31. The BA proposed that work construction would likely occur during the 2019 summer construction season, however, given the submittal date of the BA on February 12, 2020, NMFS assumes work will likely occur in 2020 or 2021.

The applicant intends to construct a pump with a 70-foot long, 18-inch diameter intake pipe partially enclosed in a 50-foot long, 30-inch diameter conductor pipe. The pump will be supported on a 12-foot by 12-foot platform with a self-cleaning, retractable fish screen. The intake pipe and platform will be supported by 8-inch diameter piles set at various depths. The

applicant intends to drive the 8-inch diameter support piles with a vibratory hammer. Pile driving will only occur from July 16 through August 31.

The pump will replace the applicant's broken and subsequently stolen mobile pump, which had been non-operational for the past few years. The concrete structure the old pump was on remains as does an electrical pole that provided power to the old pump. The new pump location will be approximately 100 yards upstream of the old pump structure. The previous pump location was susceptible to sediment accumulation and flood damage.

The footprint of the whole system will be approximately 70 feet long by 12 feet wide and will sit above ground at varying heights. The 18-inch discharge pipe will be installed 4 feet below current grade. The placement of the pump structure will permanently impact 0.0012 acres of riverine habitat within the Yuba River.

The applicant proposes to use an Intake Screens, Inc., fish screen with a hydraulically driven, self-cleaning brushing system. The fish screen complies with NMFS' 1997 Fish Screening Criteria for Anadromous Salmonids (NMFS 1997).

The pump will draw water directly from the Yuba River for delivery to adjacent kiwifruit orchards for irrigation and frost protection. The pump will draw frost protection water typically during the late winter and early spring between January and March; however, it may be used as early as November, if conditions necessitate. The pump may be used as needed for irrigation purposes between March and October. A maximum flow of approximately 13.5 cubic feet per second (cfs) (6,000 gallons per minute) will be diverted through the proposed pump. Riparian vegetation removed as a result of the project construction will be restored onsite to pre-project conditions. Restoration work will occur during the same construction season as the pump construction.

The purpose of the construction of the pump, is to pump water from the Yuba River for agricultural purposes. Although the operation of the pump is not regulated by USACE, and not part of the proposed action, the operation of the pump is considered an "other activity" as it would not occur but for the proposed action (construction of the pump), and therefore is analyzed in this consultation. According to the applicant, the previous pump used approximately 1,000 acre-feet per year and, as the applicant expects comparable usage with the new pump, NMFS will assume for this opinion that the new pump will use approximately 1,000 acre-feet per year.

1.3.3. Avoidance and Minimization Measures

The applicant included the following take avoidance and minimization measures (AMMs) for this project:

- All riparian vegetation to be removed as a result of the project activities will be restored onsite to pre-project conditions within the same season as project construction.

- Channel disturbance will be kept to a minimum during construction activities within the channel and only occur within designated areas.

- Any large woody debris (*i.e.*, dead trunk or branch with diameter greater than 6 inches) that is removed during construction will be placed back into the active Yuba River.

- An erosion control plan that incorporates erosion best management practices (BMPs) will be created and implemented before the wet season (October 15 to April 1), to avoid sediment from entering into the Yuba River.

- BMPs will be implemented that are necessary to minimize the risk of sedimentation, turbidity, and hazardous material spills. Applicable BMPs will include permanent and temporary erosion control measures, including the use of straw bales, mulch or wattles, silt fences, filter fabric, spill remediation material, such as absorbent booms, and ultimately seeding and revegetating.

- All fueling and/or equipment maintenance will occur 250 feet from all water bodies and riparian areas, except for pile drivers or other stationary equipment, and a spill prevention plan (SPP) and cleanup will be created and implemented, if a spill or equipment leak occurs during construction activities. Any spill within the active channel of the Yuba River will be reported to NMFS, California Department of Fish and Wildlife, and other appropriate resource agencies within 48 hours.

- A SPP and a stormwater pollution prevention plan (SWPPP) will be developed and implemented by the contractor. Spill prevention measures will include stockpiling absorbent booms, staging hazardous materials at least 25 feet away from the river, and maintaining and checking construction equipment to prevent fuel and lubrication leaks. SWPPP measures will utilize applicable BMPs, such as the use of silt fences, straw bales, and other methods necessary to minimize stormwater discharge associated with construction activities.

- The contractor will have absorbent booms available within 250 feet of the live channel during all in-water work to be further prepared for quick containment of any spills within or adjacent to the Yuba River.

1.3.3.1. Minimization of Effects to Fishes

Additionally the project includes the following AMMs that will minimize effects to fishes:

- Pile driving activities will only occur from July 16 through August 31, when there is the smallest amount of spawning and migration activity for listed anadromous fish species that occur within the Yuba River.

- Pile driving will only occur during daylight hours followed by non-work periods of at least eight hours at night to allow quiet migration conditions for anadromous fishes.

- Piles will be installed using a vibratory hammer to most efficiently reduce acoustic effects underwater, so as not to exceed the acoustical thresholds for salmon.

- The previous pump location was susceptible to sediment accumulation and flood damage. The new site is expected to reduce the need for sediment removal and will provide deeper water coverage for the pump.

2. ENDANGERED SPECIES ACT: BIOLOGICAL OPINION AND INCIDENTAL TAKE STATEMENT

The ESA establishes a national program for conserving threatened and endangered species of fish, wildlife, plants, and the habitat upon which they depend. As required by section 7(a)(2) of the ESA, each Federal agency must ensure that its actions are not likely to jeopardize the continued existence of endangered or threatened species, or adversely modify or destroy their designated critical habitat. Per the requirements of the ESA, Federal action agencies consult with NMFS and section 7(b)(3) requires that, at the conclusion of consultation, NMFS provide an opinion stating how the agency's actions would affect listed species and their critical habitats. If incidental take is reasonably certain to occur, section 7(b)(4) requires NMFS to provide an ITS that specifies the impact of any incidental taking and includes non-discretionary reasonable and prudent measures (RPMs) and terms and conditions to minimize such impacts.

2.1. Analytical Approach

This biological opinion includes both a jeopardy analysis and an adverse modification analysis. The jeopardy analysis relies upon the regulatory definition of "jeopardize the continued existence of" a listed species, which is "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 that species" (50 CFR 402.02). Therefore, the jeopardy analysis considers both survival and recovery of the species.

This biological opinion relies on the regulatory definition of "destruction or adverse modification," which "means a direct or indirect alteration that appreciably diminishes the value of critical habitat as a whole for the conservation of a listed species" (50 CFR 402.02).

The designations of critical habitat for CV spring-run Chinook salmon, CCV steelhead, and sDPS green sturgeon use the term primary constituent element (PCE) or essential features. The 2016 critical habitat regulations (50 CFR 424.12) replace this term with physical or biological features (PBFs). The shift in terminology does not change the approach used in conducting a ''destruction or adverse modification'' analysis, which is the same regardless of whether the original designation identified PCEs, PBFs, or essential features. In this biological opinion, we use the term PBF to mean PCE or essential feature, as appropriate for the specific critical habitat.

The 2019 regulations define effects of the action using the term "consequences" (50 CFR 402.02). As explained in the preamble to the regulations (84 FR 44976), that definition does not change the scope of our analysis and in this opinion we use the terms "effects" and "consequences" interchangeably.

We use the following approach to determine whether a proposed action is likely to jeopardize listed species or destroy or adversely modify critical habitat:

- Evaluate the rangewide status of the species and critical habitat expected to be adversely affected by the proposed action.

- Evaluate the environmental baseline of the species and critical habitat.

- Evaluate the effects of the proposed action on species and their habitat using an exposure-response approach.

- Evaluate cumulative effects.

- In the integration and synthesis, add the effects of the action and cumulative effects to the environmental baseline, and, in light of the status of the species and critical habitat, analyze whether the proposed action is likely to: (1) directly or indirectly 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 that species, or (2) directly or indirectly result in an alteration that appreciably diminishes the value of critical habitat as a whole for the conservation of a listed species.

- If necessary, suggest a reasonable and prudent alternative to the proposed action.

2.2. Rangewide Status of the Species and Critical Habitat

This opinion examines the status of each species that would be adversely affected by the proposed action. The status is determined by the level of extinction risk that the listed species face, based on parameters considered in documents, such as recovery plans, status reviews, and listing decisions. This informs the description of the species' likelihood of both survival and recovery. The species status section also helps to inform the description of the species' "reproduction, numbers, or distribution" as described in 50 CFR 402.02. The opinion also examines the condition of critical habitat throughout the designated area, evaluates the conservation value of the various watersheds and coastal and marine environments that make up the designated area, and discusses the function of the PBFs that are essential for the conservation of the species.

Table 1. Description of species, current ESA listing classifications, and summary of species status

Species	Listing Classification and Federal Register Notice	Status Summary
CV spring-run Chinook salmon ESU	Threatened, 70 FR 37160; June 28, 2005	According to the NMFS 5-year species status review (NMFS 2016b), the status of the CV spring-run Chinook salmon ESU, until 2015, has improved since the 2010 5-year species status review. The improved status is due to extensive restoration, and increases in spatial structure with historically extirpated populations (Battle and Clear Creeks) trending in the positive direction. Recent declines, however, of many of the dependent populations, high pre-spawn and egg mortality during the 2012 to 2016 drought, uncertain juvenile survival during the drought are likely increasing the ESU's extinction risk. Monitoring data showed sharp declines in adult returns from 2014 through 2018 (CDFW 2018b).
CCV steelhead DPS	Threatened, 71 FR 834; January 5, 2006	According to the NMFS 5-year species status review (NMFS 2016a), the status of CCV steelhead appears to have remained unchanged since the 2011 status review that concluded that the DPS was in danger of extinction. Most natural-origin CCV populations are very small, are not monitored, and may lack the resiliency to persist for protracted periods, if subjected to additional stressors, particularly widespread stressors, such as climate change. The genetic diversity of CCV steelhead has likely been impacted by low population sizes and high numbers of hatchery fish relative to natural-origin fish. The life-history diversity of the DPS is mostly unknown, as very few studies have been published on traits, such as age structure, size at age, or growth rates in CCV steelhead.
sDPS green sturgeon	Threatened, 71 FR 17757; April 7, 2006	According to the NMFS 5-year species status review (NMFS 2015) and the 2018 final recovery plan (NMFS 2018), some threats to the species have recently been eliminated, such as take from commercial fisheries and removal of some passage barriers. Also, several habitat restoration actions have occurred in the Sacramento River Basin, and spawning was documented on the Feather River. However, the species viability continues to face a moderate risk of extinction, because many threats have not been addressed, and the majority of spawning occurs in a single reach of the main stem Sacramento River. Current threats include poaching and habitat degradation. A recent method has been developed to estimate the annual spawning run and population size in the upper Sacramento River so species can be evaluated relative to recovery criteria (Mora *et al*. 2018).

Table 2. Description of critical habitat, listing, and status summary.

Critical Habitat	Designation Date and Federal Register Notice	Description
CV spring-run Chinook salmon critical habitat	September 2, 2005; 70 FR 52488	Critical habitat for CV spring-run Chinook salmon includes stream reaches of the Feather, Yuba and American rivers, Big Chico, Butte, Deer, Mill, Battle, Antelope, and Clear creeks, the Sacramento River, as well as portions of the northern Delta. Critical habitat includes the stream channels in the designated stream reaches and the lateral extent as defined by the ordinary high-water line. In areas where the ordinary high-water line has not been defined, the lateral extent will be defined by the bankfull elevation. PBFs considered essential to the conservation of the species include: Spawning habitat; freshwater rearing habitat; freshwater migration corridors; and estuarine areas. Although the current conditions of PBFs for CV spring-run Chinook salmon critical habitat in the Central Valley are significantly limited and degraded, the habitat remaining is considered highly valuable.
CCV steelhead critical habitat	September 2, 2005; 70 FR 52488	Critical habitat for CCV steelhead includes stream reaches of the Feather, Yuba and American rivers, Big Chico, Butte, Deer, Mill, Battle, Antelope, and Clear creeks, the Sacramento River, as well as portions of the northern Delta. Critical habitat includes the stream channels in the designated stream reaches and the lateral extent as defined by the ordinary high-water line. In areas where the ordinary high-water line has not been defined, the lateral extent will be defined by the bankfull elevation. PBFs considered essential to the conservation of the species include: spawning habitat; freshwater rearing habitat; freshwater migration corridors; and estuarine areas. Although the current conditions of PBFs for CCV steelhead critical habitat in the Central Valley are significantly limited and degraded, the habitat remaining is considered highly valuable.

Critical Habitat	Designation Date and Federal Register Notice	Description
sDPS green sturgeon	October 9, 2009; 74 FR 52300	Critical habitat includes the stream channels and waterways in the Delta to the ordinary high water line. Critical habitat also includes the main stem Sacramento River upstream from the I Street Bridge to Keswick Dam, the Feather River upstream to the fish barrier dam adjacent to the Feather River Fish Hatchery, and the Yuba River upstream to Daguerre Dam. Critical habitat in coastal marine areas include waters out to a depth of 60 fathoms, from Monterey Bay in California, to the Strait of Juan de Fuca in Washington. Coastal estuaries designated as critical habitat include San Francisco Bay, Suisun Bay, San Pablo Bay, and the lower Columbia River estuary. Certain coastal bays and estuaries in California (Humboldt Bay), Oregon (Coos Bay, Winchester Bay, Yaquina Bay, and Nehalem Bay), and Washington (Willapa Bay and Grays Harbor) are included as critical habitat for sDPS green sturgeon. PBFs considered essential to the conservation of the species for freshwater and estuarine habitats include: food resources, substrate type or size, water flow, water quality, migration corridor; water depth, sediment quality. In addition, PBFs for nearshore coastal marine areas include migratory corridor, water quality, and food resources. Although the current conditions of PBFs for sDPS green sturgeon critical habitat in the Central Valley are significantly limited and degraded, the habitat remaining is considered highly valuable.

2.2.1 Global Climate Change

One major factor affecting the rangewide status of the threatened and endangered anadromous fish in the Central Valley and aquatic habitat at large is climate change. Warmer temperatures associated with climate change reduce snowpack and alter the seasonality and volume of seasonal hydrograph patterns (Cohen *et al*. 2000). Central California has shown trends toward warmer winters since the 1940s (Dettinger and Cayan 1995). Projected warming is expected to affect Central Valley Chinook salmon. Because the runs are restricted to low elevations as a result of impassable rim dams, if climate warms by 5°C (9°F), it is questionable whether any Central Valley Chinook salmon populations can persist (Williams 2006).

CCV spring-run Chinook salmon adults are vulnerable to climate change because they over-summer in freshwater streams before spawning in autumn (Thompson *et al*. 2011). CV spring-run Chinook salmon spawn primarily in the tributaries to the Sacramento River, and those

tributaries without cold water refugia, usually input from springs, will be more susceptible to impacts of climate change.

Although CCV steelhead will experience similar effects of climate change to Chinook salmon, as they are also blocked from the vast majority of their historic spawning and rearing habitat, the effects may be even greater in some cases, as juvenile steelhead need to rear in the stream for one to two summers prior to emigrating as smolts. In the Central Valley, summer and fall temperatures below the dams in many streams already exceed the recommended temperatures for optimal growth of juvenile steelhead, which range from 14°C to 19°C (57°F to 66°F).

The Anderson Cottonwood Irrigation District (ACID) Dam is considered the upriver extent of sDPS green sturgeon passage in the Sacramento River. The upriver extent of sDPS green sturgeon spawning, however, is approximately 30 kilometers downriver of the ACID Dam where water temperature is higher than ACID during late spring and summer. Thus, if water temperatures increase with climate change, temperatures adjacent to ACID may remain within tolerable levels for the embryonic and larval life stages of sDPS green sturgeon, but temperatures at spawning locations lower in the river may be more affected.

In summary, observed and predicted climate change effects are generally detrimental to the species (McClure 2011, Wade *et al*. 2013), so unless offset by improvements in other factors, the status of the species and critical habitat is likely to decline over time. The climate change projections referenced above cover the time period between the present and approximately 2100. While there is uncertainty associated with projections, which increases over time, the direction of change is relatively certain (McClure *et al*. 2013).

2.3. Action Area

"Action area" means all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action (50 CFR 402.02). The project site is located on the south bank of the Yuba River, northwest of the unincorporated area of Dantoni in Yuba County, California (39.1731° N, 121.5268° W). The site is within the Yuba City United States Geological Survey topographic quadrangle. The project site is located on the north side of Sun Pacific Farms at the end of Dantoni Road, 2.9 miles east of the intersection of Simpson Road and Simpson-Dantoni Roads. The action area consists of the project footprint and extends approximately 300 feet downstream from the construction area due to sedimentation and turbidity effects.

The action area includes the adjacent riparian zone, 100 feet beyond the construction footprint in all directions on the river side of the project to account for effects from noise and dust, and an additional approximately 200 feet downstream to capture turbidity impacts. The action area encompasses an area of approximately 0.28 acres. Areas affected by the project will be those in the immediate construction footprint and immediately downstream. Short-term effects associated with the project are those related to noise, dust, and turbidity above ambient levels. Long-term effects associated with the project are those related to the other activity of the pump operation and will consist of removal of water.

2.4. Environmental Baseline

The "environmental baseline" refers to the condition of the listed species or its designated critical habitat in the action area, without the consequences to the listed species or designated critical habitat caused by the proposed action. The environmental baseline includes the past and present impacts of all Federal, State, or private actions and other human activities in the action area, the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal or early section 7 consultation, and the impact of State or private actions which are contemporaneous with the consultation in process. The consequences to listed species or designated critical habitat from ongoing agency activities or existing agency facilities that are not within the agency's discretion to modify are part of the environmental baseline (50 CFR 402.02).

2.4.1. Past and Present Conditions

The Yuba River watershed drains approximately 1,340 square miles covering Sierra, Placer, Yuba, and Nevada Counties. The water flows west from the Sierra Nevada Mountains carrying melted snow run-off and water from the three upper Yuba River forks down to the confluence with the Feather River. While the location of the project is in the lower Yuba River, the overall watershed plays a large role in water quality and quantity in the project area. Multiple factors affect the water quality of the lower Yuba River, including hydroelectric power generation, diversion for water supply, dams and reservoirs, mining activities, urbanization, and timber harvesting.

Major dams in the Yuba River watershed include Spaulding, Bowman, Fordyce, Englebright, Jackson Meadows, and New Bullards Bar. Many of the dams in the Yuba River watershed were originally built for gold mining but later shifted emphasis to flood control, water supply, and hydropower. The flows in the lower Yuba River are based on the Lower Yuba River Accord, which is an agreement between the Yuba County Water Agency and stakeholders in the area to balance interests of irrigation, conservation, water supply, and fisheries concerns. The physical (*i.e*., geomorphology), thermal, and chemical changes that occur from water being retained behind dams can greatly affect the downstream water quality and the temperature of the river (Ligon *et al*. 1995).

The lower Yuba River experiences water temperature fluctuation due to variation in snowpack, releases from upper watershed dams, inflows from Deer Creek (RM 22.7), irrigation diversions at Daguerre Point Dam (RM 11.6), and operational releases from Englebright Dam (RM 24). Furthermore, the general width to flow ratio in conjunction with low riparian cover provide the opportunity for solar heating of the water. The water within the lower Yuba River can increase up to 7°C from the release at Englebright Dam to the City of Marysville (Yuba River Management Team 2013) (Yuba RMT) but this is seasonally dependent and influenced by the amount of water released from Englebright Dam, solar input, and air temperature. Data taken near Marysville showed that dissolved oxygen concentrations, total dissolved solids, pH, alkalinity, and turbidity are well within acceptable or preferred ranges for salmonids and other key freshwater organisms (USACE 2012). In 2007, instream flow requirements were established by the Lower Yuba River Accord (Yuba Water Agency 2007) (YWA) to maintain suitable habitat in the lower Yuba River for fish and wildlife. Flows are prescribed based on the water

year and the amount of water predicted to be available in the Yuba, referred to as the North Yuba Index. Flow schedules with minimum flow requirements are listed in Figure 1, with schedule 1 occurring in years with plentiful water ranging to schedule 6 occurring in years with less water available. In years of critically low water, conference with stakeholders occurs to determine how to manage flows on a case-by-case basis. At the time of this agreement, schedule 1 was predicted to occur 56% of the time, schedule 2 22% of the time, schedule 3 7% of the time, schedule 4 5% of the time, schedule 5 5% of the time, schedule 6 4% of the time, and conference 1% of the time (YWA 2007). The flows presented in Figure 1 are the minimum flows required and actual flows are usually higher than the listed values. At the time of writing this opinion, the Yuba River is operating on schedule 2 with a minimum flow of 500 cfs, but with actual flows of 1,192 cfs. These prescribed flows may change with the issuance of a new Federal Energy Regulatory Commission (FERC) license for Englebright Dam in the next few years.

Schedule	OCT		NOV	DEC	JAN	FEB	MAR	APR		MAY		JUN		JUL	AUG	SEP	Total Annual Volume (AF)
	1-15	16-31	1-30	1-31	1-31	1-29	1-31	1-15	16-30	1-15	16-31	1-15	16-30	1-31	1-31	1-30	
1	500	500	500	500	500	500	700	1000	1000	2000	2000	1500	1500	700	600	500	574200
2	500	500	500	500	500	500	700	700	800	1000	1000	800	500	500	500	500	429066
3	500	500	500	500	500	500	500	700	700	900	900	500	500	500	500	500	398722
4	400	400	500	500	500	500	500	600	900	900	600	400	400	400	400	400	361944
5	400	400	500	500	500	500	500	500	600	600	400	400	400	400	400	400	334818
6	350	350	350	350	350	350	350	350	500	500	400	300	150	150	150	350	232155

* Indicated flows represent average volumes for the specified time period. Actual flows may vary from the indicated flows according to established criteria.
* Indicated Schedule 6 flows do rot include an additional 30 TAF available from groundwater substitution to be allocated according to established criteria.

Figure 1. Yuba River flow requirements (in cfs) at Marysville gage (YWA 2007)

Due to mining, mining sediment deposition, and relocation of the lower Yuba River, the lower Yuba River has been largely converted from a multi-channel system to a single constricted channel, and features, such as functional floodplains and other off-channel salmonid rearing habitat, are reduced. Most of the floodplain habitat and side channels that are present only inundate at extremely high flows, with a few deep backwater pools created by dredge mining that connect perennially at the downstream end of remnant side channels via subsurface flow. Instream habitats within the lower Yuba River have been modified or converted for uses, such as agriculture, gravel and gold mining, water impoundments, water diversions, and levees. These major actions and other events have led to the deterioration of riparian and aquatic habitat conditions. The lower Yuba River is largely disconnected from historic floodplains, providing little opportunity for seasonally inundated terrestrial vegetation and off-channel areas that are important for juvenile salmonids. Rearing habitat is generally considered a limiting factor in the Yuba River (Yoshiyama *et al*. 1996, Lindley *et al*. 2009). In some reaches of the lower Yuba River, instream cover is very limited.

2.4.2. Fisheries and Aquatic Habitat

The lower Yuba River provides an important upstream and downstream migration corridor for adult and juvenile CV spring-run Chinook salmon and CCV steelhead and rearing habitat for juvenile CV spring-run Chinook salmon and CCV steelhead. sDPS green sturgeon utilize the lower Yuba River as a migration corridor and for non-natal rearing.

2.4.2.1. CV spring-run Chinook Salmon and Critical Habitat

The Yuba River within the action area is used as a migration corridor for adult and juvenile CV spring-run Chinook salmon. Adult CV spring-run Chinook salmon have been documented to hold for an extended period in the pool below Daguerre Point Dam (Yuba RMT 2013). The action area is about five miles downstream of Daguerre Point Dam and likely does not support summer holding habitat. CV spring-run Chinook salmon spawning may occur within the action area or slightly upstream of the action area (NMFS 2014). The Yuba River within the action area is also used by rearing juvenile CV spring-run Chinook salmon. The recovery plan for CV spring-run Chinook salmon identifies the lower Yuba River as a core 2 population (NMFS 2014). Core 2 populations are expected to have the potential to meet the moderate risk of extinction criteria. Core 2 populations are of secondary importance for recovery efforts. Adult CV spring-run Chinook salmon will likely not be in the action area during the proposed in-water work window, as the action area likely does not provide good summer holding habitat (Yuba RMT 2013). Rearing juvenile spring-run Chinook salmon may be present in the action area throughout the year including during the in-water work window (Yuba RMT 2013). According to the most recent five year status review, the population size from VAKI counts within the Yuba River, ranging from a few hundred to a few thousand, meets low extinction risk for criteria for abundance, though hatchery influence likely puts the Yuba River population at a high extinction risk (NMFS 2016b).

The PBFs of critical habitat for CV spring-run Chinook salmon within the action area include freshwater rearing, migration, and spawning. The Yuba River has a medium to high value for the conservation of the CV spring-run Chinook salmon because it supports several life stage functions. The upper Yuba River (upstream of Englebright Dam) is a prime candidate for reintroduction efforts (NMFS 2014).

2.4.2.2. CCV Steelhead and Critical Habitat

CCV steelhead are well-distributed throughout the Central Valley below the major rim dams (Good *et al*. 2005). The Yuba River within the action area is used as a migration corridor for adult and juvenile CCV steelhead. CCV steelhead spawning may occur within the action area (NMFS 2014). The Yuba River within the action area is also used by rearing juvenile CCV steelhead. The recovery plan for CCV steelhead identifies the lower Yuba River as a core 2 population (NMFS 2014). Core 2 populations are expected to have the potential to meet the moderate risk of extinction criteria. Core 2 populations are of secondary importance for recovery efforts.

Adult CCV steelhead will likely not be in the action area during July of the proposed in-water work window but may be present during August as adult immigration and holding may have begun by then (Yuba RMT 2013). Rearing fry and juvenile CCV steelhead may be present in the action area throughout the year including during the in-water work window (Yuba RMT 2013). Juvenile CCV steelhead may also migrate downstream during the proposed in-water work window (Yuba RMT 2013).

The PBFs of critical habitat for CCV steelhead within the action area include freshwater rearing, migration, and spawning. The Yuba River has a medium to high value for the conservation of

CCV steelhead, because it supports several life stage functions. The upper Yuba River (upstream of Englebright Dam) is a prime candidate for reintroduction efforts (NMFS 2014).

2.4.2.3. sDPS Green Sturgeon and Critical Habitat

Daguerre Point Dam is impassible to adult sDPS green sturgeon and blocks access to historical upstream sDPS green sturgeon spawning habitat (Mora *et al*. 2009). sDPS green sturgeon have been observed in the pool downstream of Daguerre Point Dam and exhibited spawning behavior in 2011 (Bergman *et al*. 2011). Adult sDPS green sturgeon have been observed in the pool downstream of Daguerre Point Dam in several years. Eggs collected in 2018 were determined to be green sturgeon eggs based on vouchering via dichotomous key, confirming that green sturgeon spawn in the Yuba River (CDFW 2018a). The pool below Daguerre Point Dam may be the only currently accessible location in the lower Yuba River where depth, substrate type and size, and water flow may be conducive to green sturgeon spawning. The rest of the lower Yuba River, including the action area, has been highly modified by anthropogenic activities and likely only serves as a migratory corridor for sDPS green sturgeon migration.

Adult sDPS green sturgeon will likely not be in the action area during the proposed in-water work window as spawning will be underway and spawning within the Yuba River is likely to occur upstream of the action area (Yuba RMT 2013). Post-spawning holding typically lasts through November, so there will likely not be any adult sDPS green sturgeon outmigration within the in-water work window (Yuba RMT 2013). Juvenile rearing and outmigration occurs year-round including during the proposed in-water work window so juvenile sDPS green sturgeon may be present in the action area (Yuba RMT 2013).

The PBFs of critical habitat features for sDPS green sturgeon within the action area include food resources, migratory corridor, water quality, depth, substrate type or size, sediment quality, and water flow. The Yuba River has a medium to high value for the conservation of sDPS green sturgeon because it supports several life stage functions, including serving as the only known spawning area other than the Sacramento and Feather Rivers (NMFS 2018). Critical habitat for sDPS green sturgeon currently ends at Daguerre Point Dam. Providing volitional passage upstream of Daguerre Point Dam is a priority recovery action and would likely improve the ability of sDPS to spawn in the Yuba River (NMFS 2018).

2.4.3. Factors Affecting Species and Critical Habitat

The PBFs of critical habitat for salmonids and sturgeon within the action area include: freshwater spawning habitat, freshwater rearing habitat, and freshwater migration corridors, containing attributes, such as adequate substrate, water quality, water quantity, water temperature, water velocity, shelter, food; riparian vegetation, space, and safe passage conditions. Habitat within the action area primarily is used as freshwater rearing and migration for juveniles and as freshwater migration for adults. The conservation value of the action area is of medium value, because its entire length is used for extended periods of time by federally listed fish species. These features have been affected by human activities such as water management, flood control, agriculture, and urban development throughout the action area.

2.4.4. Climate Change

One major factor affecting threatened and endangered anadromous fish in the Central Valley and aquatic habitat at large is climate change. Warmer temperatures associated with climate change reduce snowpack and alter the seasonality and volume of seasonal hydrograph patterns *(Cohen et al*. 2000). Central California has shown trends toward warmer winters since the 1940s (Dettinger and Cayan 1995). An altered seasonality results in runoff events occurring earlier in the year due to a shift in precipitation falling as rain rather than snow (Roos 1991, Dettinger *et al*. 2004). Specifically, the Sacramento River basin annual runoff amount for April-July has been decreasing since about 1950 (Roos 1987, Roos 1991). Increased temperatures influence the timing and magnitude patterns of the hydrograph.

The magnitude of snowpack reductions is subject to annual variability in precipitation and air temperature. The large spring snow water equivalent (SWE) percentage changes, late in the snow season, are due to a variety of factors including reduction in winter precipitation and temperature increases that rapidly melt spring snowpack (VanRheenen *et al*. 2004). Factors modeled by VanRheenen *et al*. (2004) show that the melt season shifts to earlier in the year, leading to a large percent reduction of spring SWE (up to 100% in shallow snowpack areas). Additionally, an air temperature increase of 2.1°C (3.8°F) is expected to result in a loss of about half of the average April snowpack storage (VanRheenen *et al*. 2004). The decrease in spring SWE (as a percentage) would be greatest in the region of the Sacramento River watershed, at the north end of the Central Valley, where the snowpack is shallower than in the San Joaquin River watersheds to the south.

Projected warming is expected to affect Central Valley Chinook salmon. Because the runs are restricted to low elevations as a result of impassable rim dams, if temperatures rise by 5°C (9°F), it is questionable whether any Central Valley Chinook salmon populations can persist (Williams 2006). Based on an analysis of an ensemble of climate models and emission scenarios and a reference temperature from 1951- 1980, the most plausible projection for warming over Northern California is 2.5°C (4.5°F) by 2050 and 5°C by 2100, with a modest decrease in precipitation (Dettinger 2005). Chinook salmon in the Central Valley are at the southern limit of their range, and warming will shorten the period in which the low elevation habitats used by naturally producing fall-run Chinook salmon are thermally acceptable. This would particularly affect fish that emigrate as fingerlings, mainly in May and June, and especially those in the San Joaquin River and its tributaries.

CV spring-run Chinook salmon adults are vulnerable to climate change, because they over-summer in freshwater streams before spawning in autumn (Thompson *et al*. 2011). CV spring-run Chinook salmon spawn primarily in the tributaries to the Sacramento River, and those tributaries without cold water refugia, usually provided by springs, will be more susceptible to impacts of climate change. In years of extended drought and warming water temperatures, unsuitable conditions may occur even in tributaries with cool water springs. Additionally, juveniles often rear in the natal stream for one to two summers prior to emigrating and would be susceptible to warming water temperatures. In Butte Creek, fish are limited to low elevation habitat that is currently thermally marginal, as demonstrated by high summer mortality of adults in 2002 and 2003, and will become intolerable within decades if the climate warms as expected. Ceasing water diversion for power production from the summer holding reach in Butte Creek

resulted in cooler water temperatures, more adults surviving to spawn, and extended population survival time (Mosser *et al*. 2013).

Although steelhead will experience similar effects of climate change to Chinook salmon, as they are also blocked from the vast majority of their historic spawning and rearing habitat, the effects may be even greater in some cases, as juvenile steelhead need to rear in the stream for one to two summers prior to emigrating as smolts. In the Central Valley, summer and fall temperatures below the dams in many streams already exceed the recommended temperatures for optimal growth of juvenile steelhead, which range from 14°C to 19°C (57°F to 66°F). Several studies have found that steelhead require colder water temperatures for spawning and embryo incubation than salmon (McCullough *et al*. 2001). In fact, McCullough *et al*. (2001) recommended an optimal incubation temperature at or below 11°C to 13°C (52°F to 55°F). Successful smoltification in steelhead may be impaired by temperatures above 12°C (54°F), as reported in Richter and Kolmes (2005). As stream temperatures warm due to climate change, the growth rates of juvenile steelhead could increase in some systems that are currently relatively cold, but potentially at the expense of decreased survival due to higher metabolic demands and greater presence and activity of predators. Stream temperatures that are currently marginal for spawning and rearing may become too warm to support wild steelhead populations.

sDPS green sturgeon spawn primarily in the Sacramento River in the spring and summer. The ACID Dam is considered the upriver extent of green sturgeon passage in the Sacramento River. The upriver extent of green sturgeon spawning, however, is approximately 30 kilometers downriver of the ACID Dam where water temperatures are higher than at the Dam during late spring and summer. Thus, if water temperatures increase with climate change, temperatures adjacent to the ACID Dam may remain within tolerable levels for the embryonic and larval life stages of green sturgeon, but temperatures at spawning locations lower in the river may be more affected. It is uncertain, however, if green sturgeon spawning habitat exists closer to ACID Dam, which could allow spawning to shift upstream in response to climate change effects. Successful spawning of green sturgeon in other accessible habitats in the Central Valley (*i.e.*, the Feather River) is limited, in part, by late spring and summer water temperatures. Similar to salmonids in the Central Valley, green sturgeon spawning in the major lower river tributaries to the Sacramento River are likely to be further limited if water temperatures increase and suitable spawning habitat remains inaccessible.

In summary, observed and predicted climate change effects are generally detrimental to the species analyzed in this opinion (McClure 2011, Wade *et al*. 2013), so unless offset by improvements in other factors, the status of the species and critical habitat is likely to decline over time. The climate change projections referenced above cover the time period between the present and approximately 2100. While there is uncertainty associated with projections, which increases over time, the direction of change is relatively certain (McClure *et al*. 2013).

2.4.5. Species Survival and Recovery in the Action Area

CV spring-run Chinook salmon, CCV steelhead, and sDPS green sturgeon utilize the Yuba River. The lower Yuba River has a medium value for the conservation of these species because of the location and the habitat features provided that are essential to meeting nearly all of the freshwater life history requirements of these species. Improving population trends and ongoing

habitat improvements to the Yuba River are needed for these species to continue to survive and recover within the action area. The recovery plan for winter-run Chinook salmon, CV spring-run Chinook salmon, and CCV steelhead identifies the lower Yuba River as a core 2 population for CV spring-run Chinook salmon and a core 2 population for CCV steelhead (NMFS 2014). Core 2 populations are assumed to have the potential to meet the moderate risk of extinction criteria. Core 2 populations are of secondary importance for recovery efforts. The Yuba River upstream of Englebright Dam is a primary candidate for reintroduction of spring-run Chinook salmon (NMFS 2014).

2.5. Effects of the Action

Under the ESA, "effects of the action" are all consequences to listed species or critical habitat that are caused by the proposed action, including the consequences of other activities that are caused by the proposed action. A consequence is caused by the proposed action if it would not occur but for the proposed action and it is reasonably certain to occur. Effects of the action may occur later in time and may include consequences occurring outside the immediate area involved in the action (see 50 CFR 402.17). In our analysis, which describes the effects of the proposed action, we considered 50 CFR 402.17(a) and (b).

The effects assessment will consider the nature, duration, and extent of the effects of the proposed action relative to the migration timing, behavior, and habitat requirements of federally listed species and the magnitude, timing, frequency, and duration of project impacts to these listed species.

To evaluate the effects of the Sun Pacific Yuba River Pump Station Project, NMFS examined the proposed action activities in the action area. We analyzed construction-related impacts and the expected fish response to habitat modifications. We also reviewed and considered the applicant's proposed conservation and mitigation measures. This assessment relied heavily on the information from the BA project description and discussions with consulting biologists.

Specifically, the assessment will consider the potential short- and long-term impacts related to these species resulting from the construction components of the proposed action and other activities (i.e., the operation of the pump), including:

- potential for contaminants or hazardous materials entering the water;
- increased turbidity and suspended sediment;
- construction noise;
- temporal loss of riparian vegetation;
- permanent loss of riverine habitat;
- direct injury or death from in-channel/in-water work;
- operation of the pump; and

- removal of water from the Yuba River

2.5.1. Effects of the Action to Listed Fish Species

The in-water work window is July 16 to August 31. NMFS expects that various life stages of listed species may be present in the action area during construction activities, including migrating adults and rearing and emigrating juveniles.

Adult CV spring-run Chinook salmon will likely not be in the action area during the proposed in-water work window, as the action area likely does not provide good summer holding habitat (Yuba RMT 2013). Rearing juvenile CV spring-run Chinook salmon may be present in the action area throughout the year, including during the in-water work window (Yuba RMT 2013). Adult CCV steelhead will likely not be in the action area during July of the proposed in-water work window, but may be present during August as adult immigration and holding may have begun by then (Yuba RMT 2013). Rearing fry and juvenile CCV steelhead may be present in the action area throughout the year, including during the in-water work window (Yuba RMT 2013). Juvenile CCV steelhead may also migrate downstream during the proposed in-water work window (Yuba RMT 2013). Adult sDPS green sturgeon will likely not be in the action area during the proposed in-water work window as spawning will be underway and spawning within the Yuba River is likely to occur upstream of the action area (Yuba RMT 2013). Post-spawning holding typically lasts through November, so there will likely not be any adult sDPS green sturgeon outmigration within the in-water work window (Yuba RMT 2013). Juvenile rearing and outmigration occurs year-round including during the proposed in-water work window, so juvenile sDPS green sturgeon may be present in the action area (Yuba RMT 2013). Spawning will likely not occur within the action area for listed species during the proposed in-water work window, therefore, adverse effects to incubating eggs will likely not occur.

2.5.1.1. Increased Sedimentation and Turbidity

Increased sedimentation and turbidity may result from the use of heavy equipment in and along the river banks. Sedimentation and turbidity are expected to have varying effects among different listed species and different life stages that are expected to be present in the action area during the proposed in-water construction window. CV spring-run Chinook salmon, CCV steelhead, and sDPS green sturgeon juveniles and CCV steelhead adults may be present within the action area during the in-water work window. High levels of suspended sediment reduce the ability of listed fish to feed and respire, resulting in increased stress levels and reduced growth rates, and reduced tolerance to fish diseases and toxicants (Waters 1995). Spawning may occur within the action area but not during the in-water work window, so impacts to egg life stages by sedimentation and turbidity are not expected. In a lab study, juvenile steelhead and coho salmonids were found to occupy a parcel of water by choice between 57 and 77 nephelometric turbidity units (NTU) (Sigler *et al*. 1984a). This result suggests that juvenile salmonids may not exhibit avoidance behavior in low to moderate turbidities during migration. One effect of turbidity that has important implications for juvenile salmonids is that predator avoidance behavior has been shown to decrease at increased levels of turbidity (Gregory 1993). Growth and survival amidst increased sediment and turbidity levels have also been shown to decrease resulting from reduced prey detection and availability and physical injury due to increased activity, aggression, and gill fouling (Sigler *et al*. 1984a, Suttle *et al*. 2004, Kemp *et al*. 2011).

Although less is known about the timing of rearing and migration of sDPS green sturgeon, both adult and juvenile life stages are known to utilize the Yuba River as a migration corridor and may exhibit rearing behavior there as well. Less is known about the specific detrimental physical and physiological effects of sedimentation and turbidity to sturgeon. However, it is thought that high levels of turbidity can generally result in gill fouling, reduced temperature tolerance, reduced swimming capacity, and reduced forage capacity in lotic fishes (Wood and Armitage 1997). While sDPS green sturgeon are lotic fish, as bottom feeders their foraging capacity may not be as impacted as other species due to turbidity and may be enhanced due to turbidity. Wishingrad *et al.* (2015) found that lake sturgeon (*Acipenser fulvescens*) exhibited greater foraging activity in turbid water than in clear water.

Fish responses to increased turbidity and suspended sediment can range from behavioral changes (*e.g.*, alarm reactions, abandonment of cover which could lead to predation, and avoidance) to sublethal effects (*e.g.*, reduced feeding rate), and, at high suspended sediment concentrations for prolonged periods, lethal effects (Newcombe and Jensen 1996). Temporary spikes in suspended sediment may result in behavioral avoidance of the site by fishes; several studies have documented active avoidance of turbid areas by juvenile and adult salmonids (Bisson and Bilby 1982, Sigler *et al*. 1984b, Lloyd *et al*. 1987, Servizi and Martens 1992). Individual salmonids that encounter increased turbidity or sediment concentrations will likely move away from affected areas into suitable surrounding habitat.

High turbidity and suspended sediment levels can lead to reduced growth, survival, and reproduction due to reduced foraging ability, impaired disease resistance, or interference with cues necessary for orientation in homing and migration (Lloyd *et al*. 1987). Laboratory studies have demonstrated that chronic or prolonged exposure to high turbidity and suspended sediment levels can lead to reduced growth rates in juvenile salmonids. For example, Sigler *et al*. (1984b) found that juvenile Coho salmon and steelhead trout exhibited reduced growth rates and higher emigration rates in turbid water (25-50 NTU) compared to clear water.

Increases in turbidity associated with instream work are likely to be brief and remain localized to approximately 300 feet downstream, attenuating downstream as suspended sediment settles out of the water column. Also, avoidance and minimization techniques will be implemented in this project as well as BMPs to minimize sedimentation and turbidity. These actions will minimize the extent of adverse effects associated with the proposed action. Due to their use of the nearshore habitat in the action area, juvenile listed fish in the action area during construction would be subject to mobilized sediment and short-term increases in turbidity resulting in an increase in predation and reduced feeding and survival.

Avoidance and minimization measures are described in Section 1.3.3 and will aid in reducing the potential risk of increased sedimentation and turbidity to a minimal level.

2.5.1.2. Construction-related Effects

Construction-related activities have the potential to result in injury or death to listed fish species. Construction-related effects may include debris falling into the active channel, tools and/or equipment falling into the active channel, or noise generated by displaced rock and sediment and the operation of construction machinery. Any listed species and life stages present during the in-

water work window would be affected by construction-related effects. BMPs, avoidance, and minimization techniques will be implemented, minimizing the probability and magnitude of construction-related effects in the action area.

Adults and juveniles could potentially encounter falling debris, be hit or become trapped by equipment as work occurs, which could cause physical injury or death. Construction-related noise may alter behavior, which result in displacement from a position normally occupied in their habitat for short or long durations. Depending on the innate behavior that is being disrupted, the effects could be varied. This is of particular concern for juvenile fish as there are innate behaviors that are essential to their maturation and survival such as feeding, sheltering, and migratory patterns. For example, construction activities could cause cessation or alteration of migratory behavior. In the context of the proposed action area, the migratory behavior of juvenile salmonids and green sturgeon may be affected by various construction-related effects.

Avoidance and minimization measures are described in Section 1.3.3 and will aid in minimizing the potential risk and magnitude of construction effects to a minimal level.

2.5.1.3. Contaminants and Pollution-related Effects

The project activities described in the proposed action will involve heavy construction equipment and many potential sources of hazardous material contamination in the action area. Potential sources of pollutants include hazardous material spills, petroleum product leaks in construction equipment, introduction of metals from the operation of equipment and vehicles, and the disturbance of sediments that may contain hazardous suspended particulates. BMPs will be implemented, minimizing the probability of pollutant incursion into the Yuba River. However, unlike sedimentation, turbidity, and construction-related effects; potential pollution-related effects may be persistent in the action area and may affect multiple life stages if they were to occur.

Incursion of contaminants into the Yuba River has the potential to adversely affect CV spring-run Chinook salmon, CCV steelhead, and/or sDPS green sturgeon that may be migrating or rearing in the action area at or after the time of a pollution event. Construction equipment and heavy machinery will be present in the action area and metals may be deposited through their use and operation (Paul and Meyer 2008). These materials have been shown to alter juvenile salmonid behavior through disruptions to various physiological mechanisms including sensory disruption, endocrine disruption, neurological dysfunction, and metabolic disruption (Scott and Sloman 2004). Oil-based products used in combustion engines are known to contain polycyclic aromatic hydrocarbon (PAHs), which have been known to bio-accumulate in other fish taxa, such as flatfishes (order Pleuronectiformes) and have carcinogenic, mutagenic and cytotoxic, or toxic to cell, effects (Johnson *et al*. 2002). The exact toxicological effects of PAHs in juvenile salmonids are not well understood, although studies have shown that increased exposure of salmonids to PAHs, reduced immunosuppression, increasing their susceptibility to pathogens (Arkoosh *et al*. 1998, Arkoosh and Collier 2002). Listed fish species are expected to be present in the action area during construction activities and would likely be exposed if a pollution event occurred. If contaminants were to settle within substrate in the active channel of the Yuba River, listed fish could be adversely affected later in time when the substrate becomes disturbed and contaminants resurface.

Avoidance and minimization measures are described in Section 1.3.3 and will aid in minimizing the potential risk of exposure to contaminants to such a degree that spills, leaks, or metal introduction, or disturbance of contaminants in sediment are not expected to occur.

2.5.1.4. Noise Effects

All of the pile driving for this project will be accomplished using vibratory hammers instead of impact hammers. Vibratory hammers use counter-rotating eccentric weights to transmit vertical vibrations into the pile, causing the sediment surrounding the pile to liquefy and allow the pile to penetrate the substrate. The vibratory hammer produces sound energy that is spread out over time and is generally 10 to 20 dB lower than impact pile driving (Buehler *et al*. 2015). Based on the results of hydroacoustic monitoring of vibratory hammer pile installations (Buehler *et al*. 2015), the sound levels generated by vibratory hammer use will be considerably below the injury and mortality thresholds for both single strike and cumulative SEL, and no adverse effects to listed fish are anticipated. However, pile driving activities by vibratory hammer could result in noise that may startle listed fish and result in temporary dispersion from the action area. Therefore, adverse effects from pile driving noise are expected to be minimal.

2.5.1.5. Effects from Other Activities

The operation of the pump, while not part of the proposed action, would not occur but for the proposed action. Water will be removed from the Yuba River and will not be available in the river downstream for fish. The pump will remove up to 13.5 cfs while operating and a total of approximately 1,000 acre feet per year. As described in section 2.4.1 and figure 1 above, the Yuba River operates under flow schedules based on precipitation and available water storage. Figure 2 below shows the expected pump operation as a percentage of flows under the different flow schedules. In schedule 1 years, 13.5 cfs equates to between 0.68% to 2.7% of the minimum flows depending on the month, with the lowest percentages of the flow occurring in May and the highest in September and October. In schedule 6 years, 13.5 cfs equates to between 2.7% to 9% of the minimum flows with the lowest percentages of the flow occurring in late April and early May and the highest occurring in late June through August. Using the yearly total of 1,000 acre feet per year, the total flow from the pump equates to 0.17% of the minimum total annual volume in the wetter schedule 1 years and 0.43% of the minimum total annual volume in drier schedule 6 years. According to the estimated occurrences of flow schedules and the expected flows from the pump, the percentage of the available flow used by the pump will be 2.7% or less in 85% of years. Since the prescribed flows are minimums, the percentage of the flow will likely be even lower than 2.7% most of the time and especially in spring when the prescribed flows are higher.

Percent Occurrence	Cumulative	Schedule	Oct		Nov	Dec	Jan	Feb	Mar	Apr		May		Jun		Jul	Aug	Sep	Total Annual Volume (AF)
			1-15	16-31	1-30	1-31	1-31	1-29	1-31	1-15	16-30	1-15	16-31	1-15	16-30	1-31	1-31	1-30	
56%	56%	1	2.70%	2.70%	2.70%	2.70%	2.70%	2.70%	1.93%	1.35%	1.35%	0.68%	0.68%	0.90%	0.90%	1.93%	2.25%	2.70%	0.17%
22%	78%	2	2.70%	2.70%	2.70%	2.70%	2.70%	2.70%	1.93%	1.93%	1.69%	1.35%	1.35%	1.69%	2.70%	2.70%	2.70%	2.70%	0.23%
7%	85%	3	2.70%	2.70%	2.70%	2.70%	2.70%	2.70%	2.70%	1.93%	1.93%	1.50%	1.50%	2.70%	2.70%	2.70%	2.70%	2.70%	0.25%
5%	90%	4	3.38%	3.38%	2.70%	2.70%	2.70%	2.70%	2.70%	2.25%	1.50%	1.50%	2.25%	3.38%	3.38%	3.38%	3.38%	3.38%	0.28%
5%	95%	5	3.38%	3.38%	2.70%	2.70%	2.70%	2.70%	2.70%	2.70%	2.25%	2.25%	3.38%	3.38%	3.38%	3.38%	3.38%	3.38%	0.30%
4%	99%	6	3.86%	3.86%	3.86%	3.86%	3.86%	3.86%	3.86%	3.86%	2.70%	2.70%	3.38%	4.50%	9.00%	9.00%	9.00%	3.86%	0.43%
1%	100%	Conference																	

Figure 2. Percentage of minimum flows at Marysville gage that pump operations will account for under different flow schedules. Assumptions are that the pump will operate at no higher than 13.5 cfs and that annual usage will be about 1,000 acre feet per year.

Depending on conditions and agricultural needs, the pump station could operate during all months of the year, which would potentially impact all life stages of listed species that occur in the Yuba River. There may be some level of impacts on listed species due to reduced flows, such as a reduced ability to get over barriers, and effects to water temperatures, but without modeling we cannot say to what extent those effects will manifest. These impacts may affect migrating fish, rearing fish, may cause changes to water temperature, and may affect the ability of listed fish species to move up or downstream. The proportion of the prescribed flows is small and the proportion of the actual flows will likely be even less. As such, effects to listed fish due to changes to the flow in the Yuba River downstream of the pump, depth of the river, and temperature are expected to be minimal.

2.5.2. Effects of the Action to Critical Habitat and PBFs

Construction is expected to have short- and long-term effects on habitat quantity and quality, including effects on the PBFs of designated critical habitat of listed species. The PBFs within the action area for CV spring-run Chinook salmon and CCV steelhead are: (1) freshwater rearing sites; (2) freshwater migration corridors; and, for CCV steelhead, (3) spawning habitat. The PBFs within the action area for sDPS green sturgeon are: (1) food resources; (2) adequate flow regime for all life stages; (3) water quality; (4) migratory corridors; (5) adequate water depth for all life stages; and (6) adequate sediment quality.

Effects to migratory corridor PBFs for listed species include some incursion of the new pump station into the river but, given the width of the river, adult listed species migrating through this area are not expected to alter course or behavior. Juveniles migrating downstream may need to move around the pump station depending on flows, moving into deeper water, which could result in a higher risk of predation. As the size of the pump station is relatively small, the increased risk is expected to be small.

Impacts to rearing and migration habitat PBFs are expected to occur during construction of the new pump station, including turbidity effects and removal of riparian vegetation to the extent of the action area, approximately 0.28 acres. The project will also result in the permanent loss of 52 square feet (0.0012 acres) of riverine habitat that may have been suitable for rearing of juvenile listed fish.

Possible contamination to PBFs of habitat or prey items for listed species or impacts to food resources, water quality, or sediment quality for sDPS green sturgeon could occur as a result of this project. Given the BMPs and minimization measures that will be in place to prevent contamination to the river, habitat, and prey items, effects due to pollution or contamination are not expected to occur.

Adequate flow and adequate water depth for all life stages of green sturgeon and rearing and migrating listed salmonids are PBFs that may be slightly impacted by the other activities that will occur due to the proposed project. As discussed above, flows will be slightly decreased and will compose a greater or lesser proportion of the available flow depending on the time of year and the amount of water available in that year. The proportion of the flow is small enough that water flow and depth will remain adequate for listed species.

2.6. Cumulative Effects

"Cumulative effects" are those effects of future state or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action subject to consultation (50 CFR 402.02 and 402.17(a)). Future Federal actions that are unrelated to the proposed action are not considered in this section, because they require separate consultation pursuant to section 7 of the ESA.

Some continuing non-Federal activities are reasonably certain to contribute to climate effects within the action area. However, it is difficult, if not impossible, to distinguish between the action area's future environmental conditions caused by global climate change that are properly part of the environmental baseline *vs.* cumulative effects. Therefore, all relevant future climate-related environmental conditions in the action area are described in the environmental baseline (Section 2.4).

2.6.1. Increased Urbanization

Increases in urbanization and housing developments upstream of the action area could impact habitat by altering watershed characteristics and changing both water use and stormwater runoff patterns within the action area. Increased growth will place additional burdens on resource allocations, including natural gas, electricity, and water, as well as on infrastructure, such as wastewater sanitation plants, roads and highways, and public utilities. Some of these actions, particularly those which are situated away from water bodies, will not require Federal permits, and thus will not undergo review through the ESA section 7 consultation process with NMFS.

Increased urbanization of nearby areas may also increase recreational activities in the action area. Among the activities expected to increase in volume and frequency is recreational boating. Boating activities typically result in increased wave action and propeller wash in waterways. This potentially will degrade riparian and wetland habitat by eroding channel banks and mid-channel islands, thereby causing an increase in siltation and turbidity. Wakes and propeller wash also churn up benthic sediments thereby potentially re-suspending contaminated sediments and degrading areas of submerged vegetation. This will reduce habitat quality for the invertebrate forage base required for the survival of juvenile salmonids and green sturgeon moving through the system. Increased recreational boat operation is anticipated to result in more contamination

from the operation of gasoline and diesel-powered engines on watercraft entering the associated water bodies.

2.6.2. Aquaculture and Fish Hatcheries

More than 32 million fall-run Chinook salmon, 2 million spring-run Chinook salmon, 1 million late fall-run Chinook salmon, 0.25 million winter-run Chinook salmon, and 2 million steelhead are released annually from six hatcheries producing anadromous salmonids in the Central Valley. All of these facilities are currently operated to mitigate for natural habitats that have already been permanently lost as a result of dam construction. The loss of historical habitat and spawning grounds upstream of dams results in dramatic reductions in natural population abundance, which is mitigated for through the operation of hatcheries. Salmonid hatcheries can, however, have additional negative effects on ESA-listed salmonid populations.

California salmon fishing regulations are set according to the combined abundance of hatchery and natural stocks, which can lead to over-exploitation and reduction in the abundance of wild populations that are indistinguishable and exist in the same system as hatchery populations. Releasing large numbers of hatchery fish can also pose a threat to wild Chinook salmon and steelhead stocks through the spread of disease, genetic impacts, competition for food and other resources, predation of hatchery fish on wild fish, and increased fishing pressure on wild stocks as a result of hatchery production.

Impacts of hatchery fish can occur in both freshwater and marine ecosystems. Limited marine carrying capacity has implications for naturally produced fish experiencing competition with hatchery production. Increased salmonid abundance in the marine environment may also decrease growth and size at maturity, and reduce fecundity, egg size, age at maturity, and survival (Bigler *et al*. 1996).

Within the action area, hatchery CV spring-run Chinook salmon or CCV steelhead from the Feather River Fish Hatchery may compete with wild fish for food and other resources.

2.6.3. Recreational Fishing

While hatchery CCV steelhead and Chinook salmon are targeted, incidental catch of protected species, such as naturally produced CV spring-run Chinook salmon and CCV steelhead does occur. Since 1998, all hatchery CCV steelhead have been marked with an adipose fin clip, allowing anglers to tell the difference between hatchery and wild CCV steelhead. Current regulations restrict anglers from keeping unmarked CCV steelhead in Central Valley streams, except in the upper Sacramento River.

Current sport fishing regulations do not prevent wild CCV steelhead from being caught and released many times over while on the spawning grounds, where they are more vulnerable to fishing pressure. Studies on hooking mortality based on spring-run Chinook salmon have found a 12 percent mortality rate for the Oregon in-river sport fishery (Lindsay *et al*. 2004). Applying a 30 percent contact rate for Central Valley rivers (*i.e.*, the average of estimated Central Valley harvest rates), approximately 3.6 percent of adult steelhead die before spawning from being caught and released in the recreational fishery. Studies have consistently demonstrated that

hooking mortality increases with water temperatures. Mortality rates for steelhead may be lower than those for Chinook salmon, due to lower water temperatures.

In addition, survival of CCV steelhead eggs is reduced by anglers walking on redds in spawning areas while targeting hatchery CCV steelhead or salmon. Roberts and White (1992) identified up to 43 percent mortality from a single wading over developing trout eggs, and up to 96 percent mortality from twice daily wading over developing trout eggs. Salmon and trout eggs are sensitive to mechanical shock at all times during development (Leitritz and Lewis 1980). While state angling regulations have moved towards restrictions on selected sport fishing to protect listed fish species, hook-and-release mortality of steelhead and trampling of redds by wading anglers may continue to cause a threat.

The lower Yuba River is a popular sport fishing area and fish that were caught and released within the action area may be killed, injured, or stressed and less able to handle other effects. Migrating fish that were caught or released upstream or downstream of the action area may have reduced survivability to further effects as they continue their migrations through the action area.

2.6.4. Agricultural Practices

Non-Federal actions that may affect the action area include ongoing agricultural activities in the Yuba River watershed. Farming and ranching activities within or adjacent to or upstream of the action area may have negative effects on water quality due to runoff laden with agricultural chemicals. Stormwater and irrigation discharges related to agricultural activities contain numerous pesticides and herbicides that may adversely affect salmonid reproductive success and survival rates (King *et al*. 2014). Grazing activities from cattle operations can degrade or reduce suitable critical habitat for listed salmonids by increasing erosion and sedimentation, as well as introducing nitrogen, ammonia, and other nutrients into the watershed, which then flow into the receiving waters of the associated watersheds.

Agricultural practices in the Yuba River may adversely affect riparian and wetland habitats through upland modifications of the watershed that lead to increased siltation or reductions in water flow.

2.6.5. Mining Activities

Increased water turbidity levels for prolonged periods of time may result from adjacent mining activities and increased urbanization and/or development of riparian habitat, which could adversely affect the ability of young salmonids to feed effectively and result in reduced growth and survival. Turbidity may cause harm, injury, or mortality to juvenile anadromous fish in the vicinity and downstream of the project area. High turbidity levels can reduce the ability of listed fish to feed and respire, resulting in increased stress levels and reduced growth rates, and reduce tolerance to fish diseases and toxicants. Mining activities may adversely affect water quality, riparian function, and stream productivity.

2.7. Integration and Synthesis

The Integration and Synthesis section is the final step in our assessment of the risk posed to species and critical habitat as a result of implementing the proposed action. In this section, we

add the effects of the action (Section 2.5) to the environmental baseline (Section 2.4) and the cumulative effects (Section 2.6), taking into account the status of the species and critical habitat (Section 2.2), to formulate the agency's biological opinion as to whether the proposed action is likely to: (1) Reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing its numbers, reproduction, or distribution; or (2) appreciably diminish the value of designated or proposed critical habitat as a whole for the conservation of the species.

CV spring-run Chinook salmon ESU, CCV steelhead DPS, and sDPS green sturgeon have experienced significant declines in abundance and available habitat in the California Central Valley relative to historical conditions. The status of the species (Section 2.2) details the current range-wide status of these ESUs and DPSs and their critical habitat. The environmental baseline (Section 2.4) describes the current baseline conditions found in the Yuba River, where the proposed action is to occur. Section 2.4.4 discusses the vulnerability of listed species and critical habitat to climate change projections in the California Central Valley and specifically in the Yuba River. Reduced summer flows and increased water temperatures will likely be exacerbated by increasing surface temperatures in the Yuba River. The Yuba River is a manipulated system with flow and temperature regimes that differ drastically from their historical condition. Cumulative effects (Section 2.6) are likely to include decreased water flow, increased river traffic, and increased stormwater runoff from increased urbanization and from concurrent state and local projects in the action area.

2.7.1. Effects of the Proposed Action to Listed Species

The proposed action is expected to affect adult and juvenile CV spring-run Chinook salmon and CCV steelhead; and adult, juvenile, and subadult sDPS green sturgeon. Adverse effects due to increased sedimentation and turbidity, construction, contaminants and pollution, and noise are expected to be minimized, given the BMPs and AMMs that will be implemented. These impacts to listed species will be minimal and relatively short in duration and will avoid higher river and peak migration time periods, so that abundance would be low within the project footprint. Long-term impacts of the incursion of the new pump structure into the river is expected to result in some brief minor behavioral modifications of migrating or rearing juvenile fish, as they move past the structure to adjacent shoreline.

Other activities that would not occur but for the proposed action includes the operation of the pump. Given the small proportion of the flow that will be taken by the pump and the use of a fish screen, we expect adverse impacts to listed fish to be minimal, not rising to the level of take.

2.7.2. Effects of the Proposed Action to Critical Habitat

The project will result in the permanent loss of 52 square feet (0.0012 acres) of riverine habitat and temporary effects to approximately 0.28 acres of riverine and riparian habitat for rearing or migration of juvenile listed fish.

2.7.3. Survival and Recovery of the DPS/ESU

The Yuba River contains spawning populations of CV spring-run Chinook salmon, CCV steelhead, and sDPS green sturgeon, making it an important river in terms of range-wide

recovery for these species. The recovery plan (NMFS 2014) identified the lower Yuba River as a Core 2 population for CV spring-run Chinook salmon and CCV steelhead. Further, the Yuba River is the only known spawning location for sDPS green sturgeon other than the Sacramento and Feather Rivers (NMFS 2018). We expect species to use the available habitat in adjacent areas because the majority of effects are reduced to minimal levels and the area of permanent impacts is fairly small compared to the available habitat in the lower Yuba, and the range-wide DPS/ESU. The addition of adverse and minimal effects to CV spring-run Chinook salmon, CCV steelhead, and sDPS green sturgeon within the action area are not expected to (1) reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing its numbers, reproduction, or distribution; or (2) appreciably diminish the value of designated critical habitat as a whole for the conservation of the species.

2.8. Conclusion

After reviewing and analyzing the current status of the listed species and critical habitat, the environmental baseline within the action area, the effects of the proposed action, the effects of other activities caused by the proposed action, and cumulative effects, it is NMFS' biological opinion that the proposed action is not likely to jeopardize the continued existence of CV spring-run Chinook salmon, CCV steelhead, or the sDPS of North American green sturgeon, nor destroy or adversely modify their designated critical habitat.

2.9. Incidental Take Statement

Section 9 of the ESA and Federal regulations pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without a special exemption. "Take" is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. "Harm" is further defined by regulation to include significant habitat modification or degradation that actually kills or injures fish or wildlife by significantly impairing essential behavioral patterns, including breeding, spawning, rearing, migrating, feeding, or sheltering (50 CFR 222.102). "Incidental take" is defined by regulation as takings that result from, but are not the purpose of, carrying out an otherwise lawful activity conducted by the Federal agency or applicant (50 CFR 402.02). Section 7(b)(4) and section 7(o)(2) of the ESA provide that taking that is incidental to an otherwise lawful agency action is not considered to be prohibited taking under the ESA if that action is performed in compliance with the terms and conditions of this ITS.

2.9.1. Amount or Extent of Take

In the biological opinion, NMFS determined that incidental take is reasonably certain to occur as follows: NMFS anticipates incidental take of juvenile CV spring-run Chinook salmon, juvenile CCV steelhead, and sub-adult sDPS green sturgeon as a result of the Sun Pacific Yuba River Pump Station Project. NMFS expects long-term permanent impacts from the loss of riverine habitat and the new structure.

Incidental take is expected to occur in the form of harassment, harm, or death from temporary and permanent physical disturbance of habitat for listed species. NMFS cannot precisely quantify and track the amount or number of individuals per species that are expected to be taken

incidentally as a result of the proposed project. This is due to the variability and uncertainty associated with the response of listed species to the effects of the proposed action, the varying population size of each species, annual variations in the timing of migration, individual habitat use within the action area, and difficulty in observing injured or dead fishes. However, it is possible to estimate the extent of incidental take by designating as ecological surrogates, those elements of the project that are expected to result in incidental take. Ecological surrogates are more predictable and/or measurable and monitoring those surrogates will determine the extent to which incidental take is occurring. The most appropriate threshold for incidental take is an ecological surrogate of temporary habitat disturbance during the project construction activities and permanent habitat disturbance for the life of the structure.

The ecological surrogate for behavioral modifications or fish responses that result from habitat disturbance are described below. NMFS anticipates incidental take will be limited to the following form:

(1) Harassment, harm, or death from temporary and permanent physical disturbance to a total area of approximately 0.28 acres and 52 square feet (0.0012 acres), respectively. Construction of the pump is reasonably certain to result in harm to the species through modification or degradation of the PBFs for rearing and migration that will result in temporary and permanent displacement of individuals, leading to reduced fitness and reduced growth; and increased predation.

If permanent physical disturbance of 52 square feet or temporary disturbance of 0.28 acres is exceeded, the anticipated incidental take levels described are also exceeded, triggering the need to reinitiate consultation.

2.9.2. Effect of the Take

In the biological opinion, NMFS determined that the amount or extent of anticipated take, coupled with other effects of the proposed action, is not likely to result in jeopardy to the species or destruction or adverse modification of critical habitat.

2.9.3. Reasonable and Prudent Measures

"Reasonable and prudent measures" are non-discretionary measures that are necessary or appropriate to minimize the impact of the amount or extent of incidental take (50 CFR 402.02).

(1) USACE and the applicant shall minimize impacts to riparian vegetation and riverine habitat in the action area.

(2) Measures shall be taken by USACE and the applicant to monitor and provide NMFS with a report associated with the proposed action.

2.9.4. Terms and Conditions

The terms and conditions described below are non-discretionary, and USACE and the applicant must comply with them in order to implement the RPMs (50 CFR 402.14). USACE and the applicant has a continuing duty to monitor the impacts of incidental take and must report the

progress of the action and its impact on the species as specified in this ITS (50 CFR 402.14). If the entity to whom a term and condition is directed does not comply with the following terms and conditions, protective coverage for the proposed action would likely lapse.

(1) The following terms and conditions implement reasonable and prudent measure 1, and shall be included in the USACE permit:

a. BMPs shall be implemented to prevent soil erosion and sediment incursion into the active channel of the Yuba River. Straw wattles and silt fences shall be installed at source sites for the project, as appropriate. Any non-biodegradable materials (*e.g.*, silt fence) shall be removed at project completion.

b. Operation of heavy machinery in the active channel shall be minimized to avoid disturbance of substrates and releasing of contaminants.

c. Turbidity and settleable solids shall be monitored according to water quality permits. If acceptable limits are exceeded, work shall be suspended until acceptable measured levels are achieved.

d. Disturbed areas adjacent to the active channel that are deemed unstable shall be vegetated with native plant species and/or hydroseeded upon project completion.

e. Equipment used for the project shall be thoroughly cleaned off-site to remove any invasive plant material or invasive aquatic biota prior to use in the action area.

f. Environmentally sensitive areas, sensitive plant species, and wetland areas shall be avoided during project activities to the maximum extent practicable. High visibility fencing shall be placed around these areas to minimize disturbance.

g. Soil and excavated material and/or fill material shall be stockpiled in existing clearings when possible.

h. Stockpiles shall be covered prior to a rain event or when there is a greater than 50 percent possibility of rain forecasted by the National Weather Service during the next 24 hours.

i. A copy of this opinion shall be provided to the construction crew, making them responsible for implementing all requirements and obligations included in this document and for educating and informing all other contractors involved in the project as to the requirements of this opinion. A notification that the construction crew have been supplied with this information shall be provided to the reporting address below. A copy of this opinion will be available on-site at all times during work activity.

(2) The following terms and conditions implement reasonable and prudent measure 2 and shall be included in the USACE permit:

a. The applicant shall submit the erosion control plan to NMFS for review and approval.

b. The applicant shall submit the SPP to NMFS for review and approval.

c. The applicant shall submit the SWPPP to NMFS for review and approval.

d. The applicant shall submit to NMFS an annual report describing the incidental take resulting from the proposed project. This shall include any fishes known to have been killed or injured during project activities. This report shall be filed not later than June 1st, covering the instream construction window from the previous year. The report should be submitted to the following address:

Assistant Regional Administrator
California Central Valley Office
National Marine Fisheries Service
650 Capitol Mall, Suite 5-100
Sacramento CA 95814
Phone: (916) 930-3600
FAX: (916) 930-3629

2.10. Conservation Recommendations

Section 7(a)(1) of the ESA directs Federal agencies to use their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of the threatened and endangered species. Specifically, conservation recommendations are suggestions regarding discretionary measures to minimize or avoid adverse effects of a proposed action on listed species or critical habitat or regarding the development of information (50 CFR 402.02).

(1) USACE should encourage their applicants to minimize any potential take whenever possible, and implement practices that avoid or minimize negative impacts to salmon, steelhead, sturgeon, and their critical habitat.

(2) USACE and the applicant should support and promote aquatic and riparian habitat restoration within the Yuba River and other watersheds, especially those with listed aquatic species. Practices that avoid or minimize negative impacts to listed species should be encouraged.

(3) USACE and the applicant should continue to work cooperatively with other state and Federal agencies, private landowners, governments, and local watershed groups to identify opportunities for cooperative analysis and funding to support recovery actions in the NMFS Salmonid Recovery Plan (NMFS 2014).

In order for NMFS to be kept informed of actions minimizing or avoiding adverse effects or benefitting listed species or their habitats, NMFS requests notification via email within 90 days of the implementation of any conservation recommendations.

2.11. Reinitiation of Consultation

This concludes formal consultation for the Sun Pacific Yuba River Pump Station Project.

As 50 CFR 402.16 states, reinitiation of consultation is required and shall be requested by the Federal agency or by the Service where discretionary Federal agency involvement or control over the action has been retained or is authorized by law and if: (1) The amount or extent of incidental taking specified in the ITS is exceeded, (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion, (3) the identified action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in the biological opinion, or (4) a new species is listed or critical habitat designated that may be affected by the action.

3. MAGNUSON-STEVENS FISHERY CONSERVATION AND MANAGEMENT ACT ESSENTIAL FISH HABITAT RESPONSE

Section 305(b) of the MSA directs Federal agencies to consult with NMFS on all actions or proposed actions that may adversely affect essential fish habitat (EFH). Under the MSA, this consultation is intended to promote the conservation of EFH as necessary to support sustainable fisheries and the managed species' contribution to a healthy ecosystem. For the purposes of the MSA, EFH means "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity," and includes the physical, biological, and chemical properties that are used by fish (50 CFR 600.10). Adverse effect means any impact that reduces quality or quantity of EFH, and may include direct or indirect physical, chemical, or biological alteration of the waters or substrate and loss of (or injury to) benthic organisms, prey species and their habitat, and other ecosystem components, if such modifications reduce the quality or quantity of EFH. Adverse effects on EFH may result from actions occurring within EFH or outside of it and may include site-specific or EFH-wide impacts, including individual, cumulative, or synergistic consequences of actions (50 CFR 600.810). Section 305(b) of the MSA also requires NMFS to recommend measures that can be taken by the action agency to conserve EFH. Such recommendations may include measures to avoid, minimize, mitigate, or otherwise offset the adverse effects of the action on EFH [CFR 600.905(b)]

This analysis is based, in part, on the EFH assessment provided by USACE and descriptions of EFH for Pacific Coast Salmon (Pacific Fishery Management Council [PFMC] 2014) contained in the fishery management plans (FMPs) developed by the PFMC and approved by the Secretary of Commerce.

3.1. Essential Fish Habitat Affected by the Project

EFH is designated under the Pacific Coast Salmon FMP, which includes the action area of the proposed action. EFH in the action area consists of adult migration habitat and juvenile rearing and migration habitat for the four Chinook salmon runs (winter-, spring-, fall-, and late fall-run Chinook salmon). Habitat areas of particular concern (HAPCs) that may be either directly or indirectly adversely affected include: (1) complex channels and floodplain habitats, (2) thermal

refugia, and (3) spawning habitat. The other HAPCs for Pacific Coast Salmon: (4) estuaries, and (5) marine and estuarine submerged aquatic vegetation, are not present in the action area.

3.2. Adverse Effects on Essential Fish Habitat

Construction activities would result in increased sedimentation, turbidity, and the potential for contaminants to enter the waterway. Channel grading would result in adverse effects to EFH due to losses of riparian habitat and disturbance of natural substrate. Long-term effects of the project are expected to include a loss of approximately 0.0012 acres of EFH within the action area. Temporary effects to EFH will occur within the entire action area, an area of 0.28 acres.

Consistent with the ESA portion of this document, which determined that aspects of the proposed action would result in impacts to listed fish species and critical habitat, we conclude that aspects of the proposed action would also adversely affect EFH for Chinook salmon. Effects to the HAPCs listed in Section 3.1 were described in detail in Section 2.5 and subsections. A list of temporary and permanent adverse effects to EFH HAPCs is included in this EFH consultation. We conclude that the following adverse effects on EFH designated for Pacific Coast Salmon are reasonably certain to occur (affected HAPCs are indicated by number, corresponding to the HAPCs listed above in Section 3.1).

3.2.1. Sedimentation and Turbidity

- Reduced habitat complexity (1)
- Degraded water quality (1, 2, 3)
- Reduction in aquatic macroinvertebrate production (1)

3.2.2. Contaminants and Pollution-related Effects

- Degraded water quality (1, 2, 3)
- Reduction in aquatic macroinvertebrate production (1)

3.2.3. Removal of Riparian Vegetation

- Reduced shade (2, 3)
- Reduced supply of terrestrial food resources (1)
- Reduced supply of large woody material (1)

3.3. Essential Fish Habitat Conservation Recommendations

NMFS determined that the following conservation recommendations are necessary to avoid, minimize, mitigate, or otherwise offset the impact of the proposed action on EFH.

(1) To protect HAPC #1 (complex channels and floodplain habitats), NMFS recommends that USACE and the applicant adopt term and conditions 1 (a, b, c, f, g, h, and i) and 2 (a, b, and c).

(2) To protect HAPC #2 (thermal refugia), NMFS recommends that USACE and the applicant adopt term and conditions 1 (d, f, and i) and 2 (a and c).

(3) To protect HAPC #3 (spawning habitat), NMFS recommends that USACE and the applicant adopt term and conditions 1 (a, b, c, d, e, f, g, h, and i) and 2 (a, b, and c).

Fully implementing the above-listed EFH conservation recommendations would protect, by avoiding or minimizing the adverse effects described in section 3.2, above, 4.88 acres of designated EFH for Pacific Coast Salmon.

3.4. Statutory Response Requirement

As required by section 305(b)(4)(B) of the MSA, USACE must provide a detailed response in writing to NMFS within 30 days after receiving an EFH Conservation Recommendation. Such a response must be provided at least 10 days prior to final approval of the action if the response is inconsistent with any of NMFS' EFH Conservation Recommendations unless NMFS and USACE have agreed to use alternative time frames for the Federal agency response. The response must include a description of measures proposed by USACE for avoiding, minimizing, mitigating, or otherwise offsetting the impact of the activity on EFH. In the case of a response that is inconsistent with the Conservation Recommendations, USACE must explain its reasons for not following the recommendations, including the scientific justification for any disagreements with NMFS over the anticipated effects of the action and the measures needed to avoid, minimize, mitigate, or offset such effects (50 CFR 600.920(k)(1)).

In response to increased oversight of overall EFH program effectiveness by the Office of Management and Budget, NMFS established a quarterly reporting requirement to determine how many conservation recommendations are provided as part of each EFH consultation and how many are adopted by the action agency. Therefore, we ask that in your statutory reply to the EFH portion of this consultation, you clearly identify the number of conservation recommendations accepted.

3.5. Supplemental Consultation

USACE must reinitiate EFH consultation with NMFS if the proposed action is substantially revised in a way that may adversely affect EFH, or if new information becomes available that affects the basis for NMFS' EFH Conservation Recommendations (50 CFR 600.920(l))

4. DATA QUALITY ACT DOCUMENTATION AND PRE-DISSEMINATION REVIEW

The DQA specifies three components contributing to the quality of a document. They are utility, integrity, and objectivity. This section of the opinion addresses these DQA components, documents compliance with the DQA, and certifies that this opinion has undergone pre-dissemination review.

4.1. Utility

Utility principally refers to ensuring that the information contained in this consultation is helpful, serviceable, and beneficial to the intended users. USACE and the applicant are the intended users of this opinion. Other interested users could include the USFWS, CDFW, or the California Department of Water Resources. Individual copies of this opinion were provided to USACE. The document will be available within two weeks at the NOAA Library Institutional Repository [https://repository.library.noaa.gov/welcome]. The format and naming adheres to conventional standards for style.

4.2. Integrity

This consultation was completed on a computer system managed by NMFS in accordance with relevant information technology security policies and standards set out in 3 III, 'Security of Automated Information Resources,' Office of Management and Budget Circular A-130; the Computer Security Act; and the Government Information Security Reform Act.

4.3. Objectivity

Information Product Category: Natural Resource Plan

Standards: This consultation and supporting documents are clear, concise, complete, and unbiased; and were developed using commonly accepted scientific research methods. They adhere to published standards including the NMFS ESA Consultation Handbook, ESA regulations, 50 CFR 402.01 *et seq*., and the MSA implementing regulations regarding EFH, 50 CFR 600.

Best Available Information: This consultation and supporting documents use the best available information, as referenced in the References section. The analyses in this opinion and EFH consultation contain more background on information sources and quality.

Referencing: All supporting materials, information, data, and analyses are properly referenced, consistent with standard scientific referencing style.

Review Process: This consultation was drafted by NMFS staff with training in ESA and MSA implementation, and reviewed in accordance with West Coast Region ESA quality control and assurance processes.

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