

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 No: WCRO-2019-03441

July 8, 2020

Chandra Jenkins Senior Project Manager California Delta Section, Regulatory Division U.S. Army Corps of Engineers, Sacramento District 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 Antioch Desalination Facility Intake Replacement Project.

Electronic only

Dear Ms. Jenkins:

Thank you for your letter of October 22, 2019, 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 issuance of a Department of the Army permit under section 404 of the Clean Water Act to the City of Antioch. The City of Antioch proposes to implement the Antioch Desalination Facility Intake Replacement Project (Project). This consultation was conducted in accordance with the 2019 revised regulations that implement section 7 of the ESA (50 CFR 402; 84 FR 45016, August 27, 2019).

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 reviewed the likely effects of the proposed action on EFH and 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.

This biological opinion is based on the final biological assessment and other related environmental permitting documents prepared in support of the Project, and on the best available scientific and commercial information. NMFS concludes that the Project is not likely to adversely affect the federally listed as endangered, Sacramento River winter-run Chinook salmon (*Oncorhynchus tshawytscha*) evolutionarily significant unit (ESU) or the threatened Central Valley spring-run Chinook salmon ESU (*O. tshawytscha*); not likely to jeopardize the continued existence of the threatened California Central Valley steelhead distinct population segment (DPS, *O. mykiss*), or the threatened southern DPS of the North American green sturgeon (*Acipenser medirostris*), and is not likely to destroy or adversely modify their designated critical habitats. NMFS has included an incidental take statement with reasonable and prudent measures and nondiscretionary terms and conditions that are necessary and appropriate to avoid, minimize, or monitor incidental take of listed species associated with the Project.



Please contact Doug Hampton in our California Central Valley Office at (916) 930-3610 or at <u>douglas.hampton@noaa.gov</u> if you have any questions concerning this consultation, or if you require additional information.

Sincerely,

A. Catherine Manunkevage

Cathy Marcinkevage Acting Assistant Regional Administrator California Central Valley Office

Enclosure

cc: 151422-WCR2019-SA00556

Electronic copy only:

Mr. Scott Buenting, City of Antioch, <u>sbuenting@ci.antioch.ca.us</u> Mr. Jesse Halstead, Environmental Science Associates, jhalstead@esassoc.com



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

Antioch Desalination Facility Intake Replacement Project

NMFS Consultation Number: WCRO-2019-03441

Action Agency: U.S. Army Corps of Engineers

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?
Sacramento River winter-run Chinook salmon (<i>Oncorhynchus</i> <i>tshawytscha</i>)	Endangered	No	No	Yes	No
Central Valley spring- run Chinook salmon (<i>O. tshawytscha</i>)	Threatened	No	No	Yes	No
California Central Valley steelhead (<i>O.</i> <i>mykiss</i>)	Threatened	Yes	No	Yes	No
Southern distinct population segment of North American green sturgeon (<i>Acipenser</i> <i>medirostris</i>)	Threatened	Yes	No	Yes	No

Affected Species and NMFS' Determinations:

Fishery Management Plan That	Does Action Have an	Are EFH Conservation
Identifies EFH in the Project Area	Adverse Effect on EFH?	Recommendations Provided?
Pacific Coast Salmon	Yes	No

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

A. Catherine Marinkerage

Issued By:

Cathy Marcinkevage Acting Assistant Regional Administrator

Date: July 8, 2020



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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 U.S.C. 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 California Central Valley Office located in Sacramento, California.

1.2. Consultation History

On September 18, 2019, NMFS met with the U.S. Army Corps of Engineers (Corps), the U.S. Fish and Wildlife Service (FWS), the City of Antioch (City, applicant), and the permit applicant's consultants (Environmental Science Associates). This meeting served as a pre-application briefing to preview the project description and initiate early consultation.

On October 28, 2019, NMFS received a letter dated October 22, 2019, from the Corps requesting the initiation of formal consultation on the issuance of a Department of the Army permit to the applicant for the Antioch Desalination Facility Intake Replacement Project (Project). Attachments to the letter included a biological assessment (BA; Environmental Science Associates 2019) for the proposed Project, which was subsequently determined to be sufficient to initiate formal section 7 consultation under the ESA.

On March 4, 2020, NMFS met with the Corps, the FWS, the City, and their consultants, to discuss the scope of the project description and clarify the extent of the Federal action being consulted on by the Corps.

On March 6, 2020, NMFS sent an electronic mail (e-mail) to the Corps requesting a 90-day extension to the consultation period in order to accommodate further deliberations related to the scope and extent of the proposed action under consultation.

On March 9, 2020, the Corps sent an email to NMFS agreeing to the requested 90-day extension.

On March 27, 2020, the Central Valley Regional Water Quality Control Board (CVRWQCB) issued a Clean Water Act section 401 water quality certification order to the City for the City of Antioch Brackish Water Desalination Project.

On June 9, 2020, NMFS sent an email to the Corps requesting an additional two-week extension to the consultation period in order to accommodate challenges arising from recent stay-at-home orders issued in response to the recent spread of a global pandemic.

On June 12, 2020, the Corps sent an email to NMFS agreeing to the requested two-week extension.

1.3. Proposed Federal Action

"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). 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).

For the purposes of this consultation, the Corps proposes to issue a Department of the Army permit to the City in order to remove and replace the existing intake structure in the San Joaquin River with a new river intake facility as part of the planned construction of the new brackish water desalination facility in conjunction with its existing water treatment plant (WTP) facilities and operations in the cities of Antioch and Pittsburg, in Contra Costa County, California (Figure 1). The City's current treated water system covers a water service area of approximately 29 square miles servicing approximately 31,800 connections including residential, commercial, and irrigation customers located within the City limits and adjacent lands to the northeast and west (Figure 2). The issuance of the Corps permit for this Project is limited to the construction activities occurring in association with the intake removal and replacement, and does not extend to future operations of the planned brackish water desalination facility following construction.



SOURCE: NAIP, 2016; ESRI, 2012; ESA, 2019

City of Antioch Desalination Project





SOURCE: USDA, 2018; ESRI, 2012; City of Antioch, 2019; Corollo, 2109; ESA, 2019

City of Antioch Desalination Project





SOURCE: Brown and Caldwell, 2014

Brackish Water Desalination Facility

Figure 3. Existing Raw Water Collection System (ESA 2019).

The City's water treatment system currently collects raw water from two sources, the San Joaquin River and the Contra Costa Canal, and conveys it through a series of pumping stations and pipelines to the 240 million gallon (735 acre-foot) capacity Antioch Municipal Reservoir (Figure 3). The City has observed that the intake in the San Joaquin River typically experiences fresher conditions in winter and early spring, with salinity concentrations increasing in the late spring through the summer and into the fall as conditions become drier and regional water operations in the Delta change. This seasonal pattern also varies in response to hydrology, and the intake location is tidally influenced with salinity concentrations fluctuating throughout the day. During periods of drought, diversion from the San Joaquin River are extremely limited due to poor water quality caused by saline bay waters moving further upstream into the Delta. The City's ability to reliably utilize river water to meet the City's present and future water supply needs is, therefore, limited by the San Joaquin River's water quality and the inability of the existing WTP to remove salinity and other water quality constituents of concern (e.g., chlorides and bromides). Compounding these limitations is the reliance on a constant-speed pump operation at the river intake that diverts its full capacity of 16 mgd anytime it is in operation.

The construction of the proposed desalination facility is intended to improve water quality and water supply reliability from a drought resistant source that will help the City reduce its dependency on purchased water supplies, preserve and maximize the use of its pre-1914 water rights, and provide cost effective operational flexibility. The new desalination plant with appurtenant facilities would be constructed within the fence line of the City's existing WTP and would have the capacity to produce 6 mgd. In addition, the existing river intake would be removed and replaced with a new intake pump station on the San Joaquin River, and a new raw water pipeline connection allowing river water to be conveyed directly from the existing raw water pipeline to the WTP, as well as a brine concentrate disposal pipeline and connection to the Delta Diablo's Wastewater Treatment Plant outfall would also be constructed. Locating the new desalination facility at the WTP would allow the use of existing infrastructure as part of the overall treatment process. The existing wastewater treatment plant outfall pipeline extends approximately 500 feet offshore and discharges through a 42-inch diameter diffuser port with 50 3-inch diameter ports spaced 8 feet apart in alternating directions. No construction or modifications to the Delta Diablo Wastewater Treatment Plant or outfall would be required as part of the proposed Project.

The majority of the construction activities associated with the Project will occur on already developed or disturbed land in a predominantly urban setting characterized by residential, commercial, and industrial development, and any impacts to aquatic species or habitats would be determined by the nature of the construction activities and their proximity to neighboring waterways. The remainder of this section will focus, therefore, only on the aspects of the Project that will occur in, adjacent to, or over the water, where construction activities have the potential to adversely affect listed anadromous fish species or their designated critical habitats (e.g., the new river intake pump station). These activities include the construction of a temporary cofferdam in the San Joaquin River, removal of the temporary cofferdam, and removal of the temporary cofferdam following construction. These activities are further described below, and an assessment of the potential effects to listed species and their designated critical habitats that are anticipated to occur as a result of these activities is presented in section 2.5 (Effects of the Action), below.

Construction activities for the new river intake pump station would involve excavation, pouring concrete footings for foundations, assembling and installing piping, pumps, and electrical equipment, building concrete enclosures and roofs, and performing finish work, such as paving, and fencing the perimeter of the pump station site on City property. Construction of the new intake pump station would occur during normal working hours (between the hours of 8:00 AM and 5:00 PM) on weekdays, and require approximately 12 months to complete. In order to accommodate this work schedule and minimize the potential construction-related effects to aquatic life, a temporary cofferdam would be installed in the San Joaquin River to facilitate installation of the intake pipelines and fish screens. The cofferdam would consist of up to 300 interlocking 24-inch thick steel sheet piles being driven into the channel bottom with a bargemounted impact hammer to form a watertight corridor approximately 42 feet wide that would extend into the river approximately 143 feet from the shore, and would take approximately 2 weeks to complete. Once the cofferdam construction has been completed, any fish still remaining in the now enclosed area will be encouraged to exit the area on their own volition, or they will be captured and removed through the implementation of a dewatering and fish rescue plan, before the coffer-dammed area is dewatered. Following the completion of construction of the new river intake pump station and demolition and removal of the existing pump station, it will take approximately two weeks to remove the temporary cofferdam. The City has committed to implementing several conservation measures and best management practices (BMP) to minimize the potential adverse effects associated with the Project. These include conducting worker awareness training prior to the start of construction activities, and developing and adhering to a stormwater pollution prevention plan, a hazardous materials management and spill response plan, and a fish rescue plan. In addition, all in-water work associated with the Project, including cofferdam construction and removal, will be restricted to the period from August 1 through October 31.

The new intake pump station would connect to and convey San Joaquin River water through the City's existing 30-inch diameter raw water pipeline for the majority of the distance between the pump station and the WTP. The existing raw water conveyance pipeline is located within road rights-of-way and connects the intake pump station to the Antioch Municipal Reservoir. As part of Project construction, a new 30-inch diameter pipeline, constructed of ductile iron and up to 3,000 feet long, would tee off of the existing pipeline and provide a direct connection between the new intake pump station and the WTP. Valves would be installed at the tee to allow flow from the San Joaquin River to be directed to either the Antioch Municipal Reservoir or the WTP.

We considered whether or not the proposed action would cause any other activities and determined that operation of the desalination facility and brine disposal system would not be able to occur but for completion of the Project, which will facilitate the continued operation of the WTP with an enhanced flexibility and increased capacity to divert water from the San Joaquin River during all months of the year, whereas those operations have previously been restricted to a seasonal diversion schedule based on the technical specifications and functional limitations of the current pumping apparatus at the San Joaquin River intake.

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.

The Corps determined that the proposed Project is likely to result in adverse effects to Sacramento River winter-run Chinook salmon (Oncorhynchus tshawytscha), Central Valley spring-run Chinook salmon (O. tshawytscha), California Central Valley (CCV) steelhead (O. mykiss), Southern distinct population segment (sDPS) of North American green sturgeon (Acipenser medirostris), and their designated critical habitats. Based on the timing and location of the action taken, however, NMFS has independently determined, that the proposed Project is not likely to adversely affect either of the two Chinook salmon runs as a result of limiting inwater construction activities to the period from August 1 through October 31 during a season of the year when these fish are least likely to be present in the action area. The rationale supporting our determinations is documented in the "Not Likely to Adversely Affect" Determinations section (Section 2.12) of this opinion. NMFS otherwise agrees with the Corps' determinations that CCV steelhead and sDPS green sturgeon could experience or be exposed to negative impacts associated with the construction and removal of the cofferdam, and therefore have the potential to be adversely affected by it. NMFS agrees with the Corps' determinations that the designated critical habitat for all of the above listed species will likely be adversely affected by the proposed Project. The remainder of this opinion will therefore focus on the analysis of effects to CCV steelhead, sDPS green sturgeon, and the portions of the designated critical habitats that have been identified in the action area.

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 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 some listed species use the term primary constituent element (PCE) or essential features. The 2016 critical habitat regulations (50 CFR 424.12) replaced 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 44977), 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 areas, evaluates the conservation value of the various watersheds and coastal and marine environments that make up the designated areas, and discusses the function of the essential PBFs that help to form that

conservation value. This opinion considers the potential effects of the Project to the following evolutionarily significant units (ESUs) and distinct population segments (DPS): the endangered Sacramento River (SR) winter-run Chinook salmon ESU (*Oncorhynchus tshawytscha*), the threatened Central Valley (CV) spring-run Chinook salmon ESU (*O. tshawytscha*), California Central Valley (CCV) steelhead DPS (*O. mykiss*), and Southern DPS (sDPS) of North American green sturgeon (*Acipenser medirostris*). The current status of the above listed species and their designated critical habitats are summarized in Tables 1 and 2, respectively.

Species	Listing Classification and Most Recent Federal Register Notice	Status Summary	
California Central Valley steelhead DPS	Threatened, 71 FR 834; January 5, 2006	According to the NMFS (2016) 5-year species status review, 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.	
Southern DPS of North American green sturgeon	Threatened, 71 FR 17757; April 7, 2006	According to the NMFS (2015) 5-year species status review 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	

Table 1. Description of species, current Endangered Species Act (ESA) listing classifications, and summary of species status.

occurs in a single reach of the main stem Sacramento River. Current threats include

Species	Listing Classification and Most Recent Federal Register Notice	Status Summary	
		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. 2017).	

	Designation Date	
Critical Habitat	and Federal	Description
	Register Notice	-
Sacramento River winter-run Chinook salmon (SR winter-run) critical habitat	Register Notice June 16, 1993; 58 FR 33212	Designated critical habitat includes the Sacramento River from Keswick Dam (river mile (RM) 302) to Chipps Island (RM 0) at the westward margin of the Sacramento-San Joaquin Delta (Delta); all waters from Chipps Island westward to the Carquinez Bridge, including Honker Bay, Grizzly Bay, Suisun Bay, and the Carquinez Strait; all waters of San Pablo Bay westward of the Carquinez Bridge; and all waters of San Francisco Bay north of the San Francisco-Oakland Bay Bridge from San Pablo Bay to the Golden Gate Bridge. The designation includes the river water, river bottom and adjacent riparian zones used by fry and juveniles for rearing.
		PBFs considered essential to the conservation of the species include: access from the Pacific Ocean to spawning areas; availability of clean gravel for spawning substrate; adequate river flows for successful spawning, incubation of eggs, fry development and emergence, and downstream transport of juveniles; water temperatures at 5.8–14.1°C (42.5–57.5°F) for successful spawning, egg incubation, and fry development; riparian and floodplain habitat that provides for successful juvenile development and survival; and access to downstream areas so that juveniles can migrate from spawning grounds to the San Francisco Bay and the Pacific Ocean.

Table 2. Description of critical habitat, Listing, and Status Summary.

Critical Habitat	Designation Date and Federal Register Notice	Description
Central Valley spring-run Chinook salmon (CV spring-run) critical habitat	September 2, 2005; 70 FR 52488	Designated critical habitat 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 critical habitat are significantly limited and degraded, the habitat remaining is considered highly valuable.
California Central Valley steelhead (CCV steelhead) critical habitat	September 2, 2005; 70 FR 52488	Designated critical habitat 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 are significantly limited and degraded, the habitat remaining is considered highly valuable.

Critical Habitat	Designation Date and Federal Register Notice	Description
Southern DPS of North American (sDPS) green sturgeon critical habitat	Southern DPS of North American (sDPS) green sturgeon critical nabitat	Designated 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 include migratory corridor, water quality, and food resources in nearshore coastal marine areas. Although the current conditions of PBFs for sDPS green sturgeon critical habitat are significantly limited and degraded, the habitat remaining is considered highly valuable.

2.2.1. Recovery Plans

In July 2014, NMFS released a final Recovery Plan for SR winter-run, CV spring-run, and CCV steelhead (NMFS 2014, Recovery Plan). The Recovery Plan outlines actions to restore habitat, access, and improve water quality and quantity conditions in the Sacramento River to promote the recovery of listed salmonids. Key actions from the Recovery Plan include conducting landscape-scale restoration throughout the Delta, incorporating ecosystem restoration into Central Valley flood control plans that includes breaching and setting back levees, and restoring flows throughout the Sacramento and San Joaquin River basins and the Delta.

In August 2018, NMFS released a final Recovery Plan for the sDPS green sturgeon (NMFS 2018), which focuses on fish screening and passage projects, floodplain and river restoration, and riparian habitat protection in the Sacramento River Basin, the Delta, San Francisco Estuary, and nearshore coastal marine environment as strategies for recovery.

2.2.2. Global Climate Change

One major factor affecting the rangewide status of the listed anadromous fish species in the Central Valley (CV) 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 CV 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 CV Chinook salmon populations can persist (Williams 2006).

SR winter-run Chinook salmon embryonic and larval life stages that are most vulnerable to warmer water temperatures occur during the summer, which makes the species particularly at risk from climate warming. The only remaining population of SR winter-run Chinook salmon relies on the cold water pool in Shasta Reservoir, which buffers the effects of warm temperatures in most years. The exception occurs during drought years, which are predicted to occur more often with climate change (Yates et al. 2008). The long-term projection of how the Central Valley Project (CVP) and State Water Project (SWP) will operate incorporates the effects of climate change in three possible forms: less total precipitation; a shift to more precipitation in the form of rain rather than snow; or, earlier spring snow melt (Reclamation 2019). Additionally, air temperature appears to be increasing at a greater rate than what was previously analyzed (Beechie et al. 2012, Dimacali 2013). These factors will compromise the quantity and/or quality of SR winter-run Chinook salmon habitat available downstream of Keswick Dam. It is imperative for additional populations of SR winter-run Chinook salmon to continue to be reestablished into historical habitat in Battle Creek and above Shasta Dam for long-term viability of the ESU (NMFS 2014).

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 input from springs) will be more susceptible to impacts of climate change.

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 CCV 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 CCV 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 19 miles downriver of the ACID Dam where water temperature is warmer than at the ACID Dam during late spring and summer. Thus, if water temperatures increase with climate change, spawning locations lower in the river may be more affected.

In summary, observed and predicted climate change effects are generally detrimental to these listed 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 the uncertainty associated with these projections increases over time, the direction of climate change is relatively certain (McClure 2011).

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). For the purposes of this consultation, the action area encompasses all areas affected by the proposed Project's construction, both on land and in water, including those portions of the San Joaquin River that will be impacted by the construction and removal of the coffer dam, including the area confined within it, associated with the replacement and removal of the existing intake structure located at Latitude 38.017431°, Longitude -121.802699°, in Contra Costa County, California. Centered on this location, the action area extends for a distance of approximately three miles in all directions [i.e., upstream, downstream, and laterally across the entire width of the San Joaquin River (approximately 2,483 feet at the Project location)] from the site where the temporary cofferdam will be installed. This area was selected because it is reflective of the maximum extent to which the anticipated adverse effects associated with the proposed construction activities (i.e., acoustic disturbances and temporarily degraded habitat quality) are likely to be experienced in the aquatic environment.

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 consultations, 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).

The segment of the San Joaquin River located within the action area is heavily channelized and leveed and bordered primarily by agricultural, industrial, and municipal land uses, although much of the surrounding landscape is also being considered or secured for several current and planned tidal habitat restoration projects. This segment of the San Joaquin River is characterized primarily by slow moving deep water which is tidally influenced and predominantly depositional

in nature. This section of the river is hydrologically influenced by the confluence of the Sacramento and San Joaquin rivers where they converge to form the Delta. As such, it has generally lower water clarity and habitat diversity relative to the upper reaches of either river.

The action area is considered an important rearing and migratory corridor for all ESA-listed anadromous fish species. Juvenile sDPS green sturgeon utilize the waters of the Delta for rearing habitat for a period of up to 3 years as they acclimate to higher concentrations of salinity prior to ocean entry. As such, they have the potential to be present in the action area during every month of the year, and would therefore also have the potential to be exposed to the effects of the Project. Adult CCV steelhead begin to migrate into the watersheds of the Central Valley during the late summer or early fall months (i.e., September through November), particularly when early winter rains create increased flows in the system. NMFS does not expect them to be present in the action area in any significant numbers, however, until the months of December through February, which is the peak of their spawning migration. The peak of juvenile CCV steelhead emigration from the tributaries in the Sacramento and San Joaquin river basins to the ocean occurs from February through May. Therefore, conducting in-water construction activities from August 1 through October 31 should avoid impacts to the majority of outmigrating juvenile steelhead smolts. There are larger steelhead smolts that migrate at other times of the year, including the fall and early winter period, that may be exposed to the direct effects of the Project during their passage through the action area, albeit in very small numbers. As with adults, however, NMFS expects the most likely period for them to be present is during the month of December.

Baseline and cumulative effects from activities such as continued municipal, industrial, and agricultural practices, bank and levee stabilization projects, and both commercial shipping traffic and recreational boating and fishing will continue to negatively affect the federally listed species in the action area. Runoff from municipal, industrial, and agricultural activities may contain contaminants such as pesticides, sediments, and nutrients that may affect listed species through lethal and sublethal impacts. Levee construction and bank protection can reduce floodplain connectivity, change substrate size, and decrease riparian habitat and shaded riverine aquatic cover. However, NMFS expects the species and their designated critical habitats to improve with the implementation of both ongoing and planned habitat restoration efforts incorporating and advancing progress on recovery actions identified in NMFS (2014, 2018).

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).

Equipment mobilization and staging to prepare the site for cofferdam installation will require general excavation and earth moving activities both in the water and on the nearby bank. These activities generate noise and a physical disturbance in the aquatic environment, which could

displace fish into adjacent habitats, and also have the potential to transfer kinetic energy through the adjoining substrates and temporarily generate increased turbulence and turbidity in the river. Migrating fish generally react to this disturbance with a startle response in which they are likely to suddenly disperse in random directions (Carlson et al. 2001). This displacement can lead them into predator-occupied habitat where opportunistic predators can take advantage of behavioral changes to target and prey on juvenile salmonids. Carlson et al. (2001) observed this behavior occurring in response to routine channel maintenance activities in the Columbia River. Some of the fish that did not immediately recover from the disorientation of turbidity and noise from channel dredges and pile driving swam directly into the point of contact with predators.

Disturbances to the substrate on the channel bottom during construction will resuspend sediments in the water column, resulting in increased turbidity in the action area. The action area typically exhibits relatively high concentrations of suspended sediments as a natural background condition due to its position at the confluence of two large rivers forming the Sacramento San Joaquin Delta. Nevertheless, short-term increases in turbidity and suspended sediment concentrations in the water column from in-water construction disturbances may disrupt feeding activities of fish or result in their temporary displacement from preferred habitats. Numerous studies show that suspended sediment and turbidity levels moderately elevated above natural background values can result in non-lethal detrimental effects to salmonids, such as decreasing reproductive success, reducing feeding success and growth, causing avoidance of rearing habitats, and disrupting migration cues (Bash et al. 2001). NMFS expects turbidity to affect CCV steelhead in much the same way that it affects the other salmonids used in these studies because of similar physiological and life history requirements between species. The disturbance of the channel banks and bottom during construction and removal of the coffer dam will increase suspended sediments locally, which will produce turbidity plumes that will extend up and down the river from the construction activity in accordance with the prevailing tide. The duration of turbidity plumes resulting from in-water construction-related activities is expected to last throughout the time the disturbance is occurring and for several hours after the work has ceased each day, including during the early evening hours, before gradually dissipating and returning to natural background levels.

Both migrating and rearing fish are expected to move through, rather than hold position or remain in the immediate vicinity of ongoing construction activities for more than a few hours or days. Although CCV steelhead are highly migratory and capable of moving freely throughout the action area, a substantial increase in turbidity may injure fish by temporarily disrupting normal behaviors that are essential to their growth and survival, such as feeding, sheltering, and migrating. Disrupting these behaviors increases the likelihood that individual fish will face increased competition for food and space, and experience reduced growth rates or possibly weight loss resulting in harm to individuals and increased risk to the affected species. Turbidity increases may also affect the sheltering abilities of some fish and may decrease their likelihood of survival by increasing their susceptibility to predation. Conversely, some turbidity is helpful in reducing predation by shielding individual fish from visual predators in a turbid field (Gregory and Levings 1998). Adherence to erosion control measures and BMPs, such as the use of silt fences, straw bales, and straw wattles as described in the BA (ESA 2019), will minimize the amount of suspended sediment generated by construction activities and will minimize the potential for post-construction turbidity changes should precipitation events occur after construction has been completed. In addition, in-water construction activities will adhere to

CVRWQCB turbidity objectives for the Sacramento and San Joaquin River basins that stipulate where natural turbidity is between 5 and 50 nephelometric turbidity units (NTUs), turbidity levels may not be elevated by 20 percent above ambient conditions; where ambient conditions are between 50 and 100 NTUs, conditions may not be increased by more than 10 NTUs; and where natural turbidity is greater than 100 NTUs, increases will not exceed 10 percent above ambient conditions (CVRWQCB 2018). NMFS expects that most fish will actively avoid the elevated turbidity plumes. For those fish that do not or cannot avoid the turbid water, exposure is expected to be brief (i.e., minutes to hours) and not likely to cause injury or death from reduced growth or physiological stress. This expectation is based on the general avoidance behaviors of salmonids. However, some juveniles that are exposed to turbidity plumes may be injured or killed by predatory fish that take advantage of disrupted normal behavior. Once fish migrate past the turbid water, normal feeding and migration behaviors are expected to resume.

Construction activities are also expected to generate underwater noise from both terrestrial and in-water sources, occasionally reaching intense levels. Intense noise will be produced in the aquatic environment primarily by pile driving operations to install the cofferdam, but also by heavy machinery operating in close proximity to the river. Feist et al. (1992) found that noise from pile driving activities in Puget Sound affected the general behavior of juvenile salmon by temporarily displacing them from active construction areas. Nearly twice as many fish were observed at construction sites on non-pile driving days compared to days when pile driving occurred. The level of noise generated from impact pile driving the sheet piles during cofferdam installation is expected to reach levels that have the potential to either cause instantaneous mortality (>206 decibels peak, referenced to 1 μ Pa) to fish swimming within 29.5 feet (9 meters) of the source of the acoustic signal, or incur tissue injury (>187 decibels accumulated sound exposure level, re: 1 μ Pa) to fish swimming within 1,119 feet (341 meters) of the source of the acoustic signal. Greater than 150 decibels root mean square (re: 1 μ Pa) is also likely to cause altered behavioral responses of fish swimming within 3 miles (4.82 kilometers) of the source of the acoustic signal.

NMFS expects both juvenile and adult life stages of fish to be at some risk of exposure to these construction activities. Typically, smaller fry- and larval-sized fish would have the highest potential risk of exposure due to their near shore orientation and slower swimming speeds. However, fry- and larval-sized fish are unlikely to be present in the action area due to the season and the location of the construction site, which is downstream of the natal reaches of CCV steelhead and sDPS green sturgeon. Juvenile green sturgeon may be present in the action area throughout the year, and would therefore be exposed to the effects of the action. In contrast to this, adult CCV steelhead do not begin to migrate into the watersheds of the Central Valley until the late summer or early fall months (i.e., September through November) when early winter rains create increased flows in the system. NMFS, therefore, does not expect them to be present in the action area in any significant numbers until the months of December through February, which is the peak of their spawning migration. Similarly, the peak of juvenile CCV steelhead emigration from the tributaries in the Sacramento and San Joaquin river basins to the ocean occurs from February through May. Therefore, conducting in-water construction activities from August 1 through October 31 should also avoid impacts to the majority of outmigrating juvenile steelhead smolts. NMFS generally expects most migrating and rearing fish to avoid entering the zone of active construction activity, or to have a startle response when construction activity begins. Although behavioral reactions of fish to in-water disturbances vary greatly between species,

many studies have also demonstrated that avoidance behavior is not limited to a simple startle response, but that directional changes and shifting stratification within the water column also exhibit deflective movement directly in response to, and away from, the source signal in an attempt to selectively avoid the disturbance (Shafiei Sabet et al. 2015). These behavioral modifications may delay migration for several hours or more. When construction activity is curtailed or paused, such as when crews take breaks or suspend activities overnight, fish are generally expected to continue their migration. Migratory movement is generally thought to occur under low light conditions, which is when construction activity would not be occurring. However, individual fish may mobilize at any time and would consequently face a higher level of risk of exposure to construction-related effects.

In-water construction activities additionally have the potential to temporarily negatively affect the designated critical habitat PBFs of migratory corridors and rearing habitat for all of the listed anadromous fish. This includes increased exposure to noise, turbidity, and suspended sediments as described above, as well as by precluding access to approximately 0.15 acres of aquatic habitat that will be dewatered for a period of up to one year while the proposed coffer dam is in place. Increased turbidity, used as an indicator of increased suspended sediments, also is correlated with a decline in primary productivity, a decline in the abundance of periphyton, and reductions in the abundance and diversity of invertebrate fauna in the affected area (Lloyd 1987, Newcombe and MacDonald 1991). Reduction in prey/food for anadromous fish may result in short term localized degradation of the rearing habitat PBFs. However, these effects on critical habitat would be minimized by implementing the previously described BMPs and conservation measures such as implementing spill and stormwater prevention plans and adhering to regional water quality standards. In addition to the temporary construction-related effects to designated critical habitat, the proposed Project, once completed, will also permanently displace approximately 0.02 acres of currently available habitat due to the presence of the newly installed intake structure in the San Joaquin River.

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).

Non-Federal actions that occur in the action area include ongoing municipal, industrial, and agricultural activities and increased urbanization. Agricultural practices throughout the San Joaquin Delta hydrologic unit (hydrologic unit code 18040003) may negatively affect riparian and wetland habitats. Unscreened agricultural diversions along the San Joaquin and Sacramento

rivers entrain fish, including juvenile salmonids and sDPS green sturgeon. Grazing activities from dairy and cattle operations can degrade or reduce suitable critical habitat for listed salmonids and sturgeon by increasing erosion and sedimentation as well as introducing nitrogen, ammonia, and other nutrients into the watershed, which then flow into the Delta. Stormwater and irrigation discharges related to both agricultural and urban activities contain numerous pesticides and herbicides that may negatively affect salmonid and sturgeon reproductive success and survival rates (Dubrovsky et al. 1998, Daughton 2003).

Increases in urbanization and housing developments can impact habitat by altering watershed characteristics, and changing both water use and stormwater runoff patterns. Increased anthropogenic 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 waterbodies, will not require Federal permits, and thus will not undergo review through the ESA section 7 consultation process with NMFS. Increased urbanization is also expected to result in an expansion of increased recreational activities throughout the action area. Among the activities expected to increase in both volume and frequency is recreational boating, which typically results in greater increased wave action and propeller wash in waterways. These activities will potentially degrade riparian and wetland habitat by eroding channel banks and mid-channel islands, thereby causing an increase in siltation and turbidity in hydrologically connected waters. Wakes and propeller wash also disturb benthic sediments and, thereby, potentially re-suspend contaminated sediments and further degrading areas of submerged vegetation. This disturbance, in turn, would reduce habitat quality for the invertebrate forage base required for the survival of juvenile salmonids and sDPS green sturgeon entering and moving throughout the action area. Expanded recreational boat operation is also expected to result in elevated concentrations of contaminants from the operation of gasoline and diesel powered engines on watercraft entering the streams and waterways of the action area.

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.

The proposed action is scheduled to occur during a period of time that corresponds with the recommended in-water work window for the Sacramento-San Joaquin River Delta, from August 1 through October 31, in a reach of the river where there is historically no spawning habitat present. Despite being the major migratory corridor for all of the Sacramento River Basin populations of listed species considered in this opinion, the numbers of individuals from those populations present at the time of construction are expected to be very low, and impacts to those individuals are not likely to translate into population level effects. Specifically, a few CCV

steelhead adults and juveniles have the potential to be migrating through the action area during the in-water work window when it overlaps with the rising and falling limbs of their migration and emigration seasons, respectively, as do juvenile sDPS green sturgeon, which are present year round in the action area. In contrast, however, adult and juvenile Sacramento River winter-run Chinook salmon and Central Valley spring-run Chinook salmon are not anticipated to be present at all. In addition, the action area represents a very small proportion of the adjacent habitat available for fish to disperse into, and the effects from the action are expected to dissipate rapidly within the context of the larger surrounding habitat as well. Therefore, construction effects to listed species are expected to be temporary and limited to behavioral responses and injury or death to a very few individual adult and juvenile CCV steelhead and juvenile sDPS green sturgeon migrating through the action area for approximately two weeks during the period from August 1 through October 31 in two successive years. In addition, the Project will result in the permanent loss of up to 0.02 acres of designated critical habitat displaced by the presence of the new intake structure, and the temporary disturbance of up to 0.15 acres of designated critical habitat for all of the species for a period of one year while the cofferdam is in place.

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 California Central Valley steelhead DPS, the southern DPS of North American green sturgeon, or destroy or adversely modify the designated critical habitats of Sacramento River winter-run Chinook salmon, Central Valley spring-run Chinook salmon, California Central Valley steelhead, or the southern DPS of North American green sturgeon.

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) 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 CCV steelhead and sDPS green sturgeon through construction-related impacts in the action area is reasonably certain to occur. Specifically, NMFS anticipates that juvenile and adult CCV steelhead and juvenile sDPS green sturgeon may be killed, injured, or harassed during construction activities.

Using the best available information, NMFS cannot specifically quantify the anticipated amount of incidental take of individual CCV steelhead and sDPS green sturgeon because of the variability and uncertainty associated with the response of listed species to the effects of the action, uncertainty with regard to the varying population size of the two DPSs, annual variations in the timing of migration and emigration, and individual habitat use within the action area. However, it is possible to designate ecological surrogates for the extent of incidental take anticipated to be caused by the proposed Project, and to monitor those surrogates to determine the level of incidental take that is occurring. The most appropriate ecological surrogate for the extent of pile driving conducted during cofferdam construction and removal.

2.9.2. Ecological Surrogates

- The analysis of the effects of the Project anticipates that the installation of up to 300 interlocking 24-inch thick steel sheet piles will require the use of an impact pile driving hammer operating for approximately 2 weeks between August 1 and October 31 during daylight hours resulting in acoustic effects exceeding:
 - o 150 decibels (dB) out to a distance of 4,642 meters (2.88 miles) from the source,
 - o 187 dB at a distance of 341 meters (0.21 miles) from the source, and
 - 206 dB at a distance of 9 meters (29.5 feet) from the source.

If any specific parameter of this ecological surrogate is exceeded, the anticipated incidental take levels are also exceeded, triggering the need to reinitiate consultation on the proposed Project.

2.9.3. 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.

2.9.4. Reasonable and Prudent Measures

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

NMFS has determined that the following reasonable and prudent measures (RPMs) are necessary and appropriate to minimize take of CCV steelhead and southern DPS of North American green sturgeon resulting from construction of the proposed Project.

- 1. Measures shall be taken to minimize the amount and duration of pile driving and its potential impacts on listed anadromous fish.
- 2. Measures shall be taken to monitor and report the amount or extent of incidental take that occurs in connection with implementation of the proposed Project.

2.9.5. Terms and Conditions

The terms and conditions described below are non-discretionary, and the Corps or any applicant must comply with them in order to implement the RPMs (50 CFR 402.14). The Corps or any 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.

The terms and conditions described below are non-discretionary, and the Corps and the applicant must comply with them in order to implement the RPMs (50 CFR 402.14). The Corps and the applicant have a continuing duty to monitor the impacts of incidental take and must report the progress of the Project 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 term and condition implements RPM 1:
 - a. The permit applicant, including all employees contracted by the applicant to carry out the permitted work, shall ensure that all in-water pile driving activity commences during a period of low tide each day.
- 2. The following term and condition implements RPM 2:
 - a. Any Sacramento River winter-run Chinook salmon, Central Valley spring-run Chinook salmon, California Central Valley steelhead, or sDPS green sturgeon found dead or injured within the action area during construction shall be reported within 48 hours to NMFS via fax or by phone:

Attention: Cathy Marcinkevage, Acting Assistant Regional Administrator NMFS California Central Valley Office Fax: (916) 930-3629 Phone: (916) 930-3600

A follow-up written notification shall also be submitted to NMFS which includes the date, time, and location that the carcass or injured specimen was found, a color photograph, the cause of injury or death, if known, and the name and affiliation of the person who found the specimen. Written notification shall be submitted to:

Cathy Marcinkevage, Acting Assistant Regional Administrator California Central Valley Office National Marine Fisheries Service 650 Capitol Mall, Suite 5-100 Sacramento, California 95814

Any dead specimen(s) should be placed in a cooler with ice, then sent to:

NMFS, Southwest Fisheries Science Center, Fisheries Ecology Division 110 Shaffer Road Santa Cruz, California 95060

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) The Corps and the permit applicant/holder should support and promote aquatic and riparian habitat restoration in the Sacramento and San Joaquin river basins for listed aquatic species. Practices that avoid or minimize negative impacts to listed species should be encouraged.
- (2) The Corps and the permit applicant/holder should continue to work cooperatively with other State and Federal agencies, private landowners, governments, and local watershed groups to identify opportunities for cooperative analysis and funding to support salmonid habitat restoration projects.
- (3) The Corps should use species recovery plans to help ensure that their actions will address the underlying processes that limit fish recovery, and to identify key actions in the action area when prioritizing project sites each year.

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 of the implementation of any conservation recommendations.

2.11. Reinitiation of Consultation

This concludes formal consultation for the Antioch Desalination Intake Replacement 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.

2.12. "Not Likely to Adversely Affect" Determinations

Exposure of both Sacramento River winter-run Chinook salmon and Central Valley spring-run Chinook salmon to the direct effects of the Project is expected to be entirely avoided largely because in-water work will occur during the summer and fall months when these species are typically not present in the action area. A brief discussion of the likelihood of exposure of listed fish by time of year, species, and life stage follows:

For Sacramento River winter-run Chinook salmon, the proposed work window for construction of the cofferdam in the San Joaquin River (August 1 through October 31) should preclude most, if not all, instances of exposure to the direct effects of the Project. Adult Sacramento River winter-run Chinook salmon may begin to enter the action area in November, but are most likely to be migrating through the action area in December. Similarly, juveniles may be present in the action area as early as November and December, especially if significant rainfall events occur to trigger their outmigration behavior.

Adult Central Valley spring-run Chinook salmon are not expected to be present in the action area during the in-water work window from August 1 through October 31. Yearling fish may appear in the action area as early as late October, but are not likely to occur in any substantial numbers until after February when the bulk of yearling and young-of-year spring-run Chinook salmon begin to enter the Delta.

Based on the timing of Sacramento River winter-run Chinook salmon or Central Valley springrun Chinook salmon movements in and through the action area described above, NMFS does not anticipate the proposed Project will result in adverse effects to Sacramento River winter-run Chinook salmon or Central Valley spring-run Chinook salmon. NMFS reached these conclusions based on the timing of the in-water work, and pile driving activity in particular, associated with the construction of the cofferdam being limited to the period from August 1 to October 31, during the time of year when Chinook salmon are not expected to be present in the action area.

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 EFH. The MSA (section 3) defines EFH as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." 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) also requires NMFS to recommend measures that can be taken by the action agency to conserve EFH.

This analysis is based, in part, on the EFH assessment provided by the Corps and descriptions of EFH for Pacific Coast salmon [Pacific Fishery Management Council (PFMC) 2014] contained in

the fishery management plans developed by the PFMC and approved by the Secretary of Commerce.

3.1. Essential Fish Habitat Affected by the Project

The PFMC has identified and described EFH, Adverse Impacts and Recommended Conservation Measures for salmon in Amendment 14 to the Pacific Coast Salmon FMP (PFMC 2000). The action area is within the region identified as EFH for Pacific salmon in Amendment 14 of the Pacific Coast Salmon FMP. Freshwater EFH for Pacific salmon in the California Central Valley includes waters currently or historically accessible to salmon within the Central Valley ecosystem as described in Myers et al. (1998), and includes the San Joaquin Delta (Delta) hydrologic unit (i.e., number 18040003). Sacramento River winter-run Chinook salmon, CV spring-run Chinook salmon, and CV fall-/late fall-run Chinook salmon are species managed under the Pacific Coast Salmon FMP that occur in the Delta unit.

The San Joaquin River within the action area provides upstream migratory habitat for adult Chinook salmon, and downstream migratory and rearing habitat for all Chinook salmon runs. Chinook salmon juveniles may rear throughout the action area; however, spawning does not occur in the action area, as Chinook salmon spawning occurs well upstream.

3.2. Adverse Effects on Essential Fish Habitat

Temporary adverse construction impacts of the Project include pile driving noise and increased turbidity. The full impacts of the Project on Chinook salmon habitat are the same as those described in section 2.5 of this opinion and are generally expected to apply to Pacific salmon EFH.

3.3. Essential Fish Habitat Conservation Recommendations

The Project includes adequate measures described in Section 1.3 of this opinion to avoid, minimize, or otherwise offset the adverse effects to EFH. Therefore, additional EFH Conservation Recommendations are not being provided at this time.

3.4. Supplemental Consultation

The Corps 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(1)).

4. DATA QUALITY ACT DOCUMENTATION AND PRE-DISSEMINATION REVIEW

The Data Quality Act (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. The intended users of this opinion are the U.S. Army Corps of Engineers and the City of Antioch. Other interested users could include the Central Valley Regional Water Quality Control Board, the U.S. Fish and Wildlife Service, the California Department of Fish and Wildlife, and the California Department of Water Resources. Individual copies of this opinion were provided to the Corps. The document will be available within two weeks at the NOAA Library Institutional Repository. 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 Appendix 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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