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-2020-01956

October 7, 2020

Ramon Aberasturi
Regulatory Project Manager
1325 J Street
Sacramento CA 95814

Re: Endangered Species Act Section 7(a)(2) Biological Opinion, and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Response for the Harding Drain Fish Barrier

Dear Ramon Aberasturi:

Thank you for your letter on June 16, 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 Harding Drain Fish Barrier Project. This consultation was conducted in accordance with the 2019 revised regulations that implement section 7 of the ESA (50 CFR Part 402, as amended; 84 Fed. Reg. 44976, 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.

The enclosed biological opinion, based on the biological assessment, and the best available scientific and commercial information, concludes that the project is not likely to jeopardize the continued existence of the federally listed threatened Central Valley spring-run Chinook salmon evolutionarily significant unit (*Oncorhynchus tshawytscha*) and threatened California Central Valley steelhead distinct population segment (*Oncorhynchus mykiss*) and is not likely to destroy or adversely modify California Central Valley steelhead designated critical habitat. 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.

Please contact Savannah Bell at savannah.bell@noaa.gov or at (916)930-3721 if you have any questions concerning this consultation, or if you require additional information.

Sincerely,

A. Catherine Marcinkevage

Cathy Marcinkevage
Assistant Regional Administrator
California Central Valley Office

Enclosure

cc: To the File 151422-WCR2020-01956

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

Harding Drain Fish Barrier

NMFS Consultation Number: WCRO-2020-01956

Action Agency: 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 Evolutionarily Significant Unit (ESU) (*Oncorhynchus tshawytscha*)	Threatened	Yes	No	N/A	N/A
California Central Valley steelhead Distinct Population Segment (DPS (*Oncorhynchus mykiss*)	Threatened	Yes	No	Yes	No

Fishery Management Plan That Identifies 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
Assistant Regional Administrator for the California Central Valley Office

Date: October 7, 2020

Table of Contents

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 Part 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 (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 California Central Valley Office, Sacramento, CA.

1.2. Consultation History

In November 2016, Turlock Irrigation District (TID) notified NMFS that Central Valley fall-run Chinook salmon (*Oncorhynchus tshawytscha*) were encountered in TID's canal systems; a false migration pathway with no available route to return to the mainstem San Joaquin River. A rescue effort was coordinated between California Department of Fish and Wildlife (CDFW) and TID to rescue 36 adult salmon. CDFW and TID trucked and released the rescued salmon to the Merced River.

In the fall of 2017, TID notified NMFS that more fall-run Chinook salmon were observed entrained into the canal system. However, due to the difficulty locating and isolating the fish, they were not able to rescue the fish from the canal system. Although it was initially unclear where the salmon had entered the TID canal system, it was later observed that they had entered through both the Harding Drain Culverts and the Nielson Drain Culverts.

Between October 2017 to September 2019, ongoing e-mail correspondence occurred between TID, NMFS, CDFW, and U.S. Fish and Wildlife Service (USFWS) regarding flow regimes, run timing, legal aspects of fish barriers, fish barrier design, installation, maintenance, and reporting occurred.

Between February 2019 and August 2019, regular coordination meetings occurred between TID, NMFS, and CDFW to discuss proposed project details and fish barrier options.

On June 16, 2020, NMFS received an initiation package from the U.S. Army Corps of Engineers (Corps) for the formal section 7 consultation for the Harding Drain Fish Barrier project. Formal consultation was initiated on this date.

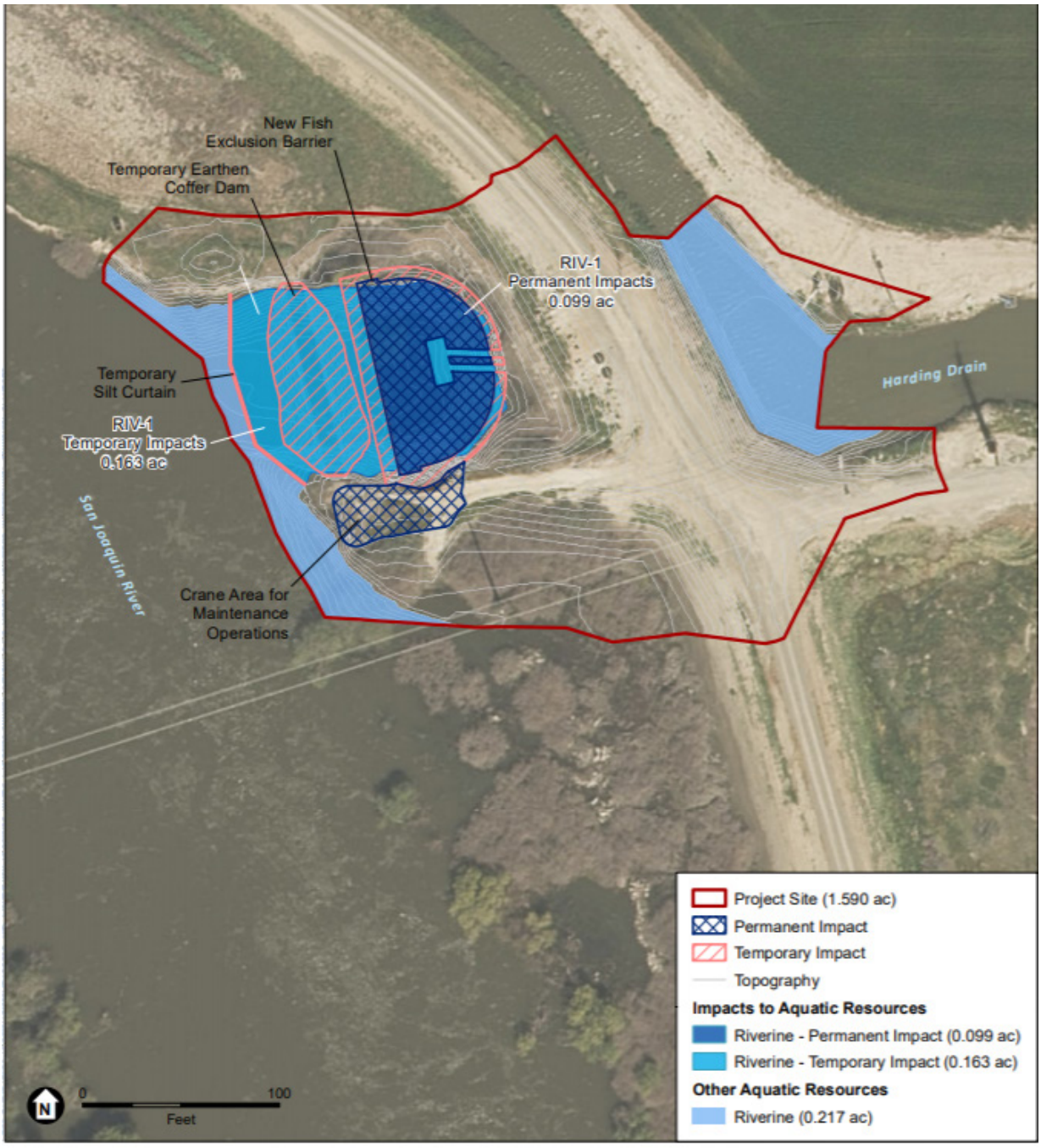
1.3. Proposed Federal Action

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 the MSA, a 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). We considered under the ESA whether or not the proposed action would cause any other activities that would have consequences on listed species or its critical habitat and determined that it would not. 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.

The U.S. Army Corps of Engineers (Corps) is the lead Federal agency for this project. The applicant, TID, is proposing to install a fish barrier at the existing Harding Drain Culvert, located directly west of the city of Turlock along Harding Road. The Harding Drain has two parallel, 48-inch-diameter, 155 feet long, corrugated metal culverts that pass through the flood control levee to the San Joaquin River. Both culverts have flapper valves attached to the outlet end of the pipeline and slide gates located at approximately the midpoint of each pipeline. The slide gates are used as shutoff valves to prevent San Joaquin River water from gravity-feeding back into the open-channel drains on the landside of the river levee. The culverts discharge into an approximately 100-foot-long cove off the main channel off the San Joaquin River. The objective of the Proposed Action is to prevent Central Valley (CV) fall/late fall-run Chinook salmon from entering the TID canal system via the Harding Drain.

1.3.1. Project Description

The barrier at the Harding Drain would be a 60-foot-long, vertical, metal picket fence flanked by 20-foot-long, reinforced concrete retaining walls extending into the adjacent embankments on either side of the existing outlet channel (Figure 1). The barrier would be 15 feet high, measured from the base of the foundation in the channel bottom to the top of the picket fence. The picket fence would be divided into six sections, each with a removable barrier panel that could be lifted out of the top of the structure by crane for operations and cleaning of aquatic vegetation and debris. The area upstream of the barrier and downstream of the Central Valley Flood Protection Board levee would be concrete lined to prevent scour.



SOURCE: Esri, 2018; CE and WRA, 2019; ESA, 2020 Turlock Irrigation District Harding Drain Fish Barrier Project

Figure 1. Map showing the layout and proposed barrier of the Harding Drain Fish Barrier Project

The picket fence was designed to comply with the Specific Criteria and Guidelines for Picket Fences outlines in the Anadromous Salmonid Passage Facility Design (NMFS 2011) as described below:

Openings (Section 5.3.2.1) - The clear opening between pickets and between pickets and abutments would be equal to one inch.

Average Design River Velocity (**Section 5.3.2.2)** - The average design river velocity through pickets should be less than 1.0 foot per second (ft/s) for all design flows, with maximum velocity less than 1.25 ft/s, or half the velocity of adjacent passage route flows, whichever is lower. Based on calculations derived from Harding Drain flow data for the last 5 years (2014 – 2019) it was determined that if the fish barrier was in place, the velocity through the pickets would not have exceeded 0.81 ft/s, which is well below the required criteria.

Head Differential (**Section 5.3.2.3)** - The facility would be regularly cleaned to prevent the head differential from exceeding 0.3 feet over the clean picket condition.

Debris and Sediment (**Section 5.3.2.4)** - TID intends to monitor the site on a weekly basis while the barriers are in place to ensure that no constrictions are occurring that would violate the NMFS flow requirements outlined in Sections 5.3.2.2 and 5.3.2.3. The weekly monitor will allow them to adapt to the range of conditions that may arise with the new fish barrier. TID is obtaining a permit from CDFW as part of the 1600 process to clean the screens and remove sediment and debris build-up on an as-needed basis.

Orientation of Picket Barrier (**Section 5.3.2.5)** - Picket barriers would be designed to lead fish to stay in the San Joaquin migratory corridor.

Picket Freeboard (Section 5.3.2.6) - The minimum picket extension above the water surface at high fish passage design flow would be 2 feet.

Submerged Depth (**Section 5.3.2.7)** - The minimum submerged depth at the picket barrier at low design discharge should be two feet for at least 10% of the river cross section at the barrier. However, the fish barrier would be across a drain channel outlet to the San Joaquin River. When river levels are low, the drain outlet would often be unsubmerged and thus the depth would be a function solely of the tail water discharging from the drain. TID cannot guarantee that these tail water flows will create a minimum submerged depth of 2 feet at the screen.

Picket Porosity (**Section 5.3.2.8)** - Based on the 5-year flow data described above, the anticipated picket porosity is 47%, which meets the minimum requirement of 40% open area.

Picket Construction Material (**Section 5.3.2.9)** - The pickets would be made of galvanized structural steel tubing with sufficient strength to handle head losses across the barriers within the operational limits set by NMFS.

Picket Sill (Section 5.3.2.10)- The pickets would sit on the concrete foundation of the fish barrier structure, which would be embedded 3 feet into the ground and have the upstream area concrete lined and the downstream area stabilized with rip rap. TID will ensure that the picket fence panels seat fully in their slots when they are installed.

1.3.2. Construction

Construction of the Proposed Action is anticipated to require four weeks. The sequential major construction activities associated with the construction of the Proposed Action are as follows:

- Mobilize construction equipment and materials
- Clear and grub the site
- Construct cofferdam
- Excavate for the fish barrier foundation
- Install the fish barrier foundation
- Install fish barrier walls, gates, walkways, and screen panels

To install a fish barrier base at the project site, a cast-in-place or precast reinforced-concrete footing would be placed below grade. The footing would extend above grade to provide a foundation for the wall. The wall itself would be made of precast concrete blocks or cast-in-place concrete, with vertical steel columns anchored to the footing to support a series of steel picket fence panels. Equipment required for construction of the fish barrier bases may include an excavator to dig trenches, a small bulldozer to level the ground surface, a flatbed truck to provide material to erect forms, concrete delivery trucks, and a concrete pumping truck. Alternately, should soil conditions allow, an excavator would dig the trenches and a precast foundation would be purchased and delivered to the site on a flatbed truck and placed using a crane.

The fish barrier for Harding Drain would consist of vertical precast-concrete block walls or cast-in-place concrete walls, flanking an opening with galvanized steel I-beams supporting galvanized steel picket fence panels. The fence panels would be inserted between the steel columns so that they would extend between the column webs and rest against the flanges of the I-beams. The steel columns would be bolted to the foundation at the base using precast, high strength anchor bolts. With this arrangement, the steel picket fence panels could be lifted out through the top of the assembly for cleaning. Constructing this portion of the project would require a crane for lifting concrete blocks and steel components into place and a flatbed truck for delivery of components.

During construction of the permanent vehicle access path, a small bulldozer and dump trucks would deliver any required imported soil to widen the existing paths on the abutments. The area of the cove upstream of the fish barrier would be regraded and a wire mesh, reinforced concrete lining would be installed up to the level of the adjacent embankments. Construction of this lining would require a small bulldozer and an excavator for regrading activities, a concrete pumper truck, and a roller screed for lining placement.

In addition, rock riprap would be placed on the downstream side of the fish barrier foundation to mitigate scour. Twelve-inch angular rock rip rap would be placed at least 18 inches in thickness in the disturbed areas 3 feet downstream and of the new fish barrier (100 feet wide) and on the adjacent disturbed embankment slopes. Gravel and/or soil would be used to fill voids in rip-rap that may otherwise provide structure for nonnative predatory fish.

The area of temporary loss for shaded riverine aquatic (SRA) habitat would be 0.09 acres for Harding Drain. The project proponent would replace trees on-site at a 1:1 ratio to compensate for loss of SRA habitat. A minimum of three red willows and one Fremont cottonwood would be planted at Harding Drain to compensate for the removal of trees during construction.

1.3.3. Dewatering

To facilitate isolation of the project site from the San Joaquin River and to facilitate dewatering for construction, a temporary cofferdam would be constructed on the river side of the levee and the levee slide gate shut off valves would be closed to prevent upstream drainage from entering the construction area. Dewatering would be accomplished with drainage pumps moving any residual or seepage water from the construction area to adjacent ground on the landside of the levee to the adjacent agricultural fields. Water would soak into the agricultural field or would evaporate. Water would not drain back into Harding Drain or the river. Construction of the temporary cofferdams may include the use of an excavator to create temporary berms using imported soil or if water levels allow (at 6 feet or below), an AquaDam may be used.

The earthen coffer dam would be approximately 100 feet long by 12 feet wide at the top, which would require approximately 480 yards of material. Prior to installation, sediment/turbidity curtains would be deployed to protect water quality on the San Joaquin River side of the work activities. Fill material used onsite will be clean native soil, free from any organic material or rocks larger than 3-inches in diameter compacted to 90 percent relative compaction in no greater than 12 inch lifts.

If the AquaDam is used, it would be filled with onsite water using portable pumps with intakes equipped with a 1.75-millimeter mesh screen. The dam would be positioned at the top of the bank and unrolled into the water. The dam would then be connected to pumps that would fill the inner chambers with water. The dam would conform to the bottom of the drain preventing water seepage. Dam removal would occur in reverse and water would be pumped out of the dam. If feasible, water would be pumped to the landside of the levee in the same manner as the nuisance water as described in the dewatering section above. However, due to the large amount of water being stored in the AquaDam, pumping to land may be infeasible and water may be required to be pumped back into the drain. If so, turbidity would be monitored per the conservation measures and the sediment/turbidity curtain would remain in place to prevent turbid water from reaching the River.

1.3.4. Operations and Maintenance

A boom truck would remove or insert the picket fence panels from the Harding Drain fish barrier at the following times:

- During high river levels that require the levee shutoff gates to be closed or opened,
- During required cleaning events,
- At the beginning and past the end of the Central Valley Fall-Run Chinook Salmon adult migration and spawning season (September 1 through February 28).

The levee shutoff gates would be closed when the elevation of the San Joaquin River is high enough (approximately 8.5 feet above the crown of the Harding Drain Culverts) to cause river water to flow into the Harding Drain. Closing the gates reroutes the water flowing down the Harding Drain away from the San Joaquin River north to Gomes Lake, where the water is then pumped through the levee into the river until river levels recede. The operations crew would pull the fish barrier panels when it closes the shutoff gates, and would reinstall the panels when it

reopens the gates. This operation is intended to prevent fish from becoming stranded between the culverts and the fish barrier when water levels recede.

Ongoing monitoring for the Harding Drain fish barrier would be conducted quarterly to monthly. During the adult migration and spawning season, the fish barrier would be monitored on a weekly basis to monitor for debris and sediment removal to maintain functionality in compliance with the Specific Criteria and Guidelines for Picket Structures (NMFS 2011 Section 5.3.2). The current plans for cleaning at the Harding Drain involve using an excavator staged on the drain embankment reaching into the concrete lined area upstream of the fish barrier and scooping out built up debris on top of the concrete lining. If the panels need to be cleaned, the excavator can lift them out individually for hand cleaning on the drain embankment before replacing them in their slots. Debris removed from upstream of the barrier will be placed in a trash truck and hauled to an appropriate disposal facility. Given the size of the barrier, cleaning would likely be required one or two times per year and would be done when the barriers are removed in March and reinstalled at the end of August. Sediment and debris removal will occur on an as needed basis.

1.3.5. Conservation Measures

The following are minimization measures have been incorporated into the proposed project:

1) Conduct Worker Awareness Training - Before implementing site-specific actions, the action agency will conduct an education program for all TID and contractor employees regarding the federally listed species that may be encountered in the project areas of the action, and required practices to avoid and protect those species. A NMFS-appointed representative will be identified to allow employees' and contractors' questions regarding avoidance and protection measures to be addressed in a timely manner.

2) Develop and Implement a Spill Prevention Plan - The construction contractor will prepare and implement a spill prevention plan for the project. The plan will describe measures to minimize the risk that fluids or other materials (e.g., oils, transmission and hydraulic fluids, cement, fuel) will enter the San Joaquin River or contaminate adjacent riparian areas. The contractor will also develop a cleanup protocol before construction begins and will implement the protocol in case of a spill.

3) Develop and Implement a Hazardous-Materials Management and Spill Response Plan -

   TID will ensure that any hazardous materials are stored in the staging areas. An impermeable membrane will separate the materials from the ground, and the hazardous materials will be contained to prevent the discharge of pollutants to groundwater and runoff water. In case of a leak or spill of fuel or hazardous waste, TID will:

   a. Stop work immediately.

   b. In compliance with state and federal laws and regulations, arrange for repair and cleanup of the leak or spill by qualified individuals at the time of occurrence, or as soon as it is safe to do so, according to the spill response plan.

c. Notify regulatory agencies of the leak or spill within 24 hours.

TID will properly contain and dispose of any unused or leftover hazardous products off-site. Hazardous materials, such as vehicle fuels and lubricants, will be used and stored in designated staging areas away from stream channels and wetlands, according to applicable local, state, and federal regulations. Construction vehicles and equipment will be checked daily for leaks and will be maintained properly to prevent contamination of soil or water from external grease and oil or from leaking hydraulic fluid, fuel, oil, and grease.

4) Manage Sedimentation and Turbidity - Turbidity curtains will be installed or similar methods will be used during in-channel work to control silt and sediments, where needed.

5) Conduct Biological Monitoring - A qualified biological monitor will be present during vegetation clearing, grubbing, pruning, and trimming at each job site at the start of construction, midway through construction, and at the close of construction to monitor implementation of conservation measures and water quality.

6) Revegetation - Disturbed habitats will be revegetated with native seeds and plants reflective of the target plant community where feasible following construction.

7) To minimize risk of stranding adult CV spring-Run Chinook salmon, CV fall/late fall-run Chinook salmon, and CCV steelhead into the TID canal system or within the fish barrier infrastructure, TID or its contractor will develop and implement a fish monitoring plan. The plan will include the following steps:

- a. The TID canal system and the area immediately upstream of each fish barrier structure will be visually monitored for presence of stranded adult salmonids on a bi-weekly basis throughout the year, and during high-flow events that may increase the risk of stranding.

- b. If any stranded salmonids are observed, the NMFS and CDFW Sacramento Offices will be immediately contacted. The purpose of the contact is to allow the agencies to review the activities resulting in fish stranding and to determine if additional protective measures are required.

- c. If stranded salmonids are found alive, TID staff will work with CDFW to identify a rescue strategy. If CDFW determines that a fish rescue is necessary, CDFW will work with TID staff to plan and implement a rescue of stranded fish from the TID canal system back into the San Joaquin River. If fish become entrained into the system, TID will reevaluate their operations and fish barrier design.

8) In-channel construction activities that could affect designated critical habitat for anadromous salmonids will be limited to the low-flow period to minimize the potential for adverse effects on federally listed anadromous salmonids during their emigration period. In-water work would occur June 15 – September 15 in critical, dry, or below

normal water year types, and July 1 – September 15 in above normal or wet water year types.

9) To reduce the potential for fish stranding or minimize the potential for harm during cofferdam dewatering activities, TID or its contractor will develop and implement a fish capture/relocation plan. The plan will include the following steps:
   - a. Before closure of the cofferdam, a qualified fisheries biologist will conduct seining within the cofferdam using a small-mesh seine to direct and move fish out of the cofferdam area. Upon completion of seining, the entrance to the cofferdam will be blocked with a net to prevent fish from entering the cofferdam isolation area before the cofferdam is completed.

   - b. Once the cofferdam is completed and the area within the cofferdam is closed and isolated, additional seining will be conducted within the cofferdam to remove any remaining fish, if present.

   - c. Once all noticeable fish have been removed from the isolated area, portable pumps with intakes equipped with a 1.75-millimeter mesh screen will be used to dewater to a depth of 1.5 to 2 feet.

   - d. A qualified biologist will implement further fish capture/relocation operations using electrofishing and dip nets. All fish captured will be placed in clean 5-gallon buckets and/or coolers filled with San Joaquin River water, and immediately transported downstream of the construction area, and released back into suitable habitat in the San Joaquin River with minimal handling.

   e. After all fish have been removed using multiple seine passes (as necessary), portable pumps with screens (see above) will be used for final dewatering. NMFS, USFWS, and CDFW will be notified at least 48 hours before the fish relocation.

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 designation of critical habitat for the CCV steelhead DPS uses 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 44976, 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.

In the proposed action description above, two options were identified for dewatering the work site, an earthen dam, or an AquaDam. For the purposes of the consultation it is being assumed that the water level will not be low enough for the AquaDam to be used. The analysis of the effects will include the use of the earthen coffer dam described above with the understanding that if the AquaDam is used it would result in less detrimental effects, and would not change the analysis.

2.2. Rangewide Status of the Species and Critical Habitat

This biological 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' current "reproduction, numbers, or distribution" as described in 50 CFR 402.02. The biological opinion also examines the condition of critical habitat throughout the designated area, evaluates the value of the various watersheds and coastal and marine environments that make up the designated area, and discusses the current function of the essential PBFs that help to form that value for the conservation of the listed species.

Detailed CCV steelhead DPS and critical habitat information:
http://www.westcoast.fisheries.noaa.gov/protected_species/salmon_steelhead/salmon_and_steelhead_listings/steelhead/california_central_valley/california_central_valley_steelhead.html

Detailed CV spring-run Chinook salmon ESU and critical habitat information:
http://www.westcoast.fisheries.noaa.gov/protected_species/salmon_steelhead/salmon_and_steelhead_listings/chinook/central_valley_spring_run/central_valley_spring_run_chinook.html

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

Species	Listing Classification and Federal Register Notice	Status Summary
Central Valley 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 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 2018).
California Central Valley 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 becoming endangered. 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.

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

Critical Habitat	Designation Date and Federal Register Notice	Description
California Central Valley steelhead DPS	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.

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).

For 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). 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 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. This is because 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).

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 Harding Drain project site is located adjacent to the intersection of South Carpenter Road and West Harding Road in Stanislaus County; it includes portions of the San Joaquin River, the

Harding Drain, and a levee. This site is in Sections 25 and 36 of Township 5 South, Range 8 East of the Crows Landing, California, U.S. Geological Survey 7.5-minute series quadrangle. The approximate centroid of the Harding Drain project site is 37º 23′ 52.39″ North, 120º 58′ 20.49″ West.

The Harding Drain Culverts pass through the levee to the east side of the San Joaquin River. The culverts discharge into a 100-foot-long cove off the main channel of the San Joaquin River. The action area encompasses the project footprint, including those associated with placement and construction of project features, as well as the areas required for access, and the operation, storage, and staging of equipment and materials. The action area also includes the water that flows into the San Joaquin River approximately 120 feet downstream and represents the extent of the area of anticipated impacts from the proposed project activities, including turbidity and sedimentation increases and possible water contaminates.

CV spring-run Chinook salmon and CCV steelhead have the potential to occur in the action area during the proposed action's period of construction and long-term operations. Designated critical habitat occurs in the action area for CCV steelhead. CV spring-run Chinook salmon critical habitat does not occur in the action area and will not be discussed further in this biological opinion because it will not be affected by the action.

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).

2.4.1. Occurrence of Listed Species and Critical Habitat in the Action Area

The federally listed anadromous species that use and occupy the action area are migrating adult and juvenile CCV steelhead and CV spring-run Chinook salmon, and the action area is within designated critical habitat for CCV steelhead. The portion of the San Joaquin River mainstem in the action area is the primary migration corridor for both adult and juvenile CV spring-run Chinook salmon and CCV steelhead life stages spawned in the San Joaquin River Basin to the Delta, which contains important rearing habitat for juveniles. The life history strategies of steelhead are extremely variable between individuals, and it is important to take into account that CCV steelhead are iteroparous (i.e., can spawn more than once in their lifetime) (Busby et al. 1996), and therefore may be expected to emigrate back down the system after spawning. All anadromous fish that utilize the San Joaquin River Basin must also pass by this location at least twice to successfully complete their life histories.

2.4.1.1. CCV steelhead migration timing

Adult CCV steelhead enter freshwater in August (Moyle, 2002) and peak migration of adults moving upriver occurs in August through September (Hallock et al. 1957). Adult CCV steelhead will hold until flows are high enough in the tributaries to migrate upstream where they will spawn from December to April (Hallock et al. 1961). After spawning, most surviving steelhead kelts migrate back to the ocean. Migrating adult CCV steelhead through the San Joaquin River are present from July to March, with highest abundance between December and January (Table 1). Small, remnant populations of CCV steelhead are known to occur in the Stanislaus River and the Tuolumne River and their presence is assumed on the Merced River due to proximity, similar habitats, historical presence, and otolith chemistry studies verifying at least one steelhead in the limited samples collected from the river (Zimmerman et al. 2008). Out-migrating juveniles from these tributaries would have to pass through the action area during their emigration to the ocean. Juveniles would emigrate from February through June, with the core of their migration occurring March through May.

2.4.1.1.1 CCV steelhead critical habitat

The PBFs for CCV steelhead critical habitat in the action area include freshwater migration corridors and rearing habitat. The freshwater migration utility in the action area is of fair quality, since flows of the lower San Joaquin River are typically of adequate magnitude, quality, and temperatures to support adult and juvenile migration. Most importantly, this section of CCV steelhead critical habitat serves as a migration corridor for all of the adults and juveniles produced and supported by the San Joaquin River and its major tributaries.

However, during the summer months, migration and rearing habitat is of poor quality due to unsuitable water temperatures and low flows. In addition, rearing habitat is poor as the San Joaquin River is leveed and channelized. The floodplain habitat that would otherwise normally exist has been largely removed near the action area due to the high levees, which limits the value of the area for juvenile rearing. Migratory habitat for adults and juveniles would likely not be impacted because the project footprint is off of the main channel and would not become an obstacle to migration functionality.

Even though the habitat has been substantially altered and its quality diminished through years of human actions, its value remains high for the conservation of CCV steelhead DPS. A large fraction of the CCV steelhead smolts originating in the San Joaquin River Basin will likely pass downstream through the action area within the San Joaquin River mainstem channel, particularly if there is a fish barrier at the Head of Old River (placed from April to May) to prevent smolt entrance into that route. Likewise, adults migrating upstream to spawn are likely to pass through the action area within the mainstem of the San Joaquin River to reach their upstream spawning areas in the San Joaquin River basin. Therefore, it is of critical importance to the long-term viability of the CCV steelhead to maintain a functional migratory corridor and freshwater rearing habitat through the action area to sustain the Southern Sierra Diversity Group, and provide the necessary spatial diversity needed to aid in recovery.

2.4.1.2. CV spring-run Chinook salmon

Typical CV spring-run Chinook salmon life history patterns involve adults returning to freshwater basins in March through June, depending on the water year. Capitalizing on springtime runoff, adults travel to holding pools, where available, to over-summer. Adults arrive in an immature state and hold over the summer months and develop gonads until ready to spawn in late summer through mid-autumn.

CV spring-run Chinook salmon are considered functionally extirpated from the Southern Sierra Nevada diversity group despite their historical abundance in the San Joaquin River Basin (NMFS 2016). There have been observations of low numbers of spring-time running fish returning to major San Joaquin River tributaries that exhibit some typical spring-run life history characteristics (Franks 2014). The reintroduction of the spring-run Chinook salmon into the San Joaquin River has begun and has resulted in approximately 200,000 juvenile spring-run Chinook salmon (SJRRP 2020). These juveniles should be imprinted to the upper San Joaquin River mainstem below Friant Dam, and are expected to return as adults when volitional passage is achieved and river conditions are suitable (NMFS 2016). In May 2019, a total of 114 adult CV spring-run Chinook salmon broodstock cultivated at the San Joaquin River Conservation and Research Facility were released by CDFW into Reach 1A of the San Joaquin River. While the exact amount of adult and juvenile CV spring-run Chinook salmon migrating through the action area is unknown, the population numbers mentioned above is a good indicator of their presence in the action area.

Based on known spring-run Chinook salmon life history timing and limited information of the San Joaquin River Basin use, as well as limited information available from SJRRP observations, returning adults are expected to travel through the action area from March through June. Juveniles are expected in the action area November through May as they emigrate through the action area to the Delta. Exact timing of CV spring-run Chinook salmon use of the action area would depend on in-river water being adequate in quality and temperature, and actual life history stage timelines are expected to differ slightly between the Sacramento River and San Joaquin River basins.

2.4.2. Factors Affecting Listed Species and Critical Habitat in the Action Area

The action area encompasses a small portion of the area utilized by ESA-listed species. Factors that impact listed species and critical habitat specific to the action area are discussed below.

2.4.2.1. San Joaquin River Basin water resources

The San Joaquin River is the longest river in California, covering 366 miles, but is considered California's second largest river according to average total annual flow (the Sacramento River being the largest). The San Joaquin River has an average mean flow of 6 million acre feet per year compared to the Sacramento River's 18 million acre feet (Reclamation, 2016). It drains the central and southern portions of the Central Valley and joins the Sacramento River near the center of California to form the Delta, the largest estuary on the west coast of the United States. The San Joaquin River is primarily fed (receiving two thirds of its water) by the melting snowpack of the Sierra Nevada Mountains.

The primary storage reservoir on the San Joaquin River is the Friant Dam, which was completed in 1944. Friant Dam created Millerton Lake/Reservoir and can hold more than 500 thousand acre feet in water storage. Friant Dam diverts Sierra Nevada snowmelt water into two canals, the Friant-Kern Canal and the Madera Canal, both of which primarily support the irrigation needs of agriculture as part of the Central Valley Project (CVP). Except for releases to manage floods and to meet the requirements of riparian water rights holders, the entirety of San Joaquin River's flow is impounded by the Friant Dam and directed into the canals for distribution. The existing Coordinated Long-term Operation of the CVP and SWP, and their effects on ESA-listed species and their critical habitats under NMFS jurisdiction are analyzed in the 2019 NMFS CVP Operations Biological Opinion. In the past, in a typical year, all of the San Joaquin River's flows were allocated to water users. Historically, the river ran dry annually for a 40-mile stretch, only connecting to the Delta during flood releases from Millerton. In recent years, mandated river restoration flows have reconnected the San Joaquin River to the Delta (see section 2.4.2.3, *The San Joaquin River Restoration Program*).

2.4.2.2. San Joaquin River diversions

The Patterson Irrigation District (PID) Fish Screen Intake is located near the City of Patterson, in Stanislaus County, California. The project is located upstream of West Stanislaus Irrigation District (WSID) project, on the west bank of the San Joaquin River, between Merced and Tuolumne rivers. The diversion consists of seven pumps, six vertical turbine pumps and one horizontal centrifugal pump, with a combined pumping capacity of 195 cubic-feet-per-second (cfs). PID's original pump station facility used an unscreened intake that had the ability to entrain listed anadromous fish as they migrated through the area. The existing pump station facility could not be retrofitted with a fish screen that would comply with NMFS and the California Department of Fish and Wildlife's (CDFW) fish screen criteria. As a result, PID constructed a new 195 cfs pump station diversion with a screen with reinforced concrete that is 144 feet long supported on 422 steel piles. The fish screen includes ten stainless steel, high profile bars.

Banta Carbona Irrigation District (BCID) Fish Screen and Fish Bypass System is located near the City of Tracy and is downstream from the San Joaquin River and Stanislaus River confluence. The diversion has a 250 cfs capacity. The fish screen facility consists of a V-shaped screen located within the leveed canal close to the river and 18 panel screens installed vertically in a V configuration with 9 panels to a side. Each panel is 6 feet 1-inch tall and 11-feet 6-inches wide. Fish pass the screens and are pumped through a Hidrostal fish pump to the fish return pipeline on the north levee. This pipeline returns fish back to the river downstream from the diversion point. The positive barrier fish screen is fully consistent with the fish screen criteria of the regulatory agencies including NMFS, CDFW, and the USFWS.

2.4.2.3. The San Joaquin River Restoration Program

The SJRRP is the result of a settlement that was reached in 2006 on an 18-year lawsuit between federal agencies, the Natural Resources Defense Council, and the Friant Water Users Authority (SJRRP, 2009). The settlement is based on two goals: 1) Restore and maintain fish populations in "good condition" in the mainstem of the San Joaquin River below Friant Dam to the confluence of the Merced River, including naturally-reproducing and self-sustaining populations of salmon and other fish; and 2) Reduce and avoid adverse water supply impacts to all Friant Division long-term contractors caused by the interim and restoration flows provided for in the settlement.

As previously identified, some key recovery actions identified in the NMFS Final Recovery Plan for the Evolutionarily Significant Units of Sacramento River Winter-Run Chinook Salmon and Central Valley Spring-Run Chinook Salmon and the Distinct Population Segment of California Central Valley Steelhead (NMFS Salmonid Recovery Plan, NMFS 2014), are achieved through the implementation of the settlement goals. Though this settlement and the SJRRP actions are restricted to the restoration area, which is the San Joaquin River mainstem from Friant Dam to the Merced River, the achievement of volitional fish passage from the Delta to the base of Friant Dam would increase the use of the San Joaquin River mainstem within the action area of this project by both adult and juvenile salmonid migration.

2.4.3. NMFS Salmonid Recovery Plan – Recovery Criteria and Actions

The NMFS Salmonid Recovery Plan (NMFS 2014) identifies recovery criteria and actions for the San Joaquin River Basin populations for both CCV steelhead and CV spring-run Chinook salmon. For the Southern Sierra Nevada Diversity Group, recovery criteria includes two populations for each species. Recovery actions included in the action area, focus on addressing several key stressors that are vital to both CCV steelhead and CV spring-run Chinook salmon: (1) elevated water temperatures affecting adult migration and holding; (2) low flows and poor fish passage facilities, affecting attraction and migratory cues of migrating adults; and (3) possible catastrophic events (e.g., fire or volcanic activity).

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).

2.5.1. Construction Impacts

During the construction of the barrier there is a possibility for adult CV spring-run Chinook salmon and adult CCV steelhead to be present. Since it is the same life stage of these species that could be present and they are expected to respond to these impacts in the same manner they have been analyzed together below.

2.5.1.1. Water Quality: Sediment and Turbidity

Construction activities are likely to result in increases in turbidity, suspended sediment concentrations, and contaminant concentrations. Construction activities are expected to disturb sediments and soils within Harding Drain and flow into the San Joaquin River. Increased turbidity and sedimentation have the potential to adversely affect CV spring-run Chinook salmon and CCV steelhead in several ways, including reduced visibility of prey or forage items, respiratory stress, changes in temperature regimes, and in severe cases, damage to gills or other organs. During implementation of a proposed project, sediments may enter water bodies or become suspended in the water column through soil or substrate disturbances resulting from the use of heavy equipment, particularly during in-water work activities, such as the installation of the temporary cofferdam and dewatering. This may include the deposition of construction-generated dust onto nearby waters and vegetation, and increased erosion and sedimentation during storm runoff resulting from terrestrial or riparian vegetation removal. These sediments may appear as localized increases in turbidity due to resuspension of fine sediments and may potentially result in burial of existing substrates when suspended sediments settle. Turbidity increases may also occur when water reenters the dewatered area after the removal of work area isolation structures (e.g., cofferdam).

Increases in turbidity and sedimentation are likely to lead to under use of stream habitats, displacement from or avoidance of preferred rearing areas, which may increase losses to competition, disease, predation, or, for juvenile fish, reduce the ability to obtain food necessary for growth and maintenance (Moberg 2000; Newcombe and Jensen 1996; Sprague and Drury 1969). However, the avoidance and minimization measures required of the project make it likely that fish would only vacate preferred areas temporarily and return quickly with negligible consequences to their fitness.

The use of the general construction avoidance and minimization measures described in Section 1.3.5 such as silt fences, sediment curtains, and the dewatering of work area would reduce the severity and duration of suspended sediment generated, and any remaining suspended sediment would resettle following the cessation of activities. In turn, these avoidance and minimization measures are expected to greatly reduce potential adverse effects to listed species, their prey, and their habitats downstream of the activity. The project's in-water work activities would occur during the periods of mid-June to mid-September. These periods coincide when CCV steelhead are least likely to be present in the action area. Adult CCV steelhead may commence their

upstream migration as early as October and juveniles would not likely be migrating downstream during this time. There is likely to be little exposure to any CV spring-run adults or juveniles based on the expected timing of their life histories.

Actions that result in sediment and turbidity impacts taking place during the in-water work window are expected to have minimal effects on listed salmonids due to both the avoidance and minimization measures employed to reduce turbidly and the ability of the fish to temporarily leave the affected area to adjacent suitable habitat.

2.5.1.2. Water Quality: Contaminants

During construction, the potential exists for spills or leakage of toxic substances to enter the waterways. Refueling, operation, and storage of construction equipment and materials could result in accidental spills of pollutants (e.g., fuels, lubricants, sealants, and oil). Adverse effects to listed fish may result from point and non-point source chemical contaminant discharges within the action area. These contaminants include, but are not limited to cement, oil, lubricants, and gasoline product discharges. These contaminants may adversely affect fish reproductive success and survival rates. Fish could also be exposed to legacy contaminants during sediment disturbing activities such as dredging, if the soils disturbed by the project have a contamination history, and hazardous product runoff from vehicles and equipment used during construction. Even low concentrations of contaminants found in typical construction sites can cause effects to fish. The severity of these effects depends on the contaminant, the concentration, duration of exposure, and sensitivity of the affected life stage.

Effects of accidentally spilled hazardous material could include mortality to CV spring-run Chinook salmon and CCV steelhead, the plants that provide habitat to these species, and their prey if a high concentration of hazardous material causes suffocation or poisoning. Spilled hazardous materials could also injure listed species or their prey species without directly causing mortality through food web interactions. Long-term effects of spilled hazardous materials could include lingering elevated contaminant levels in soils and streambeds that could leach out and continue injuring or reducing reproductive success of listed species or their prey. However, the proposed cofferdam would isolate the project area and other water quality measures such as a Stormwater Pollution Protection Plan, and the accidental spill prevention and containment plan would mean the risk of exposure of contaminants to listed salmonids is expected to be avoided.

2.5.1.3. Dewatering and Fish Relocation Activities

Adult CV spring-run Chinook salmon and CCV steelhead have the potential to become trapped behind the cofferdam during the dewatering activities, resulting in injury or death, and/or require handling for relocation, which may result in injury or death. Fish capture and relocation would be necessary during dewatering activities if listed fish are present and found in the enclosed area of the cofferdam. A qualified biologist would follow appropriate minimization measures, as described above in this biological opinion, to capture and relocate the fish. Each step during the capture/relocation process could also induce physiological stress even when a skilled fish biologist performs the relocation under optimal conditions.

The capture and relocation of salmonids associated with the dewatering activities is not expected to occur. The implementation of the in-water work window coincides during a time when listed salmonids are least likely present in the action area and impacts resulting from dewatering activities are expected to be extremely low. Additionally, the measures implemented to reduce the likelihood of entrapment (seining below the barrier) make it extremely unlikely that fish will remain in the area to be dewatered.

2.5.1.4. CCV Steelhead Critical Habitat Loss/Modification

Construction of the fish barrier would require the alteration, or loss, of SRA. The loss of SRA would result in the loss of foraging habitat and potentially refugia for listed fish from predators and high flows. The area of loss would be small (0.1 acres) and the conservation measures described in the project description, to replant at a 1:1 is expected to compensate for the temporary loss of listed fish habitat, after two to five years of growth. Though this area does function as migratory and rearing habitat PBF, it is of very low quality. This low quality will not be altered by the construction of the barrier. Therefore, impacts to this habitat and its support of listed fish would be minor.

2.5.2. Operations and Maintenance

2.5.2.1. Operations

The new fish barrier will remain in place from August 1 through February 28, of each year, to achieve its intended purpose of restricting access to the drain by fall-run Chinook salmon. This is the period when TID has previously observed fish entrained in the canals. The barrier will be removed from March 1 through July 31, and has potential to entrain CV spring-run Chinook salmon and CCV Steelhead. Although the TID has never encountered an adult CCV steelhead or CV spring-run Chinook salmon inside the canal system, there is still the likelihood of this occurring as a result of the overlap of adult spring-run Chinook salmon migration period (March through June) and juvenile CCV Steelhead downstream migration (March through May). Entrainment would require capture and relocation to ensure their survival and reproductive success. Any physical handling is known to be stressful to fish, as described by Sharpe et al. with the following (1998). The primary contributing factors to stress and death from handling are excessive doses of anesthetic, differences in water temperatures (between the river and wherever the fish are held in buckets/live boxes), dissolved oxygen conditions, the amount of time that fish are held out of the water, and physical trauma. Stress on salmonids increases rapidly from handling if the water temperature exceeds 18º Celsius or dissolved oxygen is below saturation. Fish that are transferred to holding tanks can experience trauma if care is not taken in the transfer process, and fish can experience stress and injury from overcrowding in traps if the traps are not emptied regularly. Decreased survival of fish can result when stress levels are high because stress can be immediately debilitating and may also increase the potential for vulnerability to subsequent challenges (Sharpe et al. 1998). Without rescue, the fish would likely perish in the drain. Because part of the operations schedule is to monitor whether fish enter the drain while the fish screen is out (March 1 – July 31), it is likely CV spring-run Chinook salmon adults would be observed and CDFW/NMFS contacted for further instructions. Thus, a small number of fish is expected to be entrained each year.

Adult CCV steelhead migration occurs mostly between October through February, and thus would be protected from entering the drain given the proposed operations schedule. However, during high flood events in the Harding Drain (above 60 cfs), the District may need to open the gates anytime from August to February. This could increase the risk for CCV steelhead to become entrained. Based on historic daily averages for the last 5 years, this scenario only occurred 1.2 percent of the time. Because of the rarity of large flows scenarios that would attract steelhead during their migration timing while the barrier gates are open, the installation of the fish barrier is expected to provide some benefit to the CCV steelhead DPS, compared to current conditions without a fish screen, as the pathway to the drain is open and steelhead are at risk to being entrained. Therefore, adverse effects to CCV steelhead from the operations of the fish screen are expected to occur 1.2 percent of the year when the gates are in.

Operation of the Harding Drain fish barrier would generally prohibit stranding of any adult fall/late fall–run Chinook salmon in the Harding Drain, with all the picket fence panels remaining in place during the spawning season, August 1 through February 28. Although the picket fence panels may be removed temporarily for cleaning, those events would be infrequent (one or two times per year) and would occur primarily outside of the fall/late fall–run Chinook salmon spawning season. The picket fence panels may also be removed during high river levels; however, this would occur only when the levee shutoff gates are closed, preventing any fish from entering the Harding Drain.

Operations of the Harding Drain fish barrier may lead to straying of adult spring-run Chinook salmon and steelhead into the Harding Drain outside of the fall/late fall–run Chinook salmon spawning season. Any migrating CV spring-run Chinook salmon or CCV steelhead adults in the San Joaquin River system when the picket fence panels are removed from March 1 through July 31, have the potential to stray into the TID canal system. Those that do become entrained would be found by the prescribed daily/weekly inspections and will be captured and returned to mainstem San Joaquin. As described above, the handling and relocation of fish causes a high amount of stress to the individuals and can possibly lead to mortality.

2.5.2.2. Maintenance

Ongoing monitoring for the Harding Drain fish barrier would be conducted quarterly to monthly. During the fall/late-fall run Chinook salmon adult migration and spawning season, the fish barrier would be monitored on a weekly basis to monitor for debris and sediment removal to maintain functionality in compliance with the Specific Criteria and Guidelines for Picket Structures (NMFS 2011 Section 5.3.2). Given the size of the barrier, required cleaning would be one or two times per year and would be done when the barriers are removed in March and reinstalled at the end of August. Maintenance of accumulated sediment will occur on an as needed basis. Accumulated sediment and other build up will be removed and hauled off site to an authorized disposal facility. Other requirements include periodic inspection of and repair of cracks or buckles in the upstream concrete-lined area and periodic vegetation abatement would be conducted to keep the area around the fish barrier clear.

The cleaning and removal of sediment from the barrier could result in increased turbidity. As stated above, increases in turbidity can likely lead to displacement from or avoidance of stream habitats. However, due to the infrequency of the cleaning and maintenance required, the timing

of the cleanings, and the ability of fish to leave the affected area, there is expected to be minimal effects on species due to increased turbidity.

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. Agricultural Practices

Agricultural practices in the action area may adversely affect riparian habitats through upland modifications of the watershed that lead to increased siltation, reductions in water flow, or agricultural runoff. 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 can flow into the receiving waters of the associated watersheds. Stormwater and irrigation discharges related to both agricultural and urban activities contain numerous pesticides and herbicides that may adversely affect listed salmonids reproductive success and survival rates if not properly treated before discharge (Dubrovsky et al. 1998, Daughton 2003).

2.6.2. Increased Urbanization

Increases in urbanization and housing developments can impact habitat by altering watershed characteristics, and changing both water use and stormwater runoff patterns. Increased growth would 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, would not require Federal permits, and thus would not undergo review through the ESA section 7 consultation process with NMFS.

Increased urbanization is also expected to result in increased recreational activities in the region. 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 would 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 in turn would reduce habitat quality for the invertebrate forage base required for the survival of juvenile salmonids 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.

2.6.3. Rock Revetment and Levee Repair Projects

Depending on the scope of the action, some non-federal riprap projects carried out by state or local agencies do not require federal permits. These types of actions, as well as illegal placement of riprap, are common occurrences within the watershed. The effects of such actions result in continued degradation, simplification, and fragmentation of riparian and freshwater habitat and is difficult to reverse on a large-scale.

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.

2.7.1. Status of the CCV Steelhead DPS and Designated Critical Habitat

The Status of Species and Critical Habitat sections show that past and present impacts to the San Joaquin River basin have caused significant salmonid habitat loss, fragmentation and degradation. This has significantly reduced the quality and quantity of freshwater rearing sites and the migratory corridors within the lower valley floor reaches of the San Joaquin River and the south Delta for these listed species. Additional loss of freshwater spawning sites, rearing sites, and migratory corridors have also occurred upstream of the south Delta in the upper main stem and tributaries of the San Joaquin River. The last status review (NMFS 2016) concluded that overall CCV steelhead should remain listed as threatened, as the DPS is likely to become endangered within the foreseeable future throughout all or a significant portion of its range. Further, there is still a general lack of data on the status of individual wild CCV steelhead populations. There are some encouraging signs, as several hatcheries in the Central Valley (such as Mokelumne River), have experienced increased returns of CCV steelhead over the last few years. There has also been a slight increase in the percentage of wild CCV steelhead in salvage at the south Delta fish facilities, and the percent of wild fish in those data remains much higher than at Chipps Island. Although there have been recent restoration efforts in the San Joaquin River tributaries, CCV steelhead populations in the San Joaquin River Basin continue to show an overall very low abundance, and fluctuating return rates. The NMFS Salmonid Recovery Plan (NMFS 2014) strategy for CCV steelhead lists the San Joaquin River's eastside tributaries below rim dams (Stanislaus, Tuolumne, and Merced rivers) as Core 2 populations, and as candidates to

reach viable population status if reintroduced upstream of the dams. It also lists the San Joaquin River, below Friant Dam, as a candidate to reach viable population status. Since the action area serves as a migratory corridor to these eastside tributaries, it has potential to affect the success of recovery within the Southern Sierra Nevada Diversity Group.

2.7.2. Status of the CV spring-run Chinook salmon

The CV spring-run Chinook salmon ESU is also listed as threatened under the ESA but is considered extirpated from the San Joaquin River basin (NMFS, 2016). The NMFS 2016 5-Year Status Review re-evaluated the status of CV spring-run Chinook salmon and concluded that the species should remain listed as threatened (NMFS 2016). The NMFS Salmonid Recovery Plan (NMFS 2014) indicated that for CV spring-run Chinook salmon, re-establishing two viable populations in the San Joaquin River Basin would be necessary for recovery, with one population currently being reintroduced.

2.7.3. Environmental Baseline and Cumulative Effects

Small remnant populations of CCV steelhead currently exist in the eastside tributaries of the San Joaquin River and use the action area as a migratory corridor. Migrating adult CCV steelhead are present from July to March through the San Joaquin River, with highest abundance between December and January. Based on known CV spring-run Chinook salmon life history timing and limited information of San Joaquin River Basin use, and limited information available from SJRRP observations, returning adults are expected to travel through the action area from March through June. For CCV steelhead and CV spring-run Chinook, the San Joaquin migratory corridor is essential for the recovery strategy (NMFS 2014), which provides for two viable populations for each species to be established in the San Joaquin River Basin.

Currently, the San Joaquin River, although degraded due to levees and lack of floodplain habitat, is still an important migratory corridor for the recovery of these species. Levee armoring and channelization, alteration of river flows and timing, reduction of riparian corridors and associated shaded riverine aquatic (SRA) vegetation and the introduction of point and non-point contaminants are the major issues affecting the San Joaquin.

The Cumulative Effects section of this opinion describes how continuing or future effects such as the discharge of point and non-point source chemical contaminant discharges and increased urbanization affect the species in the action area. These activities typically result in habitat fragmentation, and conversion of complex nearshore aquatic habitat to simplified habitats that incrementally reduces the carrying capacity of migratory corridors.

2.7.4. Summary of Project Effects on listed species and critical habitat

NMFS finds that the construction, operations, and maintenance of the fish barrier would result in minimal and adverse effects to the CCV steelhead and CV spring-run Chinook salmon migrating past the Harding Drain and San Joaquin River. The gates will be closed from August 1 to February 28 and will be open from March 1 through July 31. The exposure to entrainment to CV spring-run Chinook salmon adults would occur when the gates are open, which overlaps the adult upstream migration timing and entrainment of CCV Steelhead adults could occur when the gates are open during flooding.

The proposed project is expected to cause short-term impacts to critical habitat for CCV steelhead, such as increased turbidity during construction which is expected to affect migrating adults. There will be long-term operational impacts to critical habitat for CCV steelhead such as turbidity increases during maintenance and cleaning as well as the placement and removal of the barrier. Both short-term and long-term effects to rearing and migration PBFs are expected to be minimal due to the measures in place.

1) Construction-related Effects

   During construction, adverse effects are expected to occur to listed salmonids during dewatering and relocation activities, when fish are present. Construction would occur during the summer months, when the abundance of individuals is low and outside of the migrating adult and juvenile timing period. In addition, during construction activities, degraded water quality is expected to occur, including sediment and turbidity, but with the implementation of mitigation measures, impacts would be minimized to listed species.

2) Operations and Maintenance Effects

   Low numbers of adult CCV steelhead and CV spring-run Chinook salmon are expected to be entrained into Harding Drain as a result of the operations of the fish barrier. Though current population numbers are low, conservation and reintroduction efforts generate an ever increasing risk of exposure. Adult CCV steelhead returning to the ocean may be entrained while the barrier is in place (August 1 to February 28) but open during flood control purposes (approximately 8.5 feet above the crown of the Harding Drain Culverts). Adult CV spring-run Chinook salmon would be exposed to entrainment risk during their upstream migration (March to June) when fish barrier gates are open (March to July). Finally, juvenile CCV Steelhead may be entrained during their downstream migration (March to May) when the barrier is no longer in place.

2.7.5. Risk to ESU/DPS

The proposed project would have minimal impacts to the overall CCV steelhead DPS and CV spring-run Chinook salmon ESU.

Combining the minimal, adverse, and beneficial effects (closure of gates August through February) associated with the proposed action described above, environmental baseline, cumulative effects, and status of the species and critical habitat, the proposed project is not expected to reduce appreciably the likelihood of both the survival and recovery of the listed species in the wild by reducing their numbers, reproduction, or distribution; or appreciably diminish the value of designated critical habitat 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' opinion that the proposed action is not likely to jeopardize the continued existence of CCV steelhead and CV

spring-run Chinook salmon, or destroy or adversely modify designated critical habitat for CCV steelhead.

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 Incidental Take Statement (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 expects during the operations of the fish barrier, closures would occur between August 1 to February 28, except during flood events. Gates would remain open from March 1 to July 31. NMFS expects the following species and life stages to be present in small numbers during the periods when the gates are open:

1) Adult CCV steelhead

2) Adult CV spring-run Chinook salmon

The listed species identified above would be exposed to the operations of the fish barrier. NMFS expects incidental take would be in the form of harassment, injury, and mortality resulting from entrainment and/or handling of fish in the event that fish are captured/relocated from the canals. Because of the variability and uncertainty associated with the population sizes of the species, annual variation in the timing of migration, and variability regarding individual habitat use of the action area, the actual number of individuals that are expected to be incidentally taken per species is not known, though expected to be low during the operations of the fish barrier.

However, it is possible to estimate the extent of incidental take in terms of an ecological surrogate. Because unlisted fall-run Chinook salmon have been the only identified species entrained in the canals, they will be used as the ecological surrogate. In 2016, 36 adult fall-run Chinook salmon were rescued from the canals (Turlock Irrigation District, 2020). Since fall-run Chinook salmon are higher in abundance than CCV steelhead and CV spring-run Chinook salmon in the San Joaquin River Basin, and these listed species have not been observed being entrained in the District's canals, and because the exact source location of entrainment occurring is unknown between Nielson Drain and Harding Drain, we estimate the actual numbers of

individuals taken for each species would be much lower. We also expect a small proportion of those entrained and relocated will be injured or die, and adopt McMicheal *et al.* (1998), who estimates some injury or mortality of approximately 5 percent of relocated individuals, depending on conditions and the size of the fish affected. In addition, we expect that if listed fish are encountered in the canals at any time, then modifications to the design of the barrier and/or operations would occur. Incidental take would be considered exceeded if/when either 18 CV Spring-run Chinook or 18 CCV Steelhead are found over the course of one year entrained in the canals as this would exceed the surrogate amount of 36. If take is exceeded it would trigger the need to reinitiate consultation on the Project.

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 CCV Steelhead critical habitat.

2.9.3. 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).

1) Measures shall be taken by the Corps or TID, to minimize and reduce the number and duration of adverse effects to listed species and their critical habitat during construction and operation of the proposed project.

2) Measures shall be taken by the Corps, or TID, to prepare and provide NMFS with a plan and a report describing how listed species in the action area would be protected and/or monitored and to document the observed effects of the construction and operation on listed species.

2.9.4. Terms and Conditions

The terms and conditions described below are non-discretionary, and the Corps or TID must comply with them in order to implement the reasonable and prudent measures (50 CFR 402.14). The Corps or TID 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:

    a) Protrusions such as bolts, gate operators, and exclusion material that are in the flow path of the fish, or are in areas where fish may have the potential to be present, shall be rounded, ground smooth, or have end treatments to minimize the risk of lacerations and other injuries to fish.

b) A qualified fish biologist shall be present on site to make observations, and to capture/relocate entrained fish in the canals. Only fish biologists trained in salmonid capture and relocation shall remove and relocate fish during fish rescue activities.

c) ESA-listed fish shall be handled with extreme care and kept in cold water to the maximum extent possible during processing procedures. When fish are transferred or held, a healthy environment must be provided; e.g., the holding units must contain adequate amounts of well-circulated water. ESA-listed fish shall process first to minimize handling stress.

d) When the barrier is not in place (March 1 to July 31) the flow through Harding Drain shall be monitored to watch for flows high enough to be attractant flows for adult salmonids. Should flows reach high enough to be attractant flows, Harding Drain shall be visually inspected for entrained fish.

e) Upon request, any NMFS employee or representative shall be allowed to accompany field personnel while they conduct operations and monitoring activities.

f) Upon request any NMFS employee or representative shall be allowed to inspect any records or facilities related to the proposed operation and monitoring activities.

2) The following terms and conditions implement reasonable and prudent measure 2:

a) In addition to the monitoring plan as described in the conservation measures section of the project description, post-construction daily monitoring shall occur for the first year of operation and during the first high flow event, such as the one recorded during the spring of 2017. This monitoring shall determine the efficacy of this design at excluding adult salmon and steelhead from entering Harding Drain.

b) Daily inspections during the first year after installation shall occur to maintain operations consistent with fish exclusion requirements. After the first year of installation, daily inspections shall occur from March 1st to September 1st and weekly inspections shall occur from September 1st through February 28th. Monitoring includes but is not limited to:

i. Inspection reports shall be made for incidents where fall-run Chinook salmon, CV spring-run Chinook salmon, or CCV steelhead, are encountered in the Harding Drain canal or adjoining canals or when any adjustments or maintenance is done. The inspection reports shall include the date, time, temperature, weather conditions, debris observed in the Harding exclusion barrier, fish observed in the barrier or in the drains or canals upstream, and any maintenance, adjustments, or modification actions taken at the exclusion barrier.

Inspection reports shall be submitted to NMFS at the end of the CV spring-run Chinook salmon migration season. All reports for NMFS shall be sent (preferably by email) to:

Cathy Marcinkevage
Assistant Regional Administrator
California Central Valley Office
National Marine Fisheries Service
650 Capitol Mall, Suite 5-100
Sacramento California 95814
ccvo.consultationrequests@noaa.gov.
Phone: (916) 930-3600

ii. Notification shall occur within 24-hours of observation of CCV steelhead or CV spring-run Chinook salmon injured, trapped or killed around or behind the barrier.

c) Any modification details of the design prior to installation shall be submitted for review to the appropriate NMFS biologist and NMFS engineer prior to installation.

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 should continue supporting and promoting aquatic and riparian habitat restoration and fish passage projects within the San Joaquin River and other watersheds, especially those with listed aquatic species. Practices that avoid or minimize adverse effects to listed species should be encouraged.

2) The Corps 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 and fish passage projects.

In order for NMFS to be kept informed of actions minimizing or avoiding adverse effects or benefiting 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 Harding Drain 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 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 (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 geographic extent of salmon freshwater EFH is described as all water bodies currently or historically occupied by PFMC managed salmon within the USGS 4th field hydrologic units identified by the fishery management plan (PFMC, 2014). This designation includes the Lower San Joaquin River (HUC 18040002) for all runs of Chinook salmon that historically and currently use these watersheds (spring-run, fall-run, and late fall-run). The Pacific Coast salmon fishery management plan also identifies Habitat Areas of Particular Concern (HAPCs): complex channel and floodplain habitat, spawning habitat, thermal refugia, estuaries, and submerged aquatic vegetation, of which, the HAPC for complex channel and floodplain habitat is expected to be adversely affected by the proposed action. Because of the extensive urbanization that has occurred in the California Central Valley over the last 100 years, the San Joaquin River in the action area has been leveed and channelized and is currently degraded habitat for complex channel and floodplain HAPC.

3.2. Adverse Effects on Essential Fish Habitat

Effects to the HAPC for complex channel and floodplain habitat are discussed in the context of effects to critical habitat PBFs as designated under the ESA and described in section 2.5.2. A list of adverse effects to these EFH HAPCs is included in this EFH consultation, which are expected

to be similar to the impacts affecting critical habitat, including: sediment and turbidity, in-channel disturbance from placement of the fish barrier, and habitat loss/modification.

Sediment and turbidity

- Degraded water quality

In-channel disturbance from placement of the fish barrier

- Channel disturbance and excavation associated from placement of the fish barrier

Habitat loss/modification

- Permanent habitat loss due to placement of the fish barrier
- Reduced habitat complexity
- Reduced water quality due to construction activities
- Reduced potential for riparian and aquatic vegetation
- Reduced potential for complex channel from operations
- Reduced potential of migratory corridor from entrainment

3.3. Essential Fish Habitat Conservation Recommendations

To address the adverse effects mentioned above, the conservation measures as described in the project description serve to minimizing some impacts to EFH, and we also recommend following the measures described in the terms and conditions above.

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(l)).

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 Corps. Other interested users could include TID. Individual copies of this opinion were provided to the Corps. 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 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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