



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: WCR-2018-9285

June 25, 2018

Mr. William Guthrie
Chief, California Delta Section
Regulatory Division
US Army Corps of Engineers
1325 J Street
Sacramento, California 95814-2922

Re: Endangered Species Act Section 7(a)(2) Biological Opinion, and Magnuson-Stevens
Fishery Conservation and Management Act Essential Fish Habitat Response for the
Kasson District Erosion Repair Project

Dear Mr. Guthrie:

Thank you for your letter of January 25, 2018, 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 US Army Corps of Engineers (the Corps) proposed Kasson District Erosion Repair Project.

This biological opinion (BO) is based on the final Biological Assessment for the Kasson District (RD 2085) Erosion Repair Project prepared by Moore Biological, received by NMFS on January 25, 2018. Based on the best available scientific and commercial information, the BO concludes that the Project is not likely to jeopardize the continued existence of the Federally listed threatened California Central Valley steelhead Distinct Population Segment (DPS), (*Oncorhynchus mykiss*) or the Southern DPS of the North American green sturgeon Evolutionary Significant Unit (*Acipenser medirostris*) and is not likely to destroy or adversely modify their designated critical habitats. NMFS has included an incidental take statement with reasonable and prudent measures and non-discretionary terms and conditions that are necessary and appropriate to avoid, minimize, or monitor incidental take of listed species associated with the Project.

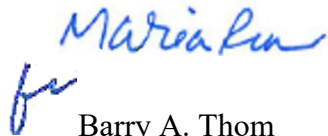
This letter also transmits NMFS's review of potential effects of the Proposed Action on essential fish habitat (EFH) for Pacific Coast Salmon, designated under the Magnuson-Stevens Fishery Conservation and Management Act (MSA). This review was pursuant to section 305(b) of the MSA, implementing regulations at 50 CFR 600.920, and agency guidance for use of the ESA consultation process to complete EFH consultation. The document concludes that the Project will adversely affect the EFH of Pacific Coast Salmon in the Action Area.



The Corps has a statutory requirement under section 305(b)(4)(B) of the MSA to submit a detailed written response to NMFS within 30 days of receipt of these conservation recommendations, and 10 days in advance of any action, that includes a description of measures adopted by the Corps for avoiding, minimizing, or mitigating the impact of the Project on EFH (50 CFR § 600.920(j)). If unable to complete a final response within 30 days, the Corps should provide an interim written response within 30 days before submitting its final response. In the case of a response that is inconsistent with our recommendations, the Corps must explain its reasons for not following the recommendations, including the scientific justification for any disagreements with NMFS over the anticipated effects of the Kasson District Erosion Repair Project and the measures needed to avoid, minimize, or mitigate (also referred to as compensate by NMFS) such effects.

Please contact LTJG Caroline Wilkinson at the California Central Valley Office of NMFS at (916) 930-3731 or via email at caroline.wilkinson@noaa.gov if you have any questions concerning this section 7 consultation, or if you require additional information.

Sincerely,



Barry A. Thom
Regional Administrator

Enclosure

cc: To the file 151422-WCR2017-SA00402
Mr. Ralph Timan, Reclamation District 2085, 451 Critchett Road, Tracy, CA 95304,
ralphtiman@hughes.net
Ms. Diane Moore, Moore Biological Consulting, moorebio@softcom.net



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

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

Kasson District (RD 2085) Erosion Repair Project

National Marine Fisheries Service (NMFS) Consultation Number: WCR-2018-9285

Action Agency: U.S Army Corps of Engineers

Affected Species and NMFS' Determinations:

ESA-Listed Species	Status	Is Action Likely to Adversely Affect Species or Critical Habitat?	Is Action Likely To Jeopardize the Species?	Is Action Likely To Destroy or Adversely Modify Critical Habitat?
California CCV steelhead DPS (<i>O. mykiss</i>)	Threatened	Yes	No	No
Southern DPS of North American green sturgeon (<i>Acipenser medirostris</i>)	Threatened	Yes	No	No

Fishery Management Plan That Describes 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:

Maria Lu
for
 Barry A. Thom
 Regional Administrator

Date: June 25, 2018



TABLE OF CONTENTS

1	Introduction	4
1.1	Background.....	4
1.2	Consultation History.....	4
1.3	Proposed Action.....	4
1.4	Action Area.....	6
2	ENDANGERED SPECIES ACT:.....	7
2.1	Analytical Approach.....	7
2.1.1	Conservation Banking in the Context of the ESA Environmental Baseline.....	8
2.2	Rangewide Status of the Species and Critical Habitat.....	9
2.2.1	Global Climate Change.....	11
2.3	Environmental Baseline.....	11
2.3.1	Mitigation Banks and the Environmental Baseline	12
2.3.2	Status of CCV Steelhead in the Action Area.....	13
2.3.3	Status of Southern DPS of North American Green Sturgeon in Action Area	14
2.3.4	Status of Critical Habitat in Action Area.....	15
2.3.5	Factors Affecting the Species and Habitat in the Area.....	16
2.4	Effects of the Action.....	17
2.4.1	Assessment.....	17
2.5	Cumulative Effects.....	22
2.6	Integration and Synthesis.....	23
2.7	Conclusion	26
2.8	Incidental Take Statement.....	27
2.8.1	Amount or Extent of Take	27
2.8.2	Effect of the Take.....	28
2.8.3	Reasonable and Prudent Measures.....	28
2.8.4	Terms and Conditions.....	28
2.9	Reinitiation of Consultation.....	30
3	MAGNUSON-STEVENSON FISHERY CONSERVATION AND MANAGEMENT ACT ESSENTIAL FISH HABITAT CONSULTATION ...	31
3.1	Essential Fish Habitat Affected by the Project	31
3.2	Adverse Effects on Essential Fish Habitat.....	31
3.3	Supplemental Consultation	32
4	DATA QUALITY ACT DOCUMENTATION AND PRE-DISSEMINATION REVIEW	32
4.1	Utility	32
4.2	Integrity.....	32
4.3	Objectivity.....	33
5	REFERENCES.....	33

List of Acronyms

ACID- Anderson Cottonwood Irrigation District
BO-Biological Opinion
CCV- California Central Valley
CCVO-California Central Valley Office
CDEC-California Data Exchange Center
CFR-Code of Federal Regulations
CHART-Critical Habitat Analytical Review Team
CORPS-United States Army Corps of Engineers
CVP – Central Valley Project
DO-Dissolved Oxygen
DFG-Department of Fish and Game
DPS-Distinct Population Segment
EFH-Essential Fish Habitat
ESA-Endangered Species Act
ESU-Evolutionary Significant Unit
ITS-Incidental Take Statement
IWM-Instream Woody Material
MSA-Magnuson-Stevens Fisheries Conservation and Management Act
NIS-Non-native Invasive Species
NMFS-National Marine Fisheries Service
NPS- Non Point source
OHWM-Ordinary High Water Mark
PBF- Physical and Biological Features
PCE-Primary Constituent Element
PS- Point Source
RSP- Rock Slope Protection
RST-Rotary Screw Trap
SRA-Shaded Riverine Aquatic
SWP- State Water Project
USFWS- United State Fish and Wildlife Service
USGC-United States Geological Survey
VAMP- Vernalis Adaptive Management Plan

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

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

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 through NMFS' Public Consultation Tracking System <https://pcts.nmfs.noaa.gov>. A complete record of this consultation is on file at the NMFS California Central Valley Office.

1.2 Consultation History

- On June 23, 2016, NMFS staff completed a site visit to discuss the Project.
- On December 26, 2017, NMFS received a formal consultation request from the Corps for an Erosion repair Project in the Kasson District on the San Joaquin River.
- On January 25, 2018, NMFS received the Biological Assessment for the Project.
- On February 22, 2018, NMFS requested and received more information via phone call with the Corps and NMFS initiated consultation.
- On June 8, 2018, NMFS received requested pollution mitigation and Best Management Practices (BMPs).

1.3 Proposed Action

“Action” means all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by Federal agencies (50 CFR 402.02).

The proposed action is an erosion repair Project for an area of approximately 280 linear feet of an earthen levee and adjacent riverbank material. The riverbank shows signs of erosion which could threaten the integrity of the levee. The proposed repair involves re-grading the slope of the riverbank at a horizontal/vertical ratio of 2.5:1 and the addition of rock slope protection (RSP) to the re-graded area. See Table 1 for the quantities of areas affected and materials used in the proposed Project. Excess soil from the riverbank would be removed to an off-site permitted disposal area. The Project requires the removal of a mature valley oak, some other small riparian trees, and scrub-shrub vegetation. Rock Slope Protection (RSP) would be placed on 0.35 acres,

0.09 below the Ordinary High Water Mark (OHWM) and 0.26 acres above the OHWM. This placement would result in the conversion of 0.16 acres of scrub-shrub vegetation and approximately 0.20 acres of riparian forest vegetation to an armored slope. Project equipment and construction materials would be staged in a disturbed upland area north of the repair site. All construction vehicles would avoid working in the water. If work is required in the wetted area of the San Joaquin, sandbags will be installed no more than two feet off the shore parallel to the bank and covered with visqueen. No dewatering is planned. Construction will occur in the late summer between August 1, 2018 and October 31, 2018.

The following pollution/spill control BMPs will be implemented:

Vehicle and Equipment Cleaning/Vehicle and Equipment Fueling and Maintenance

- All vehicle and equipment cleaning for this construction site is prohibited, and will take place off site at a location where wash waters can be captured and disposed of properly.
- Vehicles and equipment may be fueled and/or maintained at the construction site by the contractor. The designated fueling location is located within contained area within the staging area.
- A drip pan/tray and a spill kit will be available for use in the fueling area to help prevent and mitigate any potential spills.
- Waste management consist of implementing procedural and structural BMPs for handling, storing and ensuring proper disposal of wastes to prevent the release of those wastes into water bodies.
- Materials and waste management pollution control BMPs shall be implemented to minimize storm water contact with construction materials, wastes and service areas; and to prevent materials and wastes from being discharged off-site or into water bodies.

Spill Prevention and Control

- Spill prevention and control will minimize and/or eliminate the potential discharge of hazardous and non-hazardous materials into water bodies.
- Employees of contractors and subcontractors will be trained on spill prevention practices and the potential environmental impacts resulting from the materials they are handling.
- These practices will include the use of secondary containment, designating specific areas for equipment storage, and other measures.
- Minor spills typically involve small quantities of oil, gasoline, paint, etc. which can be controlled by the first responder at the discovery of the spill.
- Use absorbent materials on small spills rather than hosing down or burying the spill.
- Absorbent materials should be promptly removed and disposed of properly.
- Follow the response practices indicated below for a minor spill:
 - Contain the spread of the spill.
 - Recover spilled materials.
 - Clean the contaminated area and properly dispose of contaminated materials.
 - If the spill occurs in dirt areas, immediately contain the spill by constructing an earthen dike. Dig up and properly dispose of contaminated soil.

The Corps plans to mitigate for the temporal impacts of the Kasson District Erosion repair Project by purchasing credits from an approved mitigation bank at a 3:1 ratio for permanently

impacted land below the Ordinary High Water Mark (OHWM). There are 0.09 acres of permanently impacted critical habitat below the OHWM. The purchase of credits at a mitigation bank would occur prior to implementation of the proposed levee erosion repair. Proposed avoidance and mitigation measures include the following:

1. Construction access via adjacent existing farm roads.
2. Minimization of overall construction disturbance area.
3. Minimization of Project footprint in jurisdictional Waters of the U.S.
4. Staging area located in existing disturbed area.
5. Protection of oak trees to be retained with construction fencing in or near construction area.
6. Construction scheduling during late summer or fall to avoid potential impacts to special-status fish species.
7. Installation of sandbags to prevent sediment release if water is present in Project area.
8. Revegetation of disturbed areas with native non-invasive plant species following construction.

Table 1. Quantities of areas affected and materials used in the proposed Project

Quantity	Above OHWM	Below OHWM	Total
Project Area-permanent impacts (acres)	0.26	0.09	0.35
Temporary Disturbance (acres)	0.32	0.01	0.33
Total (acres)	0.58	0.10	0.68
Excavation (cubic yards)	2,353	761	3,114
Fill: Bedding (cubic yards)	150	127	277
Fill: RSP (cubic yards)	600	457	1,057

“Interrelated actions” are those that are part of a larger action and depend on the larger action for their justification. “Interdependent actions” are those that have no independent utility apart from the action under consideration (50 CFR 402.02). There are no interdependent or interrelated activities associated with the proposed action.

1.4 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 action area is not the same as the Project area because the action area must delineate all areas where federally-listed population of salmon, steelhead, and green sturgeon may be effected by the implementation of the proposed action.

The Project area is located in Reclamation District 2085 on the West bank of the San Joaquin River east of Kasson Road, Latitude 37.703175°, Longitude -121.274759°, in south San Joaquin

County, California. The site is an unnumbered Section in Township 3 South, Range 6 East of USGS 7.5-minute Vernalis topographic quadrangle, approximately 5.6 miles downstream of the Stanislaus River. The site is located at elevations of approximately sea level to 40 feet above mean sea level.

The action area encompasses the Project area, the staging area, 100 feet from the shoreline, and 100 feet upstream and 1,000 feet downstream of any in-water construction activities where turbidity effects have the potential to occur.

Since the proposed action includes the purchase of mitigation credits from a conservation bank, the Action Area also includes the areas affected by the four conservation or mitigation banks that have service areas relevant to the project. These include the Fremont Landing Conservation Bank, which is a 100-acre floodplain site along the Sacramento River (Sacramento River Mile 106) and Bullock Bend Mitigation Bank, a 119.65-acre floodplain site along the Sacramento River at the confluence of the Feather River (Sacramento River Mile 80). The Cosumnes Floodplain mitigation bank is a 493-acre site located at the confluence of the Cosumnes and Mokelumne Rivers in Sacramento County, and the Liberty Island Conservation Bank is a 147.91-acre floodplain site at the lower end of the Yolo Bypass, in Yolo County.

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, Federal agencies must ensure that their 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 provides an opinion stating how the agency's actions would affect listed species and their critical habitat. If incidental take is expected, section 7(b)(4) requires NMFS to provide an incidental take statement (ITS) that specifies the impact of any incidental taking and includes non-discretionary reasonable and prudent measures and terms and conditions to minimize such impacts.

2.1 Analytical Approach

This BO includes both a jeopardy analysis and an adverse modification analysis. The jeopardy analysis relies upon the regulatory definition of "to jeopardize the continued existence of a listed species," which is "to engage in an action that 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.

The adverse modification analysis considers the impacts of the Federal action on the conservation value of designated critical habitat. This BO does not rely on the regulatory

definition of "destruction or adverse modification" of critical habitat at 50 CFR 402.02. Instead, we have relied upon the statutory provisions of the ESA to complete the following analysis with respect to critical habitat.¹

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

- Identify the rangewide status of the species and critical habitat likely to be adversely affected by the proposed action.
- Describe the environmental baseline in the action area.
- Analyze the effects of the proposed action on both species and their habitat using an "exposure-response-risk" approach.
- Describe any cumulative effects in the action area.
- Integrate and synthesize the above factors to assess the risk that the proposed action poses to species and critical habitat.
- Reach jeopardy and adverse modification conclusions.
- If necessary, define a reasonable and prudent alternative to the proposed action.

2.1.1 Conservation Banking in the Context of the ESA Environmental Baseline

Conservation (or mitigation) banks present a unique situation in terms of how they are used in the context of the Effects Analysis and the Environmental Baseline in ESA section 7 consultations. When NMFS is consulting on a proposed action that includes conservation bank credit purchases, it is likely that physical restoration work at the bank site has already occurred and/or that a section 7 consultation occurred at the time of bank establishment. A traditional interpretation of "environmental baseline" might suggest that the overall ecological benefits of the conservation bank actions belong in the Environmental Baseline. However, under this interpretation, all proposed actions, whether or not they included proposed credit purchases, would benefit from the environmental 'lift' of the entire conservation bank because it would be factored into the environmental baseline. In addition, where proposed actions did include credit purchases, it would not be possible to attribute their benefits to the proposed action, without double-counting. These consequences undermine the purposes of conservation banks and also do not reflect their unique circumstances. Specifically, conservation banks are established based on the expectation of future credit purchases. In addition, credit purchases as part of a proposed action will also be the subject of a future section 7 consultation.

It is therefore appropriate to treat the beneficial effects of the bank as accruing incrementally at the time of specific credit purchases, not at the time of bank establishment or at the time of bank restoration work. Thus, for all projects within the service area of a conservation bank, only the benefits attributable to credits sold are relevant to the environmental baseline. Where a proposed action includes credit purchases, the benefits attributable to those credit purchases are considered effects of the action.

¹ Memorandum from William T. Hogarth to Regional Administrators, Office of Protected Resources, NMFS (Application of the "Destruction or Adverse Modification" Standard Under Section 7(a)(2) of the Endangered Species Act) (November 7, 2005).

That approach is taken in this BO.

2.2 Rangewide Status of the Species and Critical Habitat

This BO 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 BO also examines the condition of critical habitat throughout the designated area, evaluates the conservation value of the various watersheds and coastal and marine environments that make up the designated area, and discusses the current function of the essential physical and biological features that help to form that conservation value.

Table 2. Description of species, current ESA listing classification and summary of species status.

Species	Listing Classification and Federal Register Notice	2.2.1.1.1 Status Summary
California Central Valley (CCV) Steelhead	Threatened, 71 FR 834; January 5, 2006	According to the NMFS 2016, 5-year species status review, the status of CCV steelhead appears to have changed little since the 2011 status review that concluded that the DPS was in danger of extinction. Most wild 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 wild fish. The life-history diversity of the DPS is mostly unknown, as very few studies have been published on traits such as age structure, size at age, or growth rates in CCV steelhead.
Southern Distinct Population Segment (sDPS) of North American Green Sturgeon	Threatened, 71 FR 17757; April 7, 2006	According to the NMFS 2015, 5-year species status review, some threats to the species have recently been eliminated, such as take from commercial fisheries and removal of some passage barrier, but the species viability continues to be constrained by factors such as a small population size, lack of multiple populations, and concentration of spawning sites into just a few locations. The species continues to face a moderate risk of extinction.

Table 3. Description of critical habitat, designation details and status summary.

Species	Designation Date and Federal Register Notice	Status Summary
California Central Valley Steelhead	September 2, 2005, 70 FR 52488	<p>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 OHWM. In areas where the OHWM has not been defined, the lateral extent will be defined by the bankfull elevation.</p> <p>Physical and biological features considered essential to the conservation of the species include: Spawning habitat; freshwater rearing habitat; freshwater migration corridors; and estuarine areas.</p>
Southern Distinct Population Segment (sDPS) of North American Green Sturgeon	October 9, 2009, 74 FR 52300	<p>Critical habitat includes the stream channels and waterways in the Delta to the OHWM. Critical habitat also includes the main stem Sacramento River upstream from the I Street Bridge to Keswick Dam, the Feather River upstream to the fish barrier dam adjacent to the Feather River Fish Hatchery, and the Yuba River upstream to Daguerre Dam. Coastal marine areas include waters out to a depth of 60 fathoms, from Monterey Bay in California, to the Strait of Juan de Fuca in Washington. Coastal estuaries designated as critical habitat include San Francisco Bay, Suisun Bay, San Pablo Bay, and the lower Columbia River estuary. Certain coastal bays and estuaries in California (Humboldt Bay), Oregon (Coos Bay, Winchester Bay, Yaquina Bay, and Nehalem Bay), and Washington (Willapa Bay and Grays Harbor) are also included as critical habitat for sDPS green sturgeon.</p> <p>Physical and biological features considered essential to the conservation of the species for freshwater and estuarine habitats include: food resources, substrate type or size, water flow, water quality, migration corridor; water depth, sediment quality.</p>

2.2.1 Global Climate Change

One major factor affecting the rangewide status of the threatened and endangered anadromous fish in the CCV 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 winter-run Chinook salmon, the embryonic and larval life stages that are most vulnerable to warmer water temperatures occur during the summer, so this run is particularly at risk from climate warming. 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 CCV steelhead will experience similar effects of climate change to Chinook salmon, as they are also blocked from the vast majority of their historic spawning and rearing habitat, the effects may be even greater in some cases, as juvenile CCV steelhead need to rear in the stream for one to two summers prior to emigrating as smolts. In the Central Valley, summer and fall temperatures below the dams in many streams already exceed the recommended temperatures for optimal growth of juvenile CCV steelhead, which range from 14°C to 19°C (57°F to 66°F). The Anderson Cottonwood Irrigation Dam (ACID) is considered the upriver extent of green sturgeon passage in the Sacramento River. The upriver extent of green sturgeon spawning, however, is approximately 30 kilometers downriver of ACID where water temperature is higher than ACID during late spring and summer. Thus, if water temperatures increase with climate change, temperatures adjacent to ACID may remain within tolerable levels for the embryonic and larval life stages of green sturgeon, but temperatures at spawning locations lower in the river may be more affected.

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

2.3 Environmental Baseline

The “environmental baseline.” includes the past and present impacts of all Federal, state, or private actions and other human activities in the action area, the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal or early section 7 consultation, and the impact of state or private actions which are contemporaneous with the consultation in process (50 CFR 402.02).

Historically, as water from the Sacramento River entered the Delta area it would naturally change its course as it meandered toward San Francisco Bay. The course changes were dictated by size of the flows, the land elevations, erosion and a broad range of other naturally occurring dynamics. As the surrounding lands were developed into farms, urban, and suburban areas, it became advantageous to confine the flowing water to a prescribed system of channels; levees were built along the channel banks to assure that flows would stay within those channels. In the Sacramento and San Joaquin rivers where the land is used for agriculture and the Delta where the land is either developed or used for agriculture, the elevation of the land is lower than the water surface of the channels, and failure of the levees would lead to wide-spread flooding and damage to the adjacent land developments. To prevent that, the levees are armored with reinforcing materials whenever they show signs of weakness. This has been going on for years, and the repairs have been accomplished by individual landowners, levee maintenance districts, and government institutions. Some of the repairs are primitive and some well designed, but because most of the levees were originally built out of sand dredged from the river bottom, they are inherently weak, and the need to repair them is an ongoing challenge.

2.3.1 Mitigation Banks and the Environmental Baseline

There are several conservation or mitigation banks approved by NMFS with service areas that include the action area considered in this BO. These banks occur within critical habitat for sDPS green sturgeon and CCV steelhead. These include:

Cosumnes Floodplain Mitigation Bank: Established in September 2009, the Cosumnes Floodplain mitigation bank is a 493-acre site located at the confluence of the Cosumnes and Mokelumne Rivers in Sacramento County. This bank is authorized by NMFS to provide credits for Floodplain Mosaic Wetlands, Floodplain Riparian Habitat, and Shaded Riverine Aquatic Habitat. There are floodplain mosaic wetlands, floodplain riparian habitat, and shaded riverine aquatic habitat credits available. To date, there have been 17,407.3 of 78,172.4 credits sold and the ecological value (increased rearing habitat for juveniles) of the sold credits are part of the environmental baseline. All features of this bank are designated critical habitat for the species analyzed in this BO.

Fremont Landing Conservation Bank: Established in 2006, the Fremont Landing Conservation Bank is 100-acre floodplain site along the Sacramento River (Sacramento River Mile 106) and is approved by NMFS to provide credits for impacts to Sacramento River winter-run Chinook salmon, CV spring-run Chinook salmon and CCV steelhead. There are off-channel shaded aquatic habitat credits, riverine shaded aquatic habitat credits and floodplain credits available. To date, there have been 28.2 of 100 credits sold and the ecological value (increased rearing habitat for juvenile salmonids) of the sold credits are part of the environmental baseline. All features of this bank are designated critical habitat for the species analyzed in this BO.

Bullock Bend Mitigation Bank: Established in 2016, the Bullock Bend Mitigation Bank is a 116.15-acre floodplain site along the Sacramento River at the confluence of the Feather River (Sacramento River Mile 80) and is approved by NMFS to provide credits for impacts to Sacramento River winter-run Chinook salmon, CV spring-run Chinook salmon and CCV

steelhead. There are salmonid floodplain restoration, salmonid floodplain enhancement and salmonid riparian forest credits available. To date, there have been of 56.52 of 116.15 credits sold and the ecological value (increased rearing habitat for juvenile salmonids) of the sold credits are part of the environmental baseline. All features of this bank are designated critical habitat for the species analyzed in this BO.

Liberty Island Conservation Bank: Established in 2010, the Liberty Island Conservation Bank is a 147.91-acre floodplain site at the lower end of the Yolo Bypass and is approved by NMFS to provide credits for impacts to Sacramento River winter-run Chinook salmon, CV spring-run Chinook salmon, sDPS Green Sturgeon, and CCV steelhead. There are salmonid riparian and salmonid marsh credits available. To date, there have been of 139.11 credits sold and the ecological value (increased rearing habitat for juvenile salmonids) of the sold credits are part of the environmental baseline. All features of this bank are designated critical habitat for the species analyzed in this BO.

2.3.2 Status of CCV Steelhead in the Action Area

Historic abundance of CCV steelhead in the action area is difficult to determine, but CCV steelhead were widely distributed, with abundance estimates of 1 to 2 million adults annually, throughout the Central Valley system as a whole (McEwan 2001). The proposed Project action area functions primarily as a migratory corridor for adult and juvenile CCV steelhead. Adult CCV steelhead in the San Joaquin will migrate through the proposed Project action area in order to reach their spawning grounds and to return to the ocean following spawning. Likewise, CCV steelhead smolts in the San Joaquin River watershed will pass through the proposed Project action area during their emigration to the ocean. The waterways in the proposed action area are also expected to provide some rearing benefit to emigrating CCV steelhead smolts.

The CCV steelhead occurs in the Sacramento River and San Joaquin River watersheds, although the spawning population is much greater in the Sacramento River watershed (Good *et al.* 2005). CCV steelhead are known to be drawn into the south Delta by the actions of the State Water Project (SWP) and Central Valley Project (CVP) water diversion facilities. Small, remnant populations of CCV steelhead are known to occur on the Stanislaus River and the Tuolumne River and their presence is assumed on the Merced River due to proximity, similar habitats, and historical presence. CCV steelhead smolts should first start to appear in the action area in the fall, based on the records from the CVP and SWP fish salvage facilities. Their presence will increase through December and January with peaks in February and March. By June, the emigration has essentially ended, with only a small number of fish being salvaged through the summer at the CVP and SWP (Table 4). Kodiak trawls conducted by the United States Department of Fish and Wildlife Service (USFWS) and (Department of Fish and Game) DFG on the mainstem of the San Joaquin River just upstream of the Head of Old River during the Vernalis Adaptive Management Plan (VAMP) experimental period routinely catch low numbers of out migrating CCV steelhead smolts from the San Joaquin Basin. Monitoring is less frequent prior to the VAMP, therefore emigrating CCV steelhead smolts have a lower probability of being detected. The Rotary Screw Trap (RST) monitoring on the Stanislaus River at Caswell State Park and further upstream near the City of Oakdale indicate that smolt-sized CCV steelhead start emigrating downriver in January and can continue through late May. Fry sized fish (30 to 50 mm) are captured at the

Oakdale RST starting as early as April and continuing through June. Adult escapement numbers have been monitored in the past with the installation of an Alaskan style weir on the lower Stanislaus River between Ripon and Riverbank. Typically, very few adult CCV steelhead have been observed moving upstream past the weir due to the removal of the structure at the end of December. However, in 2006 to 2007, the weir was left in through the winter and spring and seven adult CCV steelhead were counted moving upstream. In 2008-2009, 15 adult CCV steelhead moved upstream past the weir. The weir counts indicate that at least some CCV steelhead adults are moving upstream from the lower Stanislaus River into upstream areas. These fish, due to their migratory behavior, timing of entrance, and typically larger size would be considered potential CCV steelhead returning to the tributary. The proposed construction period for the Project in the action area is from August 1 to October 31. Since both adult and juvenile CCV steelhead may be present in the Delta in all months except August and September, the construction period will overlap with their presence in October.

Table 4: Summary table of monthly combined total salvage and loss of CCV steelhead at the CVP and SWP fish collection facilities from water year 1999-2000 to water year 2017-2018. Data from CVO web site: (<http://www.usbr.gov/mp/cvo/>)

CCV Steelhead (combined salvage and loss, clipped and non-clipped)

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Sum
2017-2018	0	0	0	22	99	3680							
2016-2017	0	21	7	51	174	0	11	161	42	0	0	0	467
2015-2016	0	0	0	510	1826	2690	155	76	2	0	0	0	5259
2014-2015	0	21	0	149	1587	663	135	7	0	0	0	0	2562
2013-2014	0	0	0	21	113	513	315	13	21	0	0	0	996
2012-2013	0	21	86	194	453	2111	1863	782	114	42	0	0	5666
2011-2012	0	0	7	45	176	911	352	33	20	N	N	N	1544
2010-2011	7	0	3	244	801	496	275	301	560	N	N	N	2687
2009-2010	0	0	7	568	4403	1288	221	190	158	N	N	N	6835
2008-2009	0	0	0	40	571	1358	210	68	13	7	0	0	2267
2007-2008	0	0	0	624	4639	717	300	106	24	15	0	0	6425
2006-2007	0	0	10	81	1643	4784	2689	113	20	0	0	0	9340
2005-2006	0	0	0	129	867	3942	337	324	619	0	0	0	6218
2004-2005	0	20	70	120	1212	777	687	159	116	0	0	0	3161
2003-2004	0	12	40	613	10598	4671	207	110	0	0	0	0	16251
2002-2003	0	0	413	13627	3818	2357	823	203	61	0	0	0	21302
2001-2002	0	0	3	1169	1559	2400	583	37	42	0	0	0	5793
2000-2001	0	0	89	543	5332	5925	720	69	12	0	0	0	12690
1999-2000	3	60	0	0	0	1243	426	87	48	0	0	0	1867
Sum	10	155	735	18750	39871	40526	10309	2839	1872	64	0	0	111330
Average	1	8	39	987	2098	2133	573	158	104	4	0	0	6185

2.3.3 Status of Southern DPS of North American Green Sturgeon in Action Area

Both adult and juvenile green sturgeon are expected to occur in the action area, but in low numbers. The Delta serves as an important migratory corridor for adults during their spawning migrations, and as year round rearing habitat for juveniles. Both non-spawning adults and subadults use the Delta and estuary for foraging during the summer. Since there are no physical barriers to sDPS green sturgeon moving into the action area from the waters of the Delta adjacent

to the action area during their rearing or foraging behaviors, presence in the action area is seen as feasible and likely.

Detailed information regarding historic and current abundance, distribution and seasonal occurrence of sDPS green sturgeon in the action area is limited due to a general dearth of green sturgeon monitoring. The action area is located on one of the two main rivers feeding the Delta (the San Joaquin River) and there have been consistent reports of green sturgeon being caught by sport fisherman in the San Joaquin River from Sherman Island at the western edge of the Delta upstream to at least Highway 140 near the town of Newman (CDFW 2015, 2014, 2013, 2012, 2011), although in low numbers compared to other regions of the Delta and San Francisco estuary.

Up until recently, juvenile green sturgeon from the sDPS were routinely collected at the SWP and CVP salvage facilities throughout the entire year. Based on the salvage records, green sturgeon may be present during any month of the year, and have been particularly prevalent during July and August. However, over the past few years, salvage of juvenile green sturgeon at the facilities has been rare (as well as for salvage of the more common white sturgeon); the reason for this decline in salvage is unknown. Adult green sturgeon begin to enter the Delta in February and early March during the initiation of their upstream spawning run. The peak of adult entrance into the Delta appears to occur in late February through early April with fish arriving upstream in April and May. Adults continue to enter the Delta until early summer (June-July) as they move upriver to spawn. It is also possible that some adult green sturgeon will be moving back downstream into the Delta in April and May, either as early post spawners or as unsuccessful spawners and may potentially enter the action area via the San Joaquin River. Some adult green sturgeon have been observed to rapidly move back downstream following spawning, while others linger in the upper river until the following fall, moving downstream with changes in water temperature and flows due to fall storms.

Because the only known spawning areas for sDPS green sturgeon occur in the Sacramento River basin, there is very low potential for eggs or larval green sturgeon to occur in the action area. Spawning in the San Joaquin River has not been recorded, although there appears to be at least some presence of adult fish in the river upstream of the Delta based on the sturgeon report card data.

The proposed construction period for the Project's actions in the mainstem San Joaquin portion of the action area is from August 1 through October 31. Since both adult and juvenile sDPS green sturgeon may be present in the Delta year round, the construction period will overlap with their presence.

2.3.4 Status of Critical Habitat in Action Area

The action area, which encompasses the floodplains and riparian areas on the West bank of the San Joaquin River east of Kasson Road, Latitude 37.703175°, Longitude -121.274759°, functions primarily as a juvenile rearing and migratory habitat for CCV steelhead and migratory habitat for sDPS Green Sturgeon. Holding post-spawn adults and rearing juveniles may utilize the area on their way to the estuary. The proposed Project site is located along an eroding bank

face in an area upstream from tidal influence. Upstream of the site, is a wide floodplain area with depositional bar covered in grass and shrubs. The landside habitat of the repair site is agricultural with a service road and riparian habitat along the river. This riparian habitat contains large native tree species including blue elderberry, valley oak, and 37 additional species (see the Corp's Biological Assessment, table 2, for a complete list of species).

The action area is designated critical habitat for CCV steelhead. The designation of critical habitat for CCV steelhead use the term primary constituent element (PCE). The new critical habitat regulations (81 FR 7414) replace this term with PBFs. This shift in terminology does not change the approach used in conducting our analysis, designating primary constituent elements. In this formal consultation, we use the term PBF to mean PCE or essential feature, as appropriate for the specific critical habitat.

The PBFs for CCV steelhead critical habitat that may be affected by the proposed action include: (1) rearing sites, and (2) freshwater migratory corridors. The essential features of these PBFs include adequate substrate, water quality, water quantity, water temperature, water velocity, shelter, food, riparian vegetation, space, and safe passage conditions. The intended conservation roles of habitat in the action area is to provide appropriate freshwater rearing and migration conditions for juveniles and unimpeded freshwater migration conditions for adults. However, the conservation condition and function of this habitat has been severely impaired through several factors, discussed in more detail in the *Rangewide Status of the Species and Critical Habitat* section of the BO. The result has been the reduction in quantity and quality of several essential features of migration and rearing habitat required by juveniles to grow and survive. In spite of the degraded condition of this habitat, the intrinsic conservation value of the action area is high as it is along a primary migration corridor.

In regards to the designated critical habitat for the sDPS of North American green sturgeon, the action area includes PBFs which provide: adequate food resources for all life stages utilizing the Delta; water flows sufficient to allow adults, sub-adults, and juveniles to orient to flows for migration and normal behavioral responses; water quality sufficient to allow normal physiological and behavioral responses; unobstructed migratory corridors for all life stages utilizing the Delta; a broad spectrum of water depths to satisfy the needs of the different life stages present in the Delta and estuary; and sediment with sufficiently low contaminant burdens to allow for normal physiological and behavioral responses to the environment.

2.3.5 Factors Affecting the Species and Habitat in the Area

The action area encompasses a small portion of the area utilized by CCV steelhead as well as the sDPS of North American green sturgeon. Many of the factors affecting these species in the action area are considered the same as throughout their range, as discussed in the *Rangewide Status of the Species and Critical Habitat* section of this BO, specifically, levee armoring and channelization, alteration of river flows and temperatures, reduction of IWM in the waterways, reduction of riparian corridors and associated vegetation and the introduction of point and non-point contaminants.

This section will focus on the specific factors in the action area that are most relevant to the execution of the proposed Project.

High water temperatures limit habitat availability for listed salmonids in the San Joaquin River and the lower portions of the tributaries feeding into the mainstem of the river. High summer water temperatures in the lower San Joaquin River frequently exceed 72°F (CDEC database), and create a thermal barrier to the migration of adult and juvenile salmonids. Levee construction and bank protection have affected salmonid habitat availability and the processes that develop and maintain preferred habitat by reducing floodplain connectivity, changing riverbank substrate size, and decreasing riparian habitat and shaded riverine aquatic (SRA) cover. Armored embankments result in loss of sinuosity and braiding and reduce the amount of aquatic habitat. Impacts at the reach level result primarily from halting erosion and controlling riparian vegetation. Reach-level impacts which cause significant impacts to fish are reductions in new habitats of various kinds, changes to sediment and organic material storage and transport, reductions of lower food-chain production, and reduction in IWM. The use of rock armoring limits recruitment of IWM (*i.e.*, from non-riprapped areas), and greatly reduces, if not eliminates, the retention of IWM once it enters the river channel. Riprapping creates a relatively clean, smooth surface that diminishes the ability of IWM to become securely snagged and anchored by sediment. IWM tends to become only temporarily snagged along riprap, and generally moves downstream with subsequent high flows. Habitat value and ecological functioning aspects are thus greatly reduced, because wood needs to remain in place for extended periods to generate maximum values to fish and wildlife (USFWS 2000). Recruitment of IWM is limited to any eventual, long-term tree mortality and whatever abrasion and breakage may occur during high flows (USFWS 2000). Juvenile salmonids are likely being impacted by reductions, fragmentation, and general lack of connectedness of remaining near shore refuge areas.

2.4 Effects of the Action

Under the ESA, “effects of the action” means the direct and indirect effects of an action on the species or critical habitat, together with the effects of other activities that are interrelated or interdependent with that action, that will be added to the environmental baseline (50 CFR 402.02). Indirect effects are those that are caused by the proposed action and are later in time, but still are reasonably certain to occur.

To conduct this assessment, NMFS examined information from a variety of sources. Detailed background information on the status of these species and critical habitat has been published in a number of documents including peer reviewed scientific journals, primary reference materials, government and non-government reports, the BA for this Project, and supplemental material provided by the applicant in response to questions asked by NMFS.

2.4.1 Assessment

The assessment of Project effects will first look at construction related effects and then effects related to the loss of riparian vegetation, and predation. NMFS review of construction related effects will examine impacts from construction activities including noise, pollution, and short-term turbidity effects upon listed species. NMFS examined the role of the physical presence of

levee structures and the armoring of the levee faces with RSP on the functioning of aquatic and riparian communities, food webs, and utilization of these altered habitats by listed salmonids and green sturgeon. Finally, NMFS evaluated the impacts of the Project's actions on designated critical habitat in the action area.

2.4.1.1 Construction Related Effects

The proposed Project's construction related effects will be comprised of two main effects: noise related impacts and turbidity related impacts. Noise related impacts will occur contemporaneously with the construction activities, and will be associated primarily with the use of heavy construction equipment on the levees. When construction activities are halted, noise generation ceases. This is considered a direct effect of the construction process related to the Project. In contrast, the construction related impacts associated with turbidity have a more complex temporal pattern. During construction, soils and sediments may become disturbed and directly suspended in the surrounding waterways, creating turbidity events adjacent to the levees under construction and in the nearby waterways as the turbidity plume is disbursed by water movement. This is the immediate temporal exposure to turbidity events related to construction activities and is considered a direct effect of the Project. Long-term exposure to turbidity events can occur due to the erosion of exposed soil surfaces during or following the completion of construction activities and can occur weeks to months after the completion of Project activities during precipitation events and is considered an indirect effect of the construction process of the Project.

2.4.1.1.1. Noise Related Effects

Based on the description provided in the Corps BA regarding construction elements of the Project, heavy equipment will be used throughout the action area to implement the different levee improvements considered in the Project description. Heavy earth moving equipment will be used to evacuate soil from the levee and create the 2.5:1 slope. Bedding and RSP will be placed using equipment after a mature oak is removed. This will require equipment such as bulldozers, scrapers, front loaders, and dump trucks to haul away the soil from the levee site for offsite storage. Reconstruction of the modified levees to achieve the 2.5:1 levee prism will require new fill to be brought in by haul trucks and spread on the levee surface. Various earth moving equipment, including scrapers and soil compactors will be used to complete the levee construction to Corps design criteria.

All of these construction elements and the associated construction equipment required to complete the action will create noise in the terrestrial and aquatic environment, particularly when heavy earth moving equipment is used. The scraping and moving of earth will create noise as energy is being transferred from the hard blades or buckets of the equipment to the soil horizons. The noise generated by the earth moving actions is partially transferred through the soil to surrounding areas, including the adjacent aquatic environment. A report by Burgess and Blackwell (2003) indicated that the noise from a vibratory installation of a sheet pile wall in an upland position generated noise that was coupled through the soil to the 200 feet adjacent water column. While this Project will not involve sheet pile installation, this is representative of noise created by large machinery that will be used on the levee slope during construction. It is expected that the noise transferred through the soil horizons to the adjacent waterways will

attenuate in strength relatively quickly. Thus, it is unlikely that the noise level received by the aquatic system will be of sufficient energy to cause mortality or injury, rather, it will more likely result in levels of sound energy that cause harassment or behavioral responses. It is anticipated that the resulting noise levels will initially “drive” fish away from the area affected, however they may return or stay in the area as they acclimate to the new acoustic environment. Still, noise coupled with increased human activity (*i.e.*, motion, noise, shadows, etc.) on the levee may be sufficient to “drive” fish away from the work area for longer periods. Therefore, it is expected that any fish within the shallow water areas adjacent to levees under construction would avoid the shoreline and the shallow water adjacent to the levee toe and move into deeper, open water to avoid the noise during construction activities. This has the potential to expose the fish to elevated predation pressures from a lack of access to hiding areas associated with the shoreline.

Clearly, noise has the potential to disrupt behavior, which could result in displacement from rearing habitat leading to reduced feeding, or increased predation. However, ESA listed anadromous fish are expected to avoid the work area and based on the salvage of CCV steelhead presented in Table 4, we expect that fish will either be present at extremely low numbers (July and October) or not present at all (July and September). Additionally, green sturgeon are expected to be present in benthic environments and closer to the mid-channel of the river, and not the shallow, near-bank habitats. Therefore, the potential for noise-related effects are extremely unlikely to occur.

2.4.1.1.2. Turbidity Related Effects

During the clearing and grubbing phases of the construction actions at the proposed site, vegetation will be removed and the levee will be re-graded. This action will leave the soil exposed and disturbed for the future armoring. This temporary condition accelerates the potential for erosion from any precipitation events that may occur during construction or after the construction work window has ended without proper erosion management practices. The Corps has stated that all mitigation will be offsite in the form of credit purchases, meaning onsite vegetation that would aid in erosion prevention is being removed and not replaced. Armoring in the form of RSP is replacing removed vegetation. This action would aid in preventing erosion from occurring and soils entering the adjacent waterways. The only planned erosion control is the placement of a silt curtain below the OHWM to minimize turbidity in the waterway during construction. NMFS anticipates there is the potential for sediments from the bottom of the waterway channels to be disturbed by the construction activities and resuspended into the overlying water column. This will create localized turbidity plumes.

Suspended sediments can adversely affect salmonids in the area by clogging sensitive gill structures (Nightingale and Simenstad 2001) but are generally confined to turbidity levels in excess of 4,000 mg/L. Based on the best available information, NMFS does not anticipate that turbidity levels associated with the erosion from levee waterside faces in the Project action area or the construction itself, will increase to these deleterious levels. Resuspension of contaminated sediments may have adverse effects upon salmonids or green sturgeon that encounter the sediment plume, even at low turbidity levels.

Based on the timing of the levee construction, there is likely to be little exposure to any CCV steelhead or sDPS green sturgeon who use the action area for migration. Increased flows in the

main channel of the San Joaquin River, as a result of pulse flows or precipitation events in September and October, are expected to ameliorate any negative effects of increased turbidity by shortening the duration of migration through the action area and diluting the resuspended sediments in the water column. Increased turbidity due to rain runoff is expected to be similar to or greater than that generated within the construction area. Therefore, actions that take place early in the work window on the San Joaquin River (August) are expected to have insignificant effects on listed salmonids since the likelihood of their presence in the action area is considered low and the turbidity levels are not expected to reach a level where take occurs. Work occurring later in the work window (*i.e.*, September or October), increases the probability of in-water work effects overlapping with listed salmonid presence increases and the potential for exposure to elevated turbidity increases. This increases the risk for non-lethal levels of take to exposed fish, although the level of risk is considered to be still quite low and not likely to reach levels where adverse effects would occur.

The exposure risk to green sturgeon is less clear. It can be anticipated that juvenile green sturgeon could be found year-round in the central Delta, particularly in the deeper sections of the rivers based on sturgeon behavior and their preference for deep holes. Presence on the shallower margins of the river is likely to occur at night, when fish are foraging in those areas. Therefore, the elevated turbidity levels created by the construction during the daylight construction period may not persist into the night when sturgeon could be anticipated to move into the work area, thus reducing their exposure potential. If fish are not present when the turbidity conditions exist, they are unlikely to incur any demonstrable effects from the turbidity event, thus no take occurs. Based on this behavioral characteristic for nocturnal foraging, the risks are considered negligible to juvenile green sturgeon and the potential for adverse effects in the form of injury or death is extremely unlikely.

2.4.1.1.3. Pollution

Accidental spills of hazardous materials (e.g., oils, transmission and hydraulic fluids, cement, fuel, rodenticides, etc.) could occur during construction and maintenance. These materials could enter the San Joaquin River or contaminate riparian areas adjacent to the river. Adverse effects of pollutants in the river channel could include injury or mortality of CCV steelhead or sDPS Green Sturgeon. The introduction of pollutants may also harm fish if the pollutants cause a reduction in available prey abundance or if contaminated prey are consumed.

The proposed action includes the development of a hazardous materials spill prevention and countermeasures plan and BMPs. The proposed action includes daily inspections of all heavy equipment for leaks. With inclusion of these measures the potential effects from hazardous materials entering the aquatic environment and adversely affecting ESA listed anadromous fish are not expected to result in adverse effects to listed fish. Adverse effects are extremely unlikely, therefore these effects can be considered discountable.

2.4.1.2 Loss/degradation of habitat

RSP placed below the OHWM and below the average summer watermark will provide habitat for bass and other predators who feed on out-migrating smolts. Water level in the San Joaquin River is partially dictated as part of the San Joaquin restoration project. In the action area, water

level can span from 30 feet to 10 feet during the Project window. High water events in 2017, recorded at the San Joaquin River near Vernalis gauge, exceeded 30 feet, which would have placed a larger amount of RSP below the OHWM, which is recorded at 13.77'. The top of the levee in this area is at 37 feet (VNS, California Data Exchange Center). This can put a larger amount of RSP underwater and available for predator habitat. Current riparian plantings on the levee, that will be removed, provide cover for juveniles. Post construction the action area will provide less cover and more predatory habitat.

Harm in the definition of “take” in the Act means an act which actually kills or injures fish or wildlife. Such an act may include significant habitat modification or degradation that actually kills or injures fish or wildlife by significantly impairing essential behavioral patterns, including, breeding, spawning, rearing, migrating, feeding or sheltering. One example from the 1999 Harm rule is: “Removing or altering rocks, soil, gravel, vegetation or other physical structures that are essential to the integrity and function of a listed species’ habitat” (50 CFR 222.102).

The placement of RSP will increase predation habitat and the removal of riparian vegetation will reduce cover and allochthonous input which will cause harm to individuals by increasing the likelihood of injury and death from habitat modifications at the repair site that reduce the quantity and quality of rearing habitat and by creating habitat conditions that increase the likelihood predation. The loss and degradation of habitat will have adverse effects on listed species in the action area in the form of harm.

2.4.1.3 Effects on critical habitat

The levee repair is expected to cause a reduction in critical habitat through the long-term permanent (i.e., 50 year expected design life of the repair) replacement up to 280ft² (0.35 acres) of the natural riverbed with bare rock in the form of RSP. Of this amount, 0.09 acres of RSP will be placed below the OHWM, and a larger area has the potential to be underwater during high water events. High water events in 2017, recorded at the San Joaquin River near Vernalis gauge, exceeded 30 feet, which would have placed a larger amount of RSP below the OHWM, which is recorded at 13.77'. In the action area, 0.16 acres of scrub-shrub vegetation and approximately 0.20 acres of riparian forest vegetation will be converted to an armored slope. The top of the levee in this area is at 37 feet (VNS, California Data Exchange Center). Impact to critical habitat affect rearing and migration PBF's by reducing in-stream cover, food production, and the quality of sediment that allows for normal physiological and behavioral responses to the environment.

The Project-related impacts result in on-site adverse impact to designated critical habitat of CCV steelhead, specifically the PBFs of rearing sites and freshwater mitigation corridors located in the action area. The Project is expected to adversely impact several of the essential features of critical habitat for sDPS green sturgeon. The PBFs of food resources, which refers to the availability of prey items for all life stages, is expected to be adversely affected by the loss of riparian plant life and a change in the ability of the bank to provide allochthonous input. Migration corridors (migratory pathways necessary for the safe and timely passage of all life stages) are expected to be adversely affected by with placement of RSP and creation of habitat for predators. This decreases the safety of these passages and subjects juveniles to additional predation

pressure in a system already facing extreme predation pressure. The Project is not expected to impact the PBF's of water flow, or water depth.

2.4.1.4 Mitigation/Conservation Bank Credit Purchases

The proposed action also includes off-site mitigation for permanent impacts to streambed designated critical habitat of ESA listed anadromous salmonids at a ratio of 3:1 for permanent impacts to habitat below the OHWM. The purchase of mitigation credits will address the loss of ecosystem functions due to the modification of the river bank and streambed. These credit purchases are ecologically relevant to the impacts and the species affected because the NMFS-approved conservation/mitigation banks that serve the Project area include shaded riparian aquatic, riparian forest and floodplain credits with habitat values that are already established and meeting performance standards. Also, the banks are located in areas that will benefit the DPSs affected by the proposed action.

The purchase of credits provides a high level of certainty that the benefits of a credit purchase will be realized because each of the NMFS approved banks considered in this BO have mechanisms in place to ensure credit values are met over time. Such mechanisms include legally binding conservation easements, long-term management plans, detailed performance standards, credit release schedules that are based on meeting performance standards, monitoring plans and annual monitoring reporting to NMFS, non-wasting endowment funds that are used to manage and maintain the bank and habitat values in perpetuity, performance security requirements, a remedial action plan, and site inspections by NMFS. In addition, each bank has a detailed credit schedule and credit transactions and credit availability are tracked on the Regulatory In-lieu Fee and Bank Information Tracking System (RIBITS). RIBITS was developed by the Corps with support from the Environmental Protection Agency, the U.S. Fish and Wildlife Service, the Federal Highway Administration, and NMFS to provide better information on mitigation and conservation banking and in-lieu fee programs across the country. RIBITS allows users to access information on the types and numbers of mitigation and conservation bank and in-lieu fee program sites, associated documents, mitigation credit availability, service areas, as well as information on national and local policies and procedures that affect mitigation and conservation bank and in-lieu fee program development and operation. RIBITS also contains links to bank establishment documents. The Bullock Bend Mitigation Bank was established June 23, 2016; the Cosumnes Floodplain Mitigation Bank was established August 4, 2008; the Fremont Landing Conservation Bank was established October 19, 2006; and the Liberty Island Conservation Bank was established July 21, 2010.

2.5 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). 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.

NMFS staff are unaware of any future activities that are both within the Action Area and do not involve Federal activities.

2.6 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 to the environmental baseline and the cumulative effects, taking into account the status of the species and critical habitat, 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) reduce the value of designated or proposed critical habitat for the conservation of the species.

The *Analytical Approach* described the analyses and tools we have used to complete this analysis. This section is based on analyses provided in the *Rangewide Status of the Species*, the *Environmental Baseline*, and the *Effects of the Action*.

In our Range-wide Status of the Species section, NMFS summarized the current likelihood of extinction of each of the listed species. We described the factors that have led to the current listing of each species under the ESA and across their ranges. These factors include past and present human activities and climatological trends and ocean conditions that have been identified as influential to the survival and recovery of the listed species. Beyond the continuation of the human activities affecting the species, we also expect that ocean condition cycles and climatic shifts will continue to have both positive and negative effects on the species' ability to survive and recover. The *Environmental Baseline* reviewed the status of the species and the factors that are affecting their survival and recovery in the action area. The *Effects of the Action* reviewed the exposure of the species and critical habitat to the proposed action and cumulative effects. NMFS then evaluated the likely responses of individuals, populations, and critical habitat. The *Integration and Synthesis* will consider all of these factors to determine the proposed action's influence on the likelihood of both the survival and recovery of the species, and on the conservation value of designated critical habitat.

In order to estimate the risk to CCV steelhead and green sturgeon as a result of the proposed action, NMFS uses a hierarchical approach. The condition of the ESU or DPS is reiterated from the *Status of the Species* section of this BO. We then consider how the status of populations in the action area, as described in the *Environmental Baseline*, is affected by the proposed action. Effects on individuals are summarized, and the consequence of those effects is applied to establish risk to the diversity group, ESU, or DPS.

In designating critical habitat, NMFS considers the PBFs within the designated areas that are essential to the conservation of the species and that may require special management

considerations or protection. Such requirements of the species include, but are not limited to: (1) space for individual and population growth, and for normal behavior; (2) food, water, air, light, minerals, or other nutritional or physiological requirements; (3) cover or shelter; (4) sites for breeding, reproduction, or rearing offspring, and generally; and (5) habitats that are protected from disturbance or are representative of the historic geographical and ecological distributions of this species [see 50 CFR § 424.12(b)]. In addition to these factors, NMFS also focuses on the PBFs within the defined area that are essential to the conservation of the species. PBFs may include, but are not limited to, spawning sites, food resources, water quality and quantity, and riparian vegetation.

The basis of the “destruction or adverse modification” analysis is to evaluate whether the proposed action results in negative changes in the function and role of the critical habitat in the conservation of the species. As a result, NMFS bases the critical habitat analysis on the affected areas and functions of critical habitat essential to the conservation of the species, and not on how individuals of the species will respond to changes in habitat quantity and quality.

Range-wide status of the Species

According to the NMFS 2016, 5-year species status review, the status of CCV steelhead appears to have changed little since the 2011 status review that concluded that the DPS was in danger of extinction. According to the NMFS 2015, 5-year species status review, some threats to the sDPS green sturgeon have recently been eliminated, such as take from commercial fisheries and removal of some passage barrier, but the species viability continues to be constrained by factors such as a small population size, lack of multiple populations, and concentration of spawning sites into just a few locations. The species continues to face a moderate risk of extinction.

Environmental Baseline

The environmental baseline describes the status of listed species and critical habitat in the action area, to which we add the effects of the proposed erosion repair, to consider the effects of the proposed Federal actions within the context of other factors that impact the listed species. The effects of the proposed Federal action are evaluated in the context of the aggregate effects of all factors that have contributed to the status of listed species and, for non-Federal activities in the action area, those actions that are likely to affect listed species in the future, to determine if implementation of the proposed erosion repair is likely to cause an appreciable reduction in the likelihood of both survival and recovery or result in destruction or adverse modification of critical habitat.

The evidence presented in the Environmental Baseline section indicates that past and present activities within the San Joaquin River basin have caused significant habitat loss, degradation, and fragmentation. This has significantly reduced the quality and quantity of the remaining freshwater rearing sites and the migratory corridors within the lower valley floor reaches of the San Joaquin River for the populations of CV steelhead and the Southern DPS of North American green sturgeon that utilize this area. Alterations in the geometry of the San Joaquin River system, removal of riparian vegetation and shallow water habitat, construction of armored levees for flood protection, changes in river flow created by demands of water diverters, and the influx of

contaminants from agricultural and urban dischargers have also substantially reduced the functionality of the waterways.

Cumulative Effects

NMFS staff are unaware of any future activities that are both within the Action Area and do not involve Federal activities.

Interrelated and Interdependent Effects

NMFS staff are unaware of any interrelated or interdependent effects associated with the proposed action.

Summary of the Effects of the Proposed Action

The proposed action has the potential to result in adverse effects to individuals and critical habitat and from both construction and changes to habitat conditions. The effects analysis determined that construction related impacts to individuals are unlikely because either the fish were not likely to be present due to their season migration patterns or that they would be present in such low numbers that they were extremely unlikely to be affected by construction activities.

The placement of RSP will increase predation habitat and the removal of riparian vegetation will reduce cover and allochthonous input which will cause harm to individuals by increasing the likelihood of injury and death from habitat modifications at the repair site that reduce the quantity and quality of rearing habitat and by creating habitat conditions that increase the likelihood of predation for up to 50 years.

Adverse impacts to critical habitat are expected because the action will permanently replacing up to 0.09 of natural bank with RSP that will be placed below the OHWM. Impacts to critical habitat affect rearing and migration PBF's by reducing in-stream cover, food production, and the quality of sediment that allows for normal physiological and behavioral responses to the environment.

The proposed action also includes the beneficial effects of conservation/mitigation bank credits from a NMFS-approved bank. The purchase of bank credits will provide benefits to listed species that would not otherwise exist.

The purchase of off-site mitigation alone is not sufficient to adequately compensate for impacts to listed species. The purchase of credits at a mitigation bank would occur prior to or concurrently with implementation of the proposed action. Credits are being purchased to mitigate for habitat loss below the OHWM and not for habitat loss that also occurs in the action area in critical habitat above the OHWM. The conversion of 0.16 acres of scrub-shrub and 0.20 acres of riparian forest, including a large mature oak with a 2,000 square foot canopy cover to hardscape in the form of RSP negatively impacts PBF's along a valuable, central, and directly utilized migration corridor. These permanent impacts only represent a small loss in the scope of the available habitat, but the high intrinsic conservation value of the area means this loss will be

detrimental for the listed species that use the action area. We expect the Project's impacts to the quantity and availability of critical habitat PBFs in this reach of the river to impact the current function of the action area and affect its ability to reestablish essential features that have been impacted by past and current actions.

NMFS Recovery Plan

The NMFS recovery plan for salmonids proposes actions to be taken on the San Joaquin River to enhance fish habitat and fish passage. Two of these actions relevant to the proposed action are (1) Compile available data and/or conduct new habitat analyses to determine if instream cover is lacking in the San Joaquin River, and add instream cover as necessary; and (2) Implement habitat enhancement or augmentation actions designed to minimize predation on CCV steelhead in the San Joaquin River. The proposed Project reduces instream cover by removing woody shrubs and a large oak tree located in critical habitat of CCV steelhead and sDPS Green Sturgeon. It also fails to minimize predation where it reduces natural cover and replaces it with hardscape that serves as predator habitat.

Summary

The number of individual fish that are expected to be exposed to adverse effects is expected to be a small number, and a very small proportion of the ESA listed anadromous fish populations that utilize the San Joaquin River Basin. Based on our analysis of available evidence, the adverse effects that are anticipated to result from the proposed action are not the type or magnitude that are expected to appreciably reduce the likelihood of both the survival and recovery of the CCV steelhead DPS, nor the southern DPS of North American green sturgeon. To mitigate the effects of the Project the proposed action includes purchase of mitigation bank credits at a 3:1 ratio for permanent impacts to stream and riparian habitats below the OHWM. Although there are localized impacts to rearing and migration PBF's, across the full breath of the critical habitat of these listed species, the project is not likely to diminish the conservation value. With the measures included in the proposed action to protect fish and designated critical habitat, and purchase mitigation credits, the adverse effects to individuals, populations, and designated critical habitat are not expected to reduce appreciably the likelihood of either the survival and recovery of a 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.

2.7 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, any effects of interrelated and interdependent activities, and cumulative effects, it is NMFS' BO that the proposed action is not likely to jeopardize the continued existence of CCV steelhead and sDPS green sturgeon or destroy or adversely modify designated critical habitat of these species.

2.8 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.

2.8.1 Amount or Extent of Take

NMFS anticipates incidental take of ESA listed anadromous fish with this proposed action. Specifically, NMFS anticipates that ESA listed anadromous fish may be harmed as a result of significant habitat impacts that will increase the likelihood of injury and death from habitat modifications at the repair site that reduce the quantity and quality of rearing habitat and by creating habitat conditions that increase the likelihood predation.

It is impossible to precisely quantify and track the amount or number of individuals that are expected to be incidentally harmed as a result of the proposed action due to the varying population size (annually and seasonally), annual variations in the timing of spawning and migration, variation in individual habitat use with the Action Area, and difficulty in making observations of injured or dead fish. However, it is possible to estimate the extent of incidental take here by designating an ecological surrogate, an element of the Project that is expected to be representative of anticipated incidental take. The surrogate is predictable and measurable, and provides for the ability to monitor, to determine the extent of take that is occurring. The ecological surrogate for incidental take associated with the action is the permanent habitat alteration associated with the RSP introduced into the river and the degradation of riparian vegetation where migrating and rearing juveniles of the species exist within the footprint of the proposed action and the area of RSP placement.

The following levels of incidental take are anticipated:

Take in the form of harm to juvenile CCV steelhead and sDPS green sturgeon resulting from the reduction in the quality and quantity of habitat features along the 0.35 acres (280 linear feet) of shoreline, 0.09 acres below the OHWM and 0.26 acres above the OHWM, impacted by the repair for a period of up to 50 years.

2.8.2 Effect of the Take

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

2.8.3 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). NMFS has determined that the following reasonable and prudent measures (RPMs) are necessary and appropriate to minimize the incidental take of listed CCV steelhead and Southern DPS of North American green sturgeon resulting from the emergency repair and proposed Project activities. These reasonable and prudent measures also would minimize adverse effects on designated critical habitat.

The measures described below are non-discretionary, and must be undertaken by the Corps so that they become binding conditions of any contracts or permits, as appropriate, for the exemption in section 7(o)(2) to apply. The Corps has a continuing duty to regulate the activity covered by this incidental take statement. If the Corps (1) fails to assume and implement the terms and conditions or (2) fails to require its contractor(s) to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the Corps must report the progress of the action and its impact on the species to NMFS as specified in the incidental take statement (50 CFR§402.14(i)(3)).

1. Measures shall be taken to minimize the effects of harm from installing RSP above and below the OHWM and from removing native riparian vegetation.
2. Prepare and provide NMFS with plan(s) and report(s) describing how listed species in the action area would be protected and/or monitored and to document the effects of the action on listed species in the action area.

2.8.4 Terms and Conditions

The terms and conditions described below are non-discretionary, and the Corps or any applicant must comply with them in order to implement the reasonable and prudent measures (50 CFR 402.14). The Corps or any applicant has a continuing duty to monitor the impacts of incidental take and must report the progress of the action and its impact on the species as specified in this incidental take statement (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. Measures shall be taken to minimize the effects of harm from installing RSP above and below the OHWM and from removing native riparian vegetation
 - a. The Corps shall include in any permit or letter of permission, a requirement that the mature oak shall either be protected and preserve in-place using or retained onsite once removed and anchored into the bank in the Project area to create fish habitat. Any such measure shall be presented to NMFS for concurrence prior to Project implementation.
 - b. The Corps shall include in any permit or letter of permission, a requirement that the applicant include a mix of agricultural grade soil with rocks at a 70% rock/30% soil ratio above the OHWM and cover rock with an additional 6-12 inches of agricultural soil. The applicant shall also revegetate the site with native grasses and small native shrubs, consistent with any Corps flood manual, to restore onsite riparian habitat. The revegetation plan shall be submitted to NMFS for concurrence prior to Project implementation.
 - c. The Corps shall include in any permit or letter of permission a requirement that the applicant provide to NMFS proof of purchase of mitigation bank credits.
2. Measures shall be taken to prepare and provide NMFS with plan(s) and report(s) describing how listed species in the action area would be protected and/or monitored and to document the effects of the action on listed species in the action area.
 - a. Measures shall be taken to maintain, monitor, and adaptively manage all conservation measures throughout the life of the Project to ensure the riparian vegetation is established, and that the IWM installation is successful.
 - b. The Corps shall provide Project summary and compliance report to NMFS within 30 days of completion of construction. This report shall describe construction dates, implementation of proposed Project conservation measures, and the terms and conditions of the final BO; observed or other known effects on CCV steelhead or Southern DPS of North American green sturgeon, if any; and any occurrences of incidental take of the CCV steelhead or Southern DPS of North American green sturgeon.

Updates and reports required by these terms and conditions shall be submitted to:

Maria Rea
Sacramento Area Office
National Marine Fisheries Service
650 Capitol Mall, Suite 5-100
Sacramento CA 95814-4607
FAX: (916) 930-3629
Phone: (916) 930-3600

2.9 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 support and promote aquatic and riparian habitat restoration within the San Joaquin River watershed, and encourage practices that avoid or minimize negative impacts to salmon, steelhead, and green sturgeon.
2. The Corps should support listed anadromous fish monitoring programs throughout the San Joaquin River watershed and Delta to improve the understanding of migration and habitat utilization by salmonids and green sturgeon in this region.
3. The Corps, under the authority of section 7 (a)(1) of the ESA, should implement recovery and recovery plan-based actions within and outside of traditional flood damage reduction Projects. Such actions may include, but are not necessarily limited to restoring natural river function and floodplain development.
4. The Corps should make set-back levees an integral component of the Corps authorized bank protection or ecosystem restoration efforts.
5. The Corps should ensure onsite mitigation is being completed to minimize the placement of uncovered hardscape on levee walls.

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

2.9 Reinitiation of Consultation

This concludes formal consultation for the Kasson District Erosion Repair.

As 50 CFR 402.16 states, reinitiation of formal consultation is required 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 incidental take statement 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 agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in this 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 CONSULTATION

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 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 descriptions of EFH for Pacific coast salmon (PFMC 1999) contained in the fishery management plans developed by the Pacific Fishery Management Council and approved by the Secretary of Commerce.

3.1 Essential Fish Habitat Affected by the Project

EFH designated under the Pacific Coast Salmon Fisheries Management Plan (FMP) may be affected by the Proposed Action. Additional species that utilize EFH designated under this FMP within the Action Area include fall-run/late fall-run Chinook salmon. Habitat Areas of Particular Concern (HAPCs) that may be either directly or indirectly adversely affected include (1) complex channels and floodplain habitats, (2) thermal refugia.

3.2 Adverse Effects on Essential Fish Habitat

Construction activities would result in increased sedimentation, turbidity, and the potential for contaminants to enter the waterway. Installation of revetment would result in adverse effects to Pacific coast salmon EFH due to losses of riparian habitat and natural substrate. Effects to the HAPCs listed in Section 3.1 are discussed in context of effects to critical habitat PBFs as designated under the ESA. Effects to ESA-listed critical habitat and EFH HAPCs are appreciably similar, therefore no additional discussion is included. A list of temporary and permanent adverse effects to EFH HAPCs is included in this EFH consultation. Affected HAPCs are indicated by number, corresponding to the list in Section 3.1:

Sedimentation and Turbidity
Reduced habitat complexity (1)
Degraded water quality (1, 2)
Reduction in aquatic macroinvertebrate production (1)
Contaminants and Pollution-related Effects
Degraded water quality (1, 2)
Reduction in aquatic macroinvertebrate production (1)
Installation of Revetment

Permanent loss of natural substrate at levee toe (1)
Reduced habitat complexity (1)
Increased bank substrate size (1)
Increased predator habitat (1)
Removal of Riparian Vegetation
Reduced shade (2)
Reduced supply of terrestrial food resources (1)
Reduced supply of IWM (1)

The terms and conditions and conservation recommendations in the preceding BO contain adequate measures to avoid, minimize, or otherwise offset the adverse effects to EFH. Therefore, NMFS has no additional EFH conservation recommendations to provide.

3.3 Supplemental Consultation

The Corps must reinitiate EFH consultation with NMFS if the proposed action is substantially revised in a way that may adversely affect EFH, or if new information becomes available that affects the basis for NMFS' EFH Conservation Recommendations (50 CFR 600.920(1)).

4 DATA QUALITY ACT DOCUMENTATION AND PRE-DISSEMINATION REVIEW

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

4.1 Utility

Utility principally refers to ensuring that the information contained in this consultation is helpful, serviceable, and beneficial to the intended users. The intended user of this opinion is the Corps. Other interested users could include United States Fish and Wildlife Service, California Department of Fish and Wildlife Service, Reclamation district 2085. Individual copies of this opinion were provided to the Corps. This opinion will be posted on the Public Consultation Tracking System web site (<https://pcts.nmfs.noaa.gov/pcts-web/homepage.pcts>). 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.

5 REFERENCES

- Burgess, W. C. and S. B. Blackwell 2003. Acoustic Monitoring of Barrier Wall Installation at the Former Rhone-Poulenc Site, Tukwila, Washington. Santa Barbara, CA, RCI Environmental, Inc.: 31.
- California Data Exchange Center. Found at: <http://cdec.water.ca.gov/wquality>
- Cohen, S. J., K. A. Miller, A. F. Hamlet, and W. Avis. 2000. Climate Change and Resource Management in the Columbia River Basin. *Water International* 25(2):253-272.
- Dettinger, M. D. and D. R. Cayan. 1995. Large-Scale Atmospheric Forcing of Recent Trends toward Early Snowmelt Runoff in California. *Journal of Climate* 8(3):606-623.
- Good, T. P., et al. 2005. Updated Status of Federally Listed ESUs of West Coast Salmon and Steelhead. U.S. Department of Commerce: 637.
- McClure, M. 2011. Climate Change in Status Review Update for Pacific Salmon and Steelhead Listed under the Esa: Pacific Northwest., M. J. Ford, editor, NMFS-NWFCS-113, 281 p.
- McClure, M. M., M. Alexander, D. Borggaard, D. Boughton, L. Crozier, R. Griffis, J. C. Jorgensen, S. T. Lindley, J. Nye, M. J. Rowland, E. E. Seney, A. Snover, C. Toole, and V. A. N. H. K. 2013. Incorporating Climate Science in Applications of the U.S. Endangered Species Act for Aquatic Species. *Conservation Biology* 27(6):1222-1233.

- McEwan, D. R. 2001. Central Valley Steelhead. *Fish Bulletin* 179(1): 1-44.
- Nightingale, B. and Simenstad, C.A., 2001. Overwater structures: Marine issues (No. WA-RD 508.1.). Washington State Transportation Commission, Planning and Capital Program Management.
- PFMC (Pacific Fishery Management Council). 1998. Description and identification of essential fish habitat for the Coastal Pelagic Species Fishery Management Plan. Appendix D to Amendment 8 to the Coastal Pelagic Species Fishery Management Plan. Pacific Fishery Management Council, Portland, Oregon. December.
- PFMC. 1999. Description and identification of essential fish habitat, adverse impacts and recommended conservation measures for salmon. Appendix A to Amendment 14 to the Pacific Coast Salmon Plan. Pacific Fishery Management Council, Portland, Oregon. March.
- PFMC. 2005. Amendment 18 (bycatch mitigation program), Amendment 19 (essential fish habitat) to the Pacific Coast Groundfish Fishery Management Plan for the California, Oregon, and Washington groundfish fishery. Pacific Fishery Management Council, Portland, Oregon. November.
- PFMC. 2007. U.S. West Coast highly migratory species: Life history accounts and essential fish habitat descriptions. Appendix F to the Fishery Management Plan for the U.S. West Coast Fisheries for Highly Migratory Species. Pacific Fishery Management Council, Portland, Oregon. January.
- PFMC. 2008. Management of krill as an essential component of the California Current ecosystem. Amendment 12 to the Coastal Pelagic Species Fishery Management Plan. Environmental assessment, regulatory impact review & regulatory flexibility analysis. Pacific Fishery Management Council, Portland, Oregon. February.
- Thompson, L. C., M. I. Escobar, C. M. Mosser, D. R. Purkey, D. Yates, and P. B. Moyle. 2011. Water Management Adaptations to Prevent Loss of Spring-Run Chinook Salmon in California under Climate Change. *Journal of Water Resources Planning and Management* 138(5):465-478.
- U.S. Fish and Wildlife Service 2000. Endangered and Threatened Wildlife and Plants: Final Rule To List the Alabama Sturgeon as Endangered. *Federal Register* 65(88): 26437-26461.
- Wade, A. A., T. J. Beechie, E. Fleishman, N. J. Mantua, H. Wu, J. S. Kimball, D. M. Stoms, J. A. Stanford, and A. Punt. 2013. Steelhead Vulnerability to Climate Change in the Pacific Northwest. *Journal of Applied Ecology*:n/a-n/a.
- Williams, J. G. 2006. Central Valley Salmon: A Perspective on Chinook and Steelhead in the Central Valley of California. *San Francisco Estuary and Watershed Science* 4(3):416.