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

FEB 2 2017

Refer to NMFS No: WCR-2017-6273

Matthew Dekar
Deputy Project Leader
Lodi Fish and Wildlife Office
850 South Guild Avenue, Suite 105
Lodi, CA 95240-3170

Re: Endangered Species Act Section 7(a)(2) Biological Opinion, Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Response, and Fish and Wildlife Coordination Act Recommendations for the Hallwood Side Channel and Floodplain Restoration Project

Dear Mr. Dakar,

Thank you for your letter of October 13, 2016 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 Hallwood Side Channel and Floodplain Restoration Project.

This biological opinion (BO) is based on the final biological assessment, received by NMFS on October 18, 2016. 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 CCV spring-run Chinook salmon ESU, (*Oncorhynchus tshawytscha*), the threatened CCV steelhead DPS (*O. mykiss*) or the Southern DPS of the North American green sturgeon (*Acipencer medirostris*) and is not likely to destroy or adversely modify their designated critical habitats. NMFS has also 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. The United States Fish and Wildlife Service (USFWS) serves as the lead Federal Action Agency for the Proposed Project.

This consultation covers the effects of the construction of the Proposed Project. The effects of collecting and handling of fish during pre-project monitoring has already been analyzed under ESA 4(d) research authorization 19762. Post-project monitoring will be covered under future 4(d) research authorization.

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), including conservation recommendations. 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 and has included recommendations.

The United States Fish and Wildlife Service 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 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, USFWS 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, USFWS must explain its reasons for not following the recommendations, including the scientific justification for any disagreements with NMFS over the anticipated effects of the Proposed Action and the measures needed to avoid, minimize, or mitigate such effects.

Because the Proposed Action will modify a stream or other body of water, NMFS also provides recommendations and comments for the purpose of conserving fish and wildlife resources under the Fish and Wildlife Coordination Act (16 U.S.C. 662(a)).

Please contact Tancy Moore in NMFS' WCR CCVAO at (916) 930-3605 or via email at Tancy.Moore@noaa.gov if you have any questions concerning this section 7 consultation, or if you require additional information.

Sincerely,

for Maria Rea

Barry A. Thom
Regional Administrator

Enclosure

CC: California Central Valley
Division Chron File: 151422-WCR2017-SA00307

Ms. Elizabeth Campbell, Ph.D., United States Fish and Wildlife Service, Anadromous Fish Restoration Program, 850 S. Guild Avenue, Suite 105, Lodi, California 95240

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

Hallwood Side Channel and Floodplain Restoration Project

NMFS Consultation Number: **WCR-2017-6273**

Action Agency: United States Fish and Wildlife Service

Affected Species and NMFS' Determinations:

ESA-Listed Species	Status	Is Action Likely to Adversely Affect Species?*	Is Action Likely to Affect Critical Habitat?	Is Action Likely To Jeopardize the Species?	Is Action Likely To Destroy or Adversely Modify Critical Habitat?
California Central Valley steelhead (*Oncorhynchus mykiss*)	Threatened	Likely	No	No	No
California Central Valley spring-run Chinook salmon (*O. tshawytscha*)	Threatened	Likely	No	No	No
Green Sturgeon (*Acipencer medirostris*)	Threatened	Likely	No	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:

Barry A. Thom
Regional Administrator

Date: FEB 2 2017

LIST OF ACRONYMS

ACID – Anderson-Cottonwood Irrigation Dam
AFRP – Anadromous Fish Restoration Program
BA – biological assessment
BMPs – best management practices
BO – biological opinion
cbec – cbec eco engineering, inc.
CCV – California Central Valley
CDFG – California Department of Fish and Game (now CDFW)
CDFW – California Department of Fish and Wildlife
CEPA – California Environmental Protection Agency
CFR – Code of Federal Regulations
cfs – cubic feet per second
Coleman NFH – Coleman National Fish Hatchery
CVPIA – Central Valley Project Improvement Act
DPS – distinct population segment
DQA – Data Quality Act
EFH – essential fish habitat
EPA – Environmental Protection Agency
ESA – Endangered Species Act
ESU – evolutionarily significant unit
FMP – Fisheries Management Plan
FR – Federal Register
FRFH – Feather River Fish Hatchery
ft – feet
FWCA – Fish and Wildlife Coordination Act
HAPCs – habitat areas of particular concern
IPCC – Intergovernmental Panel on Climate Change
ITS – incidental take statement
lat/long – latitude/longitude
m – meter
mm – millimeter
MSA – Magnuson-Stevens Fishery Conservation and Management Act
NMFS – National Marine Fisheries Service
NOAA – National Oceanic and Atmospheric Administration
NTU – nephelometric turbidity unit
PBF – physical or biological feature
PCE – primary constituent element
PFMC - Pacific Fishery Management Council
RPM – Reasonable and Prudent Measure
sDPS – southern distinct population segment
SWPPP – Stormwater Pollution Prevention Plan
TRT – Technical Review Team
USFWS – U.S. Fish and Wildlife Service
USGS – U.S. Geological Survey

VSP – viable salmonid population
YCWA – Yuba County Water Agency
Yuba RMT – Yuba Accord River Management Team

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INTRODUCTION

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

1.1 Background

The National Marine Fisheries Service (NMFS) prepared the biological opinion (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.

Because the Proposed Action would modify a stream or other body of water, NMFS also

We completed pre-dissemination review of this document using standards for utility, integrity, and objectivity in compliance with applicable guidelines issued under the Data Quality Act (DQA) (section 515 of the Treasury and General Government Appropriations Act for Fiscal Year 2001, Public Law 106-554). The document will be available through NMFS' Public Consultation Tracking System https://pcts.nmfs.noaa.gov/pcts-web/homepage.pcts. A complete record of this consultation is on file at the NMFS California Central Valley Area Office.

1.2 Consultation History

- On June 10, 2016, NMFS received a preliminary draft of the biological assessment (BA) for the Proposed Project on as part of pre-consultation coordination. Listed species and critical habitats in the Action Area include California Central Valley steelhead and their critical habitat; California Central Valley spring-run Chinook salmon and their critical habitat; and the Southern DPS of North American green sturgeon and their critical habitat.
- On June 17, 2016, NMFS attended a pre-consultation coordination meeting with representatives of the Anadromous Fish Restoration Program, the project design team, and the California Department of Fish and Wildlife to discuss the draft BA.
- On October 18, 2016, NMFS received a consultation initiation request and final BA from the United States Fish and Wildlife Service (USFWS) for the Proposed Project.
- On October 18, 2016, NMFS initiated formal ESA Section 7 consultation.
- On December 20, 2016, the Army Corps of Engineers designated USFWS as the lead Federal agency to act on their behalf for purposes of compliance with Section 7 of the Endangered Species Act (ESA).

1.3 Proposed Federal Action

"Action" means all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by Federal agencies (50 CFR 402.02). The Hallwood Side Channel and Floodplain Restoration Project is designed to restore and enhance ecosystem processes with a primary focus on improving productive juvenile salmonid rearing habitat to increase natural production of fall- and spring-run Chinook salmon (*Oncorhynchus tshawytscha*) and California Central Valley (CCV) steelhead (*O. mykiss*) in the lower Yuba River. The Proposed Project will enhance habitat complexity through increases in floodplain, side channel, and alcove habitat as well as the addition of large woody debris in strategic locations. Funding for design, permitting, construction, and monitoring is provided by the USFWS Anadromous Fish Restoration Program (AFRP) as authorized by several Federal and state legislative acts including the Central Valley Project Improvement Act (CVPIA) and the Fish and Wildlife Coordination Act. USFWS serves as the lead Federal action agency for this consultation.

The project will be implemented on private land near the town of Marysville, California, and it encompasses a 2.1-mile segment of the Yuba River approximately 9.3 miles upstream from the confluence with the Feather River at Lat/Long 39.201725, -121.461517. The current alignment of the Yuba River delineates the southern boundary of the Proposed Project. Within the Proposed Project boundary the Yuba River is laterally constrained by tall linear cobble embankments (also known as "training walls") constructed by hydraulic dredges, with an additional large linear cobble embankment (middle training wall) located in the middle of the flood corridor running the length of the project.

The Proposed Project has the potential to enhance/create up to 160 acres of improved seasonally-inundated riparian floodplain habitats, nearly 3 miles of perennial side and alcove channels, and up to 4 miles of seasonal side channels. Proposed habitat enhancement actions include significant and extensive topographic modifications, strategic riparian plantings, the placement of large woody material/structures, and the construction of other micro-habitat complexity features. Topographic modifications include the removal of large portions of the middle training wall; the conversion of deep/isolated pools into shallow, well-connected alcove and slough channels; the lowering of floodplain elevations; and the enhancement/expansion of a network of perennially and seasonally inundated side channels. The spatial extents of the topographic modifications (grading limits) were designed to target the existing swaths of largely disconnected and mostly barren cobble fields and improve the connectivity of the existing floodplain habitats. These topographic modifications were designed to increase the frequency, duration, extent, and suitability of inundated habitat during the period juvenile Chinook salmon and steelhead are expected to rear.

A detailed monitoring plan has been developed for the Proposed Project, with the primary goal of defining the current state of the system before restoration and determining whether the implemented project had the desired effect on target species and overall system health. The monitoring program consists of four conceptual approaches to monitoring: 1) pre-project site description, 2) implementation, 3) effectiveness, and 4) validation. Implementation monitoring will determine if the project was installed according to the design standards. Hydrology, topography/bathymetry, sediment dynamics, and vegetation will be assessed. The effectiveness monitoring will determine if the project was effective in meeting target physical and biological objectives. Validation monitoring will be conducted to validate the underlying assumptions of the restoration work and determine if restoration projects, like the Proposed Project, recover productive habitat that promotes juvenile salmonid growth and riparian vegetation recruitment. A range of physical and biological traits will be tracked before and after restoration to assess ecosystem function. All pre-project monitoring involving the collection and handling of ESA-listed fish managed by NMFS has already been analyzed under ESA 4(d) research authorization 19762. Post-project monitoring involving the potential take of listed fish will be covered under future 4(d) research authorization.

If subsurface conditions warrant, lowered floodplain areas may be texturally modified in specific areas to increase the content of fine-grained sediment (using imported, weed-free topsoil) in order to support more rapid natural recruitment and the establishment of native riparian plant species. Topsoil will be imported from off-site to eliminate the possibility of water contamination from mercury sequestered on-site from historical mining activity. Riparian planting will be conducted in some areas where natural recruitment cannot sufficiently vegetate the area, and existing riparian vegetation stands will be preserved as much as possible. Large wood material will be installed, providing a variety of geomorphic functions including scour protection, scour enhancement, sediment deposition and sorting, as well as habitat functions including structural cover and velocity refuge.

1.3.1 Primary Side Channel

The Proposed Project centers around the creation of a 2.5-mile-long, gradually meandering primary side channel surrounded by a wide corridor of gently-sloped, seasonally-inundated riparian habitats. The primary side channel begins just upstream of the eastern end of the middle training wall and continues to the western end of the middle training wall where the deep backwater pond (sometimes called the "Blue Lagoon") connects to the main channel of the lower Yuba River. The sectional design geometry of the primary side channel is planned as a combination of three different functional elements:

- ***Low Flow Channel*** - a relatively narrow, un-vegetated, perennial (groundwater fed), base flow channel with an undulating longitudinal profile that creates the vertical basis for pool/riffle flow patterns, habitat complexity, and overbank connectivity.
- ***Normal Flow Channel*** - a slightly larger, also un-vegetated, 'normal' flow channel with a conveyance capacity set just below the average monthly flow observed in most years between January and June (approximately 2,000 cfs), with broad, gently-sloped, tapered benches at riffle sections and smaller benches on the inside of the meander bends.
- ***Riparian Corridor*** - a wide, frequently inundated, vegetated corridor with strategically undulating width aimed at providing extensive, off channel rearing habitat at the full range of ecological flows (2,000 cfs to 10,000 cfs) and to provide the geomorphic valley expansion/constriction sequence understood to help support and maintain long-term channel form.

The primary side channel was designed as a patterned sequence of deeper and narrower areas (pool habitats) followed by wider and shallower areas (riffle habitats) imitative of natural, valley-constrained gravel bed river forms. This design pattern extends upward and outward into the design grading of the surrounding higher floodplain areas. A brief description of the geometric and hydrologic considerations for the three components of the primary side channel is provided below.

Low Flow Channel

During base flow conditions, when the total flow in the lower Yuba River downstream of Daguerre Point Dam is around 500 to 800 cfs, the primary side channel will not exhibit a direct surface connection to the main river at the upstream connection. Flows below this level occur in most years from July – November, corresponding to the latter portion of the adult spring-run Chinook salmon upstream migration (immigration) period and the beginning and middle of fall-run Chinook salmon immigration. During this period there is a focus on providing for deeper, colder, in-channel habitats when it is not desirable to spread out the limited surface water flows. However, with the objective of reducing the likelihood of a completely dry channel, to limit the potential for juvenile stranding, and to encourage a healthy vegetation community and beneficial riparian habitats, the primary side channel includes an inset, lightly-meandering, low flow channel. Designed to be slightly (6 inches to 3 feet) below groundwater levels as observed during base flow conditions, the low flow channel varies in width and elevation to allow for perennial, groundwater-fed, trickle flows through a series of shallow riffle habitats separated by deeper pool and glide habitats. Initial calculations for just the portion of the channel area below the elevation of the base flow water table, suggest this trickle flow could be on the order of 10 to 20 cfs. The channel design geometry creates pool water depths of up to 2-3 feet at these trickle flows and provides habitat that may potentially support extended juvenile salmonid rearing without providing ideal habitat for predatory and invasive species that are known to use and profit from deeper water.

At the downstream end, trickle flows returning to the main river are not anticipated to create significant attraction flows for upstream migrating adult salmonids. At the upstream end, flow between the low flow channel and the main river channel will be only through the subsurface.

Normal Flow Channel

Surrounding the lightly meandering, low flow channel, the primary side channel incorporates a wider, un-vegetated, normal flow channel with gradually sloped, alternating inset benches at riffle features and at the inside of meander bends. The normal flow channel is aimed at just barely conveying the ‘normal’ or average monthly winter flows with velocities and depths suitable for juvenile salmonid rearing habitat with the idea that each event within a winter period would push flow up out of the normal flow channel and into the surrounding habitat.
A statistical analysis of flow records that incorporates upstream reservoir management operations indicated that lower Yuba River flows are expected to exceed 2,000 cfs for a duration of 21 days in 2 out of 3 years. Though the ideal duration of floodplain inundation to benefit salmonid rearing is still under study and appears to be highly location specific, studies on the Lower American River suggest that floodplain invertebrate densities can approach main channel

densities after 2 to 4 weeks [Cramer Fish Sciences, unpublished data]. A three-week inundation duration has the potential to provide significant benefits to juvenile salmonids by providing additional food resources and increasing diverse off-channel habitats for rearing (Merz *et al.* 2015, Sellheim *et al.* 2016). This inundation frequency (2 out of 3 years) aims to provide benefits to each year-class based on the observation that most Central Valley salmonid adults return to spawn after three years (range 2-5 years; Moyle *et al.* 2015).

Riparian Corridor

The design of the primary side channel also includes a wider expanse of seasonally inundated riparian corridor lining both sides of the normal flow channel. The riparian corridor was designed with variable width and slope to optimize the suitable rearing habitat acreage and depth/velocity conditions created at the targeted range of ecological flows (from 2,000 cfs to about 10,000 cfs). The grading provides positive drainage back to the normal flow channel but uses variable width/elevation (and microhabitat features, e.g. large woody material) to achieve a diversity of edge habitat and to support geomorphic maintenance of channel features. Though variable and strategically shaped to avoid impacts to existing riparian vegetation, the riparian corridor of the primary side channel forms an uninterrupted feature from the upper end of the reach at the connection to the main river channel to the downstream end at the confluence with the main channel. The elevation range of the vegetated terraces was designed to provide reasonable depths to groundwater (1 to 4 ft) for vegetation throughout the drier summer months.

1.3.2 Alcove Channels

Within the established riparian areas of the floodplain to the north and south of the primary side channel, the Proposed Project also includes a series of alcove channels branching back upstream from the primary side channel. The alcove channels will be strategically aligned (and field-fitted as conditions warrant) so as to avoid impacts to mature vegetation, while also taking advantage of the habitat benefits they offer when located adjacent to and overhanging a small channel. These alcove channels are designed as slow (slackwater) extensions of the swifter aquatic habitat created by the primary side channel. The design includes approximately 2.9 miles of these alcove and alcove-spur channels at eighteen different locations along the primary side channel. These alcove channels are envisioned as narrow (4 to 8 feet bottom width), lightly meandering, shallow-water (less than 4 feet deep under normal conditions). Such habitat is meant to increase water residence time supporting increased primary and secondary production and optimal salmonid rearing depths, velocities, and temperatures (Gard 2006, Sellheim *et al.* 2016). Channel bottom elevations vary (generally within a foot or two of the observed groundwater table elevations) to provide both perennial and seasonal channels within the ecological flow ranges. At higher flows, these alcove channels are anticipated to alleviate flows along the training walls by helping gather and re-direct floodplain waters back into the primary side channel. Slopes were developed to provide positive drainage downstream that support an egress route during the receding limb of the hydrograph.

1.3.3 Seasonal Side Channels

In the areas currently occupied by the middle training wall and the barren cobble bars to the south, the Proposed Project includes wide swaths of vegetated floodplain interspersed with an extensive network of seasonal side channels. These side channels are designed to provide a substantial acreage of suitable salmonid rearing habitat within the reach during the full range of ecological flows. These side channels are also anticipated to provide a number of geomorphic and hydraulic benefits by providing secondary flow pathways from the main channel to the primary side channel and by alleviating higher-velocity areas of the main channel. Like the alcove channels, these seasonal side channels are relatively narrow flow pathways. They will provide rearing salmonids access to surrounding riparian areas with shallow floodplain inundation at the beginning of a runoff event, and then provide a natural floodplain drainage point and egress route during the receding limb of the hydrograph. Riparian plantings and woody debris will be focused on these seasonal side channels and surrounding areas since, unlike the alcove channels, the seasonal side channels will not immediately benefit from existing vegetation stands and will need to rely on plantings and natural recruitment (Sellheim *et al.* 2016).

1.3.4 Vegetated Floodplain

Surrounding the seasonal side channels and other habitat features, the Proposed Project will create large swaths of gently-graded, vegetated floodplain habitats. Designed to provide a variety of different inundation regimes ranging from frequent annual events up to more infrequent events occurring only once every few years, these vegetated floodplains will exhibit shallow, low velocity, pro-longed flooding during ecological flow events which are associated with increased benthic production. While riparian areas adjoining the primary side channel are well-characterized as a riparian corridor, these vegetated floodplains are more expansive, globular areas characterized by a wider range of elevations, more spatial variability, and larger horizontal distances from active channels. Riparian planting of Fremont cottonwood (*Populus fremontii)* and willow (*Salix* spp.) pole cuttings will be strategically employed within certain subsets of these floodplain areas to hasten floodplain soil development and natural vegetation recruitment.

1.3.5 Uplands

The Proposed Project calls for several key portions of the middle training wall to remain largely unmodified. This is chiefly to allow for continued geomorphic resistance to significant lateral channel bend migrations in the main river and to avoid increasing the existing risk to the important power transmission tower located on the middle training wall towards the western end of the site. While these elevated areas may provide some flood refugia during large events for terrestrial species, these upland areas will likely remain as un-vegetated, steeply-sloped cobble areas. Additional areas along the north side of the middle training wall will remain in place as a series of upland mounds to provide additional flood habitat refugia and to avoid impacts to existing elderberry shrubs which have become established along the toe of the slope.

1.3.6 North Training Wall Improvements

The Proposed Project is first and foremost a salmonid habitat restoration and enhancement project. All of the proposed site modifications are actions meant to create suitable habitat for rearing salmonids and the restoration of the natural floodplain processes that allow these habitats to evolve over time. An engineering analysis of hydrodynamic simulations of various flood flows also indicates that the Proposed Project, by reducing flood flow velocities across the reach for the largest flood events, lowers the existing risk posed to the north training wall and the reclaimed ponds to the north. However, since the ecological importance of the restored reach is anticipated to increase significantly with the creation of the side channels and extensive off-channel habitats, it may also be reasonable to provide an additional level of protection through some targeted improvements to the north training wall. The Proposed Project may therefore include earthwork activities at the eastern end of the north training wall (largely limited to the north side of the wall) to increase the height and width of the cobble mound if hydraulic studies indicate this is merited and project funds allow.

1.3.7 Construction Planning

The Proposed Project involves the offsite removal of approximately 3.2 million cubic yards of hydraulic dredging material from the river corridor (the bulk of the middle training wall), a significant amount of cut/fill work, and the re-contouring of over 160 acres. This large volume of material and extensive site work will require a phased construction approach that is anticipated to occur over at least three years. Several front-end loaders (using vegetable oil lubricant) and conveyor belts will be utilized to move the gravel and sediment material.

Phase 1 of the Proposed Project is expected to be completed in one year and is limited to the area between the middle and north training walls and the topographical improvements at the inlet to the primary side channel. Phase 1 involves the removal of approximately 340,000 cubic yards of material, enhances approximately 70 acres of floodplain habitat, and creates nearly three miles of perennial side and alcove channels. This portion of the work is prioritized as it creates the largest acreage of enhanced salmonid rearing habitat with the least amount of earthwork. This may also allow for any lessons learned to be developed into design refinements to the Phase 2 portion of the work.

Phase 2 involves much larger quantities of earthwork and will need to occur over several years. This phase addresses the portion of the work between Phase 1 and the main channel of the Yuba River. This Phase involves the removal of approximately 200,000 cubic yards of material from the mostly barren portions of the existing point bars on the north side of the Yuba River main channel, and the removal of approximately 2,660,000 cubic yards of material from the middle training wall. This phase will be subdivided into smaller areas so that at the close of each seasonal work period, the site is left in a suitable condition for the winter season.

Phase 2 work will also require the construction of a temporary crossing to allow equipment to access the southern portion of the site. The temporary stream-crossing to allow for Phase 2 construction activities will use either a full-spanning bridge (over the perennial side channel created in Phase 1) or a pair of culverts sized to accommodate fish passage during the range of flows present during the in-water work period, consistent with current NMFS culvert design guidance. Fish exclusion (described below) will be conducted prior to crossing placement and removal. The temporary crossing will be removed prior to the end of the in-water work window. Some larger cobbles will likely need to be imported back to the Proposed Project site from the Teichert Aggregates Hallwood Processing Plant to form the riffle crests within the primary side channel.

Most work will be conducted on the dry floodplain. Any excavation adjacent to the main Yuba river channel (e.g., to connect a side channel) or to enhance an existing wetted side channel will be conducted during an appropriate summer work window (e.g., July 15 – October 31), and the area will be surveyed in advance to ensure species listed under the ESA or other sensitive species are not present.

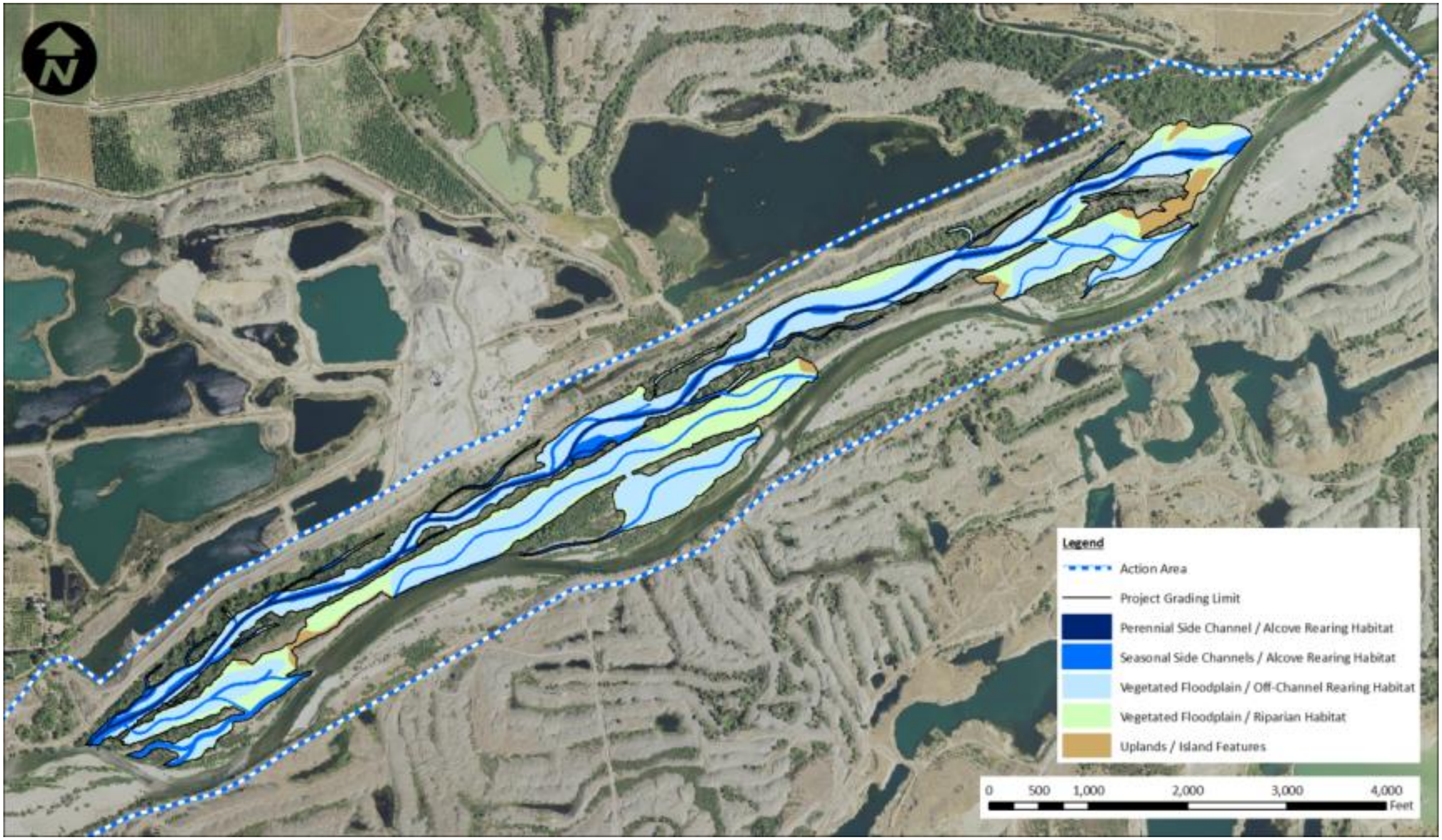

Figure 1. Enhanced floodplain and side channel habitats of the Proposed Project. Source: Hallwood Side Channel and Floodplain Restoration Project Biological and Essential Fish Habitat Assessment, prepared by Cramer Fish Sciences.

1.3.8 Avoidance and Mitigation Measures

Construction will be limited to a work window of April 16 – October 31, with an in-water construction window of July 15 – October 31. Best Management Practices (BMP's) will be developed in conjunction with the Stormwater Pollution Prevention Plan (SWPPP), and will include measures to ensure safety and minimize adverse impacts related to construction activities. The construction crew will adhere to these at all times.

Water Quality

Erosion control measures will be implemented as appropriate to prevent sediment from entering surface waters, agricultural water features, and storm drains to the extent feasible, including the use of silt fencing or fiber rolls to trap sediments and erosion control blankets on exposed slopes. Spoil sites will be graded and stabilized to minimize erosion and sediment input to surface waters and generation of airborne particulate matter. All construction work will be conducted in accordance with site-specific construction plans that minimize the potential for increased sediment inputs to storm drains and surface waters. Throughout the construction period, water quality (turbidity, settleable material, and visible construction pollutants) will be monitored as required by Section 401 Regional Water Quality Control Board certification requirements. This will include regular grab samples to monitor turbidity and settleable material. Stream bank impacts will be isolated and minimized to reduce bank sloughing. If needed, slopes will be stabilized with sediment fencing, jute mats, or re-vegetated following construction grading activities.

A Spill Prevention and Response Plan will be prepared that identifies any hazardous materials to be used during construction; describes measures to prevent, control, and minimize spillage of hazardous substances; describes transport, storage and disposal procedures for these substances; and outlines procedures to be followed in case of a spill of a hazardous material. The Spill Prevention and Response Plan will require that hazardous and potentially hazardous substances stored onsite be kept in securely closed containers located away from drainage courses, agricultural areas, storm drains, and areas where stormwater is allowed to infiltrate. It will also stipulate procedures, such as the use of spill containment pans, to minimize hazard during onsite fueling and servicing of construction equipment. Finally, the Spill Prevention and Response Plan will require that all agencies listed in the Spill Prevention and Response Plan be notified immediately of any substantial spill or release.

To minimize the risk of mercury contamination in the water, all materials excavated to reach design grades (including the finer-grained clay and silt sediments associated with mercury) will be directly transported (by aerial conveyor belt) to the Teichert Aggregate Hallwood Processing Plant for processing. Fine grain material (concentrated in the process wash water) will be monitored and discharged outside of the river corridor through the existing discharge permit for the Teichert Aggregate Hallwood Processing Plant. Fine grain materials will not be returned to the Action Area. Fine material encountered during grading and excavation will be monitored regularly and tested for mercury concentration. If an area of mercury is encountered during construction that is significantly above the background mercury level in the Goldfields then the construction in that area will cease and the proper Federal and state agencies will be contacted and a method for proceeding will be determined.

Oil and grease used in equipment will be vegetable based. All equipment working within the stream corridor will be inspected daily for fuel, lubrication, and coolant leaks; and for leak potentials (e.g., cracked hoses, loose filling caps, stripped drain plugs). Vehicles or equipment will be washed/cleaned only at approved off-site areas. All equipment will be steam cleaned prior to working within the stream channel to remove contaminants that may enter the river and adjacent lands. All equipment will be fueled and lubricated in a designated staging area located outside the stream channel and banks. All equipment entering the river that has been used in or near other Central Valley rivers will be steam cleaned before it is used for this project to minimize the chance of introducing New Zealand mud snails or other invasive species to the project site.

Protection of Existing Vegetation

Before construction begins, the project engineer and a qualified biologist will identify locations for equipment and personnel access and materials staging that will minimize riparian disturbance. During construction, as much understory brush and as many trees as possible will be retained. The emphasis will be on retaining gallery trees as well as shade-producing and bank-stabilizing vegetation. When chainsaws are used to remove riparian vegetation, saws compatible with vegetable-based bar oil will be used if possible. Any disturbed areas outside the restoration area will be revegetated with locally native stock.

Exclusion of Fish from the Work Site

A three-tiered approach will be used to minimize the adverse effects on fish from the in-stream construction work. The three approaches are the following: 1) construction approach, 2) fish relocation through herding, and 3) fish capture and relocation. Ideally, only the first technique will be used as it will be the easiest to implement and is expected to have the lowest impact to fish as they will not be subjected to the stress of capture, handling, or transport. It is possible that a combination of the methods may be necessary during the in-water work to complete the restoration. The three methods are discussed in detail below.

<u>The Construction Approach</u>

The construction approach will allow fish to move progressively downstream and away from the impact area as construction moves from upstream to downstream through the perennial channels, pond, and backwater. The majority of the in-water work will involve the filling in and creation of a side channel through the ponds and backwater. Before in-water work starts in a section of the channel a qualified fisheries biologist will survey the area and determine whether there is a suitable egress route for fish to move downstream and away from the construction area. If a suitable downstream egress route is not present, most likely because an area is deemed too shallow, then the problem area will be altered such that it becomes suitable. An excavator would likely be used to deepen the problem area and would work from downstream to upstream to discourage fish from migrating downstream until the egress route is completed. Once suitable downstream egress has been established, in-stream construction will begin at the most upstream section of the channel and work progressively downstream and across the channel.

Fish Relocation by Herding

If a qualified fisheries biologist, with input from the contractor, determines that in-stream work in an area cannot be performed using the construction approach then fish relocation will be performed to avoid fish injury and mortality and minimize disturbance. Fish relocation will most likely initially be attempted by trying to herd the fish out of the work area as this would minimize impacts to fish as they would not be handled and transported. The following guidelines will apply to fish relocation through herding:

- Before fish relocation through herding begins, a qualified fisheries biologist will identify the most appropriate method and approach. Prior to beginning the fisheries biologist will ensure that the location that fish are herded to contains suitable habitat.
- The fish relocation through herding will be conducted under the supervision of a qualified fisheries biologist. The method that will most likely be used will be to install an exclusion screen or block-net above the upstream most work area. Then an appropriately sized seine that covers the width of the channel, operated by qualified personnel, will be used and the seine pull will begin immediately below the upstream screen/net. The seine will be pulled in the downstream direction until it is below the bottom of the work area and will then be held in place, blocking the entire channel until a temporary block net can be installed. The temporary block-net will be installed immediately upstream of the seine net such that fish have been herded downstream and cannot return upstream. A minimum of three seine pulls will be performed. On each pull when the seine approaches the block-net, the block-net will be removed until the seine has passed downstream of its location and will then be re-installed immediately upstream of the seine. After the final pass, as determined by the fisheries biologist, the block-net will be left in place or replaced with an exclusion screen in such a way that fish cannot move upstream.
- After the area has been seined enough times that fish are unlikely to remain based on the judgment of a qualified fish biologist then the area will be surveyed for fish. The fisheries biologist will determine the most appropriate method to survey the area for remaining fish.
- If the survey results in an estimate of greater than 95% of individuals from each fish species that were present prior to relocation efforts being no longer present after relocation efforts and no listed species were observed then the fish relocation through herding will be considered a success. If initial relocation through herding efforts are deemed not successful then the fisheries biologist will determine whether further herding with a seine will be conducted until the success criteria is met or relocation through capture will be employed.

Fish Capture and Relocation

If fish relocation using herding is not successful or the fisheries biologist decides it is not worth attempting first then fish capture and relocation will be used. The following guidelines will apply to fish capture and relocation.

- Before fish relocation begins, a qualified fisheries biologist will identify the most appropriate release location(s). Release locations will have water temperatures within 2°C of the capture location and offer suitable habitat for released fish, and will be selected to minimize the likelihood that fish will re-enter the work area or become impinged on the exclusion net or screen.
- The method used to capture fish will depend on the nature of the work site, and will be selected by a qualified fisheries biologist who is experienced with fish capture and handling. Areas of complex habitat may require the use of electrofishing equipment, whereas in other areas fish may be captured through seining or dip netting. Electrofishing will only be performed by properly trained personnel following NMFS guidelines (2000). Electrofishing will only be performed if seining and/or dip netting is not feasible.
- Handling of salmonids will be minimized. When it is necessary, personnel will only handle fish with wet hands or nets.
- Fish will be held temporarily in cool, shaded water in a five gallon bucket with a lid. Overcrowding in buckets will be avoided by using at least two buckets and no more than 25 fish will be kept in each five gallon bucket. Aeration will be provided with a battery powered external bubbler. Fish will be protected from jostling and noise and will not be removed from the bucket until the time of release. The water temperature in each bucket will be monitored and partial water changes or the addition of ice and stress coat will be conducted as necessary to maintain a stable water temperature (within 2°C of initial water temperature). Fish will not be held for more than a half hour. If water temperature reaches or exceeds NMFS limits, fish will be released and relocation operations will cease.
- If fish are abundant, capture will cease periodically to allow release and minimize the time fish are held in containers.
- Fish will not be anesthetized or measured. However, they will be visually identified to species level, and year classes will be estimated and recorded.
- When feasible, initial fish relocation efforts will occur several days prior to the scheduled start of construction. The fisheries biologist will perform a survey on the same day before construction.
- Reports on fish relocation activities will be submitted to Californian Department of Fish and Wildlife and NMFS in a timely fashion.

1.3.9 Interrelated and Interdependent Actions

“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). Pre- and post-project biological monitoring will be conducted to assess ecosystem function before and after the restoration. This monitoring is inextricably linked to the Proposed Project and is thus an interrelated action. The effects of pre-project monitoring have already been assessed through ESA 4(d) research authorization (file number 19762). A full analysis of these effects can be found in the BO associated with this authorization (ESA section 7 consultation tracking number WCR-2015-3876). Post-project monitoring involving the potential take of listed fish will be covered under future 4(d) research authorization.

ENDANGERED SPECIES ACT:
BIOLOGICAL OPINION AND INCIDENTAL TAKE STATEMENT

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

2.1 Analytical Approach

This BO includes both a jeopardy analysis and/or 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.

This BO relies on the definition of "destruction or adverse modification," which "means a direct or indirect alteration that appreciably diminishes the value of critical habitat for the conservation of a listed species. Such alterations may include, but are not limited to, those that alter the physical or biological features essential to the conservation of a species or that preclude or significantly delay development of such features" (81 FR 7214).

The designation(s) of critical habitat for (species) use(s) the term primary constituent element (PCE) or essential features. The new critical habitat regulations (81 FR 7414) replace this term with physical or biological features (PBFs). The shift in terminology does not change the approach used in conducting a ''destruction or adverse modification'' analysis, which is the same regardless of whether the original designation identified PCEs, PBFs, or essential features. In this BO, we use the term PBF to mean PCE or essential feature, as appropriate for the specific critical habitat.

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 expected 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 by: (1) Reviewing the status of the species and critical habitat; and (2) adding the effects of the action, the environmental baseline, and cumulative effects to assess the risk that the Proposed Action poses to species and critical habitat.
- Reach a conclusion about whether species are jeopardized or critical habitat is adversely modified.
- If necessary, suggest a RPA to the Proposed Action.

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 PBFs that help to form that conservation value.

The following Federally listed species evolutionarily significant units (ESU), distinct population segment (DPS) and designated critical habitat occur in the Action Area and have the potential to be affected by the action (Table 1):

Table 1. ESA Listing History.

Species	ESU or DPS	Original Final FR Listing	Current Final Listing Status	Critical Habitat Designated
Chinook salmon (*Oncorhynchus tshawytscha*)	Central Valley spring-run ESU	9/16/1999 64 FR 50394 Threatened	6/28/2005 70 FR 37160 Threatened	9/2/2005 70 FR 52488
Steelhead (*O. mykiss*)	California Central Valley DPS	3/19/1998 63 FR 13347 Threatened	1/5/2006 71 FR 834 Threatened	9/2/2005 70 FR 52488
Green sturgeon (*Acipenser medirostris*)	Southern DPS	4/7/2006 71 FR 17757 Threatened	4/7/2006 71 FR 17757 Threatened	10/9/2009 74 FR 52300

2.2.1 Central Valley Spring-run Chinook salmon

- Listed as threatened (September 16, 1999, 64 FR 50394), reaffirmed (June 28, 2005, 70 FR 37160).
- Designated critical habitat (September 2, 2005, 70 FR 52488)

The Federally listed ESU of Central Valley (CCV) spring-run Chinook salmon and designated critical habitat for this ESU occurs in the Action Area and may be affected by the Proposed Action. Detailed information regarding ESU listing and critical habitat designation history, designated critical habitat, ESU life history, and VSP (viable salmonid population) parameters can be found in NMFS 2014 Recovery Plan for the Evolutionarily Significant Units of Sacramento River Winter-Run Chinook salmon, Central Valley Spring-Run Chinook salmon, and the Distinct Population Segment of California Central Valley steelhead.

Historically, spring-run Chinook salmon were the second most abundant salmon run in the Central Valley and one of the largest on the west coast (CDFG 1990). These fish occupied the upper and middle elevation reaches (1,000 to 6,000 feet) of the San Joaquin, American, Yuba, Feather, Sacramento, McCloud and Pit rivers, with smaller populations in most tributaries with sufficient habitat for over-summering adults (Stone 1872, Rutter 1904, Clark 1929). The Central Valley drainage as a whole is estimated to have supported spring-run Chinook salmon runs as large as 600,000 fish between the late 1880s and 1940s (CDFG 1998). The San Joaquin River historically supported a large run of spring-run Chinook salmon, suggested to be one of the largest runs of any Chinook salmon on the West Coast with estimates averaging 200,000-500,000 adults returning annually (CDFG 1990).

Monitoring of the Sacramento River mainstem during spring-run Chinook salmon spawning timing indicates some spawning occurs in the river (CDFW, unpublished data, 2014). Genetic introgression has likely occurred here due to lack of physical separation between spring-run and fall-run Chinook salmon populations (CDFG 1998). Sacramento River tributary populations in Mill, Deer, and Butte creeks are likely the best trend indicators for the CCV spring-run Chinook salmon ESU. Generally, these streams have shown a positive escapement trend since 1991, displaying broad fluctuations in adult abundance (CDFW 2016). The Feather River Fish Hatchery (FRFH) spring-run Chinook salmon population represents an evolutionary legacy of populations that once spawned above Oroville Dam. The FRFH population is included in the ESU based on its genetic linkage to the natural spawning population, and the potential for development of a conservation strategy (June 28, 2005, 70 FR 37160).

The Central Valley Technical Review Team (TRT) estimated that historically there were 18 or 19 independent populations of CCV spring-run Chinook salmon, along with a number of dependent populations, all within four distinct geographic regions, or diversity groups (Lindley *et al.* 2004). Of these populations, only three independent populations currently exist (Mill, Deer, and Butte creeks tributary to the upper Sacramento River) and they represent only the northern Sierra Nevada diversity group. Additionally, smaller populations are currently persisting in Antelope and Big Chico creeks, and the Feather and Yuba rivers in the northern Sierra Nevada diversity group (CDFG 1998). In the San Joaquin River basin, observations in the last decade suggest that spring-running populations may currently occur in the Stanislaus and Tuolumne rivers (Franks 2015).

The CCV spring-run Chinook salmon ESU is comprised of two known genetic complexes. Analysis of natural and hatchery spring-run Chinook salmon stocks in the Central Valley indicates that the northern Sierra Nevada diversity group spring-run Chinook salmon populations in Mill, Deer, and Butte creeks retain genetic integrity as opposed to the genetic integrity of the Feather River population, which has been somewhat compromised by introgression with the fall-run ESU (Good *et al.* 2005a, Garza *et al.* 2007, Cavallo *et al.* 2011).

Because the populations in Butte, Deer and Mill creeks are the best trend indicators for ESU viability, we can evaluate risk of extinction based VSP in these watersheds. Over the long term, these three remaining populations are considered to be vulnerable to anthropomorphic and naturally occurring catastrophic events. The viability assessment of CCV spring-run Chinook salmon conducted during NMFS' 2010 status review (NMFS 2011), found that the biological status of the ESU had worsened since the last status review (2005) and recommended that the species status be reassessed in two to three years as opposed to waiting another five years, if the decreasing trend continued. In 2012 and 2013, most tributary populations increased in returning adults, averaging over 13,000. However, 2014 returns were lower again, just over 5,000 fish, indicating the ESU remains highly fluctuating. The most recent status review was conducted in 2015 (NMFS 2016b), which looked at promising increasing populations in 2012-2014; however, the 2015 returning fish were extremely low (1,488), with additional pre-spawn mortality reaching record lows. Since the effects of the 2012-2015 drought have not been fully realized, we anticipate at least several more years of very low returns, which may result in severe rates of decline (NMFS 2016b).

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). CCV 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. Even in tributaries with cool water springs, in years of extended drought and warming water temperatures, unsuitable conditions may occur. Additionally, juveniles often rear in the natal stream for one to two summers prior to emigrating, and would be susceptible to warming water temperatures. In Butte Creek, fish are limited to low elevation habitat that is currently thermally marginal, as demonstrated by high summer mortality of adults in 2002 and 2003, and will become intolerable within decades if the climate warms as expected. Ceasing water diversion for power production from the summer holding reach in Butte Creek resulted in cooler water temperatures, more adults surviving to spawn, and extended population survival time (Mosser *et al*. 2013).

Summary of the Central Valley spring-run Chinook salmon ESU viability

In summary, the extinction risk for the CCV spring-run Chinook salmon ESU remains at moderate risk of extinction (NMFS 2016b). Based on the severity of the drought and the low escapements as well as increased pre-spawn mortality in Butte, Mill, and Deer creeks in 2015, there is concern that these CCV spring-run Chinook salmon strongholds will deteriorate into high extinction risk in the coming years based on the population size or rate of decline criteria (NMFS 2016b).

Critical Habitat and Physical or Biological Features for Central Valley Spring-run Chinook salmon

The critical habitat designation for CCV spring-run Chinook salmon lists the PBFs (June 28, 2005, 70 FR 37160), which are described in NMFS 2014 Recovery Plan for the Evolutionarily Significant Units of Sacramento River Winter-Run Chinook salmon, Central Valley Spring-Run Chinook salmon, and the Distinct Population Segment of California Central Valley steelhead. In summary, the PBFs include freshwater spawning sites, freshwater rearing sites, freshwater migration corridors, and estuarine habitat. The geographical range of designated critical habitat includes stream reaches of the Feather, Yuba, and American rivers, Big Chico, Butte, Deer, Mill, Battle, Antelope, and Clear creeks, and the Sacramento River, as well as portions of the northern Delta (June 28, 2005, 70 FR 37160).

Summary of the Value of CCV Spring-run Chinook salmon Critical Habitat for the Conservation of the Species

Currently, many of the PBFs of CCV spring-run Chinook salmon critical habitat are degraded, and provide limited high quality habitat. Features that lessen the quality of migratory corridors for juveniles include unscreened or inadequately screened diversions, altered flows in the Delta, scarcity of complex in-river cover, and the lack of floodplain habitat. Although the current conditions of CCV spring-run Chinook salmon critical habitat are significantly degraded, the spawning habitat, migratory corridors, and rearing habitat that remain are considered to have high intrinsic value for the conservation of the species.

2.2.2 California Central Valley Steelhead

- Originally listed as threatened (March 19, 1998, 63 FR 13347); reaffirmed as threatened (January 5, 2006, 71 FR 834).
- Designated critical habitat (September 2, 2005, 70 FR 52488).

The Federally listed distinct population segment (DPS) of California Central Valley (CCV) steelhead and designated critical habitat for this DPS occurs in the Action Area and may be affected by the Proposed Action. Detailed information regarding DPS listing and critical habitat designation history, designated critical habitat, DPS life history, and VSP parameters can be found in the NMFS 2014 Recovery Plan for the Evolutionarily Significant Units of Sacramento River Winter-Run Chinook salmon, Central Valley Spring-Run Chinook salmon, and the Distinct Population Segment of California Central Valley steelhead.

Historic CCV steelhead run sizes are difficult to estimate given the paucity of data, but may have approached one to two million adults annually (McEwan 2001). By the early 1960s the CCV steelhead run size had declined to about 40,000 adults (McEwan 2001). Current abundance data for CCV steelhead is limited to returns to hatcheries and redd surveys conducted on a few rivers.

The hatchery data is the most reliable because redd surveys for steelhead are often made difficult by high flows and turbid water usually present during the winter-spring spawning period. CCV steelhead returns to Coleman National Fish Hatchery (NFH) have increased over the last four years, 2011 to 2014. After hitting a low of only 790 fish in 2010, the last two years, 2013 and 2014, have averaged 2,895 fish. Wild adults counted at the hatchery each year represent a small fraction of overall returns, but their numbers have remained relatively steady, typically 200–300 fish each year. Numbers of wild adults returning each year have ranged from 252 to 610 from 2010 to 2014.

Redd counts are conducted in the American River and in Clear Creek (Shasta County). An average of 143 redds have been counted on the American River from 2002–2015 [data from Hannon *et al.* (2003), Hannon and Deason (2008), Chase (2010)]. An average of 178 redds have been counted in Clear Creek from 2001 to 2015 following the removal of Saeltzer Dam, which allowed steelhead access to additional spawning habitat. The Clear Creek redd count data ranges from 100-1023 and indicates an upward trend in abundance since 2006 (USFWS 2015).

The returns of CCV steelhead to the Feather River Hatchery experienced a sharp decrease from 2003 to 2010, with only 679, 312, and 86 fish returning in 2008, 2009 and 2010, respectively. In recent years, however, returns have experienced an increase with 830, 1797, and 1505 fish returning in 2012, 2013 and 2014 respectively. Overall, steelhead returns to hatcheries have fluctuated so much from 2001 to 2015 that no clear trend is present.

An estimated 100,000 to 300,000 naturally produced juvenile steelhead are estimated to leave the Central Valley annually, based on rough calculations from sporadic catches in trawl gear (Good *et al.* 2005). Nobriga and Cadrett (2001) used the ratio of adipose fin-clipped (hatchery) to unclipped (wild) steelhead smolt catch ratios in the USFWS Chipps Island trawl from 1998 through 2000 to estimate that about 400,000 to 700,000 steelhead smolts are produced naturally each year in the Central Valley. Trawl data indicate that the level of natural production of steelhead has remained very low since the 2011 status review, suggesting a decline in natural production based on consistent hatchery releases. Catches of steelhead at the fish collection facilities in the southern Delta are another source of information on the production of wild steelhead relative to hatchery steelhead (CDFW data: ftp.delta.dfg.ca.gov/salvage). The overall catch of steelhead has declined dramatically since the early 2000s, with an overall average of 2,705 in the last 10 years. The percentage of wild (unclipped) fish in salvage has fluctuated, but has leveled off to an average of 36 percent since a high of 93 percent in 1999.

About 80 percent of the historical spawning and rearing habitat once used by anadromous *O. mykiss* in the Central Valley is now upstream of impassible dams (Lindley *et al.* 2006). Many historical populations of CCV steelhead are entirely above impassable barriers and may persist as resident or adfluvial rainbow trout, although they are presently not considered part of the DPS. Steelhead are well-distributed throughout the Central Valley below the major rim dams (Good *et al.* 2005, NMFS 2016a). Most of the steelhead populations in the Central Valley have a high hatchery component, including Battle Creek (adults intercepted at the Coleman NFH weir), the American River, Feather River, and Mokelumne River.

California Central Valley steelhead abundance and growth rates continue to decline, largely the result of a significant reduction in the amount and diversity of habitats available to these populations (Lindley *et al.* 2006). Recent reductions in population size are supported by genetic analysis (Nielsen *et al.* 2003). Garza and Pearse (2008) analyzed the genetic relationships among Central Valley steelhead populations and found that unlike the situation in coastal California watersheds, fish below barriers in the Central Valley were often more closely related to below barrier fish from other watersheds than to *O. mykiss* above barriers in the same watershed. This pattern suggests the ancestral genetic structure is still relatively intact above barriers, but may have been altered below barriers by stock transfers. The genetic diversity of CCV steelhead is also compromised by hatchery origin fish, placing the natural population at a high risk of extinction (Lindley *et al.* 2007). Steelhead in the Central Valley historically consisted of both summer-run and winter-run migratory forms. Only winter-run (ocean maturing) steelhead currently are found in California Central Valley rivers and streams as summer-run have been extirpated (McEwan and Jackson 1996, Moyle 2002).

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

Summary of California Central Valley Steelhead DPS viability

All indications are that natural CCV steelhead have continued to decrease in abundance and in the proportion of natural fish over the past 25 years (Good *et al.* 2005, NMFS 2016a); the long-term trend remains negative. Hatchery production and returns are dominant. Most wild CCV populations are very small 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.

In summary, the status of the CCV steelhead DPS appears to have remained unchanged since the 2011 status review, and the DPS is likely to become endangered within the foreseeable future throughout all or a significant portion of its range (NMFS 2016a).

Critical Habitat and Physical or Biological Features for California Central Valley Steelhead

The critical habitat designation for CCV spring-run steelhead lists the PBFs (June 28, 2005, 70 FR 37160), which are described in NMFS 2014 Recovery Plan for the Evolutionarily Significant Units of Sacramento River Winter-Run Chinook salmon, Central Valley Spring-Run Chinook salmon, and the Distinct Population Segment of California Central Valley steelhead. In summary, the PBFs include freshwater spawning sites; freshwater rearing sites; freshwater migration corridors; and estuarine areas.. The geographical extent of designated critical habitat includes: the Sacramento, Feather, and Yuba rivers, and Deer, Mill, Battle and Antelope creeks in the Sacramento River basin; the San Joaquin River, including its tributaries but excluding the mainstem San Joaquin River above the Merced River confluence; and the waterways of the Delta.

Summary of the Value of California Central Valley Steelhead Critical Habitat for the Conservation of the species

Many of the PBFs of CCV steelhead critical habitat are currently degraded and provide limited high quality habitat. Passage to historical spawning and juvenile rearing habitat has been largely reduced due to construction of dams throughout the Central Valley. Levee construction has also degraded the value for the conservation of the species of freshwater rearing and migration habitat and estuarine areas as riparian vegetation has been removed, reducing habitat complexity, food resources, and resulting in many other ecological effects. Contaminant loading and poor water quality in Central California waterways poses threats to lotic fish, their habitat and food resources. Additionally, due to reduced access to historical habitats, genetic introgression is occurring because naturally-produced fish are interacting with hatchery-produced fish which has the potential to reduce the long-term fitness and survival of this species.

Although the current conditions of CCV steelhead critical habitat are significantly degraded, the spawning habitat, migratory corridors, and rearing habitat that remain in the Sacramento/San Joaquin River watersheds and the Delta are considered to have high intrinsic value for the conservation of the species as they are critical to ongoing recovery effort.

2.2.3 Southern Distinct Population Segment (sDPS) of North American Green Sturgeon

- Listed as threatened (April 7, 2006, 71 FR 17757).
- Critical habitat designated (October 9, 2009, 74 FR 52300).

The Federally listed southern distinct population segment (sDPS) of North American green sturgeon and designated critical habitat for this DPS occurs in the Action Area and may be affected by the Proposed Action. Detailed information regarding DPS listing and critical habitat designation history, designated critical habitat, and DPS life history can be found on the green sturgeon page of NMFS's website at http://www.westcoast.fisheries.noaa.gov/protected_species/green_sturgeon/green_sturgeon_pg.html.

Green sturgeon are known to range from Baja California to the Bering Sea along the North American continental shelf. During late summer and early fall, subadults and non-spawning adult green sturgeon can frequently be found aggregating in estuaries along the Pacific coast (Emmett *et al.* 1991, Moser and Lindley 2006). Using polyploid microsatellite data, Israel *et al.* (2009) found that green sturgeon within the Central Valley of California belong to the sDPS. Additionally, acoustic tagging studies have found that green sturgeon found spawning within the Sacramento River are exclusively sDPS green sturgeon (Lindley *et al.* 2011). In waters inland from the Golden Gate Bridge in California, sDPS green sturgeon are known to range through the estuary and the Delta and up the Sacramento, Feather, and Yuba rivers (Israel *et al*. 2009, Bergman *et al.* 2011, Seesholtz *et al.* 2014). It is unlikely that green sturgeon utilize areas of the San Joaquin River upriver of the Delta with regularity, and spawning events are thought to be limited to the upper Sacramento River and its tributaries. There is no known modern usage of the upper San Joaquin River by green sturgeon, and adult spawning has not been documented there (Jackson and Van Eenennaam 2013).

Recent research indicates that the sDPS is composed of a single, independent population, which principally spawns in the mainstem Sacramento River and also breeds opportunistically in the Feather River and possibly even the Yuba River (Bergman *et al.* 2011, Seesholtz *et al.* 2014). Concentration of adults into a very few select spawning locations makes the species highly vulnerable to poaching and catastrophic events. The apparent, but unconfirmed, extirpation of spawning populations from the San Joaquin River narrows the available habitat within their range, offering fewer habitat alternatives. Whether sDPS green sturgeon display diverse phenotypic traits such as ocean behavior, age at maturity, and fecundity, or if there is sufficient diversity to buffer against long-term extinction risk is not well understood. It is likely that the diversity of sDPS green sturgeon is low, given recent abundance estimates (NMFS 2015).

Trends in abundance of sDPS green sturgeon have been estimated from two long-term data sources: (1) salvage numbers at the State and Federal pumping facilities (see below), and (2) by incidental catch of green sturgeon by the California Department of Fish and Wildlife's (CDFW) white sturgeon sampling/tagging program. Historical estimates from these sources are likely unreliable because the sDPS was likely not taken into account in incidental catch data, and salvage does not capture range-wide abundance in all water year types. A decrease in sDPS green sturgeon abundance has been inferred from the amount of take observed at the south Delta pumping facilities, the Skinner Delta Fish Protection Facility, and the Tracy Fish Collection Facility. This data should be interpreted with some caution. Operations and practices at the facilities have changed over the decades, which may affect salvage data. These data likely indicate a high production year vs. a low production year qualitatively, but cannot be used to rigorously quantify abundance.

Since 2010, more robust estimates of sDPS green sturgeon have been generated. As part of a doctoral thesis at UC Davis, Ethan Mora has been using acoustic telemetry to locate green sturgeon in the Sacramento River, and to derive an adult spawner abundance estimate (Mora *et al.* 2015). Preliminary results of these surveys estimate an average annual spawning run of 223 (DIDSON) and 236 (telemetry) fish. This estimate does not include the number of spawning adults in the lower Feather or Yuba Rivers, where green sturgeon spawning was recently confirmed (Seesholtz *et al.* 2014).

The parameters of green sturgeon population growth rate and carrying capacity in the Sacramento Basin are poorly understood. Larval count data shows enormous variance among sampling years. In general, sDPS green sturgeon year class strength appears to be highly variable with overall abundance dependent upon a few successful spawning (NFMS 2010b). Other indicators of productivity such as data for cohort replacement ratios and spawner abundance trends are not currently available for sDPS green sturgeon.

Southern DPS green sturgeon spawn primarily in the Sacramento River in the spring and summer. Anderson-Cottonwood Irrigation District Diversion Dam (ACID) is considered the upriver extent of green sturgeon passage in the Sacramento River) (71 FR 17757, April 7, 2006). 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 (NMFS 2016c) . 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. It is uncertain, however, if green sturgeon spawning habitat exists closer to ACID, which could allow spawning to shift upstream in response to climate change effects. Successful spawning of green sturgeon in other accessible habitats in the Central Valley (*i.e*., the Feather River) is limited, in part, by late spring and summer water temperatures (NMFS 2015). Similar to salmonids in the Central Valley, green sturgeon spawning in tributaries to the Sacramento River is likely to be further limited if water temperatures increase and higher elevation habitats remain inaccessible.

Summary of Green Sturgeon sDPS viability

The viability of sDPS green sturgeon is constrained by factors such as a small population size, lack of multiple populations, and concentration of spawning sites into just a few locations. The risk of extinction is believed to be moderate (NFMS 2010a). Although threats due to habitat alteration are thought to be high and indirect evidence suggests a decline in abundance, there is much uncertainty regarding the scope of threats and the viability of population abundance indices (NMFS 2010a). Lindley *et al.* (2008), in discussing winter-run Chinook salmon, states that an ESU (or DPS) represented by a single population at moderate risk of extinction is at high risk of extinction over a large timescale; this would apply to the sDPS for green sturgeon. The most recent 5-year status review for sDPS green sturgeon found that some threats to the species have recently been eliminated, such as take from commercial fisheries and removal of some passage barrier (NMFS 2015). Since many of the threats cited in the original listing still exist, the threatened status of the DPS is still applicable (NMFS 2015).

Critical Habitat and Physical or Biological Features for sDPS Green Sturgeon

The critical habitat designation for sDPS green sturgeon lists the PBFs (October 9, 2009, 74 FR 52300), which are described on the green sturgeon page of NMFS's website at http://www.westcoast.fisheries.noaa.gov/protected_species/green_sturgeon/green_sturgeon_pg.html. In summary, the PBFs include the following for both freshwater riverine systems and estuarine habitats: food resources, water flow, water quality, migratory corridor, depth, and sediment quality. Additionally, for riverine systems, the designation includes substrate type or

size. Substrate type or size is also a PBF for freshwater riverine systems. In addition, the PBFs include migratory corridor, water quality, and food resources in nearshore coastal marine areas. The geographical range of designated critical habitat includes the following.
In freshwater, the geographical range includes:

- the Sacramento River from the Sacramento I-Street bridge to Keswick Dam, including the Sutter and Yolo bypasses and the lower American River from the confluence with the mainstem Sacramento River upstream to the highway 160 bridge,
- the Feather River from its confluence with the Sacramento River upstream to Fish Barrier Dam,
- the Yuba River from its confluence with the Feather River upstream to Daguerre Point Dam, and
- the Sacramento-San Joaquin Delta (as defined by California Water Code section 12220, except for listed excluded areas).

In coastal bays and estuaries, the geographical range includes:

- San Francisco, San Pablo, Suisun, and Humboldt bays in California,
- Coos, Winchester, Yaquina, and Nehalem bays in Oregon,
- Willapa Bay and Grays Harbor in Washington, and
- the lower Columbia River estuary from the mouth to river kilometer 74.

In coastal marine waters, the geographical range includes all U.S. coastal marine waters out to the 60-fathom depth bathymetry line from Monterey Bay north and east to include waters in the Strait of Juan de Fuca, Washington.

Summary of the Value of sDPS Green Sturgeon Critical Habitat for the Conservation of the Species

Currently, many of the PBFs of sDPS green sturgeon are degraded and provide limited high quality habitat. Additional features that lessen the quality of migratory corridors for juveniles include unscreened or inadequately screened diversions, altered flows in the Delta, and presence of contaminants in sediment. Although the current conditions of green sturgeon critical habitat are significantly degraded, the spawning habitat, migratory corridors, and rearing habitat that remain in both the Sacramento/San Joaquin River watersheds, the Delta, and nearshore coastal areas are considered to have high intrinsic value for the conservation of the species.

2.2.4 Global Climate Change

One factor affecting the range-wide status of CCV steelhead, CCV spring-run Chinook and the Southern DPS of the North American green sturgeon, and aquatic habitat at large is climate change.

The world is about 1.3°F warmer today than a century ago and the latest computer models predict that, without drastic cutbacks in emissions of carbon dioxide and other gases released by the burning of fossil fuels, the average global surface temperature may rise by two or more degrees in the 21st century (IPCC 2007). Much of that increase likely will occur in the oceans, and evidence suggests that the most dramatic changes in ocean temperature are now occurring in the Pacific (Noakes *et al.* 1998). Using objectively analyzed data Liu and Huang (2000) estimated a warming of about 0.9°F per century in the Northern Pacific Ocean.

Sea levels are expected to rise by 0.5 to 1.0 meters in the northeastern Pacific coasts in the next century, mainly due to warmer ocean temperatures, which lead to thermal expansion much the same way that hot air expands. This will cause increased sedimentation, erosion, coastal flooding, and permanent inundation of low-lying natural ecosystems (*e.g.*, salt marsh, riverine, mud flats) affecting listed salmonid and green sturgeon PBFs. Increased winter precipitation, decreased snow pack, permafrost degradation, and glacier retreat due to warmer temperatures will cause landslides in unstable mountainous regions and destroy fish and wildlife habitat, including salmon-spawning streams. Glacier reduction could affect the flow and temperature of rivers and streams that depend on glacier water, with negative impacts on fish populations and the habitat that supports them.

Summer droughts along the South Coast and in the interior of the northwest Pacific coastlines will mean decreased stream flow in those areas, decreasing salmonid survival and reducing water supplies in the dry summer season when irrigation and domestic water use are greatest. Global warming may also change the chemical composition of the water that fish inhabit: the amount of oxygen in the water may decline, while pollution, acidity, and salinity levels may increase. This will allow for more invasive species to overtake native fish species and impact predator-prey relationships (Petersen and Kitchell 2001, Stachowicz *et al.* 2002).

In light of the predicted impacts of global warming, the Central Valley has been modeled to have an increase of between 2 and 7 degrees Celsius by 2100, with a drier hydrology predominated by rainfall rather than snowfall (Dettinger 2004, Hayhoe *et al.* 2004, VanRheenen 2004, Stewart *et al.* 2005). This will alter river runoff patterns and transform the tributaries that feed the Central Valley from a spring and summer snowmelt dominated system to a winter rain dominated system. It can be hypothesized that summer temperatures and flow levels will become unsuitable for salmonid survival. The cold snowmelt that furnishes the late spring and early summer runoff will be replaced by warmer precipitation runoff. This will truncate the period of time that suitable cold-water conditions exist downstream of existing reservoirs and dams due to the warmer inflow temperatures to the reservoir from rain runoff. Without the necessary cold water pool developed from melting snow pack filling reservoirs in the spring and early summer, late summer and fall temperatures downstream of reservoirs, such as Lake Shasta, could potentially rise above thermal tolerances for juvenile and adult salmonids that must hold and/or rear downstream of the dam over the summer and fall periods.

2.3 Action Area

"Action Area" means all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action (50 CFR 402.02). The Action Area for the Proposed Project includes the project footprint and the area downstream where construction activities can temporarily decrease water quality, impacting listed fish species. The project will occur on the north bank of the Yuba River in Yuba County in the Browns Valley USGS quadrant, just downstream of Daguerre Point Dam and approximately 8 miles upstream of the City of Marysville, California near the unincorporated community of Hallwood, in an area known as the Yuba Goldfields. The northern boundary of the Action Area is the Teichert Aggregates Hallwood Processing Plant, located at 3331 Walnut Avenue, Marysville, CA. The current alignment of the Yuba River delineates the southern boundary of the Action Area. The most upstream extent of the project site delineates the western boundary of the Action Area.

The effects of increased turbidity will attenuate downstream as suspended sediment settles out of the water column. Therefore, the Action Area for this project includes both the construction footprint and 1,000 feet downstream. In total, the Action Area encompasses a 2.75 mile segment of the Yuba River (from the most upstream border of the project site to 1,000 feet below the project footprint).

2.4 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).

2.4.1 Historical Usage of the Lower Yuba River

The lower Yuba River has undergone significant morphological and ecological changes over the past 150 years due to a sequence of anthropomorphic disturbances, beginning with the discovery of gold in California in 1848. Most relevant of these changes:

- ***vast influx of hydraulic mining sediment* -** It is estimated that from 1849 – 1909, the Yuba River received roughly 685 million cubic yards of sediment, more than the Upper Feather, Bear, and American rivers combined (Gilbert 1917). This influx caused such severe aggradation of the Yuba River that by 1868 the channel bed had risen 20 ft and was higher than the streets of Marysville (Ayres Associates 1997). Flooding in Marysville in 1875 prompted the prohibition of in-stream disposal of hydraulic mining sediments.
- ***shifting and confinement of the river's course* -** In the early 1900s, the California Debris Commission sanctioned the re-alignment of the lower Yuba River to the north of the historic alignment and the construction of large linear "training walls" consisting of steeply mounded tailings piles in the center and along both banks of the straightened river corridor. The training walls were piled to substantial heights above the 100-yr flood elevation and with dramatically varying top widths of up to 500 ft (AECOM 2015). The makeshift training walls were intended to laterally confine the river to allow for additional widespread dredging operations (gold mining) of the naturally occurring and hydraulic mining derived sediments deposited in the valley.
- ***river regulation and coarse sediment control* -** In 1906, Daguerre Point Dam was constructed as a partial sediment barrier and base-level control point. Englebright Dam

was constructed in 1941, and was designed to keep upstream hydraulic mining debris out of the river (YCWA 2017). In 1971, New Bullards Bar was raised to control mining debris and generate power (Pasternack 2009). As a result, the influx of sediment and the major flood events have both been significantly altered, affecting the hydrologic regime and the movement of sediment in the system. Large woody debris passes over the dam, but is often greatly weathered or simplified from residence time in the reservoirs upstream and through passage over the dam (i.e., canopy and rootwad removed). This most likely reduces the ability of key pieces to lock in place within the channel.

- ***recent and ongoing aggregate mining*** - Widespread processing of the remaining Goldfield sediments continues today through surface and dredge mining for the production of aggregate and other construction materials. Uncertainties related to physical parcel boundaries and contentious mining interests/claims have influenced the development of an irregular moonscape characterized by long, linear, gravel/cobble mounds, steep ravines, isolated ponds, and loss of fine sediment required for riparian vegetation establishment. Dredger ponds support invasive predatory fish and other species that compete for resources with juveniles salmonids. The ponds can reconnect during high flows, allowing the movement of invasive species into the main river channel.

Despite the presence of several significant dams in the upper watershed (e.g. New Bullards Bar and Englebright Dam), the lower Yuba River still experiences moderate and major floods capable of inducing natural and significant geomorphic changes. Recent studies have documented the increasing amplitude of the naturally developing meander pattern within the main channel (presently still confined to the corridor on the south side of the middle training wall), the significant decreases in height and thickness of the southern (and middle) training walls due to river erosion and scour on the outside of the meander bends, and the associated increased flood risk to portions of Reclamation District 784 (MBK Engineers 2011, cbec 2013, cbec 2014, AECOM 2015).

Other completed section 7 consultations that have occurred in the area include informal consultation for the ongoing operation and maintenance of Englebright Dam and Reservoir (2014) and formal consultation for the operation and maintenance of Daguerre Point Dam (2014). Both of these consultations determined that the proposed actions would not result in jeopardy to listed species or adverse modification of their critical habitats.

2.4.2 Mercury Contamination

During historical gold mining within the Yuba River watershed, more than 8 million pounds of mercury were lost to the environment (Hunerlach 2004). Much of the mercury left over from the mining era is contained in sediment held behind Englebright Dam and Daguerre Point Dam.

Methylmercury is the form of mercury that is toxic to biota and which can bioaccumulate in aquatic organisms. In the environment, methylmercury can be produced from the soluble fraction of the inorganic mercury by naturally occurring anaerobic bacteria. However, it is likely that only a very small fraction of the total mercury associated with gold mining sediments in the Yuba River is actually ‘reactive’ and available to bacteria for methylation (Singer *et al.* 2016).

Although most of the mercury is not biologically available, enough has methylized in Englebright Lake that it is bioaccumulating in the larger predatory fish (USACE 2014).

Methylmercury can be also removed from shallow surface waters through photodegradation, a process by which methylmercury is converted to less toxic inorganic mercury by the sun's ultraviolet light (USGS 2014). However, because mercury in aquatic environments preferentially partitions to soil, sediment, and suspended matter (i.e., the dissolved mercury concentration is typically far lower than the concentration in soil, sediment, and suspended matter), most of the mercury in the water column is removed not by reduction to the elemental species, but by sedimentation of the particles to which divalent mercury and methylmercury are bound. As a result of this sedimentation process, sediment in the Yuba River exhibits high levels of mercury (Cramer Fish Sciences 2016).

2.4.3 Existing Conditions

Under current conditions the north channel only connects with the Main Channel at the upstream end during high flows (> 10,000 cfs; cbec 2014). The lower Yuba River typically only remains above 10,000 cfs for a few days during high flow events; therefore, the north channel only provides ephemeral periods of sustained connectivity for juvenile salmonids. Juvenile salmonids that attempt to use the north channel during high flows may be subject to stranding when flows recede. In the middle of the north channel there are a series of ponds fed by sub-surface flow and connected by small channels. These ponds contain mostly non-native fishes including black bass (*Micropterus* spp.), smaller sunfishes (*Lepomis* spp.), and Western mosquitofish (*Gambusia affinis*). Native fishes are also present in the middle ponds including Sacramento sucker (*Catostomus occidentalis*) and Sacramento pikeminnow (*Ptychocheilus grandis*). Juvenile *O. mykiss* have been observed in the channels connecting the ponds. North American beavers (*Castor canadensis*) also use these middle ponds, and build dams, which may prevent outmigration of juvenile salmonids (Cramer Fish Sciences 2016).

A small channel connects the middle ponds to a backwater at the bottom of the site. This backwater is connected with the Yuba River Main Channel. The backwater also contains a wide variety of native and non-native fishes. Native fishes recently observed in the backwater include juvenile Chinook salmon and *O. mykiss*, tule perch (*Hysterocarpus traskii*), California roach (*Lavinia symmetricus*), Sacramento sucker, Sacramento pikeminnow, hardhead (*Mylophardon concephalus*), sculpin (*Cottus* spp.), and Pacific lamprey (*Entosphenus tridentata*) (Cramer Fish Sciences, unpublished data). Non-native fishes include black bass, sunfishes, golden shiner (*Notemigonus crysoleucas*), and Western mosquitofish. Other aquatic species present in the backwater include non-native bullfrogs (*Lithobates catesbeianus*) and non-native crayfish (*Procambarus clarkii*; *Pacifastacus leniusculus*). Fall-run Chinook salmon have been observed to use the downstream end of the backwater for spawning (Cramer Fish Sciences 2016).

The majority of the remnant floodplain surrounding the north channel is sparsely vegetated gravel bar. Within perennially ponded areas, there are cattails (*Typha* spp.), rushes (*Juncus* spp.), and non-native aquatic vegetation such as Brazilian elodea (*Egeria densa*). Riparian vegetation is also present around the ponds, backwater, and their connecting channels as well as at the base of the north and middle training walls. The riparian vegetation includes willows (*Salix* spp.), white alder (*Alnus rhombifolia*), Oregon ash (*Fraxinus latifolia*), California black walnut (*Juglans californica*), Western sycamore (*Platanus racemosa*), buttonbush (*Cephalanthus occidentalis* var. *californicus*), and Fremont cottonwood (*Populus fremontii*) (Cramer Fish Sciences 2016).

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

Instream cover is rare, but along the river margins there is some instream woody material and overhead cover provided by low-growing riparian vegetation within narrow riparian corridors. Despite the anthropogenic impacts that have reduced the quality and quantity of juvenile salmonid rearing habitat in the Yuba River, juvenile Chinook salmon and *O. mykiss* have been observed rearing within the Action Area in the Yuba River and in the backwater and its feeder channel (Cramer Fish Sciences 2016).

2.4.4 CCV Spring-run Chinook Salmon and CCV Steelhead and their Critical Habitat in the Action Area

The Yuba River within the Action Area is used as a migration corridor for adult and juvenile CCV spring-run Chinook salmon and CCV steelhead. Spring-run Chinook salmon have been documented to hold for an extended period of time in the pool below Daguerre Point Dam (Yuba RMT 2013). Riffles and glides used by salmonids for spawning occur throughout the Yuba River main channel within the Action Area, and Chinook salmon and steelhead have been documented spawning in the Yuba River within the Action Area (Campos and Massa 2010, 2012, USFWS 2010, Yuba RMT 2013). Chinook salmon have also been observed spawning in the outlet to the backwater (Cramer Fish Sciences 2016).

The PBFs of critical habitat features for CCV Spring-run Chinook and CCV Steelhead within the Action Area include freshwater rearing, migration and spawning.

2.4.5 North American Green Sturgeon and their Critical Habitat in the Action Area

The PBFs of critical habitat features for sDPS North American green sturgeon within the Action Area include food resources, migratory corridor, water quality, depth, substrate type or size, sediment quality, and water flow. Daguerre Point Dam is impassible to green sturgeon and blocks access to historical sDPS green sturgeon spawning habitat (Mora *et al.* 2009). Green sturgeon have been observed in the pool below Daguerre Point Dam and were apparently exhibiting spawning behavior (Bergman 2011). The pool below Daguerre Point Dam is likely the only currently accessible location in the Action Area where depth, substrate type and size, and water flow may be conducive to green sturgeon spawning. The rest of the Action Area has been highly modified by anthropogenic activities and likely only serves as a migratory corridor with water flow, water quality, and sediment quality sufficient for green sturgeon migration.

2.4.6 Global Climate Change

By contrast to the conditions for other Central Valley floor rivers, climate change may not have as much of an impact on salmonids in the lower Yuba River downstream of Englebright Reservoir (YCWA 2010b). Presently, the lower Yuba River is one of the few Central Valley tributaries that consistently has suitable water temperatures for salmonids throughout the year. Lower Yuba River water temperatures generally remain below 58°F year-round at the Smartsville Gage (downstream of Englebright Dam), and below 60°F year-round at Daguerre Point Dam (YCWA *et al.* 2007). At Marysville, water temperatures generally remain below 60°F from October through May, and below 65°F from June through September (YCWA *et al*. 2007). However, in dry years temperatures may become warmer than the optimum range for salmonids.

According to (YCWA 2010a), because of specific physical and hydrologic factors, the lower Yuba River is expected to continue to provide the most suitable water temperature conditions for anadromous salmonids of all Central Valley floor rivers, even if there are long-term climate changes. This is because New Bullards Bar Reservoir is a deep, steep-sloped reservoir with ample cold water pool reserves. Throughout the period of operations of New Bullards Bar Reservoir (1969 through present), which encompasses the most extreme critically dry year on record (1977), the cold water pool in New Bullards Bar Reservoir never was depleted. Since 1993, cold water pool availability in New Bullards Bar Reservoir has been sufficient to accommodate year-round utilization of the reservoir’s lower level outlets to provide cold water to the lower Yuba River. Even if climate conditions change, New Bullards Bar Reservoir still will have a very substantial cold water pool each year that will continue to be available to provide sustained, relatively cold flows of water into the lower Yuba River during the late spring, summer and fall of each year (YCWA 2010a).

2.5 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.

Work will be performed during the summer low flow period (July 15 to October 1), which avoids the primary migration and spawning windows of adult CCV steelhead, adult sDPS green sturgeon and adult CCV spring-run Chinook. The construction window also avoids the primary immigration window for CCV steelhead and CCV spring-run Chinook smolts. Incubating salmonid eggs are unlikely to be present during the Proposed Action, as the construction window avoids the incubation period CCV steelhead eggs and CCV spring-run Chinook generally spawn farther upstream. Aside from the pool below Daguerre Dam, the area does not serve as holding habitat for CCV spring-run Chinook, and thus holding adults are not expected to be impacted by project construction. However, juvenile CCV spring-run Chinook, CCV steelhead, and sDPS green sturgeon may still be present in the Action Area during work, and thus may be impacted by the Proposed Action. Direct and indirect effects are discussed below in detail.

2.5.1 Fish Relocation

To minimize direct and indirect mortality of fishes from construction activities, fish will be relocated, if necessary, away from areas where instream work occurs. The length of the channels where instream work will occur that may require fish relocation is approximately 612 meters (0.38 miles). A full description of fish relocation procedures are described above in *Proposed Federal Action* section. Fish relocation will not occur in the ponds or backwater as it is expected that fish, being highly mobile, will be able to avoid the impact areas by swimming away from the disturbance. Fish relocation will first be attempted using herding since this method is expected to have the lowest impact on the species, as fish will not be handled and will not be subject to holding and transport stress.

If fish cannot be herded, they will be collected using seining or electrofishing. Fish relocation activities pose a risk of injury or mortality to rearing juvenile steelhead, juvenile spring-run Chinook salmon, and juvenile green sturgeon, since any fish relocation or collection gear has some associated risk to fish, including stress, disease transmission, injury, or death. The amount of unintentional injury and mortality attributable to fish relocation varies widely depending on the method used, ambient conditions, and the experience of the field crew. Since fish relocation activities will be conducted by qualified fisheries biologists following NMFS guidelines, direct effects to and mortality of juvenile steelhead, Chinook salmon, and green sturgeon during relocation activities is expected to be minimal.

Sites selected for relocating fish will have similar water temperature and provide suitable habitat as the as the capture site. However, relocated fish may endure short term stress from crowding at the relocation site. Relocated fish may also have to compete with resident fish for available resources such as food and habitat. Some of the fish released at the relocation site will likely move upstream or downstream to areas that have more habitat and a lower density of fish. As each fish disperses, competition diminishes and remains localized in a small area. The number of fish affected by competition cannot be accurately estimated but it is unlikely that this impact will affect the survival chances of individuals or cascade through the population within the watershed based on the small area that will be affected and the small number of CCV steelhead, CCV spring-run Chinook, and sDPS green sturgeon that will need to be relocated.

Juvenile steelhead and spring-run Chinook salmon that evade capture and remain in the construction area may be injured or killed from construction activities. This includes desiccation if fish remain in the dewatered area, or death if fish are crushed by personnel or equipment. However, since experienced biologists will be collecting fish, 95% of fish are expected to be removed from the area before construction commences.

Juvenile CCV steelhead, CCV spring-run Chinook and sDPS green sturgeon may be present during relocation, and thus subject to the above effects. Adult CCV steelhead, CCV spring-run Chinook, and sDPS green sturgeon are not expected to be present during relocation, and thus impacts to this life stage of these species is considered improbable.

Estimates of the number of juvenile CCV steelhead, juvenile CCV spring-run Chinook salmon, and juvenile sDPS green sturgeon that may be injured or killed are based on monthly pre-project seining and snorkel surveys conducted by Cramer Fish Sciences February through May. In the channels connecting the ponds, from 0 to 5 juvenile *O. mykiss* were observed in a 50-meter snorkel survey transect and no juvenile Chinook salmon were observed. No juvenile salmonids were observed in the ponds, with the ponds mostly containing non-native bass. Juvenile salmonids were also absent from the majority of the backwater; juvenile *O. mykiss* were only observed in the inflow to the backwater and juvenile Chinook salmon only observed in the backwater inflow and exit. No green sturgeon were observed during these surveys (Cramer Fish Sciences 2016).

The anticipated injury and/or death of CCV steelhead and CCV spring-run Chinook salmon that could occur due to fish relocation activities was calculated using the following method. With observation of 5 juvenile steelhead in a 50 m section of channel it is reasonable to assume that up to 10 juvenile steelhead and 5 juvenile CCV spring-run Chinook salmon may be present in a 50 m section of channel. This would result in approximately 1 juvenile CCV steelhead per 5 meters of channel and 1 juvenile CCV spring-run Chinook salmon per 10 meters of channel. The total length of the channel which may need fish relocation is 612 meters. Therefore, approximately 123 juvenile steelhead (612 meters x 1 fish/5 meters) and 62 juvenile CCV spring-run Chinook salmon (612 meters x 1 fish/10 meters) may be subject to fish relocation. NMFS anticipated that less than 1% of juvenile salmonids will die during relocation (approximately 1 juvenile CCV steelhead and 1 juvenile CCV spring-run Chinook).

Southern DPS green sturgeon may be present in the Yuba River, but lack of available information makes it is difficult to accurately quantify the number of sturgeon that will be handled during relocation. It is presumed that up to 2 juvenile will be present during dewatering of the construction site, and none will die during relocation.

2.5.2 Instream Construction Activities

In areas where fish relocation does not occur, juvenile CCV steelhead, CCV spring-run Chinook salmon, and sDPS green sturgeon may be impacted by instream construction activities. Fish are expected to migrate downstream in response the noise and disturbance caused by these activities. Fish that migrate downstream in response to instream construction activities may endure short term stress from being forced to migrate away from their rearing area and needing to locate a new rearing area downstream. Fish may endure some short term stress from crowding and competition with resident fish for food and habitat. Fish may be subject to increased predation risk while they are locating a new rearing area. However, displaced fish will likely locate to areas downstream that have suitable habitat and low competition. A small number of juvenile steelhead and Chinook salmon are likely to be displaced as densities in the instream work areas have been observed to be low during pre-project surveys (Cramer Fish Sciences 2016). It is not expected that the temporary displacement of fish or the competition they endure will affect the survival chances of individual fish or cascade through the population based on the size of the area that will likely be affected and the small number of CCV steelhead, CCV spring-run Chinook salmon, and green sturgeon likely to be displaced. Fish that are displaced will be able to access the newly created habitat after construction has progressed past the area through upstream migration.

Instream construction activities are expected to cause mortality or abundance reduction of benthic aquatic macroinvertebrates within the immediate sediment placement areas when they are covered with coarse sediment. However, not all invertebrates will be smothered and many will move up through the material to colonize the new surface layer (Merz and Chan 2005). Furthermore, effects to aquatic macroinvertebrates from coarse sediment smothering will be temporary because construction activities will be relatively short in duration and rapid recolonization (about two weeks to two months) of the new sediment is expected (Merz and Chan 2005). Furthermore, downstream drift is expected to temporarily benefit any downstream, drift-feeding organisms, including juvenile salmonids. The benthic macroinvertebrate production within the site is expected to increase when the project is complete as there will be an increase in area of perennial riffle habitat. The amount of food available for juvenile salmonids and other native fishes is therefore expected to increase relative to pre-project conditions.

Juvenile CCV steelhead, juvenile CCV spring-run Chinook and juvenile sDPS green sturgeon may be present during instream construction activities, and thus subject to the above effects. These fish include those that are present in areas that will not be dewatered and fish that allude capture in dewatered areas. Because juveniles will be able to retreat to suitable habitat and food resources will only be temporarily impacted, effects of instream construction activities will be minor and are unlikely to result in injury or death. Adult CCV steelhead, CCV spring-run Chinook, and sDPS green sturgeon are not expected to be present during instream construction activities, and thus impacts to this life stage of these species is considered improbable.

2.5.3 Sediment and Turbidity

Construction activities related to restoration actions will temporarily disturb soil and riverbed sediments, resulting in the potential for temporary increases in turbidity and suspended sediments in the Action Area. Turbidity plumes are expected to affect a portion of the channel width and extend up to 1,000 feet downstream of the site. Construction-related increases in sedimentation and siltation above the background level could potentially affect fish species and their habitat by reducing egg and juvenile survival, interfering with feeding activities, causing breakdown of social organization, and reducing primary and secondary productivity. The magnitude of potential effects on fish depends on the timing and extent of sediment loading and flow in the river before, during, and immediately following construction.

High concentrations of suspended sediment can have both direct and indirect effects on salmonids. The severity of these effects depends on the sediment concentration, duration of exposure, and sensitivity of the affected life stage. Based on the types and duration of proposed in-water construction methods, short-term increases in turbidity and suspended sediment may disrupt feeding activities or result in avoidance or displacement of fish from preferred habitat.

Juvenile salmonids have been observed to avoid streams that are chronically turbid (Lloyd 1987) or move laterally or downstream to avoid turbidity plumes (Sigler *et al.*). Sigler et al. (1984) found that prolonged exposure to turbidities between 25 and 50 NTUs resulted in reduced growth and increased emigration rates of juvenile coho salmon and steelhead compared to controls. These findings are generally attributed to reductions in the ability of salmon to see and capture prey in turbid water (Waters 1995). Chronic exposure to high turbidity and suspended sediment may also affect growth and survival by impairing respiratory function, reducing tolerance to disease and contaminants, and causing physiological stress (Waters 1995). Berg and Northcote (1985) observed changes in social and foraging behavior and increased gill flaring (an indicator of stress) in juvenile coho salmon at moderate turbidity (30-60 NTUs). In this study, behavior returned to normal quickly after turbidity was reduced to lower levels (0-20 NTU).

Any increase in turbidity associated with instream work is likely to be brief and occur only in the vicinity of the site, attenuating downstream as suspended sediment settles out of the water column. Temporary spikes in suspended sediment may result in behavioral avoidance of the site by fish; several studies have documented active avoidance of turbid areas by juvenile and adult salmonids (Bisson and Bilby 1982, Lloyd 1987, Servizi and Martens 1992, Sigler et al. 1984). Individual fish that encounter increased turbidity or sediment concentrations will likely move away from affected areas into suitable surrounding habitat. Water quality, including measurements of turbidity will be performed on a regular basis during construction to track the response of water quality to construction activities. An onsite biologist will report these measurements to the project manager, who will be aware of Federal and state water quality requirements. Such activities will minimize water quality impacts. These plumes will occur intermittently during daylight hours, resulting in daily periods (at least 12 hours) in which water quality will return to background levels. The Proposed Project will also include preparation and implementation of SWPPP in compliance with the State Water Resources Control Board's General Permit for Discharges of Storm Water Associated with Construction Activity. The amount of sediment generated by construction will be minimized by mitigation measures associated with the SWPPP that are designed to minimize erosion and sediment entering the channel.

Sedimentation is known to have lethal and sublethal effects to incubating salmonids eggs by decreasing dissolved oxygen transport between spawning gravel. Sediment also blocks micropores on the surface of incubating eggs, inhibiting oxygen transport and creates an additional oxygen demand through the chemical and biological oxidation of organic material (Kemp *et al*. 2011, Greig *et al*. 2005, Suttle *et al*. 2004). However, due to the location and timing of construction, sDPS green sturgeon, CCV spring-run Chinook, and CCV steelhead eggs are not expected to be present, and thus adverse impacts to incubating eggs are not expected to occur.

Juvenile CCV steelhead, CCV spring-run Chinook and sDPS green sturgeon may be present during instream construction activities, and thus subject to the above effects. However, with the above measures in place, the effects of increased turbidity will be minor and are unlikely to result in injury or death. Adult CCV steelhead, CCV spring-run Chinook, and sDPS green sturgeon are not expected to be present during activities that may increase turbidity, and thus impacts to this life stage of these species is considered improbable.

2.5.4 Mercury

The construction of the Proposed Project has the potential to expose clay and silt sized particles which have elevated mercury levels. These finer sized sediments with elevated mercury could then be transported into the wetted channel of the Yuba River during high flow events. A fraction of the mercury may then methylate and become toxic to fishes and other biota in the Yuba River. The inundation of floodplains plays an important role in the methylation, mobilization, and transport of mercury. Methylmercury has a range of toxic effects to fish including; behavioral, neurochemical, hormonal, and reproductive changes. In one study of Atlantic salmon (*Salmo salar*), methylmercury caused altered behavior and pathological damage in Atlantic Salmon (Berntssen *et al.* 2003).

To minimize the risk of mercury contamination in the water, all materials excavated to reach design grades (including the finer-grained clay and silt sediments associated with mercury) will be directly transported (by aerial conveyor belt) to the Teichert Aggregate Hallwood Processing Plant for processing. Fine grain material (concentrated in the process wash water) will be monitored and discharged outside of the river corridor through the existing discharge permit for the Teichert Aggregate Hallwood Processing Plant. Fine grain materials will not be returned to the Action Area. Fine material encountered during grading and excavation will be monitored regularly and tested for mercury concentration. If an area of mercury is encountered during construction that is significantly above the background mercury level in the Goldfields then the construction in that area will cease and the proper Federal and state agencies will be contacted and a method for proceeding will be determined. With these best management practices in place, impacts from increased mercury levels are expected to be improbable for all life stages of CCC steelhead, CCV spring-run Chinook, and sDPS green sturgeon.

2.5.5 Contaminants

During construction, the potential exists for spills or leakage of toxic substances that could enter the Yuba River. Refueling, operation, and storage of construction equipment and materials could result in accidental spills of pollutants (e.g., fuels, lubricants, concrete, sealants, and oil).
High concentrations of contaminants can cause direct (sublethal to lethal) and indirect effects on fish. Direct effects include mortality from exposure or increased susceptibility to disease that reduces the overall health and survival of the exposed fish. The severity of these effects depends on the contaminant, the concentration, duration of exposure, and sensitivity of the affected life stage. A potential indirect effect of contamination is reduced prey availability; invertebrate prey survival could be reduced following exposure, therefore making food less available for fish. Fish consuming infected prey may also absorb toxins directly. For salmonids, potential direct and indirect effects of reduced water quality during project construction will be addressed by avoiding construction during times when salmonids are most likely to be present, utilization of vegetable-based lubricants and hydraulic fluids in equipment operated in the wet channel, and by implementing the construction site housekeeping measures incorporated in the project SWPPP. These measures include provisions to control erosion and sedimentation, as well as a Spill Prevention and Response Plan to avoid, and if necessary, clean up accidental releases of hazardous materials.

With these best management practices in place, impacts from contaminants are expected to be improbable for all life stages of CCV steelhead, CCV spring-run Chinook, and sDPS green sturgeon.

2.5.6 Noise

Noise generated by heavy equipment and personnel during construction activities could adversely affect fish and other aquatic organisms. The potential direct effects of underwater noise on fish and other organisms depend on a number of biological characteristics (e.g., fish size, hearing sensitivity, behavior) and the physical characteristics of the sound (e.g., frequency, intensity, duration) to which fish and invertebrates are exposed. Potential direct effects include behavioral effects, physiological stress, physical injury (including hearing loss), and mortality. The loudest noise generated at the site is expected from the sediment transport equipment. However, this equipment will not come in contact with aquatic habitat. Diesel engines are the second loudest noise expected at the site. No diesel engines or their exhaust systems will come in contact with the flowing channel. Therefore, fish are not expected to be exposed to sounds that may cause physical injury. Any fish disturbed by the limited aquatic noise generated by construction are expected to move away to suitable habitat. Therefore, the effects of increased noise will be minor and are unlikely to result in injury or death to juvenile CCC steelhead, juvenile CCV spring-run Chinook, or juvenile sDPS green sturgeon or result in death. Adult CCV steelhead, CCV spring-run Chinook, and sDPS green sturgeon are not expected to be present during activities that may increase turbidity, and thus impacts to this life stage of these species is considered improbable.

2.5.7 Effects to Critical Habitat

The Proposed Project is expected to have direct short- and long-term effects on the designated critical habitat of CCV steelhead, CCV spring-run Chinook salmon, and green sturgeon. The impacts that could occur and affect PBFs of salmon, steelhead, and green sturgeon are water quality impacts, including temporary increases to turbidity and suspended sediment and release of contaminants. These impacts are expected to be localized, minor, short term. The applicant will also utilize best management practices, including the implementation of a SWPPP and associated Spill Prevention and Response Plan. The applicant will use vegetable oil as a lubricant for construction machinery, and locate the equipment staging area in an upland area well away from the Yuba River. A contaminant spill is not likely and if one does occur then it will be cleaned up and remediated rapidly such that its effects are expected to be localized, minor, and short term.

The creation and enhancement of high quality juvenile salmonid rearing habitat is the primary goal of the project and is expected to have measureable benefits to the PBFs of freshwater rearing for salmonids. The suitability of aquatic habitat for juvenile salmonids and other fishes depends on the presence of nearshore areas with shallow water, instream woody material, and aquatic and riparian vegetation. These attributes provide juvenile salmonids and other fishes with valuable feeding and resting habitat, concealment from predators, and refuge during high flows (Jeffres et al. 2008, McCormick and Harrison 2011). Creation of floodplains, side channels, and other off-channel areas that increase habitat complexity and inundate more frequently will function as high quality juvenile salmonid rearing habitat.

The instream construction is expected to have short term effects on the critical habitat salmonid PBFs of freshwater rearing habitat through construction disturbance and modification as well as the removal of some riparian trees and shrubs. However, the removal of riparian trees and shrubs will be localized and short term. To the maximum extent practicable, existing riparian habitat will be retained and disturbance will be minimized. Following construction, all disturbed or exposed soils will be stabilized and/or planted with native woody and herbaceous vegetation to control erosion and offset any unavoidable losses of vegetation. Non-native plant species will be replaced with native riparian plants. Some short term losses of mature riparian vegetation may occur during construction however, plantings and natural riparian vegetation recruitment will establish and mature following construction thereby resulting in an increase in the amount and extent of riparian habitat within the site. This increase in riparian habitat is expected to provide increased rearing habitat, complexity, and cover for spring-run Chinook salmon, steelhead, and other native fishes in the Action Area.

Large woody material will be placed in strategic locations to provide a variety of geomorphic functions including scour protection and enhancement, sediment deposition and sorting, as well as habitat functions including structural coverage and velocity refuge for juvenile salmonids. Large woody material added as part of the Proposed Project will increase instream habitat diversity and complexity within the site.

The Proposed Project is expected to have little to no effect on the salmonid critical habitat PBFs of spawning habitat. Construction of side channel habitat and floodplain enhancement will require the removal of riparian vegetation in the Action Area which has the potential to have direct or indirect adverse effects on spawning habitat. It has been suggested by Dosskey et al. (2010) that presence and abundance of riparian vegetation can be directly correlated with water quality in riverine systems through biogeochemical cycling, soil and channel chemistry, water movement and erosion. Riparian vegetation also plays a role in maintaining adequate temperature for incubating eggs by shading. Removal of riparian vegetation has the potential to directly and indirectly adversely affect spawning habitat in the Action Area. However, as discussed above, affects to riparian vegetation will be minor and short term, as riparian vegetation will be avoided to the maximum extent possible during construction, and replanted after completion of the project.

The Proposed Project is also expected to have a positive effect on the salmonid and green sturgeon critical habitat PBFs of freshwater migration corridors, as the Proposed Project has been designed to avoid creating a fish stranding risk. Currently juvenile salmonids that attempt to use the north channel during high flows may be subject to stranding when flows recede. As part of the Proposed Project, this channel will graded to have gentle slopes positively draining back into the side channel as flows recede, reducing stranding risk. The secondary side channels will be designed to provide a natural floodplain drainage point and egress route for juvenile salmonids during the receding limb of the hydrograph. The alcoves will be constructed in such a way that they will drain downstream back into the primary side channel as flows recede. Furthermore, there will be sufficient flow in the main channel of the Yuba River all year to allow for migration of salmonids, sturgeon, and other native fishes. During base flows the low flow channel is designed to have trickle flows that are estimated to be around 10 to 20 cfs. These trickle flows returning to the main river are not expected to create significant attraction flows for upstream migrating adult salmon.

With the above minimization and mitigation measures in place, impacts to the critical habitat of CCV steelhead, CCV spring-run Chinook, and sDPS green sturgeon are expected to be localized, minor, and short term.

2.6 Cumulative Effects

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

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

Few future non-Federal actions that may affect the Action Area are expected to occur. Non-Federal actions that may affect the Action Area include angling and State angling regulation changes, agricultural practices, private water contracts, habitat restoration or maintenance, water withdrawals and diversions, adjacent mining activities, and increased population growth resulting in urbanization and development of floodplain habitats.

California angling regulations have moved toward restrictions on recreational sport fishing to protect listed fish species but incidental hooking of Chinook salmon, hook and release mortality of steelhead, and disturbance of redds by wading anglers may continue to cause a threat. Habitat restoration and maintenance projects may have short-term negative effects associated with in-stream construction activities, but these effects are temporary and localized with listed species and habitats expected to benefit long term. Prolonged periods of elevated water turbidity levels may result from agricultural practices, adjacent mining activities, and increased urbanization and/or development of riparian habitat, and could adversely affect the ability of juvenile salmonids to feed effectively, resulting in reduced growth and survival. Turbidity may cause injury or mortality to juvenile CCV spring run Chinook salmon, CCV steelhead, or green sturgeon rearing in the vicinity and downstream of the project area. High turbidity levels can cause fish mortality, reduce feeding efficiency, and decrease food availability (Berg and Northcote 1985). Farming and ranching activities within or adjacent to the Action Area may have negative effects on water quality due to runoff containing agricultural chemicals. Water withdrawals and diversions may result in entrainment of fishes into unscreened or improperly screened diversions, and may result in depleted river flows that are necessary for migration, spawning, rearing, sediment flushing from spawning gravels, gravel recruitment, and transport of large woody debris. Future urban and/or rural residential development may adversely affect water quality, riparian function, and aquatic productivity. Most of these actions would require Federal permits, and would undergo individual or programmatic Section 7 consultation. No known specific and reasonably certain future state or private activities are expected to occur within the Action Area, other than those ongoing activities already discussed in the existing conditions.

2.6.1 Interrelated and Interdependent Effects

The pre- and post-project biological monitoring used to assess the effectiveness of the restoration are inextricably linked to the Proposed Project and thus an interrelated action. The effects of pre-project monitoring have already been assessed through ESA 4(d) research authorization (file number 19762). A full analysis of these effects can be found in the BO associated with this authorization (ESA section 7 consultation tracking number WCR-2015-3876). Post-project monitoring involving the potential take of listed fish will be covered under future 4(d) research authorization.

2.7 Integration and Synthesis

The Integration and Synthesis section is the final step in our assessment of the risk posed to species and critical habitat as a result of implementing the Proposed Action. In this section, we add the effects of the action (Section 2.5) to the environmental baseline (Section 2.4) and the cumulative effects (Section 2.6), taking into account the status of the species and critical habitat (Section 2.2), to formulate the agency's biological opinion as to whether the Proposed Action is likely to: (1) Reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing its numbers, reproduction, or distribution; or (2) appreciably diminishes the value of designated or proposed critical habitat for the conservation of the species.

CCV steelhead, CCV spring-run Chinook, sDPS of green sturgeon have experienced significant declines in abundance and available habitat in the California Central Valley relative to historical conditions. The status of the species and critical habitat and environmental baseline sections (2.2 and 2.4) detail the current range-wide status of these ESUs and also the current baseline conditions found in the Yuba River, where the Proposed Action is to occur. Sections 2.1.4 and 2.4.6 discusses the vulnerability of listed species and critical habitat to climate change projections in the California Central Valley and specifically in the Yuba. In light of the predicted impacts of global warming, it has been hypothesized that summer temperatures and flow levels will become unsuitable for salmonid survival in many parts of the Central Valley. However, because of specific physical and hydrologic factors (discussed in section 2.4.6) the lower Yuba River is expected to continue to provide the most suitable water temperature conditions for anadromous salmonids of all Central Valley floor rivers, even if there are long-term climate changes (YCWA 2010a).

Cumulative effects that may affect the Action Area include angling and State angling regulation changes, agricultural practices, private water contracts, habitat restoration or maintenance, water withdrawals and diversions, adjacent mining activities, and increased population growth resulting in urbanization and development of floodplain habitats. The Proposed Action contains restoration actions that are consistent with the NMFS recovery plan for CCV spring-run Chinook and CCV steelhead, and are intended to aid in their long-term recovery and survival.

<u>2.7.1 Effects of the Proposed Action to Listed Species</u>

The Proposed Action has the potential to affect various life stages of CCV steelhead, CCV spring-run Chinook, and sDPS green sturgeon. However, the only life stages that are expected to be present in the Action Area during construction are juvenile CCV steelhead, juvenile CCV spring-run Chinook, and juvenile green sturgeon. Juveniles of these species may be captured, injured, or killed during relocation, and fish that cannot be relocated may crushed by construction equipment or personnel. Construction of side channel habitats and floodplain modification are likely to result in sediment and turbidity pulse events which may result in adverse effects to juvenile salmonids and green sturgeon due to increased activity, gill fouling and reduced foraging capability. Construction-related effects may also occur as a result of equipment operation in riparian habitats, will be impacted by the temporary removal of riparian vegetation. Juvenile CCV steelhead, juvenile CCV spring-run Chinook, and juvenile sDPS green sturgeon are the only life stages that will likely be impacted by these adverse construction-related effects, and contamination/pollution that may occur as a result of the Proposed Action. However, BMPs, minimization and avoidance measures implemented during the Proposed Action will aid in minimizing direct impacts to listed fish in the Yuba River.

<u>2.7.2 Effects of the Proposed Action to Critical Habitat</u>

Critical habitat has been designated for CCV steelhead, CCV spring-run. PBFs contained within the Action Area are for salmonids are: 1) freshwater spawning habitat 2) freshwater rearing habitat and 3) a migration corridor. Spawning and rearing habitat PBFs have the potential to be adversely affected by sedimentation and loss of riparian vegetation through a variety of physical and biological mechanisms. The migration corridor PBF also has the potential to be adversely effected in the course of the proposed construction operations. However, the beneficial effects to critical habitat PBFs far outweigh the adverse effects. The results of the Proposed Action will ultimately enhance all three PBFs contained in the Action Area for salmonids.

Critical habitat has also been designated in the Action Area for sDPS green sturgeon. The PBFs within the Action Area for sDPS green sturgeon are: (1) food resources, (2) adequate flow regime for all life stages, (3) water quality, (4) migratory corridors, (5) adequate water depth for all life stages, and (6) adequate sediment quality. It is not expected that the project will degrade any of these PBFs, as all construction impacts will be temporary and adequately mitigated.

<u>2.7.3 Survival and Recovery</u>

The CCV spring-run Chinook salmon ESU is currently limited to independent populations in Mill, Deer, and Butte creeks, with the Yuba River and others serving as dependent populations.

This ESU continues to be threatened by habitat loss, degradation and modification, small hydropower dams and water diversions that reduce or eliminate instream flows during migration, unscreened or inadequately screened water diversions, excessively high water temperatures, and predation by non-native species. In the lower Yuba River, spring-run Chinook salmon spawning may occur a few weeks earlier than fall-run spawning, but currently there is no clear distinction between the two because of the disruption of spatial segregation by Englebright Dam. Thus, spring-run and fall-run Chinook salmon spawning overlap temporally and spatially (NMFS 2014) . Restoration goals outlined in the Proposed Action are consistent with specific recommended recovery actions for the Yuba River outlined in the NMFS Recovery Plan for CCV spring-run Chinook. These include increasing floodplain habitat, improving the quality of side channel habitat, and increasing instream cover (NMFS 2014). Implementation of the Proposed Action is expected to benefit these fish and their critical habitat by improving growth, survival, and production, ultimately aiding in the range-wide recovery of these ESUs.

Existing wild steelhead populations in the Sacramento River basin occur in the upper Sacramento River and its tributaries, which includes the Yuba River. NMFS Recovery Plan for CCV steelhead lists the Yuba River steelhead as an independent population with and uncertain population extinction risk. Englebright Dam is currently impassable to steelhead, and thus represents the upstream extend of their range in the Yuba River. Restoration goals outlined in the Proposed Action are consistent with specific recommended recovery actions for the Yuba River outlined in the NMFS Recovery Plan for CCV steelhead. These include increasing floodplain habitat, improving the quality of side channel habitat, and increasing instream cover (NMFS 2014). Implementation of the Proposed Action is expected to aid in the range-wide recovery of this ESU.

Recent population estimates for the Southern DPS of North American green sturgeon indicate that there are few fish relative to historic conditions, and that loss of habitat has affected population size and distribution. However, the Southern DPS of North American green sturgeon remain widely distributed along the Pacific coast from California to Washington, and recent findings of fish in the Feather and the Yuba River indicate that their distribution in the Central Valley may be broader than previously thought. This suggests that the DPS probably meets several viable species population criteria for distribution and diversity, and indicates that the Southern DPS of North American green sturgeon faces a low to moderate risk of extinction. The Proposed Project is not expected to impede the survival or recovery of sDPS green sturgeon, and may improve survival by restoring natural ecosystem process to the lower Yuba River and reducing stranding risk caused by the current configuration of the channel.

2.8 Conclusion

After reviewing and analyzing the current status of the listed species and critical habitat, the environmental baseline within the Action Area, the effects of the Proposed Action, any effects of interrelated and interdependent activities, and cumulative effects, it is NMFS' biological opinion that the Proposed Action is not likely to jeopardize the continued existence of CCV steelhead, CCV spring-run Chinook salmon, or the sDPS of the North American green sturgeon or destroy or adversely modify designated critical habitat of these species.

2.9 Incidental Take Statement

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

2.9.1 Amount or Extent of Take

In the BO, NMFS determined that incidental take is reasonably certain to occur as follows:

NMFS anticipates incidental take of juvenile CCV steelhead, juvenile CCV spring-run Chinook salmon and juvenile Southern DPS of green sturgeon to occur in the course of the Hallwood Side Channel and Floodplain Restoration Project. Specifically, NMFS anticipates that juvenile CCV steelhead, juvenile CCV spring-run Chinook salmon, and juvenile green sturgeon may be captured, injured, or killed as a result of project implementation as they will likely be present in the Action Area during the scheduled work period each year. Adult CCV steelhead, adult CCV spring-run Chinook, and adult green sturgeon are not expected to be present in the Action Area during the Proposed Action, and therefore no take of this life stage of these species is expected.

Take of juvenile CCV steelhead, juvenile CCV spring-run Chinook salmon, and juvenile green sturgeon may occur during fish relocations, which may utilize herding, seining, or electrofishing to relocate fish. Seining and electrofishing require handling fish, and thus will only be used when herding is not successful. Any fish relocation or collection gear has some associated risk to fish, including stress, disease transmission, injury, or death. The amount of unintentional injury and mortality attributable to fish relocation varies widely depending on the method used, ambient conditions, and the experience of the field crew. Since fish relocation activities will be conducted by qualified fisheries biologists following both NMFS guidelines, direct effects to and mortality of juvenile steelhead, Chinook salmon, and green sturgeon during relocation activities is expected to be minimal. However, some fish may still be killed or injured during relocation. Take in the form of collection, injury, or death is summarized below in Table 2.
Table 2: Expected take of juvenile CCV steelhead and CCV spring-run Chinook salmon due to fish relocation activities during Proposed Project construction.

Species	Life Stage	Expected Collection	Mortality
CCV Steelhead	Juvenile	123	1
CCV spring-run Chinook Salmon	Juvenile	62	1
sDPS Green Sturgeon	Juvenile	2	0

2.9.2 Effect of the Take

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

2.9.3 Reasonable and Prudent Measures

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

1. Measures shall be taken to minimize sedimentation events and turbidity plumes in the Action Area and their direct and indirect effects to listed species and their critical habitat.

2. Measures shall be taken to minimize impacts to riparian vegetation in the Action Area and its direct and indirect effects to critical habitat.

3. USFWS/the applicant shall prepare and provide NMFS with a yearly report detailing the take of listed fish species associated with the project.

2.9.4 Terms and Conditions

The terms and conditions described below are non-discretionary, and the USFWS or any applicant must comply with them in order to implement the RPMs (50 CFR 402.14). The USFWS or any applicant has a continuing duty to monitor the impacts of incidental take and must report the progress of the action and its impact on the species as specified in this ITS (50 CFR 402.14). If the entity to whom a term and condition is directed does not comply with the following terms and conditions, protective coverage for the Proposed Action would likely lapse.

1. The following terms and conditions implement reasonable and prudent measure:

a. BMPs shall be implemented to prevent soil erosion and sediment incursion into the active channel. Straw bales, straw wattles and silt fences will be installed at source sites for each project, as appropriate.

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

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

d. Disturbed areas adjacent to the active channel that are deemed unstable shall be vegetated with native plant species and/or mulched with certified weed-free hay upon project completion.

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

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

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

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

3. The following terms and conditions implement reasonable and prudent measure:

h. USFWS shall submit to NMFS an annual report describing the incidental take resulting from the Proposed Project. This report shall be filed not later than January 1st covering the instream construction window from the previous year. The report should be submitted to the following address:

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

2.10 Conservation Recommendations

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

(1) USFWS should provide a NMFS-approved Worker Environmental Awareness Training Program for construction personnel to be conducted by a NMFS-approved biologist for all construction workers prior to the commencement of construction activities. The program shall provide workers with information on their responsibilities with regard to Federally-listed fish, their critical habitat, an overview of the life-history of all the species, information on take prohibitions, protections under the ESA, and an explanation of terms and conditions identified in this BO. Written documentation of the training must

(2) be submitted to NMFS within 30 days of the completion of training. Completion of this training is consistent with agency requirements set forth in section 7(a)(1).

(3) USFWS should continue to work cooperatively with other State and Federal agencies, private landowners, governments, and local watershed groups to identify opportunities for cooperative analysis and funding to support salmonid and sturgeon habitat restoration projects in the Yuba River. Implementation of future restoration projects is consistent with agency requirements set forth in section 7(a)(1).

2.11 Reinitiation of Consultation

This concludes formal consultation for the Hallwood Side Channel and Floodplain Restoration Project.

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 ITS is exceeded, (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this BO, (3) the agency action is subsequently modified in a manner that causes an effect on the listed species or critical habitat that was not considered in this BO, or (4) a new species is listed or critical habitat designated that may be affected by the action.

2.12 "Not Likely to Adversely Affect" Determinations

NMFS has determined that the Proposed Action is not likely to adversely affect critical habitat designated for CCV steelhead, CCV spring-run Chinook salmon, or the Southern DPS of the North American green sturgeon. Details regarding the potential for direct or indirect adverse effects to these species and/or their critical habitats are included in Section 2.5.

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

Section 305(b) of the MSA directs Federal agencies to consult with NMFS on all actions or Proposed Actions that may adversely affect EFH. The MSA (section 3) defines EFH as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." Adverse effect means any impact that reduces quality or quantity of EFH, and may include direct or indirect physical, chemical, or biological alteration of the waters or substrate and loss of (or injury to) benthic organisms, prey species and their habitat, and other ecosystem components, if such modifications reduce the quality or quantity of EFH. Adverse effects on EFH may result from actions occurring within EFH or outside of it and may include site-specific or EFH-wide impacts, including individual, cumulative, or synergistic consequences of actions (50 CFR 600.810). Section 305(b) also requires NMFS to recommend measures that can be taken by the action agency to conserve EFH.

This analysis is based, in part, on the EFH assessment provided by USFWS and descriptions of EFH for Pacific coast salmon 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 and **(3)** spawning habitat.

3.2 Adverse Effects on Essential Fish Habitat

Effects to the HAPCs listed in section 3.1 above are discussed in context of effects to critical habitat PCEs as designated under the ESA in section 2.4.2. Effects to ESA-listed critical habitat and EFH HAPCs are appreciably similar, therefore no additional discussion is included. A list of 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:

<u>Sedimentation and turbidity</u>

- Reduced habitat complexity **(1)**
- Reduced quality and availability of spawning substrate **(3)**
- Reduced delivery of oxygenated water to incubating eggs **(3)**
- Reduced size and connectivity of spawning patches **(1, 3)**
- Increased scouring **(1, 3)**
- Reduced riffle habitat **(1, 3)**

Removal of riparian vegetationi

- Degraded water quality **(1, 3)**
- Reduced shading **(2)**
- Reduction in large woody material recruitment **(1)**
- Reduced shelter from predators **(1)**
- Reduction in aquatic macroinvertebrate production **(1)**

3.3 Essential Fish Habitat Conservation Recommendations

The following are EFH conservation recommendations for the Proposed Project:

(1) USFWS should provide a NMFS-approved Worker Environmental Awareness Training Program for construction personnel to be conducted by a NMFS-approved biologist for all construction workers prior to the commencement of construction activities. The program shall provide workers with information on their responsibilities with regard to Federally-listed fish, their critical habitat, an overview of the life-history of all the species, information on take prohibitions, protections under the ESA, and an explanation of terms and conditions identified in this BO. Written documentation of the training must be submitted to NMFS within 30 days of the completion of training. HAPCs that would benefit from implementation of this training include (1) complex channels and floodplain habitats, (2) thermal refugia and (3) spawning habitat.

Fully implementing these EFH conservation recommendations would protect, by avoiding or minimizing the adverse effects described in section 3.2, to above designated EFH for Pacific coast salmon.

3.4 Statutory Response Requirement

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

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

3.5 Supplemental Consultation

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

FISH AND WILDLIFE COORDINATION ACT

The purpose of the FWCA is to ensure that wildlife conservation receives equal consideration, and is coordinated with other aspects of water resources development (16 USC 661). The FWCA establishes a consultation requirement for Federal agencies that undertake any action to modify any stream or other body of water for any purpose, including navigation and drainage (16 USC 662(a)), regarding the impacts of their actions on fish and wildlife, and measures to mitigate those impacts. Consistent with this consultation requirement, NMFS provides recommendations and comments to Federal action agencies for the purpose of conserving fish and wildlife resources, and providing equal consideration for these resources. NMFS' recommendations are provided to conserve wildlife resources by preventing loss of and damage to such resources. The FWCA allows the opportunity to provide recommendations for the conservation of all species and habitats within NMFS' authority, not just those currently managed under the ESA and MSA.

FWCA recommendation: At any project site within the Action Area that experiences foot traffic, USFWS should post interpretive signs describing the presence of listed fish and/or critical habitat as well as highlighting their ecological and cultural value.

The action agency must give these recommendations equal consideration with the other aspects of the Proposed Action so as to meet the purpose of the FWCA. This concludes the FWCA portion of this consultation.

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 BO addresses these DQA components, documents compliance with the DQA, and certifies that this BO has undergone pre-dissemination review.

5.1 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 BO is the United States Fish and Wildlife Service. Other interested users could include California Department of

Fish and Wildlife and the Army Corps of Engineers. Individual copies of this BO were provided to USFWS. This BO will be posted on the Public Consultation Tracking System website (https://pcts.nmfs.noaa.gov/pcts-web/homepage.pcts). The format and naming adheres to conventional standards for style.

5.2 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.

5.3 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 BO and EFH consultation contain more background on information sources and quality.

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

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

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