UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
West Coast Region
777 Sonoma Avenue, Room 325
Santa Rosa, California 95404-4731

December 22, 2021 **Refer to NMFS No:** WCRO-2021-01031

Thomas Holstein
Environmental Branch Chief
Office of Local Assistance
California Department of Transportation, District 4
P.O. Box 23660, MS-10B
Oakland, California 94623-0660

Re: Endangered Species Act Section 7(a)(2) Biological Opinion for the Dry Creek Bridge Replacement Project in Napa County, California (BRLO- 5921 [061])

Dear Mr. Holstein:

Thank you for your letter of April 30, 2021, 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 Dry Creek (Napa) Bridge Replacement Project (Project) in Napa County, California.

The enclosed biological opinion is based on our review of the California Department of Transportation's (Caltrans)[1] proposed Project and describes NMFS' analysis of the effects on threatened Central California Coast (CCC) steelhead (*Oncorhynchus mykiss*) and its designated critical habitat in accordance with section 7 of the ESA. In the enclosed biological opinion, NMFS concludes the Project is not likely to jeopardize the continued existence of threatened CCC steelhead, nor is it likely to result in the destruction or adverse modification of its critical habitat. However, NMFS anticipates take of CCC steelhead will occur during construction activities as juvenile steelhead are likely to be present during dewatering of the work sites for Project construction. An incidental take statement with terms and conditions is included with the enclosed biological opinion.

[1] Pursuant to 23 USC 327, and through a series of Memorandum of Understandings beginning June 7, 2007, the Federal Highway Administration (FHWA) assigned and Caltrans assumed responsibility for compliance with Section 7 of the federal Endangered Species Act (ESA) and the Magnuson-Stevens Fishery Conservation and Management Act (MSA) for federally-funded transportation projects in California. Therefore, Caltrans is considered the federal action agency for consultations with NMFS for federally funded projects involving FHWA. Caltrans proposes to administer federal funds for the implementation of the proposed action, and is therefore considered the federal action agency for this consultation.

Please contact Andy Trent at 707-578-8553, or andrew.trent@noaa.gov if you have any questions concerning this section 7 consultation, or if you require additional information.

Sincerely,

Alecia Van Atta
Assistant Regional Administrator
California Coastal Office

Enclosure

cc: Keevan Harding, Caltrans (keevan.harding@dot.ca.gov)
Copy to E-File ARN 151422WCR2021SR00086

Endangered Species Act (ESA) Section 7(a)(2) Biological Opinion

Dry Creek (Napa) Bridge Replacement Project
Napa County, California

NMFS Consultation Number: WCRO-2021-01031

Action Agency: Department of Transportation (Caltrans)

Affected Species and NMFS' Determinations:

ESA-Listed Species	Status	Is Action Likely to Adversely Affect Species?	Is Action Likely to Jeopardize the Species?	Is Action Likely to Adversely Affect Critical Habitat?	Is Action Likely to Destroy or Adversely Modify Critical Habitat?
Central California Coast steelhead (*Oncorhynchus mykiss*)	Threatened	Yes	No	Yes	No

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

Issued By:

Alecia Van Atta
Assistant Regional Administrator
California Coastal Office

Date: December 22, 2021

Table of Contents

1. INTRODUCTION

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

1.1. Background

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

We completed pre-dissemination review of this document using standards for utility, integrity, and objectivity in compliance with applicable guidelines issued under the Data Quality Act (DQA) (section 515 of the Treasury and General Government Appropriations Act for Fiscal Year 2001, Public Law 106-554). The document will be available within 2 weeks at the NOAA Library Institutional Repository [https://repository.library.noaa.gov/welcome]. A complete record of this consultation is on file at NMFS North-Central Coast Office in Santa Rosa, California (ARN #151422WCR2021SR00086).

1.2. Consultation History

By letter dated April 30, 2021, the California Department of Transportation (Caltrans) requested initiation of formal consultation with NMFS, North-Central Coast Office for the Dry Creek (Napa) Bridge Replacement Project (Project). Caltrans determined that the Project may affect and is likely to adversely affect CCC steelhead, but is not likely to adversely affect CCC steelhead critical habitat. Included with the Caltrans' request for consultation was a Biological Assessment that was prepared by GPA Consulting, and approved by Napa County and Caltrans.

On May 10, 2021, NMFS requested a virtual meeting with Caltrans and Napa County to discuss additional information needs and seek clarification on Project construction methods. Prior to the scheduled video coordination meeting, NMFS provided comments embedded into the Project's Biological Assessment via email on May 13, 2021.

NMFS and Caltrans representatives met virtually on May 17, 2021, to discuss additional information needs and inconsistencies in the Biological Assessment. Additional information needs included: (1) clarification on CCC steelhead relocation efforts, (2) proposed water diversion method that included a k-rail system, (3) on-site mitigation plans that aim to restore the creek channel at the bridge removal site, and (4) design plans that display channel grading, rock-slope protection placement, in-channel bridge features, and riparian plantings at both the removal and new bridge construction sites. Due to inconsistencies in the Biological Assessment, NMFS requested Caltrans re-submit the document and include above the additional information.

On May 25, 2021, NMFS provided Caltrans with a follow-up email that summarized the further information needs presented during the May 17, 2021, meeting.

On July 1, 2021, Caltrans provided NMFS via email with a revised Biological Assessment that included: (1) a modified water diversion system, (2) on-site streambank restoration actions, (3) design plans for one large rootwad habitat structure, (4) design plans for the bridge removal and new bridge construction sites, and (5) description of CCC steelhead relocation plans.

On July 12, 2021, NMFS requested Caltrans to provide a hydraulic report to evaluate fish passage conditions through the stream reach. On that same day, Caltrans provided NMFS with the final hydraulic design study for the Project.

On July 23, 2021, NMFS and Caltrans representatives discussed by phone the placement of additional large rootwad habitat structures at the bridge removal site for mitigation.

On August 8, 2021, Caltrans informed NMFS that they propose the addition of one more large rootwad habitat structure to the Project, making the total of number of rootwad habitat structures to be installed as two. On that same day, via email, NMFS requested a site visit with Caltrans and asked that additional rootwad habitat structures be added to the site.

On August 24, 2021, NMFS, Caltrans, and Napa County held a virtual site visit and discussed the possibility of adding additional fish habitat features at the existing bridge removal site. In an email to NMFS on September 1, 2021, Caltrans and Napa County agreed to install a total of four rootwad habitat structures.

On October 18, 2021, NMFS received from Caltrans via email design plans for the four rootwad habitat structures. The design plans also included a drawing of the proposed vegetated soil lift at the bridge removal site. The October 18, 2021, email also informed NMFS that monitoring of stream bank conditions and native plantings would be performed by Napa County at the Project site.

1.3. Proposed Federal Action

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

Caltrans, in cooperation with Napa County, proposes to replace an existing structurally deficient bridge (Bridge No. 21C0056) over Dry Creek in rural Napa County, California as part of Caltrans’ Highway Bridge Program. The purpose of the Project is to provide a safe, functional, and reliable crossing over Dry Creek on Dry Creek Road. The Project proposes to remove the existing bridge structure and install a new bridge along a straighter roadway alignment. The new bridge would be constructed approximately 150 feet south of the existing bridge on Dry Creek Road. Project construction is anticipated to take approximately 18 months over two construction seasons and will be conducted in four stages (Table 1).

The following is a summary of work activities proposed by the County to construct the replacement bridge and remove the existing bridge:

Table 1. Anticipated Construction Stages

Stage 1	Construction during Stage 1 will include: (1) installation of the new bridge over Dry Creek, (2) construction of approximately 100 feet of new roadway in each direction, and (3) creation of 200 feet of new roadway for construction access purposes. In addition, grading for the new roadway sections and the temporary access roadway sections will be constructed. Construction of the temporary roadway section are required to allow one lane traffic to operate during Stage 2 of construction because Dry Creek Road will remain open during construction stages.
Stage 2	Construction during Stage 2 will include: (1) creation of approximately 50 feet of a new roadway that will be located to the west of the new bridge, (2) grading for the new roadway section, and (3) installation of a temporary ramp that will connect the existing road to the new roadway section.
Stage 3	Construction during Stage 3 will include: (1) demolishment of the existing bridge and pavement, (2) construction of 50 feet of new roadway alignment and the remaining access road, (3) construction of the vegetated soil layers and toe rock at the existing bridge location, and (4) the creation of a bioretention basin.
Stage 4	Construction during stage 3 will include: (1) construction of the remaining Dry Creek Road, and (2) the creation of a bioretention basin.

Channel Dewatering (Stage 1 & Stage 3)
To facilitate construction of the new bridge and remove the existing bridge, the County proposes to dewater portions of the Dry Creek channel. It is anticipated that water will be flowing in Dry Creek during the proposed in-channel construction season of June 15 to October 15. Two separate water diversions are proposed. The first water diversion (Water Diversion #1) will be installed during Stage 1 at the new bridge site during construction season one. The second water diversion (Water Diversion #2) will be installed during Stage 3 at the bridge removal site during construction season two. Each water diversion system will include placement of temporary cofferdams (e.g., gravel-filled, inflatable, aquadam, or a bladderdam) and installation of a bypass pipe in order to isolate the streamflow in Dry Creek from the construction area. Both diversions would bisect the channel allowing water to flow through the site and will rely on gravity pipe system. The use of a pump system is not anticipated.

Water Diversion #1 will extend approximately 50 feet upstream and 50 feet downstream of the new bridge site and is proposed to be removed at the end of construction season one. In total, approximately 150 linear feet of stream channel would be dewatered by Water Diversion #1. Water Diversion #2 will extend approximately 140 feet upstream and approximately 90 feet downstream of the existing bridge to dewater approximately 230 linear feet of the Dry Creek channel during construction season two. Water Diversion #2 would be fully removed from the channel at the end of Stage 4. Both water diversion systems will be removed no later than October 15 and will not be left in the creek over winter.

Concurrent with the installation of the cofferdams and temporary streamflow bypass systems, the Project will capture and relocate fish from the affected reach of Dry Creek. Fish would be relocated outside of the construction area, within approximately 1,000 feet upstream or downstream of the construction sites in Dry Creek.

Bridge Installation (Stage 1)
The new single span bridge over Dry Creek will be approximately 81 feet long by 32 feet wide. The bridge structure will be composed of a cast-in-place concrete deck and will not require any falsework within the creek to construct the deck. To support the bridge deck, new bridge abutments will be installed with two rows of 24-inch cast-in-drilled-hole piles. Abutment construction will require excavation to a depth of seven feet on both sides of the stream bank. Excavation for the bridge abutments will remain outside the 100-year water surface elevation of the stream bank. Rock slope protection (RSP) will be placed on the bank in front of the new bridge abutments to protect against scour. The RSP will extend along the channel bank 25 linear feet beyond the edge of the bridge deck both upstream and downstream.

Bridge Removal (Stage 3)
The existing 34-foot long single span bridge is proposed to be removed during Stage 3. The existing bridge wingwalls and an abutment on the western streambank (abutment one) will be fully removed. Following abutment removal, the western streambank will be regraded to a lesser slope (to approximately 4:1 or 3:1) and will be restored using a "soil burrito" design which is intended to re-establish the natural riparian vegetation along the channel, promote overhanging riparian vegetation growth, and provide soil stabilization. The soil burrito/vegetative soil lift design will consist of a combination of native soil, biodegradable fabric, and willow plantings. Rock will be placed at the toe of the western streambank to ensure stability of the soil burrito design.

On the eastern streambank, the existing wingwalls and abutment (abutment two) will be partially removed up to one foot below the existing top of roadway. Installation of rock is not proposed on the eastern streambank because the abutment is founded on natural bedrock.

Roadway Re-alignments (Stage 1 through 4)
Roadway realignments are required to access the replacement bridge and maintain access to the properties along Dry Creek Road and Dry Creek Fork Road. The new bridge will be constructed along an east-west alignment located approximately 150 feet south of the existing bridge in order to straighten the bridge and bypass a sharp curve segment of Dry Creek Road.

The section of road between the existing bridge and the proposed new roadway to the south will be demolished. The portion of the roadway north of the existing bridge that connects to Dry Creek Fork Road will be ground, overlain, and re-striped to remove the connection to the existing bridge and connect only to Dry Creek Fork Road.

Installation of Rootwad Structures (Stage 3)
Following the removal of the existing bridge, the County proposes to install four rootwad habitat structures during Stage 3 in construction season two. Rootwads will be placed into the western streambank when the construction site is dewatered. The rootwads will be installed into the western streambank after the full removal of a wingwall and abutment number one. Each rootwad structure will feature a root fan that extends into the stream channel. Each segment of root fan on each of the four rootwad structures will be approximately 6 feet wide and will overlaps with adjacent rootwad fans along the streambank for a total length of 24 feet. The

rootwad structures will be permanently fixed into the streambank through rebar stakes. Each rootwad structure will also consist of header and footer logs that overlap with one another. A vegetative soil lift with native willow plantings will be installed on top of the rootwad structures and extend up the streambank to the top of the bank.

Installation of Bioretention Basins
The Project proposes to construct new bioretention basins to collect and treat stormwater runoff from the new bridge and roadway. The basins would collect runoff in ponds and allow for settling prior to draining into Dry Creek. If feasible, portions of the bioretention basins would be built in early phases of construction. Additionally, if feasible, the partially constructed bioretention basins could serve as a construction sediment control basin.

Avoidance and Minimization Measures
The Project will implement several measures and best management practices to avoid and minimize impacts from construction activities. The following measures are proposed to avoid and minimize impacts to steelhead and aquatic habitat in Dry Creek:

(1) All construction activities within the Dry Creek channel will be limited to the period between June 15 and October 15.

(2) Once construction is completed, disturbed areas will be revegetated using hydroseeding and container plants will be used to replace native trees and shrubs. Willow plantings will be used to create the soil burrito on western streambank at the bridge removal site.

(3) Revegetated areas, including willow plantings in the soil burrito will be monitored for a minimum of five years to ensure 75% survival success.

(4) The County will provide annual monitoring reports regarding revegetation and streambank erosion conditions.

Details for all proposed avoidance and minimization measures are presented in the Project's *Biological Assessment for the Dry Creek Bridge Replacement Project in Napa County,* California, June 2021.

We considered, under the ESA, whether or not the proposed action would cause any other activities and determined that it would not.

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

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

2.1. Analytical Approach

This biological opinion includes both a jeopardy analysis and an adverse modification analysis. The jeopardy analysis relies upon the regulatory definition of “jeopardize the continued existence of” a listed species, which is “to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species” (50 CFR 402.02). Therefore, the jeopardy analysis considers both survival and recovery of the species.

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

The designation(s) of critical habitat for CCC steelhead use(s) the term primary constituent element (PCE) or essential features. The 2016 final rule (81 FR 7414; February 11, 2016) that revised the critical habitat regulations (50 CFR 424.12) replaced this term with physical or biological features (PBFs). The shift in terminology does not change the approach used in conducting a “destruction or adverse modification” analysis, which is the same regardless of whether the original designation identified PCEs, PBFs, or essential features. In this biological opinion, we use the term PBF to mean PCE or essential feature, as appropriate for the specific critical habitat.

The ESA Section 7 implementing regulations define effects of the action using the term “consequences” (50 CFR 402.02). As explained in the preamble to the final rule revising the definition and adding this term (84 FR 44976, 44977; August 27, 2019), that revision does not change the scope of our analysis, and in this opinion we use the terms “effects” and “consequences” interchangeably.

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

- Evaluate the rangewide status of the species and critical habitat expected to be adversely affected by the proposed action.
- Evaluate the environmental baseline of the species and critical habitat.
- Evaluate the effects of the proposed action on species and their critical habitat using an exposure–response approach.
- Evaluate cumulative effects.
- In the integration and synthesis, add the effects of the action and cumulative effects to the environmental baseline, and, in light of the status of the species and critical habitat, analyze whether the proposed action is likely to: (1) directly or indirectly reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species; or (2) directly or

indirectly result in an alteration that appreciably diminishes the value of critical habitat as a whole for the conservation of a listed species.

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

To conduct the assessment presented in this opinion, NMFS examined an extensive amount of information from a variety of sources. Detailed background information on the biology and status of the listed species and critical habitat has been published in a number of documents including peer reviewed scientific journals, primary reference materials, and governmental and non-governmental reports. For information that has been taken directly from published, citable documents, those citations have been referenced in the text and listed at the end of this document.

Additional information regarding the effects of the Project's actions on the listed species in question, their anticipated response to these actions, and the environmental consequences of the actions as a whole was formulated from the aforementioned resources, and the following:

- Section 7 Biological Assessment for the Dry Creek Bridge Replacement Project in Napa County, California. Prepared by the County of Napa and Caltrans, June 2021.
- Stream Inventory Report for Dry Creek in Napa County, California. Prepared by California Department of Fish and Wildlife in 1998.
- Dry Creek Watershed Draft Baseline Assessment and Preliminary Management Plan for Improving Salmonid Habitat and Watershed Health. Prepared by the Napa County Resource Conservation District in 2004.
- Final Summary Report for Road Assessment and Erosion Preventing Planning Project for the Dry Creek Watershed in Napa County, California. Prepared by Pacific Watershed Associates in 2003.
- Central Napa River Watershed Project for Salmonid Habitat and Function. Prepared by Napa County Resource Conservation District in 2005.
- Napa River Steelhead and Salmon Monitoring Program 2019-20 Report. Prepared by the Napa County Resource Conservation District in 2020.
- York Creek Dam Removal Fish Rescue Summary. Prepared by WRA in 2020.

2.2. Rangewide Status of the Species and Critical Habitat

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

2.2.1. Listed Species

This biological opinion analyzes the effect of the proposed Project in Napa County, California on CCC steelhead in Dry Creek. CCC steelhead are listed as threatened under the ESA (71 FR 834, January 5, 2006). The CCC steelhead distinct population segment (DPS) includes steelhead in coastal California streams from the Russian River to Aptos Creek, and the drainages of Suisun Bay, San Pablo Bay, and San Francisco Bay. In addition, this biological opinion analyzes the effects on designated critical habitat for threatened CCC steelhead (September 2, 2005; 70 FR 52488). Dry Creek is designated critical habitat for CCC steelhead.

2.2.2. Steelhead Life History

Steelhead are anadromous fish, spending some time in both fresh- and saltwater. The older juvenile and adult life stages occur in the ocean, until the adults ascend freshwater streams to spawn. Eggs (laid in gravel nests called redds), alevins (gravel dwelling hatchlings), fry (juveniles newly emerged from stream gravels), and young juveniles all rear in freshwater until they become large enough to migrate to the ocean to finish rearing and maturing to adults. General reviews for steelhead in California document much variation in life history (Shapovalov and Taft 1954, Barnhart 1986, Busby *et al*. 1996, McEwan 2001). Although variation occurs in coastal California, steelhead usually live in freshwater for 1 to 2 years in central California, then spend 2 or 3 years in the ocean before returning to their natal stream to spawn. Steelhead may spawn 1 to 4 times over their life. Adult steelhead returning from the ocean to the Napa River watershed, including Dry Creek, typically immigrate to freshwater between December and April, peaking in January and February, and juveniles migrate as smolts from the watershed to the ocean from January through June, with peak emigration occurring in April and May (Fukushima and Lesh 1998).

Steelhead fry rear in edgewater habitats and move gradually into pools and riffles as they grow larger. Cover is an important habitat component for juvenile steelhead, both as a velocity refuge and as a means of avoiding predation (Shirvell 1990, Meehan and Bjornn 1991). Steelhead, however, tend to use riffles and other habitats not strongly associated with cover during summer rearing more than other salmonids. Young steelhead feed on a wide variety of aquatic and terrestrial insects, and emerging fry are sometimes preyed upon by older juveniles. Rearing steelhead juveniles prefer water temperatures of 7.2-14.4 degrees Celsius (°C) and have an upper lethal limit of 23.9°C (Barnhart 1986, Bjornn and Reiser 1991). They can survive in water up to 27°C with saturated dissolved oxygen conditions and a plentiful food supply. Fluctuating diurnal water temperatures also aid in survivability of salmonids (Busby *et al.* 1996). Juvenile steelhead emigrate episodically from natal streams during fall, winter, and spring high flows, to the ocean to continue rearing to maturity.

Adults returning to spawn may migrate several miles, hundreds of miles in some watersheds, to reach their natal streams. Although spawning typically occurs between January and May, the specific timing of spawning may vary a month or more among streams within a region, and within streams interannually. Female steelhead dig a nest in the stream and then deposit their eggs. After fertilization by the male, the female covers the nest with a layer of gravel. Steelhead do not necessarily die after spawning and may return to the ocean, sometimes repeating their spawning migration one or more years. The embryos incubate within the nest. Hatching time varies from about three weeks to two months depending on water temperature. The young fish emerge from the nest about two to six weeks after hatching.

2.2.3. Status of CCC Steelhead

Historically, approximately 70 populations of steelhead are believed to have existed in the CCC steelhead DPS (Spence *et al*. 2008). Many of these populations (approximately 37) were independent, or potentially independent, meaning they historically had a high likelihood of surviving for 100 or more years absent anthropogenic impacts (Bjorkstedt *et al*. 2005). The remaining populations were dependent upon immigration from nearby CCC steelhead DPS populations to ensure their persistence (McElhaney *et al*. 2000, Bjorkstedt *et al*. 2005). While historical and current data of abundance are limited, CCC steelhead DPS numbers are substantially reduced from historical levels. A total of 94,000 adult steelhead were estimated to spawn in the rivers of this DPS in the mid-1960s, including 50,000 fish in the Russian River – the largest population within the DPS (Busby *et al*. 1996). Near the end of the 20th century, McEwan (2001) estimated that the wild steelhead population in the Russian River watershed was between 1,700 and 7,000 fish. Abundance estimates for smaller coastal streams in the DPS indicate low but stable levels, with recent estimates for several streams (Lagunitas, Waddell, Scott, San Vicente, Soquel, and Aptos creeks) of individual run sizes of 500 fish or less (62 FR 43937). However, as noted in Williams *et al*. (2016) data for CCC steelhead populations remain scarce outside of Scott Creek, which is the only long-term dataset and shows a significant decline. Short-term records indicate the low but stable assessment of populations is reasonably accurate; however, it should be noted that there is no population data for any populations outside of the Santa Cruz Mountain stratum, other than hatchery data from the Russian River.

Although available time series data sets are too short for statistically robust analysis, the information available indicates CCC steelhead populations have likely experienced serious declines in abundance, and apparent long-term population trends suggest a negative growth rate. This would indicate the DPS may not be viable in the long term, and DPS populations that historically provided enough steelhead immigrants to support dependent populations may no longer be able to do so, placing dependent populations at increased risk of extirpation. However, because CCC steelhead have maintained a wide distribution throughout the DPS, roughly approximating the known historical distribution, CCC steelhead likely possess a resilience that could slow their decline relative to other salmonid DPSs or Evolutionary Significant Units in worse condition. The 2005 status review concluded that steelhead in the CCC steelhead DPS remain "likely to become endangered in the foreseeable future" (Good *et al.* 2005), a conclusion that was consistent with a previous assessment (Busby *et al.* 1996) and supported by the NMFS Technical Recovery Team work (Spence *et al.* 2008). On January 5, 2006, NMFS issued a final determination that the CCC steelhead DPS is a threatened species, as previously listed (71 FR 834).

In the Russian River, analysis of genetic structure by Bjorkstedt *et al*. (2005) concluded previous among-basin transfers of stock, and local hatchery production in interior populations in the Russian River likely has altered the genetic structure of the Russian River populations. Depending on how “genetic diversity” is quantified, this may or may not constitute a loss of overall diversity. In San Francisco Bay streams, reduced population sizes and fragmentation of habitat has likely led to loss of genetic diversity in these populations. More detailed information on trends in CCC steelhead DPS abundance can be found in the following references: Busby *et al*. 1996, NMFS 1997, Good *et al.* 2005, and Spence *et al.* 2008.

The status review by Williams *et al*. (2011) concluded that steelhead in the CCC steelhead DPS remain "likely to become endangered in the foreseeable future" as new information released since Good *et al.* 2005 did not appear to suggest a change in extinction risk. The most recent status review (Williams *et al*. 2016) reached the same conclusion. On May 26, 2016, NMFS affirmed no change to the determination that the CCC steelhead DPS is a threatened species (81 FR 33468), as previously listed (76 FR 76386).

2.2.4. CCC Steelhead Critical Habitat Status

Critical habitat was designated for CCC steelhead on September 2, 2005 (70 FR 52488). In designating critical habitat, NMFS considers, among other things, the essential PBFs within the designated area that are essential to the conservation of the species and that may require special management considerations or protection.

PBFs for CCC steelhead and their associated essential features within freshwater include:

1. Freshwater spawning sites with water quantity and quality conditions and substrate supporting spawning, incubation and larval development.
2. Freshwater rearing sites with:
    a. water quantity and floodplain connectivity to form and maintain physical habitat conditions and support juvenile growth and mobility;
    b. water quality and forage supporting juvenile development; and
    c. natural cover such as shade, submerged and overhanging large wood, log jams and beaver dams, aquatic vegetation, large rocks and boulders, side channels, and undercut banks.
3. Freshwater migration corridors free of obstruction and excessive predation with water quantity and quality conditions and natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, side channels, and undercut banks supporting juvenile and adult mobility and survival.

The condition of CCC steelhead critical habitat, specifically its ability to provide for their conservation, has been degraded from conditions known to support viable salmonid populations. NMFS has determined that present depressed population conditions are, in part, the result of the following human-induced factors affecting critical habitat: logging, agricultural and mining activities; urbanization; stream channelization; dams; wetland loss; and water withdrawals, including unscreened diversions for irrigation. Impacts of concern include alteration of streambank and channel morphology, alteration of water temperatures, loss of spawning and rearing habitat, fragmentation of habitat, loss of downstream recruitment of spawning gravels and large woody debris, degradation of water quality, removal of riparian vegetation resulting in increased streambank erosion, loss of shade (higher water temperatures) and loss of nutrient inputs (Busby *et al*. 1996, 70 FR 52488, NMFS 2016). Water development has drastically altered natural hydrologic cycles in many of the streams in the DPS. Alteration of flows results in migration delays, loss of suitable habitat due to dewatering and blockage; stranding of fish from rapid flow fluctuations; entrainment of juveniles into poorly screened or unscreened diversions, and increased water temperatures harmful to salmonids. Furthermore, recent studies have identified the degradation of some tire products as a causal factor in salmonid mortalities, even in concentrations of less than one part per billion (Tian et al. 2020). The identified contaminant, 6PPD-quinone, has been found where both rural and urban roadways drain into waterways (Sutton et al. 2019). Studies have identified this issue and determined the cause of observed mortalities of adult and juvenile coho salmon in both field (Scholz et al. 2011) and laboratory settings respectively (Chow et al. 2019). Overall, current condition of CCC steelhead critical habitat is degraded, and does not provide the full extent of conservation value necessary for the recovery of the species.

A final recovery plan for CCC steelhead was released by NMFS in October 2016 (NMFS 2016). The plan describes key threats, actions needed to achieve recovery, and measurable criteria by which NMFS will determine when recovery has been reached. Recovery plan actions are primarily designed to restore ecological processes that support healthy steelhead populations, and address the various activities that harm these processes and threaten the species' survival. The recovery plan calls for a range of actions including the restoration of floodplains and channel structure, restoring riparian conditions, improving streamflows, restoring fish passage, protecting and restoring estuarine habitat, among other actions.

2.2.5. Global Climate Change

One factor affecting the range-wide status of the CCC steelhead DPS, and aquatic habitat at large is climate change. Impacts from global climate change are already occurring in California. For example, average annual air temperatures, heat extremes, and sea level have all increased in California over the last century (Kadir *et al*. 2013). Snow melt from the Sierra Nevada has declined (Kadir *et al.* 2013). However, total annual precipitation amounts have shown no discernable change (Kadir *et al.* 2013). CCC steelhead may have already experienced some detrimental impacts from climate change. NMFS believes the impacts on steelhead to date are likely fairly minor because natural, and local climate factors likely still drive most of the climatic conditions steelhead experience, and many of these factors have much less influence on steelhead abundance and distribution than human disturbance across the landscape. In addition, CCC steelhead are not dependent on snowmelt driven streams and, thus, not affected by declining snow packs.

The threat to CCC steelhead from global climate change will increase in the future. Modeling of climate change impacts in California suggests that average summer air temperatures are expected to continue to increase (Lindley *et al*. 2007, Moser *et al.* 2012). Heat waves are expected to occur more often, and heat wave temperatures are likely to be higher (Hayhoe *et al.* 2004, Moser *et al.* 2012, Kadir *et al.* 2013). Total precipitation in California may decline; critically dry years may increase (Lindley *et al.* 2007, Schneider 2007, Moser *et al.* 2012). Wildfires are expected to increase in frequency and magnitude (Westerling *et al*. 2011, Moser *et al.* 2012).

In the San Francisco Bay region, warm temperatures generally occur in July and August, but as climate change takes hold, the occurrences of these events will likely begin in June and could continue to occur in September (Cayan *et al.* 2012). Climate simulation models project that the San Francisco region will maintain its Mediterranean climate regime, but experience a higher degree of variability of annual precipitation during the next 50 years and years that are drier than the historical annual average during the middle and end of the 21st Century. The greatest reduction in precipitation is projected to occur in March and April, with the core winter months remaining relatively unchanged (Cayan *et al.* 2012).

Estuaries may also experience changes detrimental to salmonids. Estuarine productivity is likely to change based on changes in freshwater flows, nutrient cycling, and sediment amounts (Scavia *et al.* 2002, Ruggiero *et al*. 2010). In marine environments, ecosystems and habitats important to juvenile and adult salmonids are likely to experience changes in temperatures, circulation, water chemistry, and food supplies (Brewer and Barry 2008, Feely *et al.* 2004, Osgood 2008, Turley 2008, Abdul-Aziz *et al.* 2011, Doney *et al*. 2012). The projections described above are for the mid to late 21st Century. In shorter time frames, climate conditions not caused by the human addition of carbon dioxide to the atmosphere are more likely to predominate (Cox and Stephenson 2007, Santer *et al.* 2011).

2.3. Action Area

"Action area" means all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action (50 CFR 402.02). The action area for the Project includes the streambed and banks of Dry Creek at the new bridge site and the existing bridge site. The action area also includes the channel of Dry Creek extending 1,000 feet upstream of the existing bridge site and extending 1,000 downstream of the new bridge site where fish relocation may occur and water quality effects (e.g., fine sediment plume) might be detectable. Upland areas included in the action area consist of new and old roadway alignments and construction staging areas.

2.4. Environmental Baseline

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

Dry Creek is a perennial tributary to San Francisco Bay, via the Napa River. Dry Creek is a third-order stream with a drainage basin that is located near the northwestern limits of the City of Napa in the Mayacamas Range and spans approximately 12,640 acres or 20 square miles (NRCD, 2004). Dry Creek flows from the headwaters of Mount St. John (2,375' elevation) downstream for approximately 11.8 miles (NRCD, 2004). The headwaters are characterized as steep but Dry Creek is mostly a low gradient stream (having less than 2% average slope) that meanders through a narrow canyon until it meets the alluvial Napa Valley floor and joins the Napa River south of Yountville (NRCD, 2004). The upper watershed is comprised of private residences, ranches, and a number of hillside vineyards (NRCD, 2004). The lower watershed is primarily managed for vineyards, with some grazing (NRCD, 2004).

Four major tributaries contribute streamflow to Dry Creek with winter rains increasing flow during November through June. The climate within the action area is Mediterranean with warm dry summers and mild wet winters (NRCD, 204). Rainfall occurs primarily from November to April with the highest precipitation typically occurring in January (NRCD, 2004). A nearby California Irrigation Management Information System (Oakville Station 77) that monitors annual rainfall data indicates an annual rainfall of 37 inches on average (NRCD, 2004).

Dry Creek, within the action area contains heavily vegetated streambanks and a rock/cobble streambed. The mainstem of Dry Creek has been characterized as a low gradient, fairly entrenched channel that meanders through pool-riffle sequences. The stream channel substrates include gravel, cobble, boulder and bedrock. The natural vegetation community within the Dry Creek watershed ranges from grassland and chaparral to oak woodland and second growth coniferous forests. Tree species throughout the watershed include redwood, oak, Douglas fir, alder, willow, madrone, manzanita, and California bay laurel.

2.4.1. Status of Steelhead and Critical Habitat in the Action Area

Steelhead are native to and present in Dry Creek. Historical biological inventory surveys have been conducted in Dry Creek by the California Department of Fish and Game, the United States Fish and Wildlife Service, the Friends of the Napa River, EcoTruct Inc., and Stillwater Sciences. The highest densities of steelhead have been documented in Dry Creek reaches where habitat ranked highest (e.g., middle reaches of Dry Creek) (NRCD, 2004). Steelhead have also been documented in several tributaries to Dry Creek. In 2001 and 2002, Ecotrust Inc. and Friends of the Napa River carried out steelhead distribution surveys within Dry Creek and its tributaries (NRCD, 2004; NRCD, 2005). Survey estimates of juvenile summer steelhead abundance within a tributary (Montgomery Creek) that is approximately 1 mile south of the action area observed areas with more than 1.0 juvenile steelhead per square meter (NRCD 2004; NRCD, 2005). Within the action area, Dry Creek supports steelhead migration, spawning, egg incubation, and juvenile rearing. Given the proposed construction period for the Project (*i.e.,* June 15 through October 15), only juvenile steelhead are expected to be present in the action area during construction activities.

Based on current stream and riparian conditions, designated critical habitat within the action area is moderately degraded from properly functioning condition due to impacts from land use in the watershed (NMFS 2016). NRCD (2002) reports steelhead habitat conditions in the upper reach of Dry Creek, which includes the action area of this Project, provides better conditions than the lower reach. Spawning and rearing habitat exists with shaded canopy cover. The highest densities of juvenile summer steelhead have been documented in the middle and upper reaches of Dry Creek (NRCD, 2004). Tributaries to Dry Creek within the middle and upper reaches also provide suitable steelhead spawning and rearing habitat conditions (NRCD, 2004).

2.4.2. Factors Affecting Species Environment in the Action Area

Aquatic habitat in the action area has been adversely modified by decades of human activities in the watershed. By 1940, the Dry Creek watershed showed signs of impairment by construction of levees, diversion ditches, and the removal of riparian vegetation (NRCD, 2004). Today, the stream channel of Dry Creek is incised and narrow. Contributions to these current conditions include the building streamside road networks, construction of dams and water diversions, changing land use practices, and increased development (NRCD, 2004). The combination of these activities has resulted in alteration of stream channel morphology, increased erosion and sedimentation, reduced summer flows and the loss of riparian habitat (NRCD, 2004). Consequently, the result of these activities have had negative effects on steelhead habitat quality in the action area.

In the action area, habitat impairments are associated with the existing bridge and roadway. Bridge abutments in the streambank confine the channel and prevent lateral channel migration. Stormwater and other potentially toxic discharges enter Dry Creek from the roadway and adjacent properties within the action area. As a result, Dry Creek, throughout the action area has reduced food production and less functional habitat for rearing and spawning steelhead.

2.4.3. Previous Section 7 Consultations Affecting the Action Area

No previous individual section 7 consultations with NMFS have occurred within the action area. Section 10(a)(1)(A) research and enhancement permits and section 4(d) limits or exceptions could potentially occur in the Dry Creek watershed, including the action area of this Project. Salmonid monitoring approved under these programs includes carcass surveys, smolt outmigration trapping, and juvenile density surveys. In general, these activities are closely monitored and require measures to minimize take during the research activities. Through November 2021, no research activities authorized by these NMFS programs have occurred in Dry Creek. The Napa County RCD has a section 4(d) authorization for sampling steelhead in streams of the Napa River watershed, including Dry Creek.

2.5. Effects of the Action

Under the ESA, "effects of the action" are all consequences to listed species or critical habitat that are caused by the proposed action, including the consequences of other activities that are caused by the proposed action (see 50 CFR 402.02). A consequence is caused by the proposed action if it would not occur but for the proposed action and it is reasonably certain to occur. Effects of the action may occur later in time and may include consequences occurring outside the immediate area involved in the action (see 50 CFR 402.17). In our analysis, which describes the effects of the proposed action, we considered the factors set forth in 50 CFR 402.17(a) and (b).

2.5.1. Fish Collection and Relocation Activities

Fish collection and relocation will be performed in coordination with dewatering activities prior to construction activities during both work seasons. The dewatered portion of Dry Creek will be approximately 150 linear feet of channel during construction season one and approximately 230 linear feet during construction season two. Before and during dewatering, juvenile steelhead will be captured and relocated away from the work area to avoid direct mortality and minimize the possible stranding of fish in isolated pools when dewatering is performed. Juvenile steelhead will be relocated to Dry Creek within 1,000 feet upstream or 1,000 feet downstream of the construction area to a location with clean water and suitable habitat.

Steelhead relocation activities will occur during the summer low-flow period after emigrating smolts and kelts (post-spawned adults) have left the creek and prior to the adult migration and spawning season. Therefore, NMFS expects the CCC steelhead that will be captured during the Project will be limited to pre-smolting juveniles.

Data to precisely quantify the number of juvenile steelhead that will be relocated by the Project prior to construction are not available, but estimates can be made from available information. As a surrogate for information on steelhead densities in Dry Creek, information is available from recent observations at York Creek, a nearby tributary of the Napa River. In 2020, the City of Saint Helena in Napa County hired biologists to dewatered and relocate fish from approximately 200 linear feet of stream channel below York Creek Dam on York Creek. York Creek is a tributary to the Napa River and is located north of Dry Creek within the same upper sub-region of the Napa River Watershed. During fish relocation in July 2020 on York Creek, biologists captured 93 juvenile steelhead from 200 feet of stream channel. Steelhead ranged in size from approximately 30 mm to 180 mm. Using the density of fish captured and relocated on York Creek (approximately 0.5 fish per linear foot of channel), and allowing for 50 percent variation in inter-annual population abundance due to water year type, adult return rates, and other uncertainties, NMFS estimates that up to 113 juvenile steelhead may be collected and relocated in construction season one (150 linear feet in length), and up to 173 juvenile steelhead in construction season two (230 linear feet in length). The total of 286 during the two construction seasons combined is expected to be the maximum number of CCC steelhead that would be captured and relocated by the Project.

Fish relocation activities pose a risk of injury or mortality to rearing juvenile salmonids. Any fish collecting gear, whether passive (Hubert 1996) or active (Hayes *et al*. 1996) has some associated risk to fish, including stress, disease transmission, injury, or death. The amount of unintentional injury and mortality attributable to fish capture varies widely, depending on the method used, the ambient conditions, and the expertise and experience of the field crew. Since fish relocation activities by the Project will be conducted by qualified fisheries biologists, direct effects to and mortality of juvenile steelhead during capture will be minimized. Based on information from other relocation efforts in California, NMFS estimates injury and mortalities would be less than three percent of those steelhead that are captured and relocated (Collins 2004, CDFG 2005, 2006, 2007, 2008, 2009, 2010a, 2010b, NMFS 2016b). Fish that avoid capture during relocation efforts may be exposed to risks described in the following section on dewatering. NMFS expects no more than three percent (rounded up to the next whole number) of the steelhead captured by the Project will be injured or killed during relocation activities. Given that we anticipate the capture of 113 juvenile steelhead during construction season one, we expect no more than four (4) juvenile steelhead are expected to be injured or killed during fish relocation. For construction season two, we anticipate up to 173 juvenile steelhead may be encountered and no more than six (6) juvenile steelhead will be injured or killed during fish relocation.

Sites selected in Dry Creek for relocating fish are expected to have similar and ample aquatic habitat as in the capture sites. In some instances relocated fish may endure short-term stress from crowding at the relocation sites. Relocated fish may have to contend with other fish causing increased competition for available resources such as food and habitat area. Frequent responses to crowding by steelhead include emigration and reduced growth rates (Keeley 2003). Some of the fish released at the relocation sites may choose not to remain in these areas and move either upstream or downstream to areas that have more vacant habitat and a lower density of steelhead. As each fish moves, competition remains either localized to a small area or quickly diminishes as fish disperse. NMFS does not expect impacts from increased competition would be large enough to adversely affect the survival chances of individual steelhead, or cascade through the watershed population based on the small area that would be affected and the relatively small number of individuals likely to be relocated. As described above, sufficient habitat appears to be available in Dry Creek to sustain fish relocated without crowding of other juvenile steelhead. Once construction activities are completed, juvenile steelhead will have the ability to return to the previously dewatered portion of the action area including the newly installed rootwad habitat features.

2.5.2. Dewatering

The Project proposes to isolate the work area with cofferdams and bypass flow systems around the construction area over two separate construction seasons. During construction season one, bypass piping will be installed to divert streamflow from upstream of the construction area to below the construction area by gravity for a distance of approximately 150 linear feet of Dry Creek. During construction season two, bypass piping will be installed to divert streamflow from upstream of the construction area to below the construction area by gravity for a distance of approximately 230 linear feet of Dry Creek. NMFS anticipates only minor temporary changes to the streamflow of creek outside of the dewatered construction areas during the dewatering process. These fluctuations in flow are anticipated to be small, gradual, and short-term. Once the cofferdams and pipeline bypasses are installed and operational, streamflow above and below the work areas should be the same as the pre-project conditions except within the dewatered work areas.

The temporary stream diversion during each construction season is expected to resemble typical summer low conditions. The diversion systems could restrict movement of listed salmonid species in a manner similar to the normal seasonal isolation of pools by intermittent flow conditions that typically occur during summer within a portion of some streams through the range of CCC steelhead. Because the quality of habitat in and around the action area is adequate to support rearing salmonids, NMFS expects salmonids will be able to find food and cover downstream of the action area as needed during dewatering activities.

Juvenile steelhead that avoid capture in the Project work area following relocation efforts may die due to desiccation, thermal stress, or crushed by equipment or foot traffic if not found by biologists as water levels recede within the area being dewatered. However, due to fish relocation efforts, NMFS expects the number of juvenile steelhead that would die as a result of stranding during dewatering activities would be one percent or less of the steelhead within the work site prior to dewatering. With an estimated 113 juvenile steelhead in the dewatered portion of Dry Creek during construction season and 173 juvenile steelhead during construction season two, NMFS expects no more than two (2) juvenile steelhead will avoid capture and die as a result of dewatering during each construction season.

Benthic (*i.e.*, bottom dwelling) aquatic macroinvertebrates (a salmonid prey item) within the construction site may be killed or their abundance reduced when creek habitat is dewatered (Cushman 1985). However, effects to aquatic macroinvertebrates resulting from the construction streamflow bypass and dewatering will be temporary because construction activities would be relatively short-lived and dewatered areas are relatively small. Rapid recolonization (typically one to two months) of disturbed areas by macroinvertebrates is expected following channel re-watering (Cushman 1985, Thomas 1985, Harvey 1986). Based on the foregoing, NMFS does not expect the temporary loss of aquatic macroinvertebrates as a result of dewatering activities by the Project would adversely affect CCC steelhead during or after Project implementation.

2.5.3. Increased Mobilization of Sediment

During the two seasons of construction, Project activities will result in disturbance of the creekbed and banks of Dry Creek for equipment access, the placement/removal of the cofferdams, installation of RSP, the placement of rootwad habitat structures, and construction of a vegetated soil lift. Instream and near-stream construction activities have been shown to result in temporary increases in suspended sediment concentrations (Furniss *et al.* 1991, Reeves *et al.* 1991, Spence *et al.* 1996). Increases in sediment may affect fish in a variety of ways. High concentrations of suspended sediment can disrupt normal feeding behavior and efficiency (Cordone and Kelley 1961, Bjornn *et al.* 1977, Berg and Northcote 1985), reduce growth rates (Crouse *et al.* 1981), and increase plasma cortisol levels (Servizi and Martens 1992). High and prolonged turbidity concentrations can reduce dissolved oxygen in the water column, result in reduced respiratory functions, reduce tolerance to diseases, and can also cause fish mortality (Sigler *et al.* 1984, Berg and Northcote 1985, Gregory and Northcote 1993, Velagic 1995, Waters 1995). Small pulses of turbid water can also cause salmonids to disperse from established territories (Waters 1995), which can displace fish into less suitable habitat and/or increase competition and predation, decreasing chances of survival. Increased sediment deposition can fill pools thereby reducing the amount of potential cover and habitat available, and smother coarse substrate particles which can impair macroinvertebrate composition and abundance (Sigler *et al.* 1984, Alexander and Hansen 1986).

For this Project, work areas will be isolated from the flowing waters of Dry Creek by cofferdams during construction and little to no degradation of water quality is anticipated once the cofferdams are in place. Post-construction, disturbed soils may become mobilized when fall and winter storms increase streamflow levels. NMFS anticipates these activities would affect water quality in the action area in the form of small, short-term increases in turbidity during re-watering and subsequent higher flow events during the first winter storms post-construction. Sedimentation and turbidity levels associated with this Project are not expected to rise to the levels discussed in the previous paragraph because the Project will include methods to minimize disturbance of the stream channel and prevent conveyance of sediment and turbidity into the waters of Dry Creek. With the Project's use of cofferdams, work within the dry season (June 15-October 15), and site revegetation, NMFS anticipates any resulting elevated turbidity levels would only occur for a short period of time and would be well below levels and durations expected to cause harm to steelhead. With minimal area of disturbed, exposed soils remaining post-construction, it is unlikely that any meaningful amount of suspended sediment effects will result from this Project, and any project-related suspended sediment effects that do result will be temporary and will have an insignificant effect on CCC steelhead and their critical habitat.

2.5.4. Contaminants and Bioretention Basins

Construction operations in, over, and near surface water have the potential to release contaminants into surface waters. The Project has the potential to introduce oils and hydrocarbons from construction equipment into surface waters. Oils and hydrocarbons can contain a wide variety of polynuclear aromatic hydrocarbons (PAHs), and metals. PAHs can alter salmonid egg hatching rates and reduce egg survival as well as harm the benthic organisms that are a salmonid food source (Eisler 2000). Some of the effects that metals can have on salmonids are: immobilization and impaired locomotion, reduced growth, reduced reproduction, genetic damage, tumors and lesions, developmental abnormalities, behavior changes (avoidance), and impairment of olfactory and brain functions (Eisler 2000). These effects have the potential to harm exposed fish and temporarily degrade habitat. For this Project, all in-channel construction activities will occur within de-watered reaches behind cofferdams; thus, equipment and construction work will be isolated from the flowing waters of Dry Creek. Due to these measures, conveyance of toxic chemicals into Dry Creek during Project implementation is not expected, and the potential for the Project to degrade water quality, and harm CCC steelhead and their critical habitat is considered to be discountable.

In addition to the measures applied during Project construction activities, the County proposes to construct bioretention basins that will collect and treat stormwater runoff from the new bridge. These permanent measures incorporated into the Project will collect runoff in ponds and allow for settling prior to runoff draining into Dry Creek. The bioretention basins are expected benefit steelhead and aquatic habitat in Dry Creek by reducing future discharges of vehicle-derived and pavement-related contaminants.

2.5.5. Stream Restoration and Fish Passage

The County proposes construction of four rootwad habitat structures to be placed in Dry Creek for the purpose of enhancing fish habitat. Specifically, the four rootwad structures will be constructed within the Dry Creek channel on the western streambank where the existing bridge abutment will be fully removed. Installation of the rootwad habitat structure will occur during construction season two when the site is dewatered for the bridge removal. Additionally, the Project proposes to install a vegetated soil lift on top of the rootwad habitat structure. The vegetated soil lift will extend from the rootwad structures to the top of the stream bank. With the site already dewatered for removal of the existing bridge, no added effects of construction are expected for CCC steelhead and their critical habitat during installation of the rootwads and the vegetated soil lift.

Post-construction, the rootwad structures are expected to benefit steelhead and their habitat in Dry Creek by providing cover, retention of sediment and organic matter, and enhancing habitat complexity by altering water depths and velocities along the stream bank. Preferred territories of juvenile steelhead are commonly associated with instream large woody debris due to enhanced cover, improved water depths, and greater food availability. In combination with the upper bank vegetated soil lift, the rootwad structures are expected to increase habitat complexity and diversity for steelhead in the action area.

At the new bridge site, adult and juvenile steelhead passage is expected to be unimpaired by the Project. The new bridge will be 81 feet in length and clear span over the full channel width of Dry Creek. With no supports or other bridge-associated structure on the bed of Dry Creek, conditions are expected to be suitable post-construction for steelhead smolts moving downstream to the Napa River and steelhead adults migrating to upstream areas in Dry Creek. At the bridge removal site, the western abutment will be removed and the streambank graded to decrease the slope. These actions, in combination with the installation of rootwads, are expected to increase hydraulic complexity and improve fish passage conditions in the bridge removal portion of the action area.

2.5.6. Channel Form and Function

The Project's installation of a new bridge and the associated placement of RSP will impact the physical channel and aquatic habitat in Dry Creek. By design, bridges and their associated bank stabilization features prevent lateral channel migration, effectively forcing streams into a simplified linear configuration that, without the ability to move laterally, instead erode and deepen vertically (Leopold et al. 1968; Dunn and Leopold 1978). The resulting "incised" channel fails to create and maintain aquatic and riparian habitat through lateral migration, and can instead impair groundwater/streamflow connectivity and repress floodplain and riparian habitat function. The resulting simplified stream reach typically produces limited macroinvertebrate prey and poor functional habitat for rearing juvenile salmonids (Florsheim et al. 2008).

The proposed RSP for channel armoring at this Project's new bridge site may result in some habitat simplification in the future. However, channel incision is expected to be minimal as the the placement of a clear span bridge will encroach less on the stream channel as compared to existing bridge at the upstream site. The reduction of fill in the creek by removing the western abutment at the existing bridge, in combination with the placement of rootwads, is expected to allow the channel to develop more diverse hydraulic characteristics and increase the lateral conveyance capacity for high flow events in this portion of the action area.

2.5.7. Effects of Critical Habitat

As discussed above in section 2.5.3 of this opinion, the Project's construction activities are expected to result in short-term disturbance to the channel and the adjacent streambank areas. Localized impacts to water quality in the form of increased levels of turbidity and suspended sediment will be minimized during construction by the cofferdams and post-construction mobilization of sediment during high flow events are expected to be minimal. Given the small amounts of sediment and turbidity generated by the Project, NMFS expects PBFs of critical habitat associated with water quality for CCC steelhead in the action area are unlikely to be adversely affected. Any sediment and turbidity associated with construction activities are expected to rapidly dissipate downstream in Dry Creek during subsequent high flows following the two construction seasons.

PBFs of steelhead foraging habitat in the action area will be temporarily impacted by dewatering of approximately 150 linear feet of Dry Creek during the first construction season and approximately 230 linear feet during the second season. Food supplies within the dewatered reach will be temporarily reduced. Benthic (*i.e.*, bottom dwelling) aquatic macroinvertebrates may be killed or their abundance reduced when stream habitat is dewatered (Cushman 1985). However, effects to aquatic macroinvertebrates resulting from streamflow diversion and dewatering is expected to be short-term because construction activities will be of short-duration (approximately four months during each of the two construction season) and the dewatered reaches are relatively small. The rapid recolonization (typically one to two months) of disturbed areas by macroinvertebrates as seen by Cushman (1985), Thomas (1985). and Harvey (1986), is expected following rewatering of the construction sites. In addition, the effect of macroinvertebrate loss on juvenile steelhead would likely be negligible because food from upstream sources (via drift) would be available downstream of the dewatered areas since streamflow would be bypassed around the construction work sites. Based on the foregoing, NMFS expects the temporary loss of habitat space and impacts to aquatic macroinvertebrates as a result of dewatering activities would result in insignificant effects to rearing PBFs for steelhead in the action area.

The installation of four rootwad structures and the construction of a vegetated soil lift with native willow plantings are designed to provide natural streambank stabilization along the western bank while also improving steelhead habitat conditions within the Dry Creek channel and riparian zone. Rootwad structures influence channel formation, add retention of organic matter, and increase biological community composition. The benefits of the in-stream wood structures include increased cover for rest and to escape predators, increased hydraulic diversity affording refuge from high velocity and high turbidity, increased rearing and spawning habitat, improved upstream and downstream migration corridors, improved pool to riffle ratios, and added habitat complexity and diversity. The rootwad structures proposed by this Project are expected to provide multiple habitats benefits for all age classes of steelhead as presented above in section 2.5.5 of this opinion.

The Project's construction of vegetated soil lift and native willow plantings aim to provide natural soil stabilization on the western streambank while also increasing riparian vegetation cover. Riparian vegetation cover helps maintain stream habitat conditions necessary for steelhead. Riparian zones serve important functions in stream ecosystems such as providing shade (Poole and Berman 2001), sediment storage and filtering (Cooper et al. 1987, Mitsch and Gosselink 2000), nutrient inputs (Murphy and Meehan 1991), water quality improvements (Mitsch and Gosselink 2000), channel and stream bank stability (Platts 1991), source of woody debris that creates fish habitat diversity (Bryant 1983, Lisle 1986, Shirvell 1990), and both cover and shelter for fish (Bustard and Narver 1975, Wesche et al. 1987, Murphy and Meehan 1991). The Projects' use of a bio-engineered soil lift to restore the impaired streambank at the former bridge abutment is expected to increase riparian vegetation cover in the action area and not degrade PBFs of designated critical habitat.

As present above in section 2.5.6 of this opinion, bridges and associated bank stabilization have the potential to impair stream habitat. Bridge abutments on the streambank confine the channel and prevent lateral channel migration. In combination with RSP, the new bridge over Dry Creek may result in simplification of habitat. The resulting channel may have reduced flow connectivity to the floodplain and repress riparian habitat function with fewer invertebrate prey input from terrestrial sources. Although these effects are likely to be long term due the nature of bridge and RSP, the new bridge is a clear span across the channel and effects less than 100 linear feet of channel which will minimize the effects of confinement. Additionally, restoration actions at the bridge removal site are expected to minimize the loss of PBFs within the action area.

2.6. Cumulative Effects

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

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

2.7. Integration and Synthesis

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

CCC steelhead are listed as threatened under the ESA. Based on the extensive loss of historic habitat due to dams and the degraded condition of remaining spawning and rearing areas, CCC steelhead populations in watersheds that drain to San Francisco Bay, including the Napa River and its tributaries, have experienced severe declines. Steelhead are present in Dry Creek, though in densities and abundance lower than historic conditions. Additional factors responsible for the decline of CCC steelhead and their critical habitat include logging, agriculture, mining, urbanization, stream channelization and bank stabilization, wetland loss, water withdrawals, and global climate change. Although no population estimates are available for CCC steelhead in Dry Creek, current information suggests that steelhead numbers in the Dry Creek watershed are substantially reduced from historic levels.

As described in the *Effects of the Action* (Section 2.5) of this opinion, during Project construction, NMFS anticipates adverse effects to steelhead and designated critical habitat associated with two separate dewatering events. Installation of the new bridge will require dewatering 150 linear feet of Dry Creek in the first construction season (season one) and demolition of the existing bridge will require dewatering 230 linear feet in the second construction season (season two). NMFS estimates that up to 113 juvenile steelhead may be collected during construction season one and 173 juvenile steelhead during construction season two. Handling-associated injury and mortality during fish capture and relocation may be as high as three percent. Thus, we expect up to four (4) juvenile steelhead (season one) and up to six (6) juvenile steelhead (season two) of these individuals may be injured or killed during relocation. Dewatering may result in the additional loss of two (2) juvenile steelhead during construction season one and two (2) additional juvenile steelhead in season two. In total, up to 14 juvenile steelhead may be injured or killed during the two construction seasons in Dry Creek by fish relocation and dewatering. Dewatering of the channel will also temporarily reduce benthic invertebrate abundance, although rapid recolonization is expected following re-watering of the channel. Once the work sites are dewatered, construction activities are not expected to affect listed fish or degrade water quality because the work sites will be isolated from the flowing waters of Dry Creek.

Following the removal of the existing bridge over Dry Creek, CCC steelhead critical habitat will be restored on-site through the installation of rootwad habitat structures, vegetative soil lift, and native willow plantings. These actions are expected to enhance aquatic habitat and improve PBFs of critical habitat for fish passage, cover, and foraging. At the new bridge site, CCC steelhead critical habitat will be permanently impacted by the installation bridge and RSP. The resulting channel may have reduced flow connectivity to the floodplain and repress riparian habitat function with less invertebrate prey input from terrestrial sources. Fish passage through the action area will not be impaired by the Project and restoration actions at the bridge removal site are expected to improve PBFs within the action area.

In California, climate change is expected to result in higher average summer air temperatures, lower total precipitation, reductions in the amount of snowfall and rainfall, and reduced streamflow levels in Northern and Central Coastal rivers and streams. Estuaries may also experience changes in productivity due to changes in freshwater flows, nutrient cycling, and sediment amounts. For this project, construction will occur over a two-year period with two in-channel construction seasons. All adverse effects associated with the Project will occur during construction. The above effects of climate change are unlikely to be detected with that time frame. If the effects of climate change are detected over the short term, they will likely materialize as moderate changes to the current climate conditions within the action area. These changes may place further stress on CCC steelhead populations. The effects of the proposed Project combined with moderate climate change effects may result in conditions similar to those produced by natural ocean-atmospheric variations as described in the Environmental Baseline section of this opinion (Section 2.4) and annual variations. CCC steelhead are expected to persist throughout these phenomena, as they have in the past, even when concurrently exposed to the effects of similar projects.

NMFS does not anticipate the injury or mortality of up to 14 juvenile steelhead during Project construction activities to affect future adult returns of CCC steelhead. This loss of juveniles likely represents a miniscule percentage of the number of individuals in the Dry Creek population. The overall number of individuals in the population is expected to provide a compensatory effect, as the steelhead population in Dry Creek will be able to replace this very small number of juvenile steelhead lost during Project construction. Other areas of the Dry Creek watershed are expected to continue to contribute to the population during the time period when some juveniles in the action area may be harmed or killed as a result of this Project. Although some short-term adverse effects to water quality and riparian vegetation are anticipated during Project construction, fish passage will remain be unimpaired by the Project and the installation of rootwads are expected to benefit critical habitat by improving conditions at the bridge removal site. When added to the environmental baseline, cumulative effects, and species status, the effects of the proposed action are not expected to appreciably reduce the quality and function of critical habitat for CCC steelhead.

2.8. Conclusion

After reviewing and analyzing the current status of the listed species and critical habitat, the environmental baseline within the action area, the effects of the proposed action, the effects of other activities caused by the proposed action, and cumulative effects, it is NMFS' biological opinion that the proposed action is not likely to jeopardize the continued existence of threatened CCC steelhead destroy or adversely modify its designated critical habitat.

2.9. Incidental Take Statement

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

2.9.1. Amount or Extent of Take

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

Take of juvenile CCC steelhead is expected to occur with fish collection, relocation and dewatering of the two Dry Creek work sites during two seasons of construction. In construction season one, fish collection and relocation may capture of up to 113 juvenile steelhead during the dewatering of 150 feet of the Dry Creek channel. Up to four (4) of these individuals may be injured or killed during relocation and an additional two (2) individuals may be lost in the dewatered reach if stranded. In construction season two, fish collection and relocation may capture up to 173 juvenile steelhead during the dewatering of 230 feet of the Dry Creek channel. Up to six (6) of these individuals may be injured or killed during relocation and an additional two (2) individuals may be lost in the dewatered reach due to stranding. The anticipated level of take will be exceeded if more than 286 juvenile steelhead are collected in the two construction seasons combined and/or more than three (3) percent of the total number juvenile steelhead captured are injured or killed during fish relocation activities.

2.9.2. Effect of the Take

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

2.9.3. Reasonable and Prudent Measures

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

NMFS believes the following reasonable and prudent measures are necessary and appropriate to minimize take of CCC steelhead:

1. Undertake measures to ensure that harm and mortality to listed steelhead resulting from fish relocation and dewatering activities is low.
2. Undertake measures to minimize harm to steelhead and degradation of aquatic habitat associated with construction of the Project.
3. Prepare and submit post-construction reports regarding the effects of fish relocation, construction, and post-construction site performance.

2.9.4. Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the ESA, the Federal action agency must comply (or must ensure that any applicant complies) with the following terms and conditions. Caltrans 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 1:

    a. At least 60 days prior to the initiation of construction, Caltrans and/or Napa County shall submit a stream dewatering plan and a fish relocation plan to NMFS for review and approval. The fish relocation plan shall include information on credentials of the biologists that will capture and relocate fish, specific gear and techniques to be used to capture fish, information on equipment proposed to keep fish cool and aerated after collection and before release, criteria used to identify release sites, and alternative release sites.

b. Caltrans and/or Napa County shall retain qualified biologists with expertise in the areas of anadromous salmonid biology, including handling, collecting, and relocating salmonids; salmonid/habitat relationships; and biological monitoring of salmonids. All biologists working on the projects must be qualified to conduct fish collections in a manner which minimizes potential risks to steelhead. Electrofishing, if used, shall be performed by a qualified biologist and conducted according to the NOAA Fisheries Guidelines for Electrofishing Waters Containing Salmonids Listed under the Endangered Species Act, June 2000. See: https://media.fisheries.noaa.gov/dam-migration/electro2000.pdf. .

c. Caltrans and/or Napa County shall retain qualified biologist with expertise in the areas of anadromous salmonid biology to monitor the construction site during placement and removal of cofferdams, and streamflow diversions to ensure that any adverse effects to salmonids are minimized. The biologists will be onsite during all dewatering events to capture, handle, and safely relocate steelhead. Caltrans or the biologist will notify NMFS biologist Andrew Trent at (707) 578-8553 or andrew.trent@noaa.gov one week prior to capture activities in order to provide an opportunity for NMFS staff to observe the activities.

d. Captured steelhead shall be handled with extreme care and kept in water to the maximum extent possible during relocation activities. All captured fish will be kept in cool, shaded, aerated water protected from excessive noise, jostling, or overcrowding any time they are not in the stream, and fish will not be removed from this water except when released. To avoid predation, the biologists will have at least two containers and segregate young-of-year fish from larger age-classes and other potential aquatic predators. Captured steelhead will be relocated, as soon as possible, to a suitable instream location in which suitable habitat conditions are present to allow for adequate survival of transported fish and fish already present.

e. If any salmonids are found harmed, the biological monitor shall contact NMFS biologist, Andrew Trent, by phone immediately at 707-578-8553 or the NMFS North Central Coast Office (Santa Rosa, California) at 707-575-6050. The purpose of the contact is to review the activities resulting in take, determine if additional protective measures are required, and ensure appropriate collection and transfer of salmonid mortalities and tissue samples.

    i. All salmonid mortalities will be retained until further direction is provided by the NMFS biologist listed above.

    ii. Tissue samples are to be acquired from each mortality prior to freezing the carcass per the methods identified in the NMFS Southwest Fisheries Science Center Genetic Repository protocols: Either a one (1) cm square clip from the operculum or tail fin, or alternately, complete scales (20-30) should be removed and placed on a piece of dry blotter/filter paper (e.g. Whatman brand). Fold blotter paper over for temporary storage. Samples must be airdried as soon as possible (don't wait more than 8 hours). When tissue/paper is dry to the touch, place into a clean envelope labeled with Sample ID Number. Seal envelope.

iii. Include the following information with each tissue sample using the Salmonid Genetic Tissue Repository form or alternative spreadsheet: Collection Date, Collection Location (County, River, Exact Location on River), Collector Name, Collector Affiliation/Phone, Sample ID Number, Species, Tissue Type, Condition, Fork Length (mm), Sex (M, F or Unk), Adipose Fin Clip? (Y or N), Tag? (Y or N), Notes/Comments.

iv. Send tissue samples to: NOAA Coastal California Genetic Repository, Southwest Fisheries Science Center, 110 McAllister Way, Santa Cruz, California 95060.

f. Non-native fish that are captured during fish relocation activities shall not be relocated to anadromous streams, or areas where they could access anadromous habitat.

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

a. Caltrans and Napa County shall allow any NMFS employee(s) or any other person(s) designated by NMFS, to accompany field personnel to visit the project sites during activities described in this opinion.

b. All cofferdams, pipes and other diversion materials shall be removed from the stream upon work completion and no later than October 15 of each construction season.

c. Fill material for cofferdams shall be fully confined with the use of plastic sheeting, sandbags, or with other non-porous containment methods, such that sediment does not come in contact with streamflow or in direct contact with the natural streambed. All loose fill material for cofferdams or access ramps will be completely removed from the channel by October 15 of each construction season.

d. Construction equipment used within the creek channel shall be checked each day prior to work within the creek channel (top of bank to top of bank) and, if necessary, action will be taken to prevent fluid leaks. If leaks occur during work in the channel (top of bank to top of bank), spills will be contained and affected soils will be removed and properly disposed of.

e. Caltrans and/or Napa County shall develop a written monitoring plan to assess the survival of the Project's riparian plantings. Monitoring shall occur for a minimum of five years to ensure 75% survival success of native riparian vegetation plantings. The monitoring plan must also assess conditions at the rootwad structures and vegetated soil lift. The proposed monitoring plan shall be provided to NMFS for review and approval at least 120 days prior to the start of Project construction.

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

    a. Caltrans and/or Napa County shall provide a written report to NMFS by January 15 of each year following both construction seasons. The reports shall be provided to Andrew Trent at andrew.trent@noaa.gov or to NMFS North-Central Coast Office, Attention: San Francisco Bay Branch Chief, 777 Sonoma Avenue, Room 325, Santa Rosa, California, 95404-6528. The reports must contain, at a minimum, the following information:

        i. Construction Related Activities – The report must include the dates construction began and was completed, a discussion of any unanticipated effects or unanticipated levels of effects on steelhead, a description of any and all measures taken to minimize those unanticipated effects and a statement as to whether or not the unanticipated effects had any effect on steelhead, the number of steelhead killed or injured during the project action, and photographs taken before, during, and after the activity from photo reference points.

        ii. Fish Relocation – The report must include a description of the location from which fish were removed and the release site including photographs, the date and time of the relocation effort, a description of the equipment and methods used to collect, hold, and transport steelhead, the number of fish relocated by species, the number of fish injured or killed by species and a brief narrative of the circumstances surrounding steelhead fish injuries or mortalities, and a description of any problems which may have arisen during the relocation activities and a statement as to whether or not the activities had any unforeseen effects.

    b. Caltrans and/or Napa County shall provide annual written reports to NMFS by January 15 for five (5) years post-construction with the results of vegetation replanting success and rootwad conditions. Reports shall be provided to Andrew Trent at andrew.trent@noaa.gov or to NMFS North-Central Coast Office, Attention: San Francisco Bay Branch Chief, 777 Sonoma Avenue, Room 325, Santa Rosa, California, 95404-6528.

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). NMFS has no conservation recommendations at this time.

2.11. Reinitiation of Consultation

This concludes formal consultation for the Dry Creek (Napa) Bridge Replacement Project in Napa County, California.

Under 50 CFR 402.16(a): "Reinitiation of consultation is required and shall be requested by the Federal agency or by the Service where discretionary Federal agency involvement or control over the action has been retained or is authorized by law and: (1) If the amount or extent of taking specified in the incidental take statement is exceeded; (2) If new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not previously considered; (3) If the identified action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in the biological opinion or written concurrence; or (4) If a new species is listed or critical habitat designated that may be affected by the identified action."

3. Data Quality Act Documentation and Pre-Dissemination Review

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

3.1. Utility

Utility principally refers to ensuring that the information contained in this consultation is helpful, serviceable, and beneficial to the intended users. The intended users of this opinion are Caltrans and Napa County. Individual copies of this opinion were provided to Caltrans. Other interested users could include the California Department of Fish and Wildlife, the Regional Water Quality Control Board, Napa County Resource Conservation District, citizens within the affected areas, and others interested in the conservation of aquatic and riparian resources. The document will be available within 2 weeks at the NOAA Library Institutional Repository [https://repository.library.noaa.gov/welcome]. The format and naming adhere to conventional standards for style.

3.2. 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.

3.3. 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 part 600.

Best Available Information: This consultation and supporting documents use the best available information, as referenced in the References section. The analyses in this opinion [*and EFH consultation, if applicable*] 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, if applicable*], and reviewed in accordance with West Coast Region ESA quality control and assurance processes.

4. References

Abdul-Aziz, O.I., N.J. Mantua, K.W. Myers. 2011. Potential climate change impacts on thermal habitats of Pacific salmon (*Oncorhynchus* spp.) in the North Pacific Ocean and adjacent seas. Canadian Journal of Fisheries and Aquatic Sciences 68(9):1660-1680.

Alexander, G.R. and E.A. Hansen. 1986. Sand bed load in a brook trout stream. North American Journal of Fisheries Management 6:9-23.

Barnhart, R.A. 1986. Species profiles: life histories and environmental requirements of coastal fishes and invertebrates (Pacific Southwest), steelhead. United States Fish and Wildlife Service Biological Report 82 (11.60). 21 pages.

Beechie, T.J. and T.H. Sibley. 1997. Relationships between channel characteristics, woody debris, and fish habitat in northwestern Washington streams. Transactions of the American Fisheries Society 26:217-229.

Berg, L., and T.G. Northcote. 1985. Changes in territorial, gill-flaring, and feeding behavior in juvenile coho salmon (*Oncorhynchus kisutch*) following short-term pulses of suspended sediment. Canadian Journal of Fisheries and Aquatic Sciences 42:1410-1417.

Bjorkstedt, E.P, B.C. Spence, J.C. Garza, D.G. Hankin, D. Fuller, W.E. Jones, J.J. Smith, and R. Macedo. 2005. An Analysis of Historical Population Structure For Evolutionarily Significant Units of Chinook Salmon, Coho Salmon, and Steelhead in the North-Central California Coast Recovery Domain. NOAA Technical Memorandum NOAA-TM-NMFS_SWFSC-382. 210 pages.

Bjornn, T.C., M.A. Brusven, M.P. Molnau, J.H. Milligan, R.A. Klamt, E. Chacho, and C. Schaye. 1977. Transport of granitic sediment in streams and its effect on insects and fish. University of Idaho, Forest, Wildlife, and Range Experiment Station, Bulletin 17, Moscow, ID.

Bjornn, T.C., and D.W. Reiser. 1991. Habitat requirements of salmonids in streams. Pages 83-138 in W.R. Meehan, editor. Influences of Forest and Rangeland Management on Salmonid Fishes and Their Habitats. American Fisheries Society Special Publication 19. American Fisheries Society. Bethesda, Maryland. 751 pages.

Brewer, P. G., and J. Barry. 2008. Rising Acidity in the Ocean: The Other CO2 Problem. Scientific American.

Bryant, M.D. 1983. The role and management of woody debris in west coast salmonid nursery streams. North American Journal of Fisheries Management 3:322-330.

Busby, P.J., T.C. Wainwright, G.J. Bryant., L. Lierheimer, R.S. Waples, F.W. Waknitz, and I.V. Lagomarsino. 1996. Status review of west coast steelhead from Washington, Idaho, Oregon, and California. United States Department of Commerce, National Oceanic and Atmospheric Administration Technical Memorandum NOAA Fisheries-NWFSC-27. 261 pages.

Bustard, D.R., and D.W. Narver. (1975). Aspects of the winter ecology of juvenile coho salmon (*Oncorhynchus kisutch*) and steelhead trout (*Salmo gardneri*). Journal of the Fisheries Research Board of Canada 32(5):667-680.

Cayan, D., M. Tyree, and S. Iacobellis. 2012. Climate Change Scenarios for the San Francisco Region. Prepared for California Energy Commission. Publication number: CEC-500-2012-042. Scripps Institution of Oceanography, University of California, San Diego.

CDFG (California Department of Fish and Game). 1998. Dry Creek Stream Inventory Report.

CDFG (California Department of Fish and Game). 2005. Report to the National Marine Fisheries Service for Fisheries Restoration Grant Program Projects conducted under Department of the Army Regional General Permit No. 12 (Corps File No. 27922N) within the United States Army Corps of Engineers, San Francisco District, January 1, 2004 through December 31, 2004. March 1, 2005.

CDFG (California Department of Fish and Game). 2006. Annual report to the National Marine Fisheries Service for Fisheries Restoration Grant Program Projects conducted under Department of Army Regional General Permit No. 12 (Corps File No. 27922N) within the U.S. Army Corps of Engineers, San Francisco District, January 1, 2005 through December 31, 2005. CDFG Region 1, Fortuna Office. March 1, 2006.

CDFG (California Department of Fish and Game). 2007. Annual report to the National Marine Fisheries Service for Fisheries Restoration Grant Program Projects conducted under Department of Army Regional General Permit No. 12 (Corps File No. 27922N) within the U.S. Army Corps of Engineers, San Francisco District, January 1, 2006 through December 31, 2006. Northern Region, Fortuna Office. March 1, 2007.

CDFG (California Department of Fish and Game). 2008. Annual report to the National Marine Fisheries Service for Fisheries Restoration Grant Program Projects conducted under

Department of Army Regional General Permit No. 12 (Corps File No. 27922N) within the U.S. Army Corps of Engineers, San Francisco District, January 1, 2007 through December 31, 2007. Northern Region, Fortuna Office. March 1, 2008.

CDFG (California Department of Fish and Game). 2009. Annual report to the National Marine Fisheries Service for Fisheries Restoration Grant Program Projects conducted under Department of Army Regional General Permit No. 12 (Corps File No. 27922N) within the U.S. Army Corps of Engineers, San Francisco District, January 1, 2008 through December 31, 2008. Northern Region, Fortuna Office. March 1, 2009.

CDFG (California Department of Fish and Game). 2010a. Unpublished data documenting history of fish trapped at Warm Springs Hatchery (Dry Creek) between 1980/81 and 2009/10.

CDFG (California Department of Fish and Game). 2010b. Annual report to the National Marine Fisheries Service for Fisheries Restoration Grant Program Projects conducted under Department of Army Regional General Permit No. 12 (Corps File No. 27922N) within the U.S. Army Corps of Engineers, San Francisco District, January 1, 2009 through December 31, 2009. Northern Region, Fortuna Office. March 1, 2010.

Cederholm, C.J., R.E. Bilby, P.A. Bisson, T.W. Bumstead, B.R. Fransen, W.J. Scarlett, and J.W. Ward. 1997. Response of juvenile coho salmon and steelhead to placement of large woody debris in a coastal Washington stream. North American Journal of Fisheries Management 112(17):947–963.

Chow, M., J. Lundin, C. Mitchell, J. Davis, G. Young, N. Scholz, and J. McIntyre. 2019. An urban stormwater runoff mortality syndrome in juvenile coho salmon. Aquatic Toxicology 214:105231. 10.1016/j.aquatox.2019.105231.

Collins, B.W. 2004. Report to the National Marine Fisheries Service for instream fish relocation activities associated with fisheries habitat restoration program projects conducted under Department of the Army (Permit No. 22323N) within the United States Army Corps of Engineers, San Francisco District, during 2002 and 2003. California Department of Fish and Game, Northern California and North Coast Region. March 24, 2004. Fortuna, California.

Cooper J. R., J. W. Gilliam, R. B. Daniels, and W. P. Robarge. 1987. Riparian areas as filters for agricultural sediment. Soil Science Society of America Journal. 51:416–420.

Cordone, A.J., and D.W. Kelley. 1961. The influences of inorganic sediment on the aquatic life of streams. California Fish and Game 47:189-228.

Cox, P., and D. Stephenson. 2007. A changing climate for prediction. Science 113:207-208.

Crouse, M.R., C.A. Callahan, K.W. Malueg, and S.E. Dominguez. 1981. Effects of fine sediments on growth of juvenile coho salmon in laboratory streams. Transactions of the American Fisheries Society 110:281-286.

Cushman, R.M. 1985. Review of ecological effects of rapidly varying flows downstream from hydroelectric facilities. North American Journal of Fisheries Management 5:330-339.

Doney, S.C, M. Ruckelshaus, J.E. Duffy, J.P. Barry, F. Chan, C.A. English, H.M. Galindo, J.M. Grebmeier, A.B. Hollowed, N. Knowlton, J. Polovina, N.N. Rabalais, W.J. Sydeman, L.D. Talley. 2012. Climate Change Impacts on Marine Ecosystems. Annual Review of Marine Science 4:11-37.

Dunne, T. and L. B. Leopold. 1978. Water in Environmental Planning. W.H. Freeman and Company, New York.

Eisler, R. (2000). Handbook of chemical risk assessment: health hazards to humans, plants, and animals. Volume 1, Metals. Boca Raton, FL, Lewis Press.

Fausch, K.D., and T.G. Northcote. 1992. Large woody debris and salmonid habitat in a small coastal British Columbia stream. Canadian Journal of Fisheries and Aquatic Sciences 49:682.693.

Feely, R.A., C.L. Sabine, K. Lee, W. Berelson, J. Kleypas, V.J. Fabry, F.J. Millero. 2004. Impact of anthropogenic CO2 on the CaCO3 system in the oceans. Science 305:362-366.

Florsheim, J.L., Mount, J.F., and Chin, A. 2008. Bank erosion as a desirable attribute of rivers. BioScience, 58: 519–529. doi:10.1641/B580608.

Fukushima, L., and E.W. Lesh. 1998. Adult and juvenile anadromous salmonid migration timing in California streams. California Department of Fish and Game 84(3):133-145.

Furniss, M.J., T.D. Roelofs, and C.S. Lee. 1991. Road construction and maintenance. Pages 297-323 in W. R. Meehan, editor. Influences of Forest and Rangeland Management on Salmonid Fishes and their Habitats. American Fisheries Society Special Publication 19.

Gallagher, S.P., J. Ferreira, E. Lang, W. Holloway, and D.W. Wright. 2014. Investigation of the relationship between physical habitat and salmonid abundance in two coastal northern California streams. California Fish and Game 100(4):683-702.

Good, T.P., R.S. Waples, and P. Adams (editors). 2005. Updated status of federally listed ESUs of West Coast salmon and steelhead. United States Department of Commerce, NOAA Technical Memorandum NMFS-NWFSC-66. 598 pages.

Gregory, R.S., T.G. Northcote. 1993. Surface, Planktonic, and Benthic Foraging by Juvenile Chinook Salmon (*Oncorhynchus tshawytscha*) in Turbid Laboratory Conditions. Canadian Journal of Fisheries and Aquatic Sciences, 50: 233-240.

Harvey, B.C. 1986. Effects of suction gold dredging on fish and invertebrates in two California streams. North American Journal of Fisheries Management 6:401-409.

Hayes, D.B., C.P. Ferreri, and W.W. Taylor. 1996. Active fish capture methods. Pages 193-220 in B.R. Murphy and D.W. Willis, editors. Fisheries Techniques, 2nd edition. American Fisheries Society. Bethesda, Maryland. 732 pages.

Hayhoe, K., D. Cayan, C.B. Field, P.C. Frumhoff, E.P. Maurer, N.L. Miller, S.C. Moser S.H. Schneider, K.N. Cahill, E.E. Cleland, L. Dale, R. Drapek, and R.M. Hanermann. 2004. Emissions pathways, climate change, and impacts on California. Proceedings of the National Academy of Sciences of the USA 101(34):12422-12427.

Hubert, W.A. 1996. Passive capture techniques. Pages 157-192 in B.R. Murphy and D.W. Willis, editors. Fisheries Techniques. Second Edition. American Fisheries Society. Bethesda, Maryland. 732 pages.

Kadir, T., L. Mazur, C. Milanes, and K. Randles. 2013. Indicators of Climate Change in California. California Environmental Protection Agency, Office of Environmental Health Hazard Assessment Sacramento, CA.

Keeley, E.R. 2003. An experimental analysis of self-thinning in juvenile steelhead trout. Oikos 102:543-550.

Leopold, L. B. 1968. Hydrology for urban land planning – A guidebook on the hydrologic effects of urban land use. Geological Survey circular 554. U.S. Department of the Interior, U.S. Geological Survey, Washington, D.C. 21 p.

Lindley, S.T., and coauthors. 2007. Framework for assessing viability of threatened and endangered Chinook salmon and steelhead in the Sacramento-San Joaquin Basin. San Francisco Estuary and Watershed Science 5(1):26.

Lisle, T.E. 1986. Effects of woody debris on anadromous salmonid habitat, Prince of Wales Island, Southeast Alaska. North American Journal of Fisheries Management 6:538-550.

McElhany, P., M.H. Ruckelshaus, M.J. Ford, T.C. Wainwright, and E.P. Bjorkstedt. 2000. Viable Salmonid Populations and the Recovery of Evolutionary Significant Units. United Stated Department of Commerce, National Oceanic and Atmospheric Administration Technical Memorandum NMFS-NWFSC-42. 156 pages.

McEwan, D.R. 2001. Central Valley Steelhead. State of California, The Resources Agency, Department of Fish and Game. Contributions to the Biology of Central Valley Steelhead. Fish Bulletin 179(1): 1-44.

Meehan, W.R., and T.C. Bjornn. 1991. Salmonid distribution and life histories. Pages 47-82 in Influences of Forest and Rangeland Management on Salmonid Fishes and Their Habitats. W.R. Meehan, editor. American Fisheries Society Special Publication 19. American Fisheries Society. Bethesda, Maryland. 751 pages.

Mitsch, W.J., and J.G. Gosselink. 2000. Wetlands, 3rd ed. John Wiley & Sons, New York.

Moser, S., J. Ekstrom, and G. Franco. 2012. Our Changing Climate 2012 Vulnerability and Adaptation to the Increasing Risks from Climate Change in California. A Summary Report on the Third Assessment from the California Climate change Center. July. CEC-500-20102-007S.

Murphy, M.L., and W.R. Meehan. 1991. Stream ecosystems. Influences of Forest and Rangeland Management on Salmonid Fishes and their Habitats. American Fisheries Society, Special Publication Number 19. W. R. Meehan. Bethesda, MD, American Fisheries Society: 17-46.

NCRCD (Napa County Resource Conservation District). 2004. Dry Creek Watershed Baseline Assessment and Preliminary Management Plan for Improving Salmonid Habitat and Watershed Health.

NCRCD (Napa County Resource Conservation District). 2005. Central Napa River watershed Project, Salmonid Habitat Form and Function.

NMFS (National Marine Fisheries Service). 1997a. Screening criteria for anadromous salmonids. Southwest Region, National Marine Fisheries Service. 12 pages.

NMFS. 1997b. Status review update for West Coast steelhead from Washington, Idaho, Oregon, and California. United States Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service. 68 pages.

NMFS. 2016. Final Coastal Multispecies Recovery Plan: California Coastal Chinook Salmon, Northern California Steelhead, Central California Coast Steelhead. National Marine Fisheries Service. West Coast Region. California Coastal Office. Santa Rosa, California. October 2016.

Osgood, K.E. 2008. Climate Impacts on U.S. Living Marine Resources: National Marine Fisheries Service Concerns, Activities and Needs. National Oceanic and Atmospheric Administration, National Marine Fisheries Service. NOAA Technical Memorandum NMFS-F/SPO-89.

Platts, W.S. 1991. Livestock grazing. In: Influence of forest and rangeland management on Salmonid fishes and their habitats. American Fisheries Society, Special Publication 19:389-423.

Poole, G.C., and C.H. Berman. 2001. An ecological perspective on in-stream temperature: natural heat dynamics and mechanisms of human-caused thermal degradation. Environmental Management 27:787-802. 423.

Reeves, G.H., J.D. Hall, T.D. Roelofs, T.L. Hickman, and C.O. Baker. 1991. Rehabilitating and modifying stream habitats. Pages 519-557 in W.R. Meehan, editor. Influences of Forest and Rangeland Management on Salmonid Fishes and their Habitats. American Fisheries Society Special Publication 19. 751 pages.

Ruggiero, P., C.A. Brown, P.D. Komar, J.C. Allan, D.A. Reusser, H. Lee, S.S. Rumrill, P. Corcoran, H. Baron, H. Moritz, J. Saarinen. 2010. Impacts of climate change on Oregon's coasts and estuaries. Pages 241-256 in K.D. Dellow and P.W. Mote, editors. Oregon Climate Assessment Report. College of Oceanic and Atmospheric Sciences, Oregon State University, Corvallis, Oregon.

Santer, B.D., C. Mears, C. Doutriaux, P. Caldwell, P.J. Gleckler, T.M.L. Wigley, S. Solomon, N.P. Gillett, D. Ivanova, T.R. Karl, J.R. Lanzante, G.A. Meehl, P.A. Stott, K.E. Talyor, P.W. Thorne, M.F. Wehner, and F.J. Wentz. 2011. Separating signal and noise in atmospheric temperature changes: The importance of timescale. Journal of Geophysical Research 116: D22105.

Scavia, D., Field, J.C., Boesch, D.F., Buddemeier, R.W., Burkett, V., Cayan, D.R., Fogarty, M.A., Harwell, R.W., Howarth, C.M., Reed, D.J., Royer, T.C., Sallenger, A.H., Titus, J.G. 2002. Climate change impacts on U.S. coastal and marine ecosystems. Estuaries 25(2):149-164.

Schneider, S.H. 2007. The unique risks to California from human-induced climate change. Source: www.climatechange.ca.gov; presentation on May, 22, 2007, by Stephen H. Schneider, Melvin and Joan Lane Professor for Interdisciplinary Environmental Studies; Professor, Department of Biological Sciences; Senior Fellow, Woods Institute for the Environment Stanford University. (PDF file, 23 pg., 974 kb)

Scholz N.L., M.S. Myers, S.G. McCarthy, J.S. Labenia, J.K. McIntyre, and G.M. Ylitalo. 2011. Recurrent Die-Offs of Adult Coho Salmon Returning to Spawn in Puget Sound Lowland Urban Streams. PLoS ONE 6(12): e28013.

Servizi, J.A., and D.W. Martens. 1992. Sublethal responses of coho salmon (*Oncorhynchus kisutch*) to suspended sediments. Canadian Journal of Fisheries and Aquatic Sciences 49:1389-1395.

Shapovalov, L., and A.C. Taft. 1954. The life histories of the steelhead rainbow trout (Salmo gairdneri gairdneri) and silver salmon (*Oncorhynchus kisutch*) with special reference to Waddell Creek, California, and recommendations regarding their management. California Department of Fish and Game, Fish Bulletin 98:1-375.

Shirvell, C.S. 1990. Role of instream rootwads as juvenile coho salmon (*Oncorhynchus kisutch*) and steelhead trout (*O. mykiss*) cover habitat under varying stream flows. Canadian Journal of Fisheries and Aquatic Sciences 47:852-860.

Sigler, J.W., T.C. Bjornn, and F.H. Everest. 1984. Effects of chronic turbidity on density and growth of steelheads and coho salmon. Transactions of the American Fisheries Society 113:142-150.

Spence, B.C., G.A. Lomnicky, R.M. Hughes, and R.P. Novitzki. 1996. An ecosystem approach to salmonid conservation. TR-4501-96-6057. ManTech Environmental Research Services, Inc. Corvallis, Oregon. December. Report. National Marine Fisheries Service, Portland, Oregon.

Spence, B.C., and coauthors. 2008. A Framework for Assessing the Viability of Threatened and Endangered Salmon and Steelhead in the North-Central California Coast Recovery Domain U.S. Department of Commerce, National Marine Fisheries Service, Southwest Fisheries Service Center, NOAA-TM-NMFS-SWFSC-423, Santa Cruz, CA.

Spina, A. P. 2003. Habitat associations of steelhead trout near the southern extent of their range. California Fish and Game 89:81–95.

Sutton, R., L.D. Sedlak, M. Box, C. Gilbreath, A. Holleman, R. Miller, L. Wong, A. Munno, K. X, Zhu, and C. Rochman. 2019. Understanding Microplastic Levels, Pathways, and Transport in the San Francisco Bay Region, SFEI-ASC Publication #950, October 2019, 402 pages. https://www.sfei.org/sites/default/files/biblio_files/Microplastic%20Levels%20in%20SF%20Bay%20-%20Final%20Report.pdf.

Thomas, V.G. 1985. Experimentally determined impacts of a small, suction gold dredge on a Montana stream. North American Journal of Fisheries Management 5:480-488.

Tian Z., H. Zhao, K.T. Peter, M. Gonzalez, J. Wetzel, C. Wu, X. Hu, J. Prat, E.Mudrock, R. Hettinger, A. E. Cortina, R.G. Biswas, F.V.C Kock, R. Soong, A. Jenne, B. Du, F. Hou, H. He, R. Lundeen, A. Gibreath, R. Sutten, N.L. Scholz, J.W. Davis, M.C. Dodd, A. Simpson, J.K. McIntyre, and E.P. Kolodziej. 2020. A ubiquitous tire rubber-derived chemical induces acute mortality in coho salmon. Science 10.1126/science.abd6951.

Turley, C. 2008. Impacts of changing ocean chemistry in a high-CO2 world. Mineralogical Magazine 72(1):359-362.

Velagic, E. 1995. Turbidity study: a literature review. Prepared for Delta planning branch, California Department of Water Resources by Centers for Water and Wildland Resources, University of California, Davis.

Waters, T.F. 1995. Sediment in Streams: Sources, Biological Effects, and Control. American Fisheries Society Monograph 7.

Wesche, T.A., C.M. Goertler, and C.B. Frye. 1987. Contribution of Riparian Vegetation to Trout Cover in Small Streams. North American Journal of Fisheries Management 7:151- 153.

Westerling, A.L., B.P. Bryant, H.K. Preisler, T.P. Holmes, H.G. Hidalgo, T. Das, S.R. Shrestha. 2011. Climate change and growth scenarios for California wildfire. Climate Change 109(1):445-463.

Williams, T.H, S.T. Lindley, B.C. Spence, and D.A. Boughton. 2011. Status review update for Pacific salmon and steelhead under the Endangered Species Act: Southwest. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Southwest Fisheries Science Center, Santa Cruz, California. 98 pages.

Williams, T.H., B.C. Spence, D.A. Boughton, R.C. Johnson, L. Crozier, N. Mantua, M. O'Farrell, and S.T. Lindley. 2016. Viability assessment for Pacific salmon and steelhead listed under the Endangered Species Act: Southwest. 2 February 2016 Report to National Marine Fisheries Service – West Coast Region from Southwest Fisheries Science Center, Fisheries Ecology Division 110 Shaffer Road, Santa Cruz, California 95060.