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

August 31, 2022 **Refer to NMFS No:** WCRO-2021-02846

Randall LaVack
Branch Chief, Senior Environmental Planner
California Department of Transportation, District 5
50 Higuera Street
San Luis Obispo, California 93401-5415

Re: Endangered Species Act Section 7(a)(2) Biological Opinion and Magnuson–Stevens Fishery Conservation and Management Act Essential Fish Habitat Response for the Swanton Road at Big Creek Bridge Replacement Project [BRLO-5936(111)]

Dear Mr. LaVack:

Thank you for the California Department of Transportation's (Caltrans)[1] letter of September 1, 2022 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 Swanton Road at Big Creek Bridge Replacement Project ('Project').

On July 5, 2022, the United States District Court for the Northern District of California issued an order vacating the 2019 regulations adopting changes to 50 CFR part 402 (84 FR 44976, August 27, 2019). This consultation was initiated when the 2019 regulations were still in effect. As reflected in this document, we are now applying the section 7 regulations that governed prior to adoption of the 2019 regulations. For purposes of this consultation, we considered whether the substantive analysis and its conclusions regarding the effects of the proposed actions articulated in the biological opinion and incidental take statement would be any different under the 2019 regulations. We have determined that our analysis and conclusions would not be any different.

NMFS also reviewed the likely effects of the proposed action on essential fish habitat (EFH), pursuant to section 305(b) of the Magnuson–Stevens Fishery Conservation and Management Act [16 U.S.C. 1855(b)], and concluded that the action would adversely affect the EFH of Pacific Coast Salmon. Therefore, we have included the results of that review in Section 3 of this document.

[1] Pursuant to 23 USC 327, and through a series of Memorandum of Understandings (MOU) 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 the federally-funded highway 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 project. Thus, per the aforementioned MOU, Caltrans is considered the federal action agency for this project.

The enclosed biological opinion is based on our review of Caltrans' proposed Project and describes NMFS' analysis of potential effects on threatened Central California Coast (CCC) steelhead (*Oncorhynchus mykiss*), endangered Central California Coast (CCC) coho (*O. kisutch*), and designated critical habitat for CCC steelhead and CCC coho salmon in accordance with section 7 of the ESA. NMFS concludes the project is not likely to jeopardize the continued existence of CCC steelhead or CCC coho; nor is it likely to adversely modify CCC coho salmon and CCC steelhead critical habitat. However, NMFS anticipates that take of CCC coho salmon and CCC steelhead may occur. An incidental take statement which applies to this Project with non-discretionary terms and conditions is included within the enclosed opinion.

NMFS has reviewed the proposed Project for potential effects on EFH and determined that the proposed Project would adversely affect EFH for Pacific Coast Salmon, which are managed under the Pacific Coast Salmon Fishery Management Plan. We have included a conservation recommendation to minimize adverse effects to EFH.

If you have any questions concerning this consultation, or if you require additional information please contact Tom Wadsworth, North-Central Coast Office in Santa Cruz, California at 831-713-7620 or via email at Thomas.Wadsworth@noaa.gov.

Sincerely,

Alecia Van Atta
Assistant Regional Administrator
California Coastal Office

Enclosure

cc: Paul Holmes, Caltrans District 5, paul.holmes@dot.ca.gov
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Copy to ARN # 151422WCR2021SR00222

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

Swanton Road at Big Creek Bridge Replacement Project [BRLO-5936(111)]

NMFS Consultation Number: WCRO-2021-02846
Action Agency: California 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
Central California Coast Coho salmon (*O. kisutch*)	Endangered	Yes	No	Yes	No

Fishery Management Plan That Identifies EFH in the Project Area	Does Action Have an Adverse Effect on EFH?	Are EFH Conservation Recommendations Provided?
Pacific Coast Salmon	Yes	Yes

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

Issued By:

Alecia Van Atta
Assistant Regional Administrator
California Coastal Office

Date: August 31, 2022

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1 INTRODUCTION

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

1.1 Background

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 USC 1531 et seq.), and implementing regulations at 50 CFR 402, as amended.

We also completed an essential fish habitat (EFH) consultation on the proposed action, in accordance with section 305(b)(2) of the Magnuson-Stevens Fishery Conservation and Management Act (MSA) (16 U.S.C. 1801 et seq.) and implementing regulations at 50 CFR 600.

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

1.2 Consultation History

On November 2, 2021, NMFS received an email from the California Department of Transportation (Caltrans) that included: 1) a letter requesting initiation of Section 7 consultation for potential impacts on CCC steelhead and CCC coho salmon, due to implementation of the proposed Project; and 2) the April 2021 Biological Assessment (BA) for the Swanton Road at Big Creek Bridge Replacement Project, Santa Cruz County, Bridge No. 36C-0018, Caltrans District 5 BRLO-5936(111). The BA indicated the Project is being proposed by the County of Santa Cruz (County), in cooperation with Caltrans (Favro 2022). The BA also included a determination for CCC steelhead and CCC coho salmon critical habitat, although this was not referenced in their letter. Though Caltrans did not specifically request an EFH consultation in their incoming request letter, effects to EFH were included in the BA.

On November 15, 2021, NMFS sent an email to Caltrans requesting: design plans, hydraulic analyses results comparing current and expected flow conditions, a map showing the extent of expected riparian effects, and information about the expected acoustic impacts from pile driving and the type of hammer planned to be used for pile driving. Caltrans provided the requested information on December 22, 2021 by email. On January 20, 2022, NMFS sent an email to Caltrans requesting: that at least 72 feet of the creek be dewatered in all directions from each of the piles to be driven to minimize acoustic impacts, clarification regarding discrepancies in water surface elevations (WSE) provided in Caltrans' December 22nd response, the upstream and downstream bankfull width profile, feasibility of avoiding removal of larger riparian vegetation on the downstream (west) side of the bridge, details on how removed trees in the area would be used, linear feet of streambed that would be dewatered during Project construction, as well as the dewatered distance from proposed bridge piles. Caltrans responded to NMFS' letter with requested information on February 16, 2022, including: revised expected changes in WSE, a Floodplain Evaluation Report with information including channel width, a commitment to dewatering the stream length where acoustic impacts would be expected, a commitment to minimizing tree cutting west of the bridge and retain cut trees near the creek for habitat. On February 23, 2022, NMFS sent an email to Caltrans asking for clarification on construction schedule, including their proposed in-stream work window. Caltrans provided an in-stream work window for the Project on February 25, 2022.

NMFS requested information on March 17 and April 7, 2022 regarding: the method of diverting the stream during construction, plans for use of a fish screen on the stream diversion structure, updated construction design plans, plans for revegetation after construction, expected vegetation recovery time within the action area, and plans to address potential contaminants in stormwater runoff from the proposed new bridge and roadway approaches. Caltrans responded to these requests on April 6 and April 11, 2022. Based on these responses from Caltrans, NMFS requested a design modification from Caltrans and the County to address stormwater runoff from the proposed bridge as well as daily traffic estimates for the action area. On May 25, County proposed adding a concrete dike to the bridge deck, with drainage to a swale at the northwest end of the bridge. On May 25, 2022, NMFS initiated ESA Section 7 and EFH consultation. On June 3, Caltrans and the County notified NMFS that a concrete dike would not be part of the design and no alternatives were proposed to address stormwater runoff. NMFS met with the County and Caltrans to discuss NMFS concerns and alternatives for addressing stormwater runoff on June 14. On July 5, the County sent NMFS and Caltrans a new proposed design to address stormwater that included a trough for draining runoff from the bridge deck.

On July 5, 2022, the United States District Court for the Northern District of California issued an order vacating the 2019 regulations adopting changes to 50 CFR part 402 (84 FR 44976, August 27, 2019). This consultation was initiated when the 2019 regulations were still in effect. As reflected in this document, we are now applying the section 7 regulations that governed prior to adoption of the 2019 regulations. For purposes of this consultation, we considered whether the substantive analysis and its conclusions regarding the effects of the proposed actions articulated in the biological opinion and incidental take statement would be any different under the 2019 regulations. We have determined that our analysis and conclusions would not be any different.

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).

The County, in cooperation with Caltrans, is proposing to replace the Big Creek Bridge (Bridge Number 36C-0018) along Swanton Road located in Santa Cruz County, California. The Project is located within the northwestern portion of unincorporated Santa Cruz County. The action area is located approximately 15 miles northwest of downtown Santa Cruz and is approximately 1.2 miles east of the Pacific Ocean. Swanton Road is classified as a local road that roughly parallels State Route 1.

The purpose of the Project is to replace an existing structurally deficient bridge. The existing Big Creek Bridge is classified as structurally deficient due to significant scour. Bridge piers are being undermined, a crack in the southern abutment wall supporting the existing bridge's abutment footing has been widening, and the eastern edge of the southern abutment cracked. These deficiencies will continue to worsen and will eventually result in the closure of the bridge. In addition to the structural deficiencies, the bridge replacement is needed to improve the functionality and safety of the existing bridge crossing. A new bridge is needed to provide a structure that will meet current federal standards, provide access for emergency vehicles, and support increased future annual daily traffic demands. Funding for the Project was approved through the Highway Bridge Program.

1.3.1 Removal of Existing Bridge and New Bridge Construction

Bridge demolition would involve jackhammering, use of a mechanical ram on a backhoe, temporary shoring, and crane work. The existing bridge, including abutments, and the concrete and corrugated metal pipe along the west deck of the bridge would be removed. Existing abutments may be cut below final stream grade and covered with native river rock. All debris generated by bridge demolition would be removed from the dry streambed and disposed of at a County-approved, or commercially approved facility. The demolition of the existing bridge structure would remove one abutment and two existing bridge columns from within the Big Creek channel. Under the Ordinary High Water Mark (OHWM), the surface area opened by the removal of the existing abutment equals approximately 103.2 square feet (sq. ft.), and the two columns total approximately 78 sq. ft. (1.5 ft. by 26 ft. each) of Big Creek channel surface area.

A proposed temporary crossing for vehicles and contractor equipment will consist of a low-level bridge clear-spanning the creek on the east (upstream) side of the current bridge. The temporary crossing will be approximately 50-foot long and will be set on reinforced earth spread footings placed above Big Creek's OHWM. The existing ground contours east of the bridge are well suited for the temporary crossing, as the banks are low and sufficient width exists. Once construction is complete, the temporary bridge and supports will be removed and the banks will be restored to pre-construction conditions. Bank earthwork needed for the installation of the temporary crossing is anticipated to be minimal.

The proposed permanent replacement bridge will retain a similar vertical profile as the existing bridge structure, although the design will require less support structures within Big Creek's OHWM. The new bridge will require the construction of one new pier column and two new abutments. The one new bridge pier will equal approximately 12 sq. ft. in surface area (6 ft. by 2 ft. with round nosing) within the Big Creek channel. Therefore, as a result of the Project, the Big

Creek channel will have a net increase of approximately 169.2 sq. ft. of surface area within the OHWM. Due to substrate conditions, driven steel H-piles will be used for foundation supports of the abutments and the pier. Pile driving will be completed using an impact hammer in the dewatered creek bed, using 4,800-6,000 strikes per day to drive 8-10 piles per day for 4 to 5 days. The new abutment construction will occur on the creek banks above Big Creek's OHWM. Rock slope protection (RSP) will be installed around the new bridge abutments. General bridge construction equipment expected to be used includes, but is not limited to: haul trucks, cranes, excavators, gradalls, backhoes, dump delivery trucks, concrete boom pump, service vehicles, and rock-breaking equipment (for excavations into rock).

1.3.2 Dewatering and Fish Relocation Activities

As flow is expected to be present in Big Creek for the duration of construction, a temporary stream crossing and clear water diversions will be implemented, in accordance with the California Stormwater Quality Association (CASQA) Stormwater Best Management Practice Handbook: Construction (2019). These best management practices (BMPs) are intended to facilitate the work in the creek while minimizing erosion, sedimentation, and other water quality concerns.

A water diversion for the in-stream construction zone will be implemented prior to initiating any in-channel operations and no work within the wetted channel would occur. The water diversion will occur prior to removing the existing piers and south abutment, installing the temporary crossing, or constructing the new bridge piers. Any fish present within the action area will be removed prior to the installation of the water diversion system. Equipment used to place the diversion will remain outside of Big Creek's OHWM by utilizing the creek banks and/or the existing bridge facility. The diversion will begin upstream of the temporary crossing and end downstream of the new bridge construction. Favro (2022) completed an analysis of the distance of acoustic impacts to salmonids from proposed pile driving. Based on these results, approximately 150 linear feet of the creek will be dewatered—at a minimum, 72 feet of Big Creek will be dewatered in all directions from the proposed piles during in-water construction to exclude fish from the area in which physical injury to fish may occur due to pile driving. The diversion will consist of either pipes or a narrow open channel, based on flow conditions. If a pipe diversion is used, it will consist of two or three 30 to 48-inch diameter High Density Poly Ethylene pipes; if an open channel diversion is used, it will be constructed by placing in the channel two parallel rows of temporary K-rail (concrete railings) approximately 6 feet apart. At each end of the diversion, geotextile filter fabric will be placed across the creek bottom (bank to bank) and dams will be constructed. The dams will consist of gravel bags and plastic sheeting to funnel the creek water into the diversion. The open channel alternative will also require gravel bags and plastic sheeting along the length of the railing to make the railing waterproof. These diversion methods will allow the area between the dams to be dry for the duration of construction. Either diversion method would include screening upstream and downstream of the diversion to prevent fish from passing through the area. The stream diversion would be maintained until all in-stream work is complete or such time that the high stream flows require disassembly and removal from the stream corridor.

Groundwater may be encountered during excavations, most likely at the footings for the bridge or stream diversion structure, or the retaining walls. Pumps may be used to pump water from within the work area. Appropriate measures would be taken to avoid impacts to aquatic species. Dewatering would be in accordance with established Caltrans BMPs, including the potential use of Sedimentation/Desilting Basins or Sediment Traps. Clean, non-turbid water would be returned to the creek. Turbid water would be detained in a storage basin until it has settled before returning any water to the creek.

Upon completion of construction activities within the creek bed, the temporary diversion structures would be removed. Portions of the creek banks temporarily impacted would be re-contoured and revegetated for erosion control.

1.3.3 Vegetation Removal and Revegetation

The proposed Project is anticipated to have temporary and permanent impacts to riparian woodland habitat associated with Big Creek in the action area. Temporary impacts to the riparian woodland corridor habitat will be approximately 0.16 acres due to the temporary bridge crossing and construction access needs. To construct the temporary bridge crossing to the east of the existing bridge, riparian vegetation will be cleared, and the earth will be graded within the footprint of the temporary crossing. Additionally, a buffer of approximately 20-30 feet around the temporary road crossing will be cleared to allow for construction access for the temporary road. Additional vegetation clearing will be conducted on the west side of the existing bridge for construction access during the placement of RSP. Within access areas, riparian vegetation and trees will be trimmed where feasible rather than removed. Temporary road and construction access areas will be re-contoured to pre-construction conditions and re-vegetated after construction. Permanent impacts to the riparian woodland corridor habitat are anticipated at approximately 0.06 acres and would result from the construction of the new wider roadway approach fill slopes, wider bridge structure and abutments, and the installation of RSP around the new bridge abutments.

Areas temporarily impacted by vegetation removal and construction will be re-contoured and re-vegetated with appropriate native riparian species known to occur within Santa Cruz County, with guidance from regulatory agencies. Seeding and tree plantings will occur in areas impacted by construction, focusing primarily on areas to the east of the bridge where vegetation clearing will be most pronounced. Large diameter trees (>6-inch diameter at breast height) that are removed to facilitate construction will be retained on-site and returned to the creek following construction to enhance in-stream habitat for special-status fish species.

1.3.4 Avoidance and Minimization Measures

Provisions to reduce erosion, sedimentation, and turbidity in Big Creek during construction include the preparation of a site-specific Storm Water Pollution Prevention Plan (SWPPP) and employing appropriate BMPs in accordance with the CASQA Stormwater BMP Handbook: Construction (2019). Where possible, vegetation will be trimmed rather than fully removed under the guidance of the Project biologist. BMPs would be implemented throughout construction to prevent concrete or other materials from entering Big Creek. In-water construction activities are scheduled to occur June 15-October 15, during the summer low-flow period when runoff from the construction site will be minimal and migrating salmonids are least likely to be present. The water diversion system will be removed after bridge construction and the action area will be restored to pre-construction conditions. Invasive plant species will be removed during construction and areas impacted by construction will be replanted with appropriate native plant species (grasses, shrubs, and trees). Sensitive areas will be marked with ESA fencing to ensure construction equipment does not encroach on these areas beyond what is needed. A detailed list of the Avoidance and Minimization Measures (AMMs) and additional BMPs are described in the BA provided for this project (Favro 2021). A qualified biologist will monitor construction operations to ensure AMMs and BMPs are followed.

Under the MSA, "Federal action" means any action authorized, funded, or undertaken, or proposed to be authorized, funded, or undertaken by a Federal agency (see 50 CFR 600.910).

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

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 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 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). Such alterations may include, but are not limited to, those that alter the physical or biological features essential to the conservation of a species or that preclude or significantly delay development of such features" (81 FR 7214, February 11, 2016).

The designations of critical habitat for CCC steelhead and CCC coho use 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 part 424) 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 opinion, we use the term PBF to mean PCE or essential feature, as appropriate for the specific critical habitat.

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

- 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.

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 Species Description and Life History

This opinion analyses the effects of the federal action on the following federally listed species (Distinct Population Segment [DPS] or Evolutionarily Significant Unit [ESU]) and designated critical habitat:

Threatened Central California Coast (CCC) steelhead DPS (*O. mykiss*)
Threatened (71 FR 834, January 5, 2006);
Critical habitat (70 FR 52488, September 2, 2005);

Endangered Central California Coast (CCC) coho salmon ESU (*O. kisutch*)
Endangered (70 FR 37160; June 28, 2005);
Critical habitat (64 FR 24049; May 5, 1999).

The CCC steelhead DPS includes steelhead in coastal California streams from the Russian River to Aptos Creek, and the drainages of Suisun, San Pablo, and San Francisco Bays eastward to Chipps Island at the confluence of the Sacramento and San Joaquin Rivers. In addition, the DPS includes steelhead from one active artificial propagation program, the Don Clausen Fish Hatchery Program.[2]

The CCC coho salmon ESU includes coho salmon from Punta Gorda in northern California, south to, and including, Aptos Creek in central California, as well as populations in tributaries to San Francisco Bay, excluding the Sacramento-San Joaquin River System. In addition, the ESU includes coho salmon from the following artificial propagation programs: the Russian River Coho Salmon Captive Broodstock Program[3], and the Southern Coho Salmon Captive Broodstock Program.[4]

The action area is within designated critical habitat for CCC steelhead and CCC coho salmon. CCC steelhead critical habitat is designated from the Russian River to Aptos Creek to a lateral extent of ordinary high water in freshwater stream reaches, and to extreme high water in estuarine areas. CCC coho salmon critical habitat is designated to include all river reaches assessable to listed coho salmon from Punta Gorda in northern California south to the San Lorenzo River in central California, and includes two tributaries to San Francisco Bay, Arroyo Corte Madera Del Presidio and Corte Madera Creek. Critical habitat consists of the water, substrate, and adjacent riparian zone of estuarine and riverine reaches (including off-channel habitats).

2.2.1.1 Steelhead Life History

Steelhead are anadromous forms of *O. mykiss*, spending some time in both fresh- and saltwater. Juveniles migrate to the ocean where they mature. Adult steelhead return to freshwater rivers and

[2] Kingfisher Flat Hatchery previously had a small CCC steelhead hatchery program that released steelhead smolts into Scott Creek and the San Lorenzo River. This program was terminated in 2014.

[3] Formerly referred to as the Don Clausen Fish Hatchery Captive Broodstock Program.

[4] Formerly referred to as the Scott Creek/King Fisher Flats Conservation Program and the Scott Creek Captive Broodstock Program.

streams to reproduce, or spawn. Unlike Pacific salmon, steelhead are iteroparous, or capable of spawning in multiple years before death (Busby et al. 1996; Moyle 2002). Although one-time spawners are the great majority, Shapovalov and Taft (1954) reported that repeat spawners are relatively numerous (17.2 percent) in central California coastal streams. Eggs (laid in gravel nests called redds), alevins (gravel dwelling hatchlings), fry (juveniles newly emerged from stream gravels), and other juvenile life stages all rear in freshwater until they migrate to the ocean where they reach maturity.

O. mykiss exhibit a variable life history. Coastal *O. mykiss* populations in central and southern California are classified into three principle life history strategies: fluvial-anadromous, lagoon anadromous, and freshwater resident or non-anadromous (Boughton et al. 2007). The anadromous forms of CCC steelhead are classified as "winter-run" steelhead because they emigrate from the ocean to their natal streams to spawn annually during the winter; although run times can extend into spring (Moyle 2002). Within the CCC steelhead DPS, adults typically enter freshwater between December and April, with peaks occurring in January through March (Wagner 1983; Fukushima and Lesh 1998). It is during this time that streamflow (depth and velocity) are suitable for adults to successfully migrate to and from spawning grounds. The minimum stream depth necessary for successful upstream migration is about 13 centimeters (cm), although short sections with depths less than 13 cm are passable (Thompson 1972). More optimal water velocities for upstream migration are in the range of 40-90 cm/s, with a maximum velocity beyond which upstream migration is not likely to occur of 240 cm/s (Thompson 1972). Redds are generally located in areas where the hydraulic conditions limit fine sediment accumulations. Reiser and Bjornn (1979) found that gravels of 1.3-11.7 cm in diameter were preferred by steelhead. Survival of embryos is reduced when fines smaller than 6.4 mm comprise 20 to 25 percent of the substrate. This is because, during the incubation period, the intragravel environment must permit a constant flow of water in order to deliver dissolved oxygen and remove metabolic wastes. Studies have shown embryo survival is higher when intragravel velocities exceed 20 cm/hour (Coble 1961; Phillips and Campbell 1961). The number of days required for steelhead eggs to hatch is inversely proportional to water temperature and varies from about 19 days at 15.6˚ degrees (°) Celsius (C) to about 80 days at 5.6°C. Fry typically emerge from the gravel two to three weeks after hatching (Barnhart 1986). Other intragravel parameters such as the organic material in the substrate affect the survival of eggs to fry emergence (Shapovalov and Taft 1954; Everest et al. 1987; Chapman 1988).

Once emerged from the gravel, steelhead fry rear in edgewater habitats along the stream and gradually move into pools and riffles as they grow larger. Cover, sediment, and water quality are important habitat components for juvenile steelhead. Cover in the form of woody debris, rocks, overhanging banks, and other in-water structures provide velocity refuge and a means of avoiding predation (Shirvell 1990; Bjornn and Reiser 1991). Steelhead, however, tend to use riffles and other habitats not strongly associated with cover during summer rearing more than other salmonids. In winter, juvenile steelhead become less active and hide in available cover, including gravel or woody debris. Young steelhead feed on a wide variety of aquatic and terrestrial insects, and emerging fry are sometimes preyed upon by older juveniles. Water temperature can influence the metabolic rate, distribution, abundance, and swimming ability of rearing juvenile steelhead (Barnhart 1986; Bjornn and Reiser 1991; Myrick and Cech 2005). Optimal temperatures for steelhead growth range between 10 and 19°C (Hokanson et al. 1977;

Wurtsbaugh and Davis 1977; Myrick and Cech 2005). Fluctuating diurnal water temperatures are also important for the survival and growth of salmonids (Busby et al. 1996).

Although variation occurs, CCC juvenile steelhead that exhibit an anadromous life history strategy usually rear in freshwater for 1-2 years (NMFS 2016a). CCC steelhead smolts emigrate episodically from freshwater in late winter and spring, with peak migrations occurring in April and May (Shapovalov and Taft 1954; Fukushima and Lesh 1998; Ohms and Boughton 2019). Steelhead smolts in California range in size from 120 to 280 mm (fork length) (Shapovalov and Taft 1954; Barnhart 1986). Smolts migrating from the freshwater environment may temporarily utilize the estuarine habitats for saltwater acclimation and feeding prior to entering the ocean. Juvenile steelhead of the lagoon-anadromous life history rear in lagoons for extended periods (Smith 1990; Boughton et al. 2006; Hayes et al. 2008). Lagoons are a specific type of estuarine habitat where a seasonal impoundment of water develops after a sandbar forms at the mouth of the watershed, temporarily separating the fresh and marine environments (Smith 1990). Like other estuary types, bar-built lagoons can serve as important rearing areas for many fish and invertebrate species—including juvenile steelhead (Simenstad et al. 1982; Smith 1990; Robinson 1993; Martin 1995). Due to the combination of high prey abundance and seasonally warmer temperatures, juvenile steelhead that rear in lagoons have been found to achieve superior growth rates relative to upstream fish of the same cohort, and can therefore disproportionally represent future adult steelhead returns (Bond et al. 2008; Hayes et al. 2008). This is especially important considering that lagoon habitats often represent a fraction of the watershed area.

2.2.1.2 Coho Salmon Life History

Coho salmon in California generally exhibit a relatively simple three-year life cycle (Shapovalov and Taft 1954; Hassler 1987; Weitkamp et al. 1995). Adult salmon typically begin the immigration from the ocean to their natal streams after heavy late-fall or winter rains breach the sand bars at the mouths of coastal streams (Sandercock 1991). Coho salmon are typically associated with small to moderately-sized coastal streams characterized by heavily forested watersheds; perennially-flowing reaches of cool, high quality water; dense riparian canopy; deep pools with abundant overhead cover; instream cover consisting of large, stable woody debris and undercut banks; and gravel or cobble substrates (Sandercock 1991). Immigration continues into March, generally peaking in December and January, with spawning occurring shortly after arrival at the spawning ground (Shapovalov and Taft 1954).

When in freshwater, essential habitat features for coho salmon include: (1) deep complex pools; (2) adequate quantities of cool water [Welsh et al. (2001) indicated coho were absent when maximum weekly average water temperatures exceed 18°C, while 12-14° C is preferred, and the upper lethal limit is 25-26°C]; (3) unimpeded passage to spawning grounds (adults) and back to the ocean (smolts); (4) adequate quantities of clean spawning gravel; and (5) access to floodplains, side channels and low velocity habitat during high flow events. When the habitat features listed above are at a properly functioning condition, other requirements (e.g., adequate quantities of food, dissolved oxygen, low turbidity, etc.) are generally met.

The eggs generally hatch after four to eight weeks, depending on water temperature. Survival and development rates depend, in part, on fine sediment levels within the redd. Under optimum conditions, mortality during this period can be as low as 10 percent; under adverse conditions of high scouring flows or heavy siltation, mortality may be close to 100 percent (Baker and Reynolds 1986). McMahon (1983) found that egg and fry survival drops sharply when fines make up 15 percent or more of the substrate. The newly-hatched fry remain in the redd from two to seven weeks before emerging from the gravel (Shapovalov and Taft 1954). Upon emergence, fry seek out shallow water, usually along stream margins. As they grow, juvenile coho salmon often occupy habitat at the heads of pools, which generally provide an optimum mix of high food availability and good cover with low swimming cost (Nielsen 1992). In the spring, as yearlings, juvenile coho salmon undergo a physiological process, or smoltification, which prepares them for living in the marine environment. Emigration timing is correlated with precipitation events and peak upwelling currents along the coast. Entry into the ocean at this time facilitates more growth and, therefore, greater marine survival (Holtby et al. 1990).

2.2.2 Status of the Listed Species

NMFS assesses four population viability[5] parameters to discern the status of the listed ESUs and DPSs and to assess each species ability to survive and recover. These population viability parameters are: abundance, population growth rate, spatial structure, and diversity (McElhany et al. 2000). While there is insufficient data to evaluate these population viability parameters quantitatively, NMFS has used existing information to determine the general condition of the populations in the CCC steelhead DPS, the CCC coho salmon ESU, and factors responsible for the current status of these listed species.

The population viability parameters are used as surrogates for numbers, reproduction, and distribution, which are included in the regulatory definition of "jeopardize the continued existence of" (50 CFR 402.02). For example, abundance, population growth rate, and distribution are surrogates for numbers, reproduction, and distribution, respectively. The fourth parameter, diversity, is related to all three regulatory criteria. Numbers, reproduction, and distribution are all affected when genetic or life history variability is lost or constrained, resulting in reduced population resilience to environmental variation at local or landscape-level scales.

2.2.2.1 CCC Steelhead DPS

Historically, approximately 70 populations of steelhead existed in the CCC steelhead DPS (Spence et al. 2008; Spence et al. 2012). Many of these populations (about 37) were independent, or potentially independent, meaning they had a high likelihood of surviving for 100 years absent anthropogenic impacts (Bjorkstedt et al. 2005). The remaining populations were dependent upon immigration from nearby CCC steelhead DPS populations to ensure their viability (McElhaney et al. 2000, Bjorkstedt et al. 2005).

While historical and present data on abundance are limited, CCC steelhead 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). More recent estimates for the Russian

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[5] NMFS defines a viable salmonid population as "an independent population of any Pacific salmonid (genus *Oncorhynchus*) that has a negligible risk of extinction due to threats from demographic variation, local environmental variation, and genetic diversity changes over a 100- year time frame" (McElhany et al. 2000).

River are on the order of 4,000 fish (NMFS 1997). 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, Pudding, and Caspar creeks) of individual run sizes of 500 fish or less (62 FR 43937; August 18, 1997). Some loss of genetic diversity has been documented and attributed to previous among-basin transfers of stock and local hatchery production in interior populations in the Russian River (Bjorkstedt et al. 2005). In San Francisco Bay streams, reduced population sizes and fragmented habitat conditions has likely also depressed genetic diversity of CCC steelhead.

CCC steelhead long-term population trends suggest a negative growth rate, indicating the DPS may not be viable in the long-term. 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 remain present in most streams throughout the DPS, roughly approximating the known historical range, CCC steelhead likely possess a resilience that has slowed their rate of decline relative to other salmonid species. 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). On January 5, 2006, NMFS issued a final determination that the CCC steelhead DPS is a threatened species, as previously listed (71 FR 834).

The most recent status update concludes that steelhead in the CCC DPS remains "likely to become endangered in the foreseeable future", as new and additional information available since Williams et al. (2011) does not appear to suggest a change in extinction risk (Williams et al. 2016). In the most recent status review, NMFS concluded that the CCC steelhead DPS should remain listed as threatened (NMFS 2016a).

2.2.2.2 CCC Coho Salmon ESU

Historically, the CCC coho salmon ESU was comprised of approximately 76 coho salmon populations. Most of these were dependent populations that needed immigration from other nearby populations to ensure their long-term survival. Historically, there were 11 functionally independent populations and 1 potentially independent population of CCC coho salmon (Spence et al. 2008, Spence et al. 2012). Most of the populations in the CCC coho salmon ESU are currently doing poorly as a result of low abundance, range constriction, fragmentation, and loss of genetic diversity, as described below.

Brown et al. (1994) estimated that annual spawning numbers of coho salmon in California ranged between 200,000 and 500,000 fish in the 1940s, which declined to 100,000 fish by the 1960s, followed by a further decline to 31,000 fish by 1991. More recent abundance estimates vary from approximately 600 to 5,500 adults (Good et al. 2005). Williams et al. (2011) indicated that CCC coho salmon are likely to continue to decline in number. CCC coho salmon have also experienced acute range restriction and fragmentation. Adams et al. (1999) found that in the mid-1990’s coho salmon were present in 51 percent (98 of 191) of the streams where they were historically present. At the same time, coho presence was documented in an additional 23 streams within the CCC coho salmon ESU where there were no historical records. More recent genetic research has documented reduced genetic diversity within subpopulations of the CCC coho salmon ESU (Bjorkstedt et al. 2005). The influence of hatchery fish on wild stocks has likely also contributed to the lack of diversity through outbreeding depression and disease.

Available data from the few remaining independent populations suggests population abundance continues to decline, and many independent populations that in the past supported the species overall numbers and geographic distributions have been extirpated. This suggests that populations that historically provided support to dependent populations via immigration did not provide enough immigrants for many dependent populations in recent decades. The near-term (10-20 years) viability of many of the extant independent CCC coho salmon populations is of serious concern. These populations may not have enough fish to survive additional natural and human caused environmental change.

The CCC coho salmon ESU also includes coho salmon from the following conservation hatchery programs: the Russian River Coho Salmon Captive Broodstock Program at Don Clausen Fish Hatchery in Sonoma County, California, and the smaller Southern Coho Salmon Captive Broodstock Program at Kingfisher Flat Hatchery on Big creek, Santa Cruz County, California. While differing in size and funding, both programs were initiated in 2001 in response to severely depressed coho salmon abundance. Fish are collected from the wild, brought into the hatcheries, genetically tested, and spawned to maximize diversity and prevent inbreeding. In the hatchery, fish are raised to various ages, fed krill, tagged, and released into streams throughout the watersheds. This release strategy allows the fish to imprint on the creek with the aim that they will return to these streams as adults so they can spawn naturally. Coho salmon juveniles and smolts have been released into several Russian River tributaries and coastal watersheds in San Mateo and Santa Cruz counties.

None of the five diversity strata defined by Bjorkstedt et al. (2005) currently support viable coho salmon populations. According to Williams et al. (2016), recent surveys suggest CCC coho salmon abundance has improved slightly since 2011 within several independent populations (mainly north of San Francisco Bay), although all populations remain well below their high-risk dispensation thresholds identified by Spence et al. (2008). The Russian River and Lagunitas Creek populations are relative strongholds for the species compared to other CCC coho populations. The coho population in the Russian River is maintained predominantly due to out-planting of hatchery-reared juvenile fish from the Russian River Coho Salmon Captive Broodstock Program. The most recent status review documents conditions for CCC coho salmon did not improve since the previous status review in 2011 (NMFS 2016b). The overall risk of CCC coho salmon extinction remains high, and the most recent status review reaffirmed the ESU's endangered status (NMFS 2016b). NMFS' recovery plan for the CCC coho salmon ESU identified the major threats to population recovery (NMFS 2012). These major threats include roads, water diversions and impoundments, and residential development.

2.2.3 Status of CCC Steelhead and CCC Coho Salmon Critical Habitat

PBFs for CCC steelhead critical habitat 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.

PBFs for CCC steelhead critical habitat within estuarine areas include: areas free of obstruction and excess predation with: water quality, water quantity, and salinity conditions supporting juvenile and adult physiological transitions between freshwater and saltwater; natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, and side channels; and juvenile and adult forage, including aquatic invertebrates and fishes, supporting growth and maturation.

For CCC coho salmon critical habitat, the following essential features have been identified: 1) juvenile summer and winter rearing areas; 2) juvenile migration corridors; 3) areas for growth and development to adulthood; 4) adult migration corridors; and 5) spawning areas (64 FR 24049). PBFs for coho salmon include adequate: (1) substrate, (2) water quality, (3) water quantity, (4) water temperature, (5) water velocity, (6) cover/shelter, (7) food, (8) riparian vegetation, (9) space, and (10) safe passage conditions (64 FR 24049).

The condition of CCC steelhead, and CCC coho salmon critical habitat, specifically its ability to provide for their conservation, has been degraded from conditions known to support viable salmonid populations. NMFS determined currently depressed population conditions are, in part, the result of the following human-induced factors affecting critical habitat[6]: logging, urban and agricultural land development, mining, stream channelization, and bank stabilization, dams, wetland loss, and water withdrawals (including unscreened diversions for irrigation). Habitat impacts of current concern include altered streambank and channel morphology, elevated water temperature, lost spawning and rearing habitat, habitat fragmentation, impaired gravel and wood recruitment from upstream sources, degraded water quality/quantity, lost riparian vegetation, and increased sediment delivery into streams from upland erosion (Weitkamp et al. 1995; Busby et al. 1996; 64 FR 24049; 70 FR 37160; 70 FR 52488). Widespread diverting of rivers and streams, as well as the pumping of groundwater hydraulically connected to streamflow, has dramatically altered the natural hydrologic cycle in many of the streams within the CCC steelhead DPS and CCC coho ESU, which can delay or preclude migration and dewater aquatic habitat. Stream

[6] Other factors, such as overfishing and artificial propagation have also contributed to the current population status of these species. All these human-induced factors have exacerbated the adverse effects of natural environmental variability from such factors as drought and poor ocean productivity.

channelization, commonly caused by streambank hardening and stabilization, represents a very high threat to instream and floodplain habitat throughout much of the designated critical habitat for both species, as detailed within the CCC coho salmon and CCC steelhead recovery plans (NMFS 2012, 2016a). Streambank stabilization confines stream channels and precludes natural channel movement, resulting in increased streambed incision and reduced habitat volume and complexity.

Stream crossings, road improvements, and other road-related activities may expose salmonids to 6PPD-quinone, a degradation product of vehicle tires. This chemical was identified as the causal factor in coho salmon mortality at concentrations of less than a part per billion (Tian et al. 2020; Tian et al. 2022) and to juvenile steelhead trout at concentrations as low as one part per billion (J. McIntyre and N. Scholz, unpublished results, 2020; Brinkmann et al. 2022). Coho adults are noted to perish "within hours" of exposure (Sholz et al. 2011) and juvenile coho perished or were completely immobile within seven hours of exposure (Chow et al. 2019). Coho juveniles did not recover even when transferred to clean water (Chow et al. 2019). Steelhead juvenile mortality can begin as soon as seven hours post exposure (Brinkmann et al. 2022). Effects appear to be related to cardiorespiratory disruption, including surface swimming and gaping followed by loss of equilibrium (Sholz et al. 2011). Therefore, sublethal effects, such as disruption of behaviors needed for survival (e.g., predator avoidance) and impaired swimming performance, are expected.

The CZU Lightening Complex Fire started on August 16, 2020 as a series of lightening fires across western Santa Cruz and San Mateo counties (Cal Fire and CDC 2020). The fire burned a total of 86,509 acres before being fully contained on September 22, 2020. Portions of the burned area represented some of the highest quality habitat for salmonids in the Santa Cruz Mountains, including the Scott Creek watershed where the Project action area is located (NMFS 2020b). The long-term impacts on such valuable salmonid habitat are yet to be determined. However, there is heightened concern related to increased sediment run-off and erosion, decreased riparian vegetation, increased stream temperatures, and decreased water quality. Detailed habitat inventories since this fire in Big Creek have not been completed, but it is likely CCC coho and CCC steelhead spawning, rearing, and migratory habitat was directly and indirectly impacted by the fire and subsequent rain events.

Overall, the current condition of CCC steelhead and CCC coho salmon critical habitat is degraded, and does not provide the full extent of conservation value necessary for the recovery of the species.

2.2.4 Global Climate Change

Another factor affecting the rangewide status of CCC steelhead and CCC coho salmon and aquatic habitat at large is climate change. Recent work by the NMFS Science Centers ranked the relative vulnerability of west-coast salmon and steelhead to climate change (Crozier et al 2019). In coastal California, CCC coho salmon will likely have a very high vulnerability to climate change impacts relative to other salmonid species. CCC steelhead in coastal California were rated at moderate vulnerability to climate change impacts.

Impacts from global climate change are already occurring in California. For example, average annual air temperatures, heat extremes, and sea level increased in California over the last century (Kadir et al. 2013). Snowmelt from the Sierra Nevada has declined (Kadir et al. 2013). Although CCC steelhead and CCC coho salmon are not dependent on snowmelt driven streams, they have likely already experienced some detrimental impacts from climate change through lower and more variable stream flows, warmer stream temperatures, and changes in ocean conditions. California experienced well below average precipitation during the 2012-2016 drought, as well as record high surface air temperatures in 2014 and 2015, and record low snowpack in 2015 (Williams et al. 2016). Paleoclimate reconstructions suggest the 2012-2016 drought was the most extreme in the past 500 to 1000 years (Williams et al. 2016). Anomalously high surface temperatures substantially amplified annual water deficits during 2012-2016. California entered another period of drought in 2020. These drought periods are now likely part of a larger drought event (Williams et al. 2022). This recent long-term drought, as well as the increased incidence and magnitude of wildfires in California, have likely been exacerbated by climate change (Williams 2022, Diffenbaugh et al. 2015, Williams et al. 2019).

The threat to CCC steelhead and CCC coho salmon from global climate change is expected to 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 and the magnitude and frequency of dry years may increase (Lindley et al. 2007; Schneider 2007; Moser et al. 2012). Similarly, wildfires are expected to increase in frequency and magnitude (Westerling et al. 2011; Moser et al. 2012). Increases in wide year-to-year variation in precipitation amounts (droughts and floods) are projected to occur in California as a result of climate change (Swain et al. 2018). 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 2004; Osgood 2008; Turley 2008; Abdul-Aziz et al. 2011; Doney et al. 2012). Some of these changes, including an increased incidence of marine heat waves, are likely already occurring, and are expected to increase (Frölicher et al. 2018). In fall 2014, and again in 2019, a marine heatwave, known as "The Blob"[7], formed throughout the northeast Pacific Ocean, which greatly affected water temperature and upwelling from the Bering Sea off Alaska, south to the coastline of Mexico. The marine waters in this region of the ocean are utilized by salmonids for foraging as they mature (Beamish 2018). Although the implications of these events on salmonid populations are not fully understood, they are having considerable

[7] https://www.fisheries.noaa.gov/feature-story/new-marine-heatwave-emerges-west-coast-resembles-blob

adverse consequences to the productivity of these ecosystems and presumably contributing to poor marine survival of salmonids.

In the San Francisco Bay region (and other areas of the central California coast), warm temperatures generally occur in July and August, but with climate change these events will likely begin in June and could continue through September (Cayan et al. 2012). Climate simulation models indicate the San Francisco region will maintain its Mediterranean climate regime for the 21^{st} century; however, these models predict a high degree of variability in annual precipitation through at least 2050, leaving the region susceptible to drought (Cayan et al. 2012). These models of future precipitation suggest that, during the second half of the 21^{st} century in this region, most years will be drier than the historical annual average (1950-1999).

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 encompasses the streambed and banks of Big Creek, the active channel where the existing bridge crosses the creek (approximately 50 ft) and the riparian zone impacted by construction (Figure 1). The action area spans approximately 850 feet in length from north to south, including the proposed new bridge and roadway approaches (Favro 2022). The action area includes the active channel to be dewatered (approximately 150 linear feet) and 500 linear feet downstream of the dewatered area that is subject to increased turbidity and sedimentation due to the Project. The action area also includes areas needed for access and staging, existing roadway, shoulders, and non-vegetation turnouts.

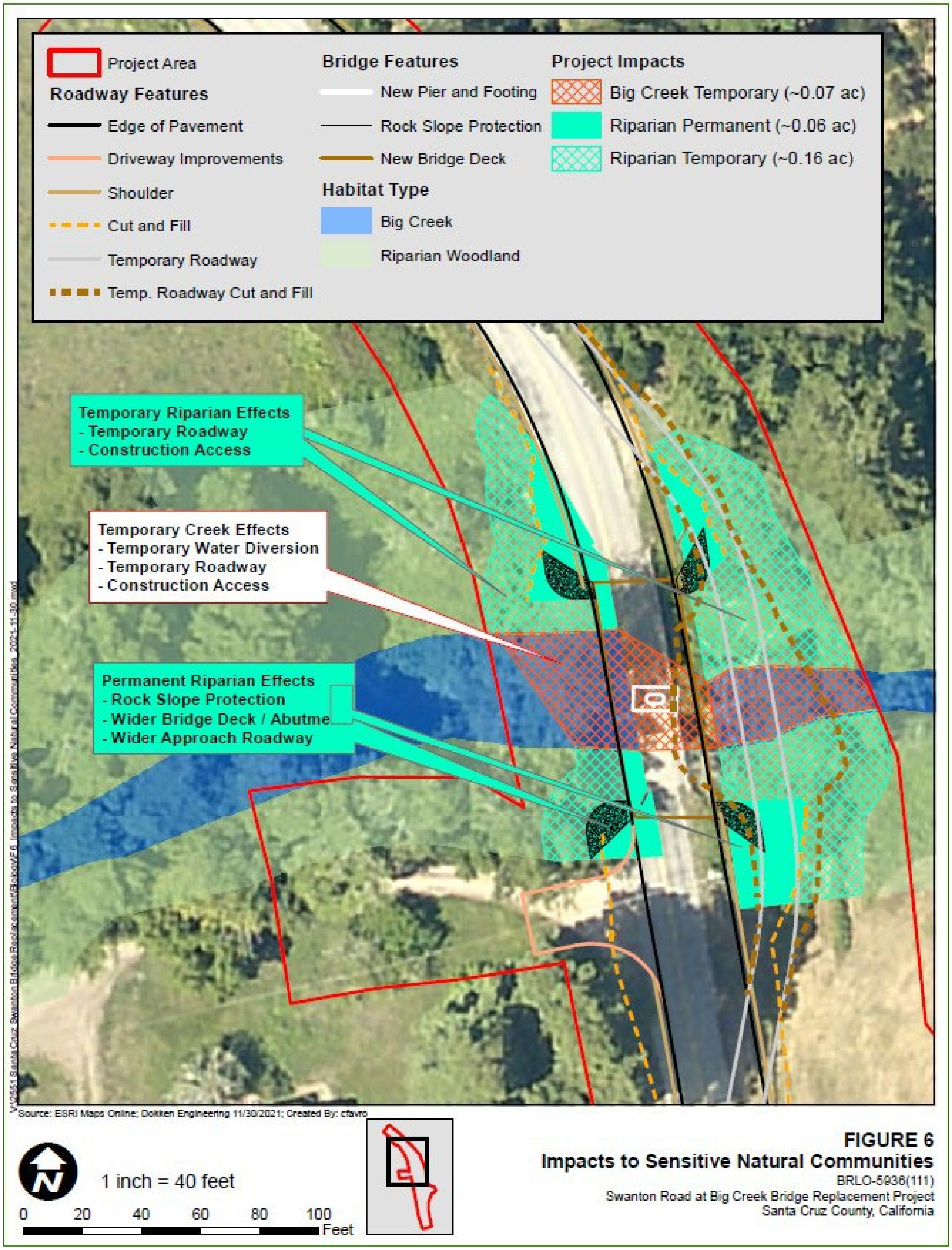

Figure 1. Depiction of areas expected to undergo temporary and permanent effects due to the proposed Project (Favro 2022).

2.4 Environmental Baseline

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

2.4.1 Description of Big Creek Watershed and the Action Area

The action area is within the Scott Creek watershed, in a rural area of Santa Cruz County. Scott Creek is a small coastal California watershed draining approximately 39 square miles which empties into the Pacific Ocean 50 miles south of San Francisco. Big Creek and Little Creek are the major tributaries to Scott Creek. Approximately 650 linear feet of Big Creek occurs within the action area based on impacts from dewatering, pile driving, sedimentation and turbidity. Big Creek is a perennial, westerly flowing stream that originates near Eagle Rock and empties into Scott Creek roughly 0.3 miles west of the action area. Big Creek is approximately seven miles long with several tributaries. Kingfisher Flat Hatchery is located on Big Creek upstream of the action area. The subsurface conditions in Big Creek within the action area consist of a 30-to-50-foot layer of loose silty-sand interspersed with cobbles, under which lies dense clayey sands and weathered bedrock (Favro 2022). Land use west of the Swanton Road Bridge is commercial agriculture, while land use east of the bridge is designated as timber production. Vegetation structure throughout the action area is diverse and composed of ruderal vegetation, coastal grasslands, mixed evergreen forest, riparian woodland, an old growth redwood grove, and remnants of a walnut orchard (Favro 2022).

2.4.2 Status of CCC Steelhead in the Action Area

The Scott Creek population of CCC steelhead is considered essential to recovery of the DPS (NMFS 2016a). The spawner density in Scott Creek is one of the highest in the Santa Cruz Mountains Diversity Stratum (NMFS 2016a). Recovery criteria for the CCC steelhead Scott Creek population includes a spawner abundance target of 700 (NMFS 2016a).

Monitoring of juvenile and adult steelhead occurs annually in the Scott Creek watershed, including the vicinity of the action area. In 2003-2019, estimated annual escapement of steelhead to Scott Creek slowly declined from 440 fish in 2003 to around 100 fish in recent years (Kiernan et al. 2019). The 2018-19 run escapement reached a high point for the time-series (547 fish), but the most recent estimate was 153 fish returning for the 2019-2020 run (Kiernan 2020). Spawner abundance targets are not met for this population, and effects from the 2020 fire (as noted above) are likely to impact the population further.

Although more limited than monitoring in Scott Creek, data on presence of steelhead within Big Creek were collected annually. While escapement estimates are not available for Big Creek, NOAA Southwest Fisheries Science Center (SWFSC) surveyed Big Creek for steelhead redds annually, beginning at the confluence with Scott Creek and extending 1.4 miles upstream to a natural anadromous barrier. Only two steelhead redds were observed in Big Creek for runs in 2016-17, 2017-18, and 2018-19 (Kiernan et al. 2018; Kiernan et al. 2019). In 2018-2019, SWFSC estimated an average of 29 juvenile steelhead in a 0.19 mile reach of Big Creek beginning at the confluence with Scott Creek, based on summer snorkel surveys of pool habitat only (Kiernan et al. 2019). In 2018-2019, Smith (2021) observed an average of 44 juvenile steelhead during electrofishing surveys of pool and glide habitats within the action area, and 7 were observed in 2021. The latter study included a 100-foot reach, beginning on the east side of the bridge over Big Creek at Swanton Road and continuing upstream, coinciding with a portion of the action area. Conducted annually in late-August through October 1992-2021 (with the exception of 2020 due to the fire), Smith (2021) found an average of 46 juvenile steelhead in approximately 100 feet of stream length. Based on this information, CCC steelhead are highly likely to be present in the action area, with their abundance remaining low, but fairly stable in recent decades.

2.4.3 Status of CCC Coho Salmon in the Action Area

Historically, CCC coho salmon inhabited all or most of the accessible coastal streams in Santa Cruz County. Until the mid-1970's CCC coho salmon were present in 13 streams south of San Francisco (all in Santa Cruz County), including the Scott Creek watershed (Bryant 1994). By 1995, only two natural runs existed south of San Francisco, Scott Creek and Waddell Creek, with a hatchery supported population in the San Lorenzo River (Bryant 1994, Anderson 1995). As of 2012, only Scott Creek supported all three CCC coho cohorts in streams south of San Francisco, mainly due to releases from Kingfisher Flat Hatchery (NMFS 2012). Juvenile coho from the Kingfisher Flat Hatchery were rarely released into Big Creek, as the habitat there is believed to be less favorable to coho than other coastal streams. For example, Big Creek produced fewer coho per redd than mainstem Scott Creek in recent years (Kiernan et al. 2018). Instead, juvenile coho from the hatchery have been trucked to release sites on Scott Creek, Pescadero Creek and other coastal creeks.

Monitoring of juvenile and adult coho occurs annually in the Scott Creek watershed, including the vicinity of the action area. In 2003-2020 estimated annual escapement of coho to Scott Creek varied from 1 to 329 fish and has generally declined, averaging 15 fish in the most recent four run-years (Kiernan et al. 2019; Kiernan 2020). The Scott Creek coho population spawner abundance target for downlisting is 255 and 510 for delisting (NMFS 2012).

Although more limited than monitoring in Scott Creek, data on presence of coho within Big Creek were collected annually. While escapement estimates are not available for Big Creek, NOAA SWFSC surveys the creek for coho redds annually, beginning at the confluence with Scott Creek and extending 1.4 miles upstream to a natural anadromous barrier. Only one coho redd was observed in Big Creek for runs in 2016-17, 2017-18, and 2018-19 (Kiernan et al. 2018; Kiernan et al. 2019). In 2016-2019, the SWFSC estimates of juvenile coho in a 0.19 mile reach of Big Creek beginning at the confluence with Scott Creek averaged 10 fish, based on summer snorkel surveys of pool habitat only (Kiernan et al. 2018; Kiernan et al. 2019). In 2016-2019, Smith (2021) only observed one juvenile coho during electrofishing surveys of pool and glide habitats within the action area, and zero were observed in 2021. See section 2.4.2 for details about the Smith (2021) study. Smith (2021) found an average of 5 juvenile coho in the action area with high variability throughout the time-series. Based on this information, CCC coho are likely to be present in the action area, although their abundance has been in long-term decline.

2.4.4 Status of Critical Habitat in the Action Area

The action area contains designated critical habitat for CCC steelhead and CCC coho salmon, and supports spawning, rearing, and migration of these listed species. Big Creek provides all essential features (or PBFs) for CCC coho salmon and CCC steelhead (see Section 2.2.3).

The construction of the existing bridge and associated infrastructure altered a portion of the habitat within the action area. It is likely that water quantity and quality had declined in the action area as a result of human activities nearby, including stream diversions and land use practices (primarily agriculture and timber production). Otherwise, the in-stream and riparian habitat in the action area was apparently in relatively good condition prior to 2020. Stream substrate in the action area consists primarily of sand and cobble over weathered bedrock.

Prior to a large wildfire in 2020, riparian vegetation was relatively healthy and tree canopy was extensive in the action area downstream and upstream of the existing bridge (Favro 2022).

The 2020 CZU Fire (see section 2.2.3) caused severe damage within the Big Creek watershed. Much of the riparian vegetation was burned, including within the action area, especially to the east of Swanton Road Bridge (Smith 2020). The fire damaged the Kingfisher Flat Hatchery and resulted in the loss of about half of the juvenile coho. There was a patchy moderate burn along Big Creek to upstream of Berry Creek with more severe burning on the slopes and farther upstream. The reduction in riparian canopy in Big Creek from the CZU Fire may raise summer water temperatures, but could also increase food for coho and steelhead. The fire's destruction of a portion of the riparian zone in the action area may explain the relatively small number of juvenile steelhead and lack of coho observed in the action area during a survey in October 2021 (Smith 2020). The long-term impacts of the CZU Fire on CCC coho and CCC steelhead in Big Creek may not be known for several years.

The long-term effects of climate change were presented above (section 2.2.4), and include changes to air and water temperature and the timing and magnitude of precipitation events that may affect steelhead, coho salmon, and critical habitat by changing water quality, streamflow levels, and salmonid migration in the action area. The threat to salmonids in the action area from climate change will likely mirror what is expected for the rest of Central California. NMFS expects that average dry season air temperatures in the action area will continue to increase, heat waves will become more extreme, and droughts and wildfire will occur more often (Hayhoe et al. 2004; Lindley et al. 2007; Schneider 2007; Westerling et al. 2011; Moser et al. 2012; Kadir et al. 2013). Many of these changes are likely to further degrade CCC steelhead and CCC coho salmon critical habitat within the action area by reducing streamflow, canopy cover and large wood recruitment, as well as increasing water temperatures and fine sediment yield in Big Creek.

2.5 Effects of the Action

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

Construction activities, both during and post-project completion, associated with the proposed Project may affect CCC steelhead and CCC coho and their critical habitat. The following may result from construction activities: unintentional direct injury or mortality during fish collection, relocation, and dewatering activities; increases in suspended sediments and turbidity; contaminants from operations during construction; contaminants in stormwater runoff post-construction; reductions in riparian vegetation and habitat loss; altered channel morphology and fish passage condition. Project effects are described in more detail below.

2.5.1 Fish Collection and Relocation

To facilitate completion of the project, a portion of Big Creek will be dewatered. As discussed above, approximately 150 linear feet will be dewatered. Caltrans proposes to collect and relocate fish in the work areas prior to, and during dewatering, to avoid fish stranding and exposure to construction activities. Before and during dewatering of the construction site, juvenile steelhead and coho will be captured by a qualified biologist using one or more of the following methods: dip net, seine, thrown net, block net, minnow trap, and electrofishing. Collected steelhead and coho will be relocated to an appropriate stream reach that will minimize impacts to captured fish, and to fish that are already residing at the release site(s).

Relocation activities will occur between June 15 and October 15. This timeframe is after emigrating coho smolts have left the area and before adults have immigrated for spawning (Osterback et al. 2018). Although upstream migrating steelhead adults are not expected to be in the action area during this timeframe, a small number of kelts (downstream migrants) may be in the creek throughout the summer if they were unable to leave the system prior to sandbar formation at Scott Creek mouth. Kiernan et al. (2019) indicated that kelts were encountered at the SWFSC trap station in Scott Creek throughout the monitoring period in 2019 (January-May). Additionally, a small number of steelhead smolts may be in the action area until the end of July based on migration timing data in nearby Scott Creek (Osterback et al. 2018). Therefore, NMFS expects young-of-the-year (YOY) juvenile coho and steelhead, as well as steelhead smolts and kelts, to be in the action area during the construction period. Based on the estimated number of coho that may occur in the action area, we anticipate up to 100 individual coho may be encountered during the work season. Based on the estimated number of steelhead that may occur in the action area, we anticipate up to 120 individual steelhead and 2 kelts may be encountered during the work season.

Fish collection and 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 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 will be conducted by qualified fisheries biologists following NMFS electrofishing guidelines (NMFS 2000), injury and mortality of juvenile salmonids during capture and relocation will be minimized. Based on prior experience with current relocation techniques and protocols likely to be used to conduct the fish relocation, unintentional mortality of listed juvenile salmonids expected from capture and handling procedures during the Project is not likely to exceed two percent (two coho and three steelhead).

Relocated fish may have to compete with other fish, causing increased competition for available resources such as food and habitat. To reduce the potential for competition, fish relocation sites will be pre-approved by NMFS to ensure the sites have adequate habitat to allow for survival of transported fish and fish already present. Nonetheless, crowding could occur which would likely result in increased inter- and intraspecific competition at those sites. Responses to crowding by salmonids include self-thinning, resulting in emigration and reduced salmonid abundance with increased individual body size within the group, and/or increased competition (Keeley 2003). Relocation sites will be selected to ensure they have similar water temperatures as the capture sites, and adequate habitat to allow for survival of transported fish and fish already present. However, 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 fish. As each fish moves, competition remains either localized to a small area or quickly diminishes as fish disperse. In some instances, relocated fish may endure some short-term stress from crowding at the relocation sites. Such stress is not likely to be sufficient to reduce their individual fitness or performance. NMFS cannot accurately estimate the number of fish likely to be exposed to competition, but does not expect this short-term stress to reduce the individual performance of juvenile salmonids, or cascade through the watershed population of these species. Fish that avoid capture during relocation may be exposed to risks described in the following section on dewatering (see section 2.5.2 below).

2.5.2 Dewatering

Once initial fish capture and relocation efforts are complete, cofferdams and a series of pipes or an open channel will be used to temporarily divert flows around the work site during construction. Dewatering of the channel is estimated to affect 150 linear feet of Big Creek. NMFS anticipates temporary changes to instream flow within, and downstream of, the Project site during installation of the diversion system, and during dewatering operations. Once installation of the diversion systems is complete, stream flow above and below the work sites should be the same as free-flowing pre-project conditions, except within the dewatered reaches where stream flow is bypassed and/or pools are dewatered. These fluctuations in flow are anticipated to be small, gradual, and short-term, but are expected to cause a temporary loss, alteration, and reduction of aquatic habitat.

Stream flow diversion and dewatering could harm any rearing steelhead or coho salmon individuals by concentrating or stranding them in residual wetted areas. Juvenile salmonids that avoid capture in the action area prior to dewatering will likely die due to desiccation, thermal stress, or may be crushed by equipment or foot traffic if not found by biologists as water levels within the reach recede. The pre-dewatering fish relocation efforts at the project site will be performed by qualified biologists, therefore NMFS expects few juvenile salmonids and zero kelts will avoid capture prior to dewatering. NMFS expects no more than one percent of the juvenile steelhead and coho within the work site prior to dewatering will be killed as a result of stranding during dewatering activities (two steelhead and one coho).

Dewatering operations may affect juvenile salmonids by temporarily reducing forage items in the action area. However, this situation may resemble isolation of pools by intermittent flow conditions that typically occurs during summer within some streams throughout the range of CCC steelhead and CCC coho salmon. Habitat in and around the action area outside of the dewatered area is adequate to support steelhead and coho. Furthermore, food from upstream sources (via drift) would be available downstream of the dewatered areas via streamflow diverted around the project work site or from terrestrial sources. NMFS expects salmonids will be able to find food upstream and downstream of the action area as needed during dewatering activities.

Dewatering activities may affect the function of critical habitat by reducing the abundance of benthic (bottom dwelling) aquatic macroinvertebrates, an important food source for juvenile salmonids (Cushman 1985). However, effects to aquatic macroinvertebrates resulting from stream flow diversion and dewatering activities will be temporary because construction activities will be short lived, and the dewatered reach will not exceed 150 linear feet within Big Creek. Rapid recolonization (typically one to two months) of disturbed areas by macroinvertebrates is expected following rewatering (Cushman 1985; Thomas 1986; Harvey 1986). For this reason, we expect the function of critical habitat for aquatic macroinvertebrates, as disrupted by dewatering, will return to its pre-Project level before adults and smolts use the action area for migration.

2.5.3 Increased Sediment Mobilization

Construction activities related to the proposed Project will result in the disturbance of the creek bed and banks due to equipment/personnel access, removal of existing bridge, placement/removal of stream diversion structures, as well as construction of the temporary stream crossing and the new permanent bridge. These types of activities result in temporary increases in turbidity (Furniss et al. 1991; Reeves et al. 1991; Spence et al. 1996). Following construction, disturbed substrate could affect water quality and critical habitat in the action area in the form of small, short-term increases in turbidity during cofferdam removal and subsequent rainfall events.

Sediment may affect salmonids in several ways. High concentrations of suspended sediment can disrupt normal feeding behavior and efficiency (Cordone and Kelly 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 lower dissolved oxygen in the water column, reduce respiratory function, lower disease tolerance, and even cause fish mortality (Sigler et al. 1984; Berg and Northcote 1985; Gregory and Northcote 1993; Velagic 1995; Waters 1995). Even small pulses of turbid water may cause salmonids to disperse from established territories (Waters 1995), which can displace fish into less suitable habitat and/or increase competition and predation, decreasing survival. In addition, increased sediment deposition can fill pools and reduce the amount of cover available to fish, decreasing the survival of juvenile salmonids (Alexander and Hansen 1986).

Chronic elevated sediment and turbidity levels may adversely affect salmonids and their critical habitat; however, the temporary increases in sedimentation and turbidity levels associated with the Project are not expected to rise to a level that would alter behavior, injure, or kill salmonids present in the action area. The applicant has proposed several measures to stabilize and prevent the mobilization of sediment post-construction. These measures include a SWPPP and applicable BMPs such as surface roughening by equipment tracking, desilting of water to be returned to the creek after dewatering, minimizing vegetation removal, and revegetating disturbed areas with a native seed mix and tree plantings post-construction. NMFS expects any sediment or turbidity generated by construction activities would be minor and localized (not extend more than 500 feet downstream of the work site), below levels known to cause injury or harm to salmonids. NMFS does not anticipate harm, injury, or behavioral impacts to CCC steelhead or CCC coho salmon associated with exposure to elevated suspended sediment from Project activities. Regarding critical habitat, the temporary exposure of habitats to increased sedimentation or turbidity is not expected to reach the scale where the PBFs of critical habitat will be altered, and therefore the ability of critical habitat to support salmonid conservation needs in the action area will be maintained.

2.5.4 Construction-related Contaminants

Construction in, over, and near surface water have the potential to release debris, hydrocarbons, concrete/cement, and similar contaminants into surface waters. Potential contaminants that could result from projects like these include wet and dry concrete debris, fuel and lubricant for construction equipment, and various construction materials. If introduced into aquatic habitats, debris could impair water quality by altering the pH, reducing oxygen concentrations as the debris decompose, or by introducing toxic materials such as hydrocarbons or metals into the aquatic habitat. Oils and similar substances from construction equipment 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).

Use of heavy equipment and storage of materials is required for the construction of the Project. As a result, if not properly contained, contaminants (e.g., fuels, lubricants, hydraulic fluids, concrete) could be introduced into the water system, either directly or through surface runoff. The effects described above for contaminants have the potential to temporarily degrade habitat and harm exposed fish. However, AMMs proposed at the work site will substantially reduce or eliminate the potential for construction materials and debris to enter waterways (section 1.3.4). Limiting the work window to the dry season from June 15 to October 15 will limit hazardous material exposure to salmonids, and eliminate the potential for containments to adversely affect the most sensitive life stages (i.e., eggs, alevin, and fry). All refueling, maintenance, storage of potential contaminants, and staging of equipment and vehicles will occur at least 60 feet from riparian habitat or water bodies and in a location from where a spill would not drain directly toward aquatic habitat (Favro 2022). Proper storage, treatment, and disposal of construction materials and discharge management is expected to substantially reduce or eliminate contaminants entering both waterways via runoff. Due to these measures, conveyance of toxic materials into Big Creek during project implementation is not expected to occur. However, prior to the onset of work, Caltrans will ensure a plan is in place for prompt and effective response to any accidental spills that do occur (Favro 2022).

2.5.5 Stormwater-related Contamination

Stormwater runoff may include material toxic to salmonids, including oil, grease, and PAHs; runoff may also include 6PPD-quinone derived from car tires, which has been shown to cause mortality of coho and juvenile steelhead (see section 2.2.3). Mortality in salmonids due to toxins in runoff can be minimized or prevented by infiltrating the road runoff through soil media containing organic matter, which results in removal of 6PPD-quinone and other contaminants (Fardel et al. 2020; Spromberg et al. 2016; McIntyre et al. 2015; McIntyre et al. 2016a; McIntyre 2016b). Caltrans (2003) reached similar conclusions in their work evaluating roadside vegetated treatment sites at various slopes. Vegetated filter strips at the edges of paved surfaces or vegetated swales (i.e., bioswales) can infiltrate stormwater into soils with large amounts of organic matter that bind or otherwise remove contaminants from the stormwater before it reaches a stream (Caltrans 2003, McIntrye et al. 2015).

The amount of stormwater-related contaminants generated by this project is expected to be small. The rural setting surrounding the bridge lends itself to a small daily traffic volume and narrow bridge size. The County estimated roughly 100 Average Daily Traffic trips across the bridge. While the Project will result in a slight increase in impervious surface area due to widening the bridge, it is still a narrow two-lane bridge. Because of the small bridge size and low traffic volumes across the bridge, the concentration of toxins in runoff originating from the bridge will be less than in heavier traffic areas with larger bridge surfaces where severe contaminant effects are often observed.

Concentration levels of toxins within stormwater runoff will be seasonally affected by rainfall patterns—after long dry periods (periods of no rain), rainfall will carry higher concentrations of pollutants. The first rain events of the wet season typically occur from October through December, when juvenile coho and steelhead as well as adult coho may be present in Big Creek. Conveyance of a portion of runoff directly into Big Creek from the new bridge is likely during periods of heavy rain.

The Project incorporates measures to treat or redirect stormwater originating from the bridge and roadway to reduce salmonid and habitat exposure to contaminated stormwater. A Storm Water Pollution Prevention Plan (SWPPP) will be implemented to maintain water quality during and after construction within Big Creek. Vegetative filters, in the form of restoration plantings, will be used to filter runoff around the road approaches to the bridge in the action area. The new permanent bridge design will incorporate a 0.5-inch-deep trough along the western edge of the bridge deck intended to channel most stormwater off the deck. Due to the grade and contouring of the deck, the County expects stormwater to flow toward the western edge where the trough is located (Jeffrey de los Santos, personal communication, July 2022). Stormwater in the trough will drain to the RSP area below the north end of the bridge then filtered through 20 feet of sand

and riparian vegetation along the creek bank. During light rain events, the system is expected to drain nearly 100% of runoff from the bridge deck to the RSP area. In heavy rain, approximately 75% of stormwater is expected to be collected in the trough and drained to the RSP area, with the remainder flowing into Big Creek (Jeffrey de los Santos, personal communication, July 2022). Rain events early in autumn that may carry the greatest contamination loads are typically less intense relative to rain events later in the wet season. These measures and design features are expected to be highly effective at reducing stormwater-related contaminant concentrations to levels that are not harmful to salmonids or critical habitat.

2.5.6 Removal of Riparian Vegetation and Habitat Loss

The Project will result in permanent and temporary reductions in riparian vegetation in the action area, including vegetation clearing and tree cutting and trimming, necessary for construction access and staging. Riparian vegetation helps maintain stream habitat conditions necessary for salmonid growth, survival, and reproduction. Riparian zones and wetland/aquatic vegetation serve important functions in stream ecosystems. Removal of riparian vegetation that provides shade increases stream exposure to solar radiation, leading to increases in stream temperatures (Poole and Berman 2001). Additional benefits from riparian vegetation includes: 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 streambank stability (Platts 1991), source of woody debris that creates fish habitat diversity (Bryant 1983; Lisle 1986; Shirvell 1990), and providing cover and shelter for fish (Bustard and Narver 1975; Wesche et al. 1987; Murphy and Meehan 1991). Riparian vegetation disturbance and removal can degrade these ecosystem functions and impair stream habitat.

As a result of the project, approximately 0.16 acres of riparian habitat may be temporarily impacted and 0.6 acres will be permanently removed (Favro 2022). The removal of riparian vegetation will result in both permanent and temporary reductions in shade and cover for fish, will remove sources of woody debris that may contribute to habitat diversity and complexity, and may result in increased stream temperatures. However, the applicant has stated that tree and vegetation removal will be minimized to the maximum extent feasible to prevent erosion and to reduce potential impacts of riparian vegetation removal on salmonids (Favro 2022). Specifically, as much as practicable, clearing of riparian vegetation for the temporary crossing and construction access will be focused on the east side of the bridge where the 2020 fire burned most of the riparian vegetation. Although riparian vegetation would also be cleared on the west side of the bridge, where the fire spared more of the vegetation, this would primarily be limited to a 10-foot buffer around the proposed abutment locations to allow for construction access and RSP placement.

Trimmed vegetation is expected to grow back and, where vegetation is removed in temporary impact areas, native vegetation will be planted following Project completion. The Project site will be monitored to ensure the success of revegetation efforts to restore areas impacted by removal of native riparian vegetation for five years following Project completion. However, the services provided by vegetation such as shade and cover, sediment storage and filtering, nutrient inputs, sources of woody debris, and habitat complexity (i.e., cover) will remain degraded at the sites until new vegetation is replanted and becomes established. When considering complete removal of trees, we expect riparian vegetation attributes on-site will return to pre-Project levels after native trees are replanted and established, which will take many years (roughly ten years, if successful). Smaller vegetation is expected to recover within one to five years.

The effects discussed above have already been realized in areas that were already denuded by the CZU fire. The project's removal of some of the remaining vegetation will further reduce shade in the action area. Plantings by the Project may help the area recover more quickly than natural processes. Additionally, shading of the creek will increase with the new bridge compared to the existing bridge. The new bridge is expected to be three feet wider than the existing bridge and spans approximately the same distance across the creek (approximately 84 feet). The larger size of the new bridge will create approximately 252 square feet (0.006 acres) of increased shaded creek area, based on dimensions provided in Favro (2022). This will partially mitigate for the loss of shading from riparian vegetation removed by the Project in the action area, but will not provide any of the additional benefits for salmonids from riparian vegetation.

The timing and establishment of the on-site revegetation and recruitment of new woody debris means that clearing of riparian vegetation by the Project may cause individual salmonids to seek alternative areas for cover and forage. Such temporary displacement of salmonids may reduce their individual performance as there are limited sites nearby with healthy riparian habitat due to the recent fire impacts. Additionally, a number of individuals could remain in the area where vegetation is either temporarily or permanently impacted by the Project. However, because most of the riparian vegetation was burned in the 2020 CZU fire, salmonids are likely already seeking out more suitable habitat in the vicinity if the action area is not providing sufficient cover and resources. Although much of the watershed was burned in the fire, pockets of riparian vegetation were spared; such areas are expected to sufficiently support salmonids displaced by both the Project and the fire while vegetation in the action area is reestablished. Regarding critical habitat, the Project will perpetuate the degraded condition of habitat in the action area. However, plantings (including trees) by the Project post-construction are expected to eventually recover primary riparian vegetation services to critical habitat. The value of woody debris is noted earlier in this section; if the Project were to cut and remove large riparian trees, this large woody debris would be lost from the action area. Caltrans has agreed to retain large diameter trees at the site to serve as habitat (see BIO-37 in Favro 2022), which is expected to provide benefits for salmonids and the riparian ecosystem. Overall, the effects to salmonids and critical habitat from the cutting and clearing of vegetation is expected to be minor and localized.

2.5.7 Hardscape in the Channel

By design, bridges and associated bank stabilization prevent lateral channel migration, effectively forcing streams into a simplified linear configuration. Without the ability to move laterally, stream channels tend to erode and deepen vertically (Leopold 1968). The resulting "incised" channel fails to create and maintain aquatic and riparian habitat through lateral migration, and can instead impair groundwater/stream flow connectivity and repress floodplain and riparian habitat function. Simplified stream reaches typically produce limited invertebrate prey and provide poor functional habitat for rearing juvenile salmonids (Florsheim et al. 2008).

The proposed new bridge will be located along the same alignment as the existing bridge and will result in hardscape in the channel. The new bridge will include one pier within the Big Creek channel and two new abutments. The new bridge pier will cover approximately 12 square feet of channel bottom. The new bridge design minimizes constriction of the channel by placing the new abutments outside the bankfull width. RSP added by the project will permanently change the channel morphology, but the scope of these additions is small enough that effects are likely to be negligible for fish passage and channel geomorphology (Figure 1). NMFS expects that the Project would not result in sediment and flow alterations that would impede fish passage or alter channel morphology in any meaningful way, nor does the proposed bridge structure itself pose a risk of causing a fish passage barrier in the future through scour. The hardscape materials added to the channel by the Project (RSP, piers, and bridge abutments) will permanently cover existing in-stream benthic habitat and destroy or displace associated invertebrates and aquatic plants. Although the disruption to benthic habitat will reduce foraging ability of juvenile salmonids in the action area, the amount of hardscape to be added represents a small portion of the in-water habitat, and suitable benthic habitat is available nearby. Overall, the effects to salmonids and critical habitat from the installation of hardscape in the creek channel is expected to be minor and localized.

2.6 Cumulative Effects

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

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

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 opinion as to whether the proposed action is likely to: (1) reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing its numbers, reproduction, or distribution; or (2) appreciably diminish the value of designated or proposed critical habitat as a whole for the conservation of the species.

The action area is located within Big Creek, a major tributary of Scott Creek. Scott Creek and Big Creek support endangered CCC coho and threatened CCC steelhead. The Scott Creek population of CCC steelhead is considered essential to recovery of the DPS (NMFS 2016a). As of 2012, among streams south of San Francisco, only Scott Creek supported all three CCC coho cohorts (NMFS 2012). Big Creek is designated critical habitat for the CCC steelhead DPS and CCC coho salmon ESU.

CCC steelhead and CCC coho salmon have declined from their historic abundances due to the widespread degradation and loss of historic habitats caused by factors including hydrologic modifications (reservoir storage, surface diversions, and groundwater pumping), land use change (urbanization, timber harvest, agriculture, and mining), construction of dams and other migration impediments, channelization and disconnection from floodplains, and the introduction of non-native and invasive species. Coho salmon populations within the Santa Cruz Mountains Diversity Stratum declined substantially over the past several decades. Although the population in the Scott Creek is the most consistent in the Diversity Stratum, abundance is highly variable and generally low, and presence is mostly maintained by hatchery releases in the watershed.

2.7.1 Summary of Effects to CCC steelhead and CCC coho salmon

The Project proposes to replace a bridge. Construction will require dewatering of approximately 150 linear feet of Big Creek, fish capture and relocation, stream diversion, riparian vegetation removal, removal of the existing bridge, construction of a temporary crossing, as well as construction of the permanent bridge which requires pile driving and other activities. The dewatered area will be screened to prevent fish passage, thereby preventing hydroacoustic impacts to juvenile salmonids during pile driving, as fish will not be within the estimated range for these impacts (Favro 2022). Construction within the creek will occur during the dry season (June 15-October 15). Based on published surveys of the action area, we expect juvenile steelhead and coho will be present during construction. Monitoring data in nearby Scott Creek suggest steelhead smolts may also be in the action area, but coho salmon smolts will not likely be present.

As described in Section 2.5, NMFS analyzed the following components of the Project that had potential to cause effects to CCC steelhead and CCC coho: fish collection and relocation, dewatering, increases in sedimentation and turbidity, pollution from hazardous materials and contaminants during and after construction, removal of riparian vegetation and habitat loss, and addition of hardscape to the channel. Fish collection and relocation, as well as dewatering, are likely to result in reduced fitness, injury, and/or mortality of salmonids. Increased sedimentation and turbidity as well as temporary loss and degradation of habitat due to dewatering will cease shortly after construction is complete and will have negligible effects on salmonids. The implementation of proposed AMMs is expected to reduce the potential of fish being exposed to construction-related hazardous materials and contaminants during construction; therefore, effects to salmonids would be extremely unlikely to occur. Design elements and minimization measures will reduce stormwater-related contaminant concentrations to levels that are not harmful to salmonids. Temporary and permanent impacts to riparian vegetation due to the Project may expose salmonids to reduced cover and forage during and after construction. However, it is expected salmonids in the action area have already been exposed to these effects due to the 2020 fire that burned most of the riparian vegetation. As vegetation in the action area has not yet recovered from the fire, fish have either persisted despite lack of riparian cover or successfully relocated to alternative nearby habitats; therefore, effects to salmonids from riparian removals would be minor. Impacts to benthic habitat from addition of hardscape (bridge pier and RSP) are expected to be minor and localized. The new bridge will not result in geomorphic conditions that impair fish passage or degrade habitat conditions to the extent that fish would be harmed. NMFS does not expect any of the aforementioned effects to combine with other effects in any significant way.

Regarding dewatering and fish relocation, NMFS estimates up to 120 juvenile CCC steelhead, 2 adult (kelt) CCC steelhead, and 100 juvenile coho salmon may be present in the area to be dewatered as part of the proposed Project. Anticipated injury or mortality from capture and relocation is expected to be two percent (or less) of the fish present for each species, and injury or mortality expected from dewatering is expected to be one percent (or less) of the fish present of each species prior to relocation and dewatering (combined injury or mortality not to exceed three percent of each species). NMFS expects no more than four juvenile steelhead would be injured or killed by fish capture/relocation/dewatering at the project site during construction. NMFS expects no more than three juvenile coho salmon will be injured or killed by fish capture, relocation, and dewatering.

We do not expect the proposed Project to affect the persistence or recovery of the Scott Creek populations of the CCC steelhead DPS or CCC coho ESU. We base this conclusion on our findings above which considered the status of the species, the environmental baseline, all of the potential effects of the action, and the cumulative effects.

2.7.2 Summary of Effects on Critical Habitats

Big Creek contains critical habitat for the CCC steelhead DPS and CCC coho salmon ESU. In our adverse modification analysis, we consider the condition of critical habitat, the potential effects of the Project on critical habitat, and whether or not those effects are expected to diminish the value of critical habitat for the conservation of CCC steelhead or CCC coho salmon.

While conditions vary, critical habitat for these salmonids throughout their ranges has been impaired by habitat loss, alteration and fragmentation, surface and groundwater extraction, land use conversion, and estuarine habitat loss. Except for estuarine habitat loss, these factors also affect CCC steelhead and CCC coho salmon critical habitat in Big Creek as a result of rural developments, water diversions, and historic forestry and other land use practices.

The Project will result in minor and localized impacts to critical habitat. During dewatering activities, approximately 150 feet of the channel will experience diminished rearing habitat condition from the temporary loss of benthic macroinvertebrates (juvenile salmonid prey). NMFS expects macroinvertebrate abundance will return to its pre-Project level within a few months of project completion. Removal of riparian vegetation will primarily occur in areas already denuded from a recent wildfire. Nonetheless, the project will perpetuate the degraded condition of habitat in the action area and further diminish conditions by removing additional vegetation. Plantings proposed by the project are intended to revegetate the action area, which are expected to return riparian vegetation benefits for critical habitat to pre-project (and pre-fire) conditions. Riparian recovery is expected to take up to five years for smaller vegetation and approximately ten years for trees. Overall, the effects to critical habitat from the removal of vegetation is expected to be minor and localized. Due to minimization measures and project design features, the effects from (see Section 2.7.1), impacts from sedimentation and turbidity, construction-related contaminants, stormwater-related contaminants, and installation of hardscape in the creek channel will either be extremely unlikely to occur, or not reach levels that will diminish the value of critical habitat. Therefore, we do not expect the proposed Project to affect critical habitat for CCC steelhead or CCC coho salmon. We base this conclusion on our findings above which considered the status of the critical habitat, the environmental baseline, all of the potential effects of the action, and the cumulative effects.

2.7.3 Climate Change

Future climate change could affect CCC steelhead and CCC coho salmon and their designated critical habitats within the action area. Some potential consequences of climate change on the central California coast are increases in air and water temperatures, more frequent and damaging forest fires, as well as changes in the timing and magnitude of precipitation events and dry season streamflow. Over time, climate change may alter the vegetation communities along the Scott Creek watershed in direct ways, such as the 2020 CZU Fire, or less directly though changes in precipitation and temperature patterns. If stream flow declines in the future due to climate change, this could reduce the frequency and duration of suitable flows for adult and smolt passage throughout the Scott Creek watershed. However, if flows do decline, it is not expected that the Project would impede salmonid passage substantially more than adjacent areas of Big Creek outside the action area. The proposed action may amplify the effects of climate change through cutting of riparian vegetation that provides shade for the creek and other benefits to salmonids; however, this would be on a very small scale given the size of the watershed.

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, any effects of interrelated and interdependent activities, and cumulative effects, it is NMFS' opinion that the proposed action is not likely to jeopardize the continued existence of the CCC steelhead DPS, nor destroy or adversely modify its designated critical habitat.

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, any effects of interrelated and interdependent activities, and cumulative effects, it is NMFS' opinion that the proposed action is not likely to jeopardize the continued existence CCC coho salmon, nor 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 opinion, NMFS determined that incidental take is reasonably certain to occur as follows:

Take of listed juvenile CCC steelhead and CCC coho is likely to occur during fish relocation and dewatering of Big Creek between June 15 and October 15. NMFS expects that no more than two percent of the juvenile steelhead and coho, and no adult steelhead, within the 150 linear foot dewatering area of Big Creek will be injured, harmed, or killed during fish relocation activities. NMFS also expects that no more than one percent of the juvenile salmonids, and no adult steelhead, within the same dewatered area will be injured, harmed, or killed during dewatering activities. Because no more than 120 juvenile steelhead and 100 CCC coho salmon are expected to be present within the 150 linear foot dewatered reach of Big Creek during the construction season, NMFS does not expect more than 5 juvenile CCC steelhead and 3 juvenile CCC coho will be harmed or killed by the project.

Incidental take will have been exceeded if, in a single construction season:

- more than 2 adult steelhead (kelts) are captured;
- more than 120 juvenile CCC steelhead are captured;
- more than 100 juvenile CCC coho are captured;
- more than 5 juvenile CCC steelhead are harmed or killed;
- more than 3 juvenile CCC coho are harmed or killed;
- more than 3 percent of the total number of each salmonid species (juvenile steelhead and/or coho) captured are injured or killed during the Project in-water construction;
- any adult steelhead are injured or killed during the Project in-water construction.

If any of these incidental take limits are exceeded, reinitiation of consultation may be needed. See section 2.11 (Reinitiation of Consultation) below.

2.9.2 Effect of the Take

In the 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 juvenile CCC steelhead and CCC coho:

1. Undertake measures to ensure that injury and mortality to salmonids resulting from fish relocation and dewatering activities is low;

2. Undertake measures to minimize harm to salmonids from construction of the project and degradation of aquatic habitat; and

3. Prepare and submit plans and reports to NMFS regarding fish capture and relocation, dewatering, construction activities, and post-construction site-performance. Detailed plans regarding these aspects of the Project should be submitted prior to completion of consultation with NMFS.

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 consultant 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, 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. Caltrans or the applicant will allow any NMFS employee(s), or any other person designated by NMFS, to accompany field personnel to visit the project sites during activities described in this opinion.
    b. Caltrans or the applicant will retain qualified biologists with expertise in the area of anadromous salmonid biology, including handling, collecting, and relocating salmonids; salmonid/habitat relationships; and biological monitoring of salmonids. Caltrans or the applicant shall ensure that all fisheries biologists be qualified to conduct fish collections in a manner which minimizes all potential risks to ESA-listed salmonids. Electrofishing, if used, shall be performed by a qualified biologists and conducted according to the *NOAA Fisheries Guidelines for Electrofishing Waters Containing Salmonids Listed*

under the Endangered Species Act, June 2000, available at: https://media.fisheries.noaa.gov/dam-migration/electro2000.pdf.

c. The biologist will monitor the construction sites during placement and removal of water diversions to ensure that any adverse effects to salmonids are minimized. The biologist will be on site during all dewatering events to capture, handle, and safely relocation salmonids to an appropriate location. The biologist will notify NMFS staff at 831-713-7620 or Thomas.Wadsworth@noaa.gov, at least one week prior to capture activities to provide an opportunity for NMFS staff to observe the activities. During fish relocation activities the fisheries biologist shall contact NMFS staff at the above number, if injury or mortality of federally listed salmonids exceeds three percent of the total for each species collected, at which time NMFS will stipulate measures to reduce the take of salmonids.
d. Salmonids will be handled with extreme care and kept in water to the maximum extent possible during rescue 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 biologist will have at least two containers and segregate young-of-year from larger age classes and other potential aquatic predators. Captured salmonids will be relocated, as soon as possible, to a suitable instream location (pre-approved by NMFS – see 3a below) in which suitable habitat conditions are present to allow for adequate survival of transported fish and fish already present.
e. If any steelhead or salmon are found dead or injured, the biological monitor will contact NMFS staff at 831-713-7620 or Thomas.Wadsworth@noaa.gov. 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.
f. All salmonid mortalities will be retained. Tissue samples are to be acquired from each mortality per the methods identified in the NMFS Southwest Fisheries Science Center Genetic Repository protocols (contact the above NMFS office at the phone number provided) and sent to: NOAA Coastal California Genetic Repository, Southwest Fisheries Science Center, 110 McAllister Way, Santa Cruz, California 95060.
g. Non-native fish that are captured during fish relocation activities shall not be relocated to anadromous fish streams, or areas where they could access anadromous fish habitat.

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

   a. To ensure that the project is built as designed and contractors adhere to construction best management practices, monitoring will be performed during construction by skilled individuals. Monitors will demonstrate prior knowledge and experience in stream channel design and restoration, fish passage design, construction minimization measures, and the needs of native fish, including salmonids. Monitoring will be performed daily. The monitor(s) will work in close coordination with project management personnel, the project design (engineering) team, and the construction crew to ensure that the project is built as designed.
   b. Any pumps used to divert live stream flow will be screened and maintained throughout the construction period to comply with NMFS' Fish Screening Criteria for Anadromous Salmonids (2000).

c. Construction equipment used within the river channel will be checked each day prior to work within the river 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, Caltrans or their contractors will contain the spill and removed the affected soils.
d. Once construction is completed, all Project-introduced material must be removed, leaving the creek as it was before construction. As an exception, trees cut during the Project should remain at the site to serve as habitat. Excess construction materials will be disposed of at an appropriate disposal site.

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

a. Fish Capture and Dewatering Plans – Caltrans must submit a fish capture/relocation and channel dewatering plan to NMFS for review, including but not limited to suitable instream locations where any captured salmonids will be relocated in which suitable habitat conditions are present to allow for adequate survival of transported fish and fish already present. The plan shall be submitted electronically to NMFS biologist Tom Wadsworth at Thomas.Wadsworth@noaa.gov at least 30 days prior to the planned start of these activities.
b. A draft of the revegetation monitoring plan must be submitted to NMFS biologist Tom Wadsworth at Thomas.Wadsworth@noaa.gov for review and approval prior to the beginning of the in-stream work season.
c. Annual Reporting – Caltrans must prepare and submit annual reports to NMFS for Project activities as outlined below. The reports must be submitted electronically to NMFS biologist Tom Wadsworth at Thomas.Wadsworth@noaa.gov by January 15 of the year following dewatering activities. Reports prepared for compliance with other agency requirements that contain the information requested below would be acceptable. The report must contain, at minimum, the following information:

- Annual reports must contain, at minimum, the following information:

    i. Fish relocation – The report(s) must include a description of the location from which fish were removed and the release site(s) including photographs; the date and time of the relocation effort; a description of the equipment and methods used to collect, hold, and transport salmonids; the number of fish relocated by species; the number of fish injured or killed by species and a brief narrative of the circumstances surrounding ESA-listed 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.
    ii. Construction related activities – The report(s) must include the dates construction began and was completed; a discussion of any unanticipated effects or unanticipated levels of effects on salmonids, including 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 ESA-listed fish; the number of salmonids killed or injured

during the project action; and photographs taken before, during, and after the activity from photo reference points.

iii. Post-Construction Vegetation Monitoring and Reporting - Caltrans must develop and submit for NMFS' review a plan to assess the success of revegetation of the site. Reports documenting post-project conditions of vegetation installed at the site will be prepared and submitted annually on January 15 for the first five years following project completion, unless the site is documented to be performing poorly, then monitoring requirements will be extended. Reports will document vegetation health and survivorship and percent cover, natural recruitment of native vegetation (if any), and any maintenance or replanting needs. Photographs must be included. If poor establishment of vegetation is documented, the report must include recommendations to address the source of the performance problems and improve conditions at the site.

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 as this time.

2.11 Reinitiation of Consultation

This concludes formal consultation for the Swanton Road at Big Creek Bridge Replacement Project.

As 50 CFR 402.16 states, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained or is authorized by law and if: (1) The amount or extent of incidental taking specified in the ITS is exceeded, (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion, (3) the agency action is subsequently modified in a manner that causes an effect on the listed species or critical habitat that was not considered in this opinion, or (4) a new species is listed or critical habitat designated that may be affected by the action.

3 MAGNUSON–STEVENS FISHERY CONSERVATION AND MANAGEMENT ACT ESSENTIAL FISH HABITAT RESPONSE

Section 305(b) of the MSA directs Federal agencies to consult with NMFS on all actions or proposed actions that may adversely affect EFH. Under the MSA, this consultation is intended to promote the conservation of EFH as necessary to support sustainable fisheries and the managed species' contribution to a healthy ecosystem. For the purposes of the MSA, EFH means "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity", and includes the physical, biological, and chemical properties that are used by fish (50 CFR 600.10). Adverse effect means any impact that reduces quality or quantity of EFH, and may include direct or indirect physical, chemical, or biological alteration of the waters or substrate and loss of (or injury to) benthic organisms, prey species and their habitat, and other ecosystem components, if such modifications reduce the quality or quantity of EFH. Adverse effects on EFH may result from actions occurring within EFH or outside of it and may include site-specific or EFH-wide impacts, including individual, cumulative, or synergistic consequences of actions (50 CFR 600.810). Section 305(b) of the MSA also requires NMFS to recommend measures that can be taken by the action agency to conserve EFH. Such recommendations may include measures to avoid, minimize, mitigate, or otherwise offset the adverse effects of the action on EFH [CFR 600.905(b)].

This analysis is based, in part, on the EFH assessment provided by Caltrans (Favro 2022) and descriptions of EFH for Pacific Coast salmon (PFMC 2014) contained in the fishery management plan developed by the PFMC and approved by the Secretary of Commerce.

3.1 Essential Fish Habitat Affected by the Project

Pacific Coast Salmon EFH may be adversely affected by the proposed action within the action area. The Project action area is located in a freshwater area that supports spawning and thermal refugia Habitat Areas of Particular Concern (HAPCs) for coho salmon managed within the Pacific Coast Salmon FMP (PFMC 2014). Water temperatures in Big Creek are typically cool relative to other creeks in the area in late-summer and fall months (J. Smith, personal communication, February 25, 2022).

3.2 Adverse Effects on Essential Fish Habitat

NMFS determined the Project would adversely affect EFH for Pacific Coast Salmon species, specifically coho salmon. The potential adverse effects of the project on EFH for Pacific Coast Salmon were described in the preceding opinion and include temporary disturbances to the streambed, bank, and flow from project site dewatering; temporary elevated turbidity levels from suspended sediment and degraded water quality; loss of riparian vegetation; streambank habitat degradation, and temporarily blocking fish movements. As described in the opinion above, degraded water quality, benthic disturbance, and turbidity effects are anticipated to be temporary and minor due to AMMs as well as the small amount of area impacted relative to the total quantity of habitat available in the action area. Effects to riparian vegetation will be both temporary and permanent, which would likely decrease the extent of shade on Big Creek, potentially increasing the water temperature within the action area and downstream. The action area is within a HAPC for thermal refugia so increased stream temperature would affect the HAPC. The Project includes measures to protect water quality in the action area, and although riparian vegetation will be degraded, onsite revegetation of native trees will occur to replace some of the vegetation lost during construction activities. Additionally, the proposed new bridge will be wider, providing slightly more shade on Big Creek within the action area.

3.3 Essential Fish Habitat Conservation Recommendations

NMFS determined that the following conservation recommendations are necessary to avoid, minimize, mitigate, or otherwise offset the impact of the proposed action on EFH.

Based on the information developed in our effects analysis (see preceding opinion), NMFS has determined that the proposed action would adversely affect EFH for federally managed CCC coho salmon within the Pacific Coast Salmon FMP. Section 305(b)(4)(a) of the MSA authorizes NMFS to provide EFH Conservation Recommendations that will minimize adverse effects of an activity. With this in mind, the following Conservation Recommendation is provided.

> Large riparian vegetation that must be cut for the Project should be retained within the action area post-construction to mitigate for impacts to habitat by adding channel complexity, cover for fish, and nutrients to the system. Benefits of adding large woody debris are recognized in NMFS recovery plans for CCC steelhead and CCC coho. This NMFS recommendation was accepted by the applicant and included in the Project's BA (Favro 2022) as follows:
>
> "BIO-37: Large diameter trees (>6-inch dbh) that are removed to facilitate construction will be retained on-site and returned to the creek following construction in order to enhance in-stream habitat for special-status fish species."
>
> To ensure maximum benefits from this proposed minimization measure (BIO-37), trees cleared for the Project and retained at the site should have their root masses intact, which could be done by toppling with an excavator or other method, if feasible. NMFS recommends that Caltrans and/or the County coordinate with stream restoration partners to place these trees in appropriate locations within or alongside the creek.

Fully implementing this EFH conservation recommendation will help protect Pacific Coast salmon by reducing adverse effects described in section 3.2, above.

3.4 Statutory Response Requirement

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

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

3.5 Supplemental Consultation

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

4 Data Quality Act Documentation and Pre-Dissemination Review

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

4.1 Utility

Utility principally refers to ensuring that the information contained in this consultation is helpful, serviceable, and beneficial to the intended users. The intended users of this opinion are Caltrans and their contractors. Individual copies of this opinion were provided to Caltrans. 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.

4.2 Integrity

This consultation was completed on a computer system managed by NMFS in accordance with relevant information technology security policies and standards set out in Appendix III, 'Security of Automated Information Resources,' Office of Management and Budget Circular A-130; the Computer Security Act; and the Government Information Security Reform Act.

4.3 Objectivity

Information Product Category: Natural Resource Plan

Standards: This consultation and supporting documents are clear, concise, complete, and unbiased; and were developed using commonly accepted scientific research methods. They adhere to published standards including the NMFS ESA Consultation Handbook, ESA regulations, 50 CFR 402.01 et seq., and the MSA implementing regulations regarding EFH, 50 CFR 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 contain more background on information sources and quality.

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

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

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