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

June 1, 2023 **Refer to NMFS No:** WCRO-2023-00027

Tom Holstein
Environmental Branch Chief
California Department of Transportation, District 4
P.O. Box 23660, MS-1A
Oakland, California 94623-6371

Re: Endangered Species Act Section 7(a)(2) Biological Opinion for the Chalk Hill Road Bridge Replacement Project

Dear Mr. Holstein

Thank you for your letter of November 6, 2019, 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 Chalk Hill Road Bridge Replacement (Project) in unincorporated Sonoma County, California.

Thank you, also, for your request for consultation pursuant to the essential fish habitat (EFH) provisions in Section 305(b) of the Magnuson-Stevens Fishery Conservation and Management Act (MSA)(16 U.S.C. 1855(b)) for this action.

The enclosed biological opinion is based on our review of California Department of Transportation's (CalTrans)[1] proposed project and describes NMFS' analysis of potential effects on endangered CCC coho salmon (*Onchorhynchus. kisutch)*, threatened Central California Coast (CCC) steelhead (*O. mykiss*), and California Coastal (CC) Chinook salmon (*O. tshawytscha)*, and on designated critical habitat in accordance with section 7 of the ESA.

In this biological opinion, we conclude that the proposed action is not likely to jeopardize the continued existence of CCC coho salmon, CCC steelhead, or CC Chinook salmon. We also conclude the proposed action is not likely to result in the destruction or adverse modification of designated critical habitat for these listed species. However, NMFS anticipates that incidental take of CCC coho and CCC steelhead is reasonably certain to occur as a result of the proposed action. Therefore, an incidental take statement with terms and conditions is included with the enclosed biological 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

[1] Caltrans is acting as the lead agency under direction of the June 2007 Memorandum of Understanding (MOU) (23 U.S. C. 326) between Caltrans and the Federal Highway Administration. As assigned by the MOU, Caltrans is responsible for the environmental review, consultation and coordination on this project.

under the Pacific Coast Salmon Fishery Management Plan. While the proposed action will result in adverse effects to EFH, the proposed project contains measures to minimize, mitigate, or otherwise offset the adverse effects; thus, no EFH Conservation Recommendations are included in this opinion.

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

Sincerely,

Alecia Van Atta
Assistant Regional Administrator
California Coastal Office

Enclosure

cc: Keevan Harding, Caltrans, Oakland, CA, keevan.harding@dot.ca.gov
Copy to ARN File # 151422WCR2023SR00024

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

Chalk Hill Bridge Replacement

NMFS Consultation Number: WCRO-2023-00027
Action Agency: California Department of Transportation

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 Coho Salmon (*Oncorhynchus kisutch*)	Endangered	Yes	No	No	No
Central California Coast Steelhead (*Oncorhynchus mykiss*)	Threatened	Yes	No	No	No
California Coastal Chinook Salmon (*Oncorhynchus tshawytscha*)	Threatened	No	No	No	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	No

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

Issued By:

Alecia Van Atta
Assistant Regional Administrator
California Coastal Office

Date: June 1, 2023

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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 U.S.C. 1531 et seq.), as amended, and implementing regulations at 50 CFR part 402.

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

1.2. Consultation History

On October 16, 2019, NMFS biologist Jodi Charrier met with the staff from the California Department of Transportation (Caltrans), Sonoma County, and Project consultants to visit the Action Area and discuss the proposed Project.

On January 13, 2023, NMFS received an email from Caltrans that included: 1) a letter requesting initiation of Section 7 consultation for potential impacts on CCC steelhead and their designated critical habitat, CCC coho, and CC Chinook salmon and their critical habitat due to implementation of the proposed project; and 2) the November 2022 Biological Assessment (BA) for the Chalk Hill Road Bridge Replacement Project, Sonoma County, Bridge No. 20C-0242, Caltrans District 4, No. BRLO-5920(118). This package included sufficient information to initiate consultation for the Project.

On July 5, 2022, the U.S. District Court for the Northern District of California issued an order vacating the 2019 regulations that were revised or added to 50 CFR part 402 in 2019 ("2019 Regulations," see 84 FR 44976, August 27, 2019) without making a finding on the merits. On September 21, 2022, the U.S. Court of Appeals for the Ninth Circuit granted a temporary stay of the district court's July 5 order. On November 14, 2022, the Northern District of California issued an order granting the government's request for voluntary remand without vacating the 2019 regulations. The District Court issued a slightly amended order two days later on November 16, 2022. As a result, the 2019 regulations remain in effect, and we are applying the 2019 regulations here. For purposes of this consultation and in an abundance of caution, we considered whether the substantive analysis and conclusions articulated in the biological opinion and incidental take statement would be any different under the pre-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). Caltrans has determined that the Chalk Hill Road Bridge over Maacama Creek (Bridge Number: 20C-0242), in unincorporated Sonoma County, needs to be replaced because it is functionally obsolete. The proposed Project includes constructing a new bridge and reconstructing the intersection with Young Road southeast of the replacement bridge. The existing historic bridge will be demolished, and scour countermeasures with stream habitat improvement features will be installed along an eroded section of the south creek bank.

The existing one-lane bridge will be replaced with a bridge built to modern American Association of State Highway and Transportation Officials standards. The replacement bridge will have two 11-foot lanes, two 4-foot shoulders and concrete railings, for a total roadway width of 30 feet, installed immediately downstream (west) of the existing bridge. The new bridge will cross the creek with a single-span concrete box girder 184 feet in length and will be supported on reinforced concrete abutments. Structural concrete footings will be placed on 24-inch cast-in-steel shell concrete pilings driven into the south and north banks to a depth of approximately 80 feet below the streambed. The bridge will be designed to pass the 100-year flood event with a minimum 2.5 feet of freeboard. A deck surface drainage system and associated bioretention receiving areas have been incorporated into the bridge design to provide stormwater capture and filtration.

Concrete retaining structures will be built along the west side of the bridge at the north approach roadway, and at the south approach roadway to minimize the extent of embankment fill. A total of 33 trees will need to be removed to facilitate access and construction of the bridge, with one of the 33 trees planned for removal being within the creek's riparian area

Construction work within the channel will include construction of falsework and the abutments, including piles driven into the streambed to an appropriate depth (and installation of the scour countermeasures, discussed below). Grading of the channel bed may be necessary to facilitate the abutment construction. Access to the creek bed requires temporary grading of the north and south creek banks for vehicle ramps. The north access point is west of the existing north abutment. The south access point is west of the proposed scour countermeasures. A third access point, if needed, is adjacent to the south abutment of the replacement bridge and will be located to minimize vegetation removal.

Clean 1½-inch drain rock up to two feet deep will be placed to protect the creek bed and to create work pads that support falsework and construction equipment. The drain rock may remain after the dry season work ends, as it is expected to enhance substrate conditions for salmonids and other aquatic life and need not be removed. All other equipment and materials for the stream diversion system will be removed following construction each work season.

Equipment to construct the new bridge includes generators, air compressors, drill rigs, cranes, excavators, loaders, gravel trucks, concrete trucks, concrete pumps, and other track mounted or wheel mounted equipment

1.3.1. Stream Diversion System

Depending on conditions, a stream diversion system may be necessary to build the new bridge and to remove the old bridge and install the scour countermeasures. The stream diversion system will be located mid-channel or as appropriate depending on stream flow present. A Stream Diversion and Temporary Dewatering Plan will be developed prior to the beginning of work activities in Year 1 and Year 2 and submitted for NMFS approval no less than 30 days prior to construction. Minimal creek bed grading to create a temporary channel, and vegetation removal, may be required to construct the stream diversion system. Cofferdams will be placed in the channel to divert streamflow away from the work area. Temporary K-rail will be used to create a 4-foot-wide, gravity-flow diversion channel anticipated to be approximately 130 feet in length in Year 1 and 170 feet in length in Year 2 to accommodate streamflow, if flow is present. The K-rail will also allow for a protective covering of 2-inch x 4-inch framing and plywood to be placed over the channel to prevent any falling debris from entering the flowing stream. If pools are present, the temporary channel will extend from a seasonal pool evident during initial surveys 50 feet upstream of the existing bridge to another seasonal pool evident at the time 200 feet downstream, resulting in a channel no more than up to approximately 285 feet in length. However, the channel bed, including the location of any pools present, may vary from year to year.

Clean 1½-inch drain rock up to two feet deep will be placed to protect the creek bed and to create work pads that support falsework and construction equipment. The drain rock may remain after the dry season work ends, as it is expected to enhance substrate conditions for salmonids and other aquatic life and need not be removed. All other equipment and materials for the stream diversion system will be removed following construction each work season.

Best Management Practices (BMPs) for stream protection will be implemented at creek bed access points and at the new roadway approaches to winterize the construction site. BMPs include placing jute mesh on exposed ground surfaces, hand cast seeding and the placement of silt fences and straw wattles to prevent sediment from entering the creek or drainage inlets.

1.3.2. Bridge Construction Sequence

1. Implement stream protection BMPs,

2. Abutment work and retaining wall work outside the channel may begin,

3. Construct access to the creek bed after the dry season begins,

4. Construct a stream diversion channel that allows fish to pass, implement fish capture and relocation plan if streamflow or pools are present,

5. Place up to two feet of clean 1 ½-inch drain rock over the creek bed,

6. Complete the bridge abutments,
7. Erect falsework in the creekbank over the drain rock pad,
8. Construct the box girder superstructure,
9. Remove the stream diversion system, falsework and any construction debris before the dry season ends,
10. Place large boulders at toe of south creekbank as a temporary scour countermeasure,
11. Winterize the creek bed access points,
12. Complete the retaining walls and wingwalls,
13. Complete the approach roadways and the new intersection at Young Road,
14. Complete the bridge barriers and approach guardrails,
15. Complete roadway and intersection signage and striping, and
16. Protect the approach embankments with jute mesh and hand-cast seeding.

1.3.3. Demolition and Removal of Existing Bridge

If needed, the stream diversion system will be installed prior to demolition of the existing bridge. Clean 1½-inch drain rock up to two feet deep will be placed to protect the creek bed and to create work pads that support falsework and construction equipment. The drain rock may remain after the dry season work ends. All other equipment and materials for the stream diversion system will be removed following construction.
Sequence of Demolition:

1. Install falsework to support existing arch rib,
2. Demolish bridge barriers and metal beam guardrail,
3. Install tie-backs,
4. Demolish north approach span,
5. Remove north abutment, wingwalls and pier down to top of their footings,
6. Demolish arch span,
7. Remove arch thrust blocks entirely or maximum 5 feet below grade, and

8. Remove south abutment and wingwalls to top of their footings.

1.3.4. <u>Installation of Scour Countermeasures and Stream Habitat Features on South Bank</u>

Installation of scour countermeasures is necessary in the second year of construction to stabilize an eroded and failing section of the south creek bank directly below and immediately downstream of the new replacement bridge in order to protect the bridge abutments from further scour. In addition to locating the new bridge foundations below the estimated scour depth in the channel, scour countermeasures include the installation of vegetated Class IV rock slope protection (RSP) and large logs with root wads to provide additional protection against the effects of high flows. The logs with root wads, together with the vegetated RSP (after establishment and growth of the riparian plantings), will provide complex stream habitat elements, cover, and shade to improve aquatic habitat for fish and other species.

The vegetated rock slope protection along the south creekbank will be approximately 125 linear feet in length, including log rootwads of 30 to 45 feet in length embedded in the structure. Root balls protruding into the channel will provide fish habitat including scour pools and complex rearing habitat. A total of 102 linear feet of RSP (44 feet of unvegetated RSP below the new bridge and 58 feet of vegetated RSP to the immediate south of the bridge footprint, where exposure to sunlight will allow the vegetation to become established) will be installed to protect the south abutment and streambank from erosion caused by high flows. The RSP will be placed on the streambed and bank to a height of approximately 19 feet, comprising a keyway excavated and installed 8 feet below the channel bed to resist scour and 11 feet of RSP above the keyway. The vegetated portion of the RSP will have live willow brush layering and joint planting to provide riparian cover and shade after vegetation establishment. Above the RSP, biotechnical soil roll and native plantings will be installed to the top of the bank to provide upslope habitat and resist erosion. Logs will be placed along the base of and embedded into the full length of the RSP structure and beyond at the upstream and downstream ends, totaling approximately 125 linear feet. Altogether, the scour countermeasure design with complex stream habitat features is anticipated to protect the bank adjacent to the south bridge footings from scour during high flows, while enhancing 125 linear feet of fish habitat in the action area.

Construction work within the wetted channel is limited to demolition of the existing bridge and installation of permanent scour countermeasures and stream habitat features. The work will occur during the second dry season, following year-one construction of the replacement bridge. The stream diversion system with cofferdams and a covered, temporary diversion channel, discussed above, will be installed prior to demolition of the existing bridge if stream conditions warrant this.

The existing bridge removal and scour countermeasure and stream habitat features installation sequence is as follows:

1. Restore creek protection BMPs,

2. Reconstruct access to the creek bed after the dry season begins,

3. Reconstruct a stream diversion channel that allows fish to pass, implement fish capture and relocation plan if streamflow or pools are present,
4. Place up to two feet of clean 1 ½-inch drain rock over the creek bed,
5. Demolish the existing bridge and remove from the site to a legal disposal facility,
6. Trim back the large tuff block that supported the existing bridge,
7. Secure the remainder of the tuff block with soil nails,
8. Install permanent scour countermeasures and stream habitat features along south creek bank,
9. Remove the stream diversion system and any remaining construction debris,
10. Regrade the creek bed to restore its original contours before the dry season ends,
11. Regrade channel access to match the surrounding topography and re-vegetate with native plants appropriate to the site,
12. Implement BMPs to winterize the former creek access points,
13. Remove pavement from the old bridge approaches and rip the soil to a 2-foot depth,
14. Re-vegetate the old bridge approaches and site access points and implement erosion control measures, and
15. The Contractor may now fully demobilize and move out from the project site.

1.3.5. Conservation Measures

All in-channel work will be limited to the proposed June 15 – October 15 work window, to avoid the adult and juvenile steelhead migration season and to limit work in the channel to the time of year when anadromous salmonids are least likely to be present in the action area. This work window is also the period of lowest flow in the stream, so any temporary downstream effects from dewatering activities, if needed based on streamflow present, are limited. Finally, this work window occurs during the dry season, when significant precipitation is not expected, minimizing the potential for sedimentation from work areas affecting the stream. Erosion control measures including dewatering the work area if water is present during proposed project activities will reduce the potential for increased sediment loads downstream of the action area.

Implementation of BMPs during dewatering will ensure no temporary increase in turbidity or sediment loads will occur. A fish capture and relocation operation will occur prior to dewatering the creek work area to ensure fish species are relocated safely outside of the work area. Temporary K-rails will be used to create 4-foot- wide channel and expected 130 feet in length (Year 1) and 170 feet in length (Year 2), but no more than approximately 285 feet in length, that can be covered below the superstructure work area to prevent any construction debris from falling into the flowing stream. Such a cover, if needed, would consist of 2-inch by 4-inch framing and plywood supported directly on the K-rails. The temporary channel will be graded to allow for gravity flow and will connect to pools if present and feasible.

Fish capture and relocation will be completed if flowing water or pools with potential to support fish remain in the proposed project area at the time work in the creek bed occurs, and work activities will require dewatering. A fish capture and relocation plan will be developed prior to the onset of any in-water work. A Stream Diversion and Temporary Dewatering Plan including fish capture and relocation will be developed prior to the beginning of work activities in Year 1 and Year 2 and submitted for NMFS approval no less than 30 days prior to construction. The plan will be implemented by a qualified biologist during dewatering activities in Maacama Creek. The fish capture and relocation plan will include an overview of the proposed methods for dewatering, expected location and duration of dewatering activities, and methods for conducting fish capture and relocation during dewatering activities.

If dewatering is necessary, pumps with 0.1-inch mesh will be used to remove standing water from the work area within the cofferdams to a filtration basin to prevent direct discharge into the creek. If a filtration basin is not available, filter bags will be placed surrounding the hose-release and the hose-release end will be placed on a level area outside of the wetted creek channel to allow water to settle prior to returning to the creek. No pumped water will be directly discharged into the creek. Allowing the pumped water to settle in a filtration basin or be released through filter bags will prevent excessive turbidity or sediment loads during the dewatering process. The stream channel will be restored to pre-project conditions following the completion of bridge work, recreating the gradient and channel substrate which currently exists. Restoration will use cobble and gravel substrate to mimic the channel conditions found prior to work activities. Revegetation of work and site access areas where riparian and upland vegetation is removed to facilitate construction will be completed according to the project’s revegetation plan.

Section 2.4 of the biological assessment (Caltrans 2022) is incorporated here by reference and describes several construction methods and best management practices that will be implemented to avoid and minimize impacts to listed species and their habitat in the action area including, but not limited to:

- Erosion and Sediment Control;
- Prevention of Accidental Spills and Pollution;
- Air Quality and Dust Control.

Additional post construction stormwater treatment will also be incorporated into the Project. To avoid and minimize stormwater runoff from the bridge deck from flowing directly into Maacama Creek, the proposed design incorporates a deck surface drainage system and associated biofiltration areas. Post-construction stormwater runoff from the bridge deck will be captured by the drainage system and will drain by gravity flow to the biofiltration areas, reducing contaminants entering the stream. Structures designed and constructed to treat stormwater runoff will receive regular long-term maintenance, with a focus on maintenance of the site in the early fall prior to the first rains of the winter season. The proposed stormwater treatment plan will be provided to NMFS for review and approval at least 120 days prior to the start of project construction.

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

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

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

2.1. Analytical Approach

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

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

The designation(s) of critical habitat for CCC coho salmon, and steelhead, and CC Chinook salmon 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 424.12) replaced this term with physical or biological features (PBFs). The shift in terminology does not change the approach used in conducting a "destruction or adverse modification" analysis, which is the same regardless of whether the original designation identified PCEs, PBFs, or essential features. In this biological opinion, we use the term PBF to mean PCE or essential feature, as appropriate for the specific critical habitat.

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

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

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

To conduct the assessment presented in this opinion, NMFS examined an extensive amount of information from a variety of sources. Detailed background information on the biology and status of the listed species and critical habitat has been published in a number of documents including peer reviewed scientific journals, primary reference materials, and governmental and non-governmental reports. For information that has been taken directly from published, citable documents, those citations have been reference in the text and listed at the end of this document. Additional information regarding the potential effects of the proposed activities on the listed species, their anticipated response to these actions, and the environmental consequences of the actions was formulated from the aforementioned resources, and the following:

- Caltrans 2022. (BA) – Biological assessment for the Chalk Hill Road Bridge Replacement Project. County of Sonoma. Bridge Number: 20C-0242. Project Number: BRLO-5920(118). November, 2022.
- NMFS 2016b - Final Coastal Multispecies Recovery Plan: CC Chinook Salmon, Northern California Steelhead, CCC Steelhead. West Coast Region, Santa Rosa, California. October 2016.

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.

NMFS assesses four population viability[2] parameters to discern the status of the listed Evolutionarily Significant Units (ESUs) and Distinct Population Segments (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 coho salmon and CC Chinook salmon ESUs and CCC steelhead DPS and the factors responsible for the current status of these listed species.

We use these population viability parameters as surrogates for "reproduction, numbers, and distribution" 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.

This opinion analyzes the effects of the proposed action on the following federally-listed species' ESUs, DPS, and designated critical habitat.

CCC coho salmon ESU
Endangered (70 FR 37160; June 28, 2005)
Critical habitat designation (64 FR 24049; May 5, 1999);

CCC steelhead DPS
Threatened (71 FR 834; January 5, 2006)
Critical habitat designation (70 FR 52488; September 2, 2005);

CC Chinook salmon ESU
Threatened (70 FR 37160; June 28, 2005)
Critical habitat designation (70 FR 52488; September 2, 2005).

2.2.1. CCC Coho Salmon Status

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. There are now 11 functionally independent populations (meaning they have a high likelihood of surviving for 100 years absent

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[2] NMFS defines a viable salmonid population as "an independent population of any Pacific salmonid (genus *Oncorhunchys)* 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*).

anthropogenic impacts) 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 not viable, hampered by low abundance, range constriction, fragmentation, and loss of genetic diversity.

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. Abundance declined further to 100,000 fish by the 1960s, then to an estimated 31,000 fish in 1991. In the next decade, abundance estimates dropped to approximately 600 to 5,500 adults (NMFS 2005). CCC coho salmon have also experienced acute range restriction and fragmentation. Adams et al. (1999) found that in the mid-1990s, coho salmon were present in 51 percent (98 of 191) of the streams where they were historically present, and documented an additional 23 streams within the CCC coho salmon ESU with no historical records. Recent genetic research has documented reduced genetic diversity within subpopulations of the CCC coho salmon ESU (Bjorkstedt et al. 2005), likely resulting from inter-breeding between hatchery fish and wild stocks.

Available data from the few remaining independent populations suggests population abundance continues to decline, and many independent populations essential to the species' abundance and geographic distributions have been extirpated. This suggests that populations that historically provided support to dependent populations via immigration have not been able to provide enough immigrants to support dependent populations for several decades. The viability of many of the extant independent CCC coho salmon populations over the next couple of decades is of serious concern. These populations may not have sufficient abundance levels to survive additional natural or human caused environmental change.

The substantial decline in the Russian River coho salmon abundance led to the formation of the Russian River Coho Salmon Captive Broodstock Program (RRCSCBP) in 2001. Under this program, offspring of wild captive-reared coho salmon are released as juveniles into tributaries within their historic range with the expectation that some of them will return as adults to naturally reproduce. Coho salmon have been released into several tributaries within the lower Russian River watershed as well as in Salmon, Walker, and Redwood creeks.

The five CCC coho diversity strata defined by Bjorkstedt et al. (2005) no longer supports viable populations. The Russian River and Lagunitas Creek populations are relative strongholds for the species compared to other CCC coho salmon populations. According to Williams et al. (2016), CCC coho salmon abundance has improved slightly since 2011 within several independent populations, although all populations remain well below their recovery targets. Within the Lost Coast – Navarro Point stratum, current population sizes range from 4 to 12 percent of proposed recovery targets. Recent sampling within Pescadero Creek and San Lorenzo River, the only two independent populations within the Santa Cruz Mountains strata, suggest coho salmon have likely been extirpated within both basins.

In positive developments, excess broodstock adults from the Russian River and Olema Creek were stocked into Salmon Creek and the subsequent capture of juvenile fish indicates successful reproduction occurred. Scott Creek experienced the largest coho salmon run in a decade from 2014 to 2015, and researchers recently detected juvenile coho salmon within four dependent watersheds (San Vincente, Waddell, Soquel, and Laguna creeks) where they were previously thought to be extirpated. In the fall of 2020, over 10,000 juvenile coho were released into Pescadero Creek.

2.2.2. CCC Steelhead Status

Historically, approximately 70 populations[3] 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). Recent estimates for the Russian 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). 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 fragmentation of habitat has likely also led to loss of genetic diversity in these populations. For more detailed information on trends in CCC steelhead abundance, see: Busby *et al*. 1996, NMFS 1997, Good *et al*. 2005, Spence *et al*. 2008, Williams *et al.* 2011, and Williams *et al.* 2016.

CCC steelhead have experienced serious declines in abundance and long-term population trends suggest a negative growth rate. This indicates the DPS may not be viable in the long term. DPS populations that historically provided enough steelhead immigrants to support dependent populations may no longer be able to do so, placing dependent populations at increased risk of extirpation. However, because CCC steelhead remain present in most streams throughout the DPS, roughly approximating the known historical range, CCC steelhead likely possess a resilience that is likely to slow their decline relative to other salmonid DPSs or Evolutionarily Significant Units (ESUs) in worse condition. The 2005 status review concluded that steelhead in the CCC steelhead DPS remain "likely to become endangered in the foreseeable future" (Good *et al*. 2005). On January 5, 2006, NMFS issued a final determination that the CCC steelhead DPS is a threatened species, as previously listed (71 FR 834).

A more recent viability assessment of CCC steelhead concluded that populations in watersheds that drain to San Francisco Bay are highly unlikely to be viable, and that the limited information

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[3] Population as defined by Bjorkstedt *et al*. 2005 and McElhaney *et al*. 2000 as, in brief summary, a group of fish of the same species that spawns in a particular locality at a particular season and does not interbreed substantially with fish from any other group. Such fish groups may include more than one stream. These authors use this definition as a starting point from which they define four types of populations (not all of which are mentioned here).

available did not indicate that any other CCC steelhead populations could be demonstrated to be viable[4] (Spence *et al.* 2008). Although there were average returns (based on the last ten years) of adult CCC steelhead during 2007/08, research monitoring data from the 2008/09 and 2009/10 adult CCC steelhead returns shows a decline in returning adults across their range compared to the last ten years (Jeffrey Jahn, NMFS, personal communication, 2010). The most recent status update concludes that steelhead in the CCC steelhead DPS remains "likely to become endangered in the foreseeable future" (Howe, 2016), as new and additional information available since Williams *et al.* (2011) does not appear to suggest a change in extinction risk.

2.2.3. CC Chinook Salmon Status

The CC Chinook salmon ESU includes all naturally spawned populations of Chinook salmon from rivers and streams south of the Klamath River, in Humboldt County, to the Russian River. Seven artificial propagation programs were considered part of the ESU at the time of listing: the Humboldt Fish Action Council (Freshwater Creek), Yager Creek, Redwood Creek, Hollow Tree, Van Arsdale Fish Station, Mattole Salmon Group, and Mad River Hatchery fall-run Chinook hatchery programs.

The CC Chinook salmon ESU was historically comprised of approximately 32 Chinook salmon populations (Bjorkstedt et al. 2005). About 14 of these populations were independent, or potentially independent. The remaining populations were likely more dependent upon immigration from nearby independent populations than dependent populations of other salmonids (Bjorkstedt et al. 2005). Data on CC Chinook salmon abundance, both historical and current, is sparse and of varying quality (Bjorkstedt et al. 2005). Estimates of absolute abundance are not available for populations in this ESU (Myers et al. 1998). In 1965, CDFG (1965) estimated escapement for this ESU at over 76,000. Most were in the Eel River (55,500), with smaller populations in Redwood Creek (5,000), Mad River (5,000), Mattole River (5,000), Russian River (500) and several smaller streams in Humboldt County (Myers et al. 1998). Between 2000 and 2020, the average number of adult Chinook salmon counted at Mirabel Dam on the Russian River was 2,716 fish (no data was obtained in 2014 and 2015) (SCWA website 2021).

CC Chinook salmon populations remain widely distributed throughout much of the ESU. Notable exceptions include the area between the Navarro River and Russian River and the area between the Mattole and Ten Mile River populations (Lost Coast area). The lack of Chinook salmon populations both north and south of the Russian River (the Russian River is at the southern end of the species' range) makes it one of the most isolated populations in the ESU. Myers *et al.* (1998) reports no viable populations of Chinook salmon south of San Francisco, California.

Because of their prized status in the sport and commercial fishing industries, CC Chinook salmon have been the subject of many artificial production efforts, including out-of-basin and out-of-ESU stock transfers (Bjorkstedt *et al.* 2005). Therefore, it is likely that CC Chinook salmon genetic diversity has been significantly adversely affected despite the relatively wide

[4] Viable populations have a high probability of long-term persistence (> 100 years).

population distribution within the ESU. An apparent loss of the spring-run Chinook life history in the Eel River Basin and elsewhere in the ESU also indicates risks to the diversity of the ESU.

Williams *et al.* (2016) summary of previous status reviews (Good *et al.* 2005, Williams *et al.* 2011) concluded that the loss of representation from one diversity stratum, the loss of the spring-run history type in two diversity substrata, and the diminished connectivity between populations in the northern and southern half of the ESU pose a concern regarding viability for this ESU. The latest status review of CC Chinook salmon determined that there is no change in the extinction risk for this ESU, and NMFS affirmed that the CC Chinook salmon ESU should remain listed as threatened (NMFS 2016a). NMFS's recovery plan (NMFS 2016b) for the CC Chinook salmon ESU identified the major threats to recovery as: channel modification, roads, logging and timber harvesting; water diversions and impoundments; and severe weather.

2.2.4. Status of Critical Habitat

PBFs for CCC steelhead and CC Chinook salmon critical habitat within freshwater include:

- freshwater spawning sites with water quantity and quality conditions and substrate supporting spawning, incubation and larval development;
- freshwater rearing sites with:
    - water quantity and floodplain connectivity to form and maintain physical habitat conditions and support juvenile growth and mobility;
    - water quality and forage supporting juvenile development;
    - 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;
- 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.

For CCC coho salmon critical habitat, the following essential habitat types were 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. Within these areas, essential features of coho salmon critical habitat 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 24029, 24059; May 5, 1999).

The condition of designated critical habitat for CCC coho salmon and steelhead, specifically its ability to provide for their conservation, has been degraded from conditions known to support viable salmonid populations. NMFS has determined that currently depressed population conditions are, in part, the result of the following human-induced factors affecting critical habitat: logging, agriculture, mining, urbanization, stream channelization and bank stabilization, dams, wetland loss, and water withdrawals (including unscreened diversions for irrigation). Other factors, such as over-fishing 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. Impacts of concern include: altered stream bank and channel morphology, elevated water temperature, lost spawning and rearing habitat, habitat fragmentation, impaired gravel and wood recruitment from upstream sources, degraded water quality, lost riparian vegetation, and increased erosion into streams from upland areas (Weitkamp *et al.* 1995; Busby *et al*. 1996; 64 FR 24049; 70 FR 52488). Diversion and storage of river and stream flow has dramatically altered the natural hydrologic cycle in many of the streams within coho and Chinook salmon ESUs and steelhead DPSs. Altered flow regimes can delay or preclude migration, dewater aquatic habitat, and strand fish in disconnected pools, while unscreened diversions can entrain juvenile fish.

2.2.5. Global Climate Change

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

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

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

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

2.3. Action Area

"Action area" means all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action (50 CFR 402.02). The action area for the Chalk Hill Road Bridge Replacement Project consists of new bridge footprint, the banks disturbed by scour countermeasures and bank stabilization placement, and the streambed of Maacama Creek. The action area includes 100 feet upstream of the existing bridge to another seasonal pool 350 feet downstream. This channel reach contains the area of the cofferdams, streambed area to be dewatered, and the channel downstream to include the length of the waterway in which any temporary disruption to habitat (e.g., fine sediment plume) might be detectable. Additionally, the action area includes 500 feet upstream or downstream of the construction site where fish relocation activities may occur.

The Chalk Hill Road Bridge crosses Maacama Creek in unincorporated Sonoma County, to the west of Healdsburg, California. Within the Action Area, Chalk Hill Road is a minor collector road serving a rural portion of Sonoma County east of Healdsburg, between the Old Redwood Highway/Highway 101 corridor and Highway 128.

2.4. Environmental Baseline

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

Upstream of the action area, the upper section of Maacama Creek lies in a wide, U-shaped canyon predominantly composed of bedrock. In the lower section of the creek, including the action area, the stream bed begins to widen for about 2.5 to 3 miles; further downstream the channel narrows and enters a steep-sided valley for approximately 1 mile. Near the mouth, the canyon is more open, and the creek runs through a small valley to enter the Russian River. Within the action area, the creek flows to the south through the Chalk Hill Road Bridge Project site. The channel is relatively wide, up to approximately 200 feet in total width to the top of bank and is divided into a primary channel and slightly higher elevation overflow channel. The stream bed is composed mainly of gravel and cobble substrate with some larger boulders and in-channel vegetation. Severe erosion along the southern bank has caused the top of bank to degrade to a sheer rock face approximately 30 feet high along the extent of the existing Chalk Hill Bridge, and to the immediate south of this rock face is an area of eroded, failing stream bank. The northern bank of Maacama Creek has a more gradual slope. Adjacent to the top of bank, surrounding valley lands are relatively flat.

This area has a Mediterranean climate characterized by cool wet winters with typically high runoff, and dry warm summers characterized by greatly reduced instream flows. Fog is a dominant climatic feature along the coast, generally occurring daily in the summer and not infrequently throughout the year. The average annual rainfall is 31.2 inches, falling during the winter and early spring as rain. The average air temperatures range from 46° to 72° F.

2.4.1. Status of CCC Steelhead and CCC Coho in the Action Area

Maacama Creek begins at the confluence of McDonnell Creek and Briggs Creek near Peter Hill in the Mayacamas Mountains. From there, it flows south, paralleling Briggs Ranch Road almost to State Route 128, where it turns westward. It parallels the highway for about 0.7 miles before passing under to meet Redwood Creek. Upon entering the Alexander Valley, it turns southward again and parallels Chalk Hill Road until it meets Franz Creek. It then flows west another 0.7 miles to enter the Russian River about four miles east of Healdsburg. Information on actual numbers of CCC coho in Maacama Creek is very limited.

2.4.1.1 CCC Coho Salmon

Little quantitative data is available for the size of recent coho runs on Maacama Creek. The September 14, 2021, site visit by WRA biologists was conducted during a historic drought, and streamflow was absent. Only a small, shallow, and receding pool approximately 8 inches in depth was observed in the Action Area, at the base of the south bank rock face. No coho salmon were observed and conditions did not support juvenile coho rearing. No barriers to fish passage are known to exist downstream of the Action Area (CDFW 2021), and Maacama Creek is considered an anadromous salmonid stream, with coho salmon observed in Maacama Creek and its tributary Redwood Creek, upstream of the Action Area, in surveys conducted from 1993 through 2017-18 (California Sea Grant (CSG) 2021, 2017).

Information on the historic run size of coho salmon in the Russian River is limited. Late 19th and early 20th Century records are sparse, or non-specific as to species (Chase *et al*. 2007). They once occupied many tributaries throughout the basin, probably reared in backwater areas of the main stem, and were a major component of the fish community (Spence et. al. 2005). Bjorkstedt (2005) concluded that coho salmon existed as two populations in the Russian River: a large independent population in the lower basin, and a smaller ephemeral population that occupied tributaries in the northwest corner of the basin. The lower river population represented what was historically the largest and most dominant source population in the ESU.

Preservation of locally adapted genotypes is critical to the recovery of the CCC coho salmon ESU. Genetic analyses of coho salmon sampled from Russian River tributaries are consistent with what would be expected for a population with such extremely reduced abundance. A review by Bjorkstedt (2005) found both strong departures from genetic equilibrium and evidence of recent, severe population bottlenecks. Historical hatchery practices may also have contributed to these results. This evidence suggests an acute loss of genetic diversity for the Russian River coho salmon population. Prior to implementation of a conservation hatchery program focused on expanding their range, they were previously restricted to a few tributaries in the lower watershed (CDFG 2002), and reared only in isolated areas of suitable habitat.

The Russian River Coho Salmon Captive Broodstock Program (RRCSCBP) was initiated to reestablish self-sustaining runs of coho salmon in tributary streams within the Russian River Basin (Obedzinski *et al*. 2007). This program currently releases approximately 200,000 juvenile offspring of wild captive-reared coho salmon into 20-30 Russian River tributaries within their historic range with the expectation that a portion of them will return to these areas as adults to naturally reproduce (PACT 2019). According to CSG spawner surveys, the estimated annual adult hatchery coho salmon returns to the Russian River from 2010 to 2021 range from 200 fish to over 700. The estimated number of hatchery coho salmon adults returning during the winter of 2019/20 was 547, the third highest on record and adults or redds were observed in 16 of the 32 coho salmon streams surveyed. (CSG 2020). In the summer of 2020, young of the year coho salmon were detected in 31 of the 43 streams surveyed (CSG 2020a). Adult coho salmon can begin migrating in the lower mainstem Russian River as early as late September and into tributaries around mid-November (CSG 2021, unpublished data). Coho salmon smolt out-migration occurs from March to June (SCWA 2021).

Based on the decline in abundance, restricted and fragmented distribution, and lack of genetic diversity, the Russian River population of coho salmon is in immediate danger of extinction. The wild population is considered functionally extirpated. The Russian River population itself is in the middle of the CCC coho salmon ESU's range and inhabits a watershed that represents fully a third of the ESU by area. For these reasons, irrespective of the condition of the watershed, the Russian River has great potential to provide important geographic continuity, diversity, and habitat space for the species. The continued existence of CCC coho salmon in the Russian River, including Maacama Creek is, therefore, significant to the survival and recovery of the entire CCC coho salmon population.

2.4.1.2 CCC Steelhead

Although rigorous population estimates have never been conducted within the Maacama watershed, sporadic historical and anecdotal surveys indicate that steelhead were once abundant. Outmigrant trapping during May, 1965, documented abundant steelhead smolts captured at a perforated-plate trap located within mainstem Maacama Creek, approximately 5 miles above the Russian River confluence (CDFG 1965). The perforated-plate trap was checked on an almost daily basis, and over 1,100 juvenile steelhead were captured during the sampling period (maximum daily count of 165 steelhead). Spot surveys conducted by the California Department of Fish and Game (CDFG) during the 1990s documented the presence of 3 age classes of steelhead within a few of the larger Maacama sub-watersheds, although steelhead abundance was largely depressed as compared to past surveys (Laurel Marcus and Associates 2004). Chinook salmon distribution and abundance within Maacama Creek are detailed within the Chinook profile for the Russian River population.

CDFW habitat surveys in the mid-1990s found steelhead distributed throughout much of the Maacama basin, the sole exceptions being high gradient headwater streams and areas upstream of migration barriers. Areas of higher quality habitat exist within upper Redwood Creek (Yellowjacket and Kellogg creeks) where limited logging has allowed the historical coniferous dominated upslope and riparian zones to remain. The McDonnell and Briggs Creek watersheds are largely devoid of agricultural operations that dominate the southern portion of the watershed, and contain large areas of quality rearing and spawning habitat (Laurel Marcus and Associates 2004).

As mentioned above, Maacama Creek is in the Russian River watershed. Russian River steelhead runs once ranked as the third largest in California behind the Klamath and Sacramento rivers. The Russian River was renowned as one of the world's finest steelhead rivers during the l930's and on through the 1950's (SEC 1996). SEC (1996) reported historic Russian River catch estimates for steelhead: 15,000 for the 1936 sport catch, and 25,000 for the 1956/57 sport catch. These estimates are based on best professional judgment by a CDFG employee and, for the latter estimate, a sportswriter. Other estimates include one of 57,000 steelhead made in 1957 (SEC 1996). Since the mid-20th Century, Russian River steelhead populations have declined. Estimates based on best professional judgment infer a wild run of 1,750 to 7,000 fish near the end of the 20th Century (Busby 1996). Hatchery returns averaged 6,760 fish for the period 1992/93 to 2006/07, and ranged from 2,200 to 11,828 fish. Though there were challenges with sampling conditions, SCWA’s estimate for the 2019/20 spawner season was 1,606 redds in the Russian River basin (SCWA 2020). The information available suggests that recent basin-wide abundance of wild steelhead has declined considerably from historic levels. A limited catch-and-release hatchery sport fishery still offers a fishing season for hatchery steelhead in the Russian River.

Hatchery practices have also impacted steelhead populations within the action area. Since the 1870's, millions of hatchery-reared salmonids have been released into the Russian River Basin. The combination of planting out-of-basin stocks, hatchery selecting processes, and interbreeding have led to a decrease in salmonid genetic diversity and loss of local adaptations (SEC 1996). The Coyote Valley Fish Facility, located upstream of the action area primarily produces and releases steelhead which have the potential to effect naturally-produced steelhead within the action area.

Despite declines in abundance, steelhead remain widely distributed within the basin (NMFS 2005). The primary exceptions to this are the barriers to anadromy caused by the Coyote Valley Dam and Warm Springs Dam. The Coyote Valley Dam has blocked approximately 21 percent of the historical habitat of the Upper Russian River population, and the Warm Springs Dam has blocked approximately, 56 percent of the Dry Creek population’s historical habitat (Spence 2006).

2.4.2. Status of Critical Habitat in the Action Area

The segment of Maacama Creek which runs through the Action Area is designated critical habitat for both CCC coho salmon (64 FR 24049, 73 FR 7816) and CCC steelhead (70 FR 52488, 70 FR 52630). For salmon and steelhead species, the physical and biological features which are essential to these functions and defined in the critical habitat designation include, but are not limited to, spawning sites, food resources, water quality and quantity, riparian vegetation, migration corridors, estuarine areas, nearshore marine areas, and offshore marine areas.

The channel contains riffle and limited pool habitat with substrate composed of gravels and cobble; areas of in-channel vegetation are evident, and riparian forest composed of a variety of shrubs and trees is found on both banks. The existing one-lane Chalk Hill Road Bridge is a concrete arch over Maacama Creek, resting on wall piers with unknown foundations. The channel in the Action Area is relatively wide, up to approximately 200 feet in total width to the top of bank, divided into a lower elevation, primary channel near the southern bank, and a slightly higher elevation, overflow channel toward the northern bank.

Critical habitat within the Action Area includes riparian woodland forest and intermittent stream habitats, including pools that may be present dependent on flow and groundwater conditions. Existing riparian vegetation on both banks and within the channel supports water quality and seasonal rearing habitat for juveniles when flow is present. The action area provides migratory and seasonal rearing habitat for salmonids, but no spawning habitat is known to be present. Historical surveys of Maacama Creek indicate a declining trend in habitat quality, including stream flows, from 1965 through 1996. A 1996 stream survey of the Maacama Creek mainstem found poor and degraded habitat conditions, inadequate riparian canopy, warm water, and siltation, whereas in 1965 and 1973, CDFG surveys found consistently good quality habitat and cool water temperatures. Sedimentation in the watershed appeared to be increasing, while summer flows were decreasing during this period (Sonoma RCD 2015, California Sea Grant 2021).

Poor riparian conditions predominantly impact summer- and winter-rearing juvenile salmonids through elevated water temperatures and lack of velocity refugia respectively. Poor riparian conditions are common throughout much of the Maacama Creek watershed, elevating summer water temperatures, increasing stream bank erosion, and limiting LWD recruitment. Historical land clearing and logging effectively removed many of the larger redwoods/conifers that shaded headwater streams in many tributaries throughout the basin. As a result, few areas of conifer/redwood forests remain within the watershed (e.g., headwater sections of Briggs and Franz creeks). Cattle grazing within the riparian corridor has likely lowered riparian function and diversity within the McDonnell Creek sub basin, also. Lower Maacama Creek has a wide riparian corridor (as compared to other tributaries in the basin) dominated by hardwood species. These lower elevation reaches, such as the mainstem Maacama Creek, likely did not support coniferous/redwood species historically.

2.5. Effects of the Action

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

Construction activities, both during and post-project completion, associated with the proposed project may affect CCC coho and CCC steelhead and their habitat. The following may result from construction activities: unintentional direct injury or mortality during fish collection, relocation, and dewatering activities; insignificant effects to CCC coho and CCC steelhead due to a temporary loss of benthic habitat; insignificant effects to CCC coho and CCC steelhead and habitat from temporary reductions in riparian vegetation; insignificant effects to CCC coho and CCC steelhead and habitat from temporary increases in suspended sediment concentrations; a discountable potential for fish and habitat to be exposed to construction debris and materials; and permanent improvements to habitat. These effects are presented in detail below.

2.5.1. Fish Relocation Activities

To facilitate completion of the project, portions of Maacama Creek will need to be dewatered. The Project proposes to collect and relocate fish in the work areas prior to, and during dewatering, to avoid fish stranding and exposure to construction activities. While dewatering structures are in place, a temporary stream diversion channel 4 feet in width and 130 feet long (year 1) and 170 feet long (year 2) in length, but no more than 285 feet in length depending on conditions, would be available to juvenile steelhead as replacement migratory habitat. Before, and during, dewatering of the construction site, juvenile steelhead and juvenile coho will be captured by a qualified biologist using one or more of the following methods: dip net, seine, thrown net, block net, and electrofishing. Collected steelhead 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). Since construction is scheduled to occur between June 15 and October 15, relocation activities will occur during the summer low-flow period after emigrating smolts have left and before adults have immigrated for spawning. Juvenile steelhead and coho could be expected to be in the action area during the construction period. NMFS expects capture and relocation of listed salmonids will be limited to primarily pre-smolting and young-of-the-year juveniles.

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 some associated risk to fish, including stress, disease transmission, injury, or death. The amount of unintentional injury and mortality attributable to fish capture varies widely, depending on the method used, the ambient conditions, and the expertise and experience of the field crew. Since fish relocation activities 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 is not likely to exceed two percent.

Relocated fish may also 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 selected by the approved biologist 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 fishes 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).

Applying applicable Avoidance and Minimization Measures (AMMs) to fish collection, relocation, and dewatering activities is expected to appreciably reduce the effects of project actions on juvenile steelhead. Specifically, salmonid collection and relocation activities conducted by NMFS-approved fisheries biologists will ensure proper equipment operation and application of NMFS guidelines thereby minimizing injury and mortality to juvenile coho and steelhead. Restricting the work window to June 15 to October 15 will limit the effects to stream rearing juvenile salmonids. Based on information from other relocation efforts, NMFS estimates injury and mortalities would be less than three percent of those steelhead that are relocated. Data on fish relocation efforts since 2004 shows most mortality rates are below three percent for steelhead (Collins 2004, CDFG 2005, 2006, 2007, 2008, 2009, 2010a, 2010b). NMFS expects applying AMMs will effectively minimize injury and mortality to juvenile steelhead in the action area.

2.5.2. Stream Diversion and Dewatering

As described above, completion of the project will require dewatering of Maacama Creek. If the work area is not dry, work area will be isolated from surface water through installation of temporary cofferdams and a temporary water diversion to bypass the construction area. As mentioned above, the stream diversion channel will be 4 feet in width and 130 feet long (year 1) in length and 170 feet long (year 2) in length, but no more than 285 feet in length depending on conditions in the work area. 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 system 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, and in the case of areas that will be dewatered, will likely result in mortality of any steelhead that avoid capture during fish relocation activities.

The diversion would remain in place during the instream work period for two consecutive seasons. Diversions would be installed on or after June 15 and removed prior to October 15 during each year of construction. The timing of diversion avoids the late fall-winter migration period for adult salmonids that may pass through the project area to spawn, and most of the spring-early summer smolt out-migration. The diversion would allow fish passage downstream for any late smolt out-migrants after June 15.

Dewatering operations at the work site may affect benthic (bottom dwelling) aquatic macroinvertebrates, an important food source for steelhead. Benthic aquatic macroinvertebrates at the project site may be killed or their abundance reduced when the creek habitat is dewatered (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 285 linear feet within Maacama Creek. Rapid recolonization (typically one to two months) of disturbed areas by macroinvertebrates is expected following rewatering (Cushman 1985, Thomas 1986, Harvey 1986). Within the action area, the effect of macroinvertebrate loss on juvenile steelhead is likely to be negligible because food from upstream sources (via drift) would be available downstream of the dewatered area since stream flow will be bypassed around the work site. Based on the foregoing, juvenile steelhead are not anticipated to be exposed to a reduction in food sources at the work site from the minor and temporary reduction in aquatic macroinvertebrates as a result of dewatering activities. Because habitat in and around the action area is adequate to support salmonids, NMFS expects steelhead and coho will be able to find food both upstream and downstream of the action area as needed during dewatering activities.

2.5.3. Increased Sedimentation and Turbidity

Deconstruction of the existing bridge and construction of the new bridge, installation of temporary stream diversions and construction of in-stream restoration would disturb soils which could potentially be transported to the wetted channels during storm events. Removal of the bridge could produce fugitive dust emissions that could reach the project area watercourses or fall to the ground and later be discharged to waterways. There is also potential for increases in sediment delivery post construction if areas of soil disturbance are not stabilized and remain susceptible to erosion. While the cofferdam and stream diversion are in place, construction activities are not expected to degrade water quality in the action area because the work areas will be dewatered and isolated from flowing waters. This disturbed soil on the creek bank is more easily mobilized when later fall and winter storms increase streamflow levels. Thus, NMFS anticipates disturbed soils could affect water quality in the action area in the form of small, short-term increases in turbidity during rewatering (i.e., cofferdam removal), and subsequent higher flow events during the first winter storms post-construction.

Instream and near-stream construction activities have been shown to result in temporary increases in turbidity (reviewed in Furniss et al. 1991, Reeves et al. 1991). Sediment may affect fish by a variety of mechanisms. High concentrations of suspended sediment can disrupt normal feeding behavior and efficiency (Cordone and Kelley 1961, Bjornn et al. 1977, Berg and Northcote 1985), reduce growth rates (Crouse et al. 1981), and increase plasma cortisol levels (Servizi and Martens 1992). High turbidity concentrations can reduce dissolved oxygen in the water column, result in reduced respiratory functions, reduce tolerance to disease, and can also 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 will cause salmonids to disperse from established territories (Waters 1995), which can displace fish into less suitable habitat and/or increase competition and predation, decreasing chances of survival. Increased sediment disposition can fill pools and reduce the amount of cover available to fish, decreasing the survival of juveniles (Alexander and Hansen 1986).

Chronic elevated sediment and turbidity levels may affect salmonids as described above. However, sedimentation and turbidity levels associated with cofferdam removal, rewetting of the construction sites within the action area, and subsequent rainfall events are not expected to rise to the levels described in the previous paragraph because the project's proposed soil and channel stabilization measures will be implemented to avoid and/or minimize sediment mobilization. Additionally, Caltrans' proposed additional AMMs and BMPs specifically aimed at reducing erosion, scour, and sedimentation in storage and staging areas, and from dewatering (Caltrans 2021). Therefore, any resulting elevated turbidity levels would be minor, occur for a short period, and be well below levels and duration shown in the scientific literature as cause injury or harm to steelhead (Sigler et al. 1984, Newcombe and Jensen 1996). NMFS expects any sediment or turbidity generated by the project would not extend more than 100 feet downstream of the worksites, based on site conditions and methods used to control sedimentation and turbidity. Thus, NMFS does not anticipate harm, injury, or behavioral impacts to salmonids associated with exposure to minor elevated suspended sediment levels that could reduce their survival chances.

2.5.4. Pollution from Hazardous Materials and Contaminants

Operating equipment in and near streams has the potential to introduce hazardous materials and contaminants into streams. Potentially hazardous materials include wet and dry concrete debris, fuels, and lubricants. Spills, discharges, and leaks of these materials can enter streams directly or via runoff. If introduced into streams, these materials could impair water quality by altering the pH, reducing oxygen concentrations as the debris decomposes, or by introducing toxic chemicals such as hydrocarbons or metals into aquatic habitat. Oil and similar substances from construction equipment can contain a wide variety of polynuclear 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). Disturbance of streambeds by heavy equipment or construction activities can also cause the resuspension and mobilization of contaminated stream sediment with absorbed metals.

The equipment needed to complete the project has the potential to release debris, hydrocarbons, concrete, and similar contaminants into surface waters at both work sites. These effects have the potential to harm or injure exposed fish and temporarily degrade habitat. However, AMMs proposed will substantially reduce or eliminate the potential for construction materials and debris to enter waterways. Limiting the work window to the dry season from June 15 to October 15 will limit hazardous material exposure to juvenile salmonids, and eliminate potential for containments to adversely affect the most sensitive life stages (i.e., eggs, alevin, and fry). Equipment will be checked daily to ensure proper operation and avoid any leaks or spills. Proper storage, treatment, and disposal of construction materials and discharge management is expected to substantially reduce or eliminate contaminants entering both waterways via runoff. A stormwater pollution prevention plan will be implemented to maintain water quality during and after construction within Maacama Creek, and render the potential for the project to degrade water quality and adversely affect salmonids improbable. Furthermore, Caltrans will also construct permanent bio retention structures and develop a maintenance program for these structures for long-term management of stormwater. Due to these measures, permanent structures, and long-term management plan, conveyance of toxic materials into active waters at the work site both during, and after, project construction is not expected to occur, and potential for the project to degrade water quality and adversely affect salmonids is improbable.

2.5.5. Post Construction Water Quality

The new two-lane replacement bridge will have a larger surface area than the existing one lane bridge that is slated for demolition as part of the Project. Published work has identified storm water from roadways and streets as causing a high percentage of rapid mortality of adult coho salmon in the wild (Scholz et al. 2011) and laboratory settings (McIntyre et al. 2018). Subsequent laboratory studies showed this morality also occurred in juvenile coho salmon (Chow et al. 2019) as well as to juvenile steelhead and Chinook salmon (Brinkmann et al. 2022, McIntyre and Scholz, unpublished results, 2020). The new bridge resulting from Project construction may expose salmonids to the degradation product of tires (6PPD-quinone) which has been identified as the causal factor in coho salmon mortality at concentrations of less than a part per billion (Tian et al. 2022, Tian et al. 2021) and to juvenile steelhead trout at concentrations of one part per billion (Brinkmann et al. 2022, J. McIntyre and N. Scholz, unpublished results, 2020). This contaminant is widely used by multiple tire manufacturers and the tire dust and shreds that produce it have been found to be ubiquitous where both rural and urban roadways drain into waterways (Sutton et al. 2019; Feist et al. 2018). 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 mortality can begin as soon as seven hours post exposure (Brinkmann et al. 2022). Effects appear to be related to cardiorespiratory disruption, consistent with symptoms (surface swimming and gaping followed by loss of equilibrium (Sholz et al. 2011)) and, therefore, sublethal effects such as disruption of behaviors needed for survival (e.g., predator avoidance) and swimming performance are expected. Additional research concerning sublethal effects is needed. Mortality can be prevented by infiltrating the road runoff through soil media containing organic matter which results in removal of this (and other) contaminant(s) (Fardel et al. 2020; Spromberg et al. 2016; McIntrye et al. 2015).

The exposure will be minimized through post-construction storm water BMPs intended to address water quality concerns associated with road projects such as where there is an increase in impervious surfaces. These changes in peak stormwater runoff rates would be offset through permanent design measures, such as the new bridge containing a deck surface drainage system and associated bioretention receiving areas. Structures designed and constructed to treat stormwater runoff will receive regular long-term maintenance, with a focus on maintenance of the site in the early fall prior to the first rains of the winter season. Therefore, we expect salmonid mortality associated with construction of the new bridge, when implemented with the proposed preventative water quality control measures, will be avoided.

2.5.6. Removal of Riparian Vegetation

Vegetation clearing from bridge construction across the channel and banks, including the removal of one riparian tree, and installation of rock slope protection on the south bank will permanently affect 0.04 acre of arroyo willow thicket (and 0.02 acre of Himalayan blackberry bramble, which does not provide habitat value), on the stream banks and within the channel. Additionally, construction of the new bridge will cause shading that is likely to affect 0.07 (.03 net permanent impact with the removal of the existing bridge) acre of existing riparian vegetation on the banks and within the channel.

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 such as providing shade (Poole and Berman 2001), sediment storage and filtering (Cooper et al. 1987, Mitsch and Gosselink 2000), nutrient inputs (Murphy and Meehan 1991), water quality improvements (Mitsch and Gosselink 2000), channel and streambank stability (Platts 1991), source of woody debris that creates fish habitat diversity (Bryant 1983, Lisle 1986, Shirvell 1990), and both cover and shelter for fish (Bustard and Narver 1975, Wesche et al. 1987, Murphy and Meehan 1991). Riparian vegetation disturbance and removal can degrade these ecosystem functions and impair stream habitat. Removal of riparian vegetation increases stream exposure to solar radiation, leading to increases in stream temperatures (Poole and Berman 2001).

All temporary and temporal impacts to riparian areas would be restored to preexisting conditions post construction and permanent impacts would be offset through additional on-site restoration, as well as willow brush layering and live willow stakes planted within the planned vegetated RSP. The project would not result in long term changes to the water chemistry or substantial change to the physical characteristics (e.g., substrate and flow) of the river after construction is complete. Given the scale of these impacts and the measures to restore riparian and wetland function post construction, effects to salmonids and their associated critical habitat are expected to be insignificant.

2.5.7. Impacts to Channel Form and Function

Permanent impacts to the stream channel include the removal of existing concrete piers, removal of existing large diameter unvegetated RSP, installation of bioengineered RSP, and installation of rootwad revetment scour countermeasures along the 125 linear feet along the south bank.

By design, streambank stabilization projects prevent lateral channel migration, effectively forcing streams into a simplified linear configuration that, without the ability to move laterally, instead erode and deepen vertically (Leopold et al. 1968; Dunn and Leopold 1978). The resulting "incised" channel fails to create and maintain aquatic and riparian habitat through lateral migration, and can instead impair groundwater/stream flow connectivity and repress floodplain and riparian habitat function. The resulting simplified stream reach typically produces limited macroinvertebrate prey that results in poor functional habitat for rearing juvenile salmonids (Florsheim et al. 2008).

Installation of the scour countermeasures and complex habitat features on the south bank is expected to increase 0.04 acre of riparian and stream habitat in the action area. The logs with root wads, together with the vegetated RSP (after establishment and growth of the riparian plantings), will provide complex stream habitat elements, cover, and shade to improve aquatic habitat for fish and other species. The root wads will be located and installed on the streambank in a manner designed to induce the formation of scour pools to provide pool habitat during and after periods of flow, and the tree roots will provide cover for juvenile salmonids.

2.5.8. Impact to Critical Habitat

The action area is designated critical habitat for CCC steelhead and CCC coho salmon. Features of critical habitat found within the action area include sites for migration and rearing. Effects of the proposed project on designated critical habitat may include elevated turbidity, streambank and floodplain habitat degradation, and precluding natural fluvial and geomorphic channel dynamics.

Regarding effects to critical habitat from project site dewatering, for the same reasons described above for juvenile salmonids, adverse effects to CCC coho, CCC steelhead, CC Chinook and their critical habitat PBFs are expected to be temporary, insignificant, and will recover relatively quickly (one to two months) after the project site is re-watered. Similarly, for reasons described above for juvenile salmonids, turbidity levels from suspended sediment are expected temporary and have minor effects to the value of critical habitat in the action area.

Minor impacts to LWD recruitment and shade are expected to reduce habitat quality in the action area. The onsite Revegetation Plan would restore riparian habitat in areas of temporal loss including the plantings within and around the RSP and scour countermeasures, promoting growth and diversity of native species and improving riparian function within the action area.

As mentioned above, streambank stabilization projects prevent lateral channel migration and simplify the channel. The 125 feet of vegetated RSP and associated rootwads on the south side of the channel will hinder channel migration along Maacama Creek. However, the channel is already constrained by the existing bridge and previous RSP placement. Additionally, placement of rootwads and attached trunk below the OHWM of Maacama Creek would improve habitat conditions for salmonids by creating hydraulic complexity, such as pools that provide refuge as well as provide cover and food resources for fish and other aquatic organisms. Therefore, the project is likely to improve the value of available critical habitat in the action area for the foreseeable future.

2.6. Cumulative Effects

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

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

2.7. Integration and Synthesis

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

As independent populations, federally endangered CCC coho salmon and threatened CCC steelhead within the Russian River watershed, including Maacama Creek, are important to the recovery of the ESU and DPS, respectively. Many independent populations of CCC coho salmon that supported the species' overall numbers and geographic distributions in the past have been extirpated and steelhead numbers are substantially reduced from historic levels. The Russian River is the largest watershed within the CCC coho salmon ESU and is critical to the survival and recovery of the species. The steelhead populations that use the action area, while substantially reduced from historical numbers, appear to be relatively stable. Furthermore, NMFS recovery plan states that compared to other watersheds within the Russian River basin, Maacama Creek likely has a moderately abundant population of steelhead that exhibit adequate life-history diversity. Several fish passage barriers occur within the watershed, but many of the higher priority sites have been addressed during the last several years, and spawning-sized gravel does not appear to be a limiting factor in most streams (NMFS 2016).

CCC coho salmon abundance has improved slightly since 2011 within several independent populations, although all populations remain well below their recovery targets. These populations are likely to persist with enough resiliency to rebound from limited impacts for the foreseeable future. However, due to their low numbers, the continuation of impacts from current baseline conditions to the population's numbers, distribution, or reproduction could limit their chance of survival and recovery. The recovery of these populations will, therefore, depend upon programs that protect and restore aquatic habitats in watersheds and the continued reduction of impacts from land use and water withdrawal.

As described in Section 2.5 *Effects of the Action*, NMFS identified the following components of the project that may result in effects to CCC steelhead and CCC coho: fish collection and relocation, dewatering, increases in sedimentation and turbidity, pollution from hazardous materials and contaminants, removal of riparian vegetation, habitat loss, and altered channel morphology. Of these, fish collections and relocation, and dewatering have the potential to result in reduced fitness, injury, and/or mortality of CCC steelhead and CCC coho. Prior to dewatering the site each work season, fish would be collected and relocated from the work areas. Fish that elude capture and remain in the Project area during dewatering may die due to desiccation or thermal stress, or be crushed by equipment or foot traffic if not found by biologists during the drawdown of stream flow. However, based on the low mortality rates for similar capture and relocation efforts, NMFS anticipates few juvenile salmonids would be injured or killed by fish relocation and construction activities during implementation of the Project. Anticipated mortality from capture and relocation is expected to be less than three percent of the total number of fish relocated, and mortality expected from dewatering is expected to be less than one percent of the fish in the action area prior to dewatering. Due to the relatively large number of juveniles produced by each spawning pair, salmonids spawning in the Maacama Creek watershed in future years are likely to produce enough juveniles to replace the few that may be lost at the Project construction site due to relocation and dewatering. It is unlikely that the small potential loss of juveniles by this Project would impact future adult returns of CCC steelhead and CCC coho in Maacama Creek.

In addition to the adverse effects described above, we also consider the potential impacts of increased sedimentation and turbidity, pollution from hazardous materials and contaminants, removal of riparian vegetation, habitat loss, increased shading, and fish passage and channel morphological changes. The implementation of proposed AMMs is expected to render the potential for fish to be exposed to pollution from hazardous materials and contaminants during and after construction improbable. Increased sedimentation and turbidity and temporary loss and degradation of habitat in the dewatered areas will cease shortly after construction is complete and will only result in minor impacts to salmonids. Riparian vegetation removed to construct the project will take up to 10 years to return to pre-project levels. During this timeframe, individual steelhead exposed to reduced cover and forage will be able to successfully complete their life cycle in the action area or alternative nearby habitats. The removal of unvegetated RSP and installation of the rootwad revetment will improve geomorphic conditions in the area. NMFS does not expect any of the aforementioned effects to combine with other effects in any significant way.

The proposed action will temporarily degrade PBFs and essential habitat types in the action area, namely those related to juvenile rearing. Effects to species' critical habitat from the proposed Project are expected to include temporary impacts due to Project construction, and permanent benefits due to habitat enhancement. The temporary impacts are expected to be associated with disturbances to the stream bed, bank, riparian corridor, and surface flow. As discussed above, these temporary impacts are not expected to adversely affect PBFs of CCC coho and CCC steelhead critical habitat because aquatic habitat at the site would be restored after the water diversion system is removed. The permanent improvements to riparian condition and instream habitat are expected to result in benefits to critical habitat within the action area.

For short-term effects, climate change is not expected to significantly worsen existing conditions over the time frame considered in this biological opinion. Considering the above, we do not expect climate change to affect CCC coho and CCC steelhead in the action area beyond the scope considered in this biological opinion. For the long-term effects, climate change would likely worsen conditions if total precipitation in California declines and critically dry years increase. These conditions would likely modify water quality, streamflow levels, rearing habitat and steelhead migration. The overall reduction in habitat quality caused by the project is limited to a small area of a watershed and, therefore, even if climate change reduced the overall habitat quality in the future, when combined with this proposed action any amplification in habitat degradation would be very small.

2.8. Conclusion

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

2.9. Incidental Take Statement

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

2.9.1. Amount or Extent of Take

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

Take of listed juvenile CCC coho and CCC steelhead is likely to occur during fish relocation and dewatering of Maacama Creek between June 15 and October 15. Construction will be completed within two construction seasons; therefore, dewatering is anticipated to occur up to two times to complete the project. The number of CCC coho and CCC steelhead that are likely to be incidentally taken during dewatering activities is expected to be limited to the pre-smolt and young-of-the-year juvenile life stage. NMFS expects that no more than three percent of the juvenile steelhead within the 285 linear foot dewatering area of Maacama Creek will be injured, harmed, or killed during fish relocation activities. NMFS also expects that no more than one percent of the fish within the same dewatered area will be injured, harmed, or killed during dewatering activities.

As described in the preceding opinion, based on prior experience with current relocation techniques and protocols likely to be used to conduct the fish relocation, unintentional mortality of listed salmonids expected from capturing and handling fish is not likely to exceed three percent of the total fish handled. The amount of incidental take during fish relocation will be considered exceeded if more than three percent of the total fish handled are injured or killed during any construction activity.

2.9.2. **Effect of the Take**

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

2.9.3. **Reasonable and Prudent Measures**

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

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

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

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

3. Prepare and submit plans and reports regarding the effects of fish relocation, sound monitoring, construction of the project, and post-construction site-performance.

2.9.4. **Terms and Conditions**

In order to be exempt from the prohibitions of section 9 of the ESA, the Federal action agency must comply (or must ensure that any applicant complies) with the following terms and conditions. The Caltrans or any applicant has a continuing duty to monitor the impacts of incidental take and must report the progress of the action and its impact on the species as specified in this ITS (50 CFR 402.14). If the entity to whom a term and condition is directed does not comply with the following terms and conditions, protective coverage for the proposed action would likely lapse.

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

    a) Caltrans or the contractor 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 contractor 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*. See: https://media.fisheries.noaa.gov/dam-migration/electro2000.pdf

b) The biologist will monitor the construction sites during placement and removal of cofferdams and channel 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 707-578-8553 or andrew.trent@noaa.gov, one week prior to capture activities in order to provide an opportunity for NMFS staff to observe the activities. During fish relocation activities the fisheries biologist shall contact NMFS staff at the above number, if mortality of federally listed salmonids exceeds three percent of the total steelhead collected, at which time NMFS will stipulate measures to reduce the take of salmonids.

c) 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 expect when released. To avoid predation, the biologists will have at least two containers and segregate young-of-the-year from larger age classes and other potential aquatic predators. Captured salmonids will be relocated, as soon as possible, to a suitable instream location in which suitable habitat conditions are present to allow for adequate survival of transported fish and fish already present.

d) If any steelhead or salmon are found dead or injured, the biological monitor will contact NMFS staff at 707-578-8553 or andrew.trent@noaa.gov. All salmonid mortalities will be retained until further direction is provided by the NMFS biologist (listed above).

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

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

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

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 steelhead. 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. Excess materials will be disposed of at an appropriate disposal site.

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

a) Caltrans must provide a written report to NMFS by January 15 of the year following construction. The report must be submitted to the parties and addresses described above in 1.c. The report must contain, at minimum, the following information:

b) Project Construction and Fish Relocation Report – the report must include the following contents:

i) **Construction Related Activities –** The report(s) must include the dates construction began, a discussion of design compliance including: vegetation installation, and post-construction longitudinal profile and cross sections; 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.

ii) **Fish Relocation** - The report must include a description of the location from which fish were removed and the release site including photographs; the date and time of the relocation effort; a description of the equipment and methods used to collect, hold, and transport salmonids; if an electrofisher was used for fish collection, a copy of the logbook must be included; 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.

c) **Post-Project Monitoring Reports and Surveys –** Project reports and survey information will be sent to the address above in 1(c), and must include the following contents:

i) **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. A draft of the revegetation monitoring plan must be submitted to NMFS (address specified in 1(c) above) for review and approval prior to the beginning of the in-stream work season, at each project location. Reports documenting post-project conditions of vegetation installed at the site will be prepared and submitted annually on January 15 for the first, third, and fifth 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 is documented, the report must include recommendations to improve conditions.

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 for this Project.

2.11. Reinitiation of Consultation

This concludes formal consultation for Chalk Hill Road Bridge Replacement Project.

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

2.12. "Not Likely to Adversely Affect" Determinations

Under the ESA, "effects of the action" means the direct and indirect effects of an action on the listed species or critical habitat, together with the effects of other activities that are interrelated or interdependent with that action (50 CFR 402.02). The applicable standard to find that a proposed action is not likely to adversely affect listed species or critical habitat is that all of the effects of the action are expected to be discountable, insignificant, or completely beneficial. Beneficial effects are contemporaneous positive effects without any adverse effects to the species or critical habitat. Insignificant effects relate to the size of the impact and should never reach the scale where take occurs. Discountable effects are those extremely unlikely to occur.

NMFS does not anticipate the proposed action will adversely affect:

California Coastal (CC) Chinook salmon ESU (*O. tshawytscha*)
Threatened (June 28, 2005; 70 FR 37160).

Work within the Maacama Creek stream bed will be restricted to the June 15 – October 15 work window and when the work area is dry. If the work area is not dry, it will be isolated from surface water through installation of temporary cofferdams and a temporary water diversion to bypass the work area. Any pools or other wetted stream features present prior to construction will be dewatered and native fish will be relocated to suitable habitat. Due to the life history strategy of Chinook salmon, neither juvenile nor adult Chinook salmon individuals are expected to be present in the Action Area at the time of construction. Therefore, relocation of this species is not anticipated to be necessary, and Project effects will be discountable.

The action area is designated critical habitat for CC Chinook salmon. Features of critical habitat found within the action area include sites for migration and rearing. Effects of the proposed project on designated critical habitat may include elevated turbidity, streambank and floodplain habitat degradation, and precluding natural fluvial and geomorphic channel dynamics.

Regarding effects to critical habitat from project site dewatering, for the same reasons described above for juvenile salmonids, adverse effects to CC Chinook salmon, and their critical habitat PBFs are expected to be temporary, insignificant, and will recover relatively quickly (one to two months) after the project site is re-watered. Similarly, for reasons described above for juvenile salmonids, turbidity levels from suspended sediment are expected temporary and have minor effects to the value of critical habitat in the action area.

Minor impacts to LWD recruitment and shade are expected to reduce habitat quality in the action area. The onsite Revegetation Plan would restore riparian habitat in areas of temporal loss including the plantings within and around the RSP and scour countermeasures, promoting growth and diversity of native species and improving riparian function within the action area.

As mentioned above, streambank stabilization projects prevent lateral channel migration and simplify the channel. The 125 feet of vegetated RSP and associated rootwads on the south side of the channel will hinder channel migration along Maacama Creek. However, the channel is already constrained by the existing bridge and previous RSP placement. Additionally, placement of rootwads and attached trunk below the OHWM of Maacama Creek would improve habitat conditions for salmonids by creating hydraulic complexity, such as pools that provide refuge as well as provide cover and food resources for fish and other aquatic organisms. Therefore, the project is likely to improve the value of available critical habitat in the action area for the foreseeable future.

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 and descriptions of EFH for Pacific Coast salmon (PFMC 2014) contained in the fishery management plans developed by the PFMC and approved by the Secretary of Commerce.

3.1. Essential Fish Habitat Affected by the Project

Pacific coast salmon EFH may be adversely affected by the proposed action. Specific habitats identified in the PFMC (2014) for pacific coast salmon include habitat areas of particular concern (HAPCs), identified as: 1) complex channels and floodplain habitats; 2) thermal refugia; and 3) spawning habitat. HAPCs for coho salmon and Chinook salmon include all waters, substrates, and associated biological communities falling within critical habitat areas described above in the accompanying biological opinion for the project located on the mainstem of Maacama Creek. The existing habitat at the project site lacks adequate in-stream cover and experiences too much solar exposure to provide good habitat for coho salmon or Chinook salmon year-round. There is no spawning habitat within the project location. However, the site provides a migration corridor for adults and juveniles of both species.

3.2. Adverse Effects on Essential Fish Habitat

The potential adverse effects of the Project on EFH have been described in the preceding biological opinion and include disturbance of the channel bed and banks, temporary loss of wetted habitat, and temporary loss of riparian vegetation. Therefore, the effects of the project on ESA- listed species are anticipated to be the same as the effects to EFH in the action area.

3.3. Essential Fish Habitat Conservation Recommendations

Section 305(b)(4)(A) of the MSA authorizes NMFS to provide EFH Conservation Recommendations that will minimize adverse effects of an activity on EFH. Although temporary potential adverse effects are anticipated as a result of the project activities, the proposed minimization and avoidance measures, and BMPs in the accompanying biological opinion are sufficient to avoid, minimize, and/or mitigate for the anticipated effects. Therefore, no additional EFH Conservation Recommendations are necessary at this time that would otherwise offset the adverse effects to EFH.

3.4. 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 the County of Sonoma. Individual copies of this opinion were provided to the 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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