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

August 5, 2022 **Refer to NMFS No:** WCRO-2022-01533

Liza Walker
Senior Environmental Planner/Branch Chief E4
North Region Environmental
California Department of Transportation, District 1
Eureka, California 95502-3700

Re: Endangered Species Act Section 7(a)(2) Biological Opinion and Magnuson–Stevens Fishery Conservation and Management Act Essential Fish Habitat Response for the Elk Creek Bridge Replacement Project

Dear Ms. Walker;

Thank you for your letter of June 28, 2022, requesting reinitiation 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 Elk Creek Bridge Replacement Project. The previous consultation had been completed on May 2, 2022, with the issuance of a NMFS Biological Opinion (WCRO-032188). Subsequent to the issuance of the May, 2022 NMFS Biological Opinion new adverse effects to listed species were discovered triggering reinitiation of the consultation. 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 [16 U.S.C. 1855(b)] for this action.

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

The enclosed biological opinion is based on our review of the California Department of Transportation (CalTrans)[1] proposed project and describes NMFS' analysis of potential effects on threatened Northern California (NC) steelhead (*Oncorhynchus mykiss*), endangered Central

[1] [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.

California Coast (CCC) coho salmon (*Oncorhynchus kisutch*) and designated critical habitats for these species in accordance with section 7 of the ESA. In the enclosed biological opinion, NMFS concludes the project is not likely to jeopardize the continued existence of NC steelhead and CCC coho salmon; and it is not likely to adversely modify critical habitat for these species. However, NMFS anticipates that take of NC steelhead and CCC coho salmon may occur. An incidental take statement which applies to this project with non-discretionary terms and conditions is included with the enclosed opinion.

NMFS has reviewed the proposed project for potential effects on EFH and determined that the proposed project would adversely affect EFH for Pacific Coast Salmon, which are managed under the Pacific Coast Salmon Fishery Management Plan. 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, North Central Coast Office in Santa Rosa California at (707)578-8553, or via email at andrew.trent@noaa.gov if you have any questions regarding this consultation, or if you require additional information.

Sincerely,

Alecia Van Atta
Assistant Regional Administrator
California Coastal Office

Enclosure

cc: Dawn Graydon, Caltrans, Eureka CA, dawn.graydon@dot.ca.gov
e-file ARN 151422WCRO2021SR00254

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

Elk Creek Bridge Replacement Project

NMFS Consultation Number: WCRO-2022-05113
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?
NC steelhead (*Oncorhynchus mykiss*)	Threatened	Yes	No	Yes	No
CCC coho salmon (*Oncorhynchus kisutch)*	Endangered	Yes	No	Yes	No

Fishery Management Plan That Identifies EFH in the Project Area	Does Action Have an Adverse Effect on EFH?	Are EFH Conservation Recommendations Provided?
Pacific 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: August 5, 2022

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1. INTRODUCTION

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

1.1. Background

NOAA's National Marine Fisheries Service (NMFS) prepared the biological opinion (opinion) and incidental take statement (ITS) portions of this document in accordance with section 7(b) of the Endangered Species Act (ESA) of 1973 (16 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 2 weeks at the NOAA Library Institutional Repository [https://repository.library.noaa.gov/welcome]. A complete record of this consultation is on file at the California Coastal NMFS office.

1.2. Consultation History

- January 24, 2018: NMFS confirmed via email that they prefer on-alignment replacement/retrofit of the bridge, and that the history of scour on the right bank may indicate issues with current bridge alignment or flow conveyance.
- June 7, 2018: Caltrans notified NMFS by email regarding fish habitat surveys.
- March 8, 2019: Technical assistance was requested by email regarding potential use of the Programmatic Biological Opinion (unable due to Project pile-driving). Confirmed that species list with NMFs. NMFS offered advice regarding bridge demolition, dewatering, and permanent habitat loss.
- June 18, 2019: On site visit to discuss habitat and shade canopy removal.
- August 22-27, 2019: Email correspondence regarding potential stream diversion and proposed debris catchment/work platform.
- October 8, 2019: Caltrans obtains NMFS Species list.
- November 13, 2019: Phone call between NMFS and Caltrans regarding project status, dewatering, and fish relocation methods.
- November 15, 2019: Email correspondence with updated Project layouts, technical assistance regarding fish handling, dewatering, and hydroacoustic monitoring.
- October 6, 2021: Meeting online with NMFS, Caltrans, and California Department of Fish and Wildlife (CDFW) to discuss fish density estimates, especially for Coho salmon.
- October 24, 2021: Draft BA sent to NMFS for review.

- November 18: Caltrans requests formal Section 7 consultation with NMFS.
- December 12: 2021: Caltrans sent supplemental information regarding additional measures proposed for the stream diversion plan. With this information, NMFS initiated formal consultation for this Project on December 12, 2021.
- January 12, 2022: Email correspondence and technical assistance between NMFs and Caltrans regarding fish weight and hydroacoustic thresholds.
- January 21, 2022: Meeting between NMFS and Caltrans discussing monitoring of large woody debris (LWD) associated with the Project.
- February 1, 2022: Email from Caltrans to NMFS discussing potential for CCC coho under 2 grams to be present in Elk Creek. Additionally, Caltrans informed NMFS that the dewatered area will increase for the project. The more recent rootwad revetment design, following CDFW's recommendations for upstream extent, would result in an upstream extent of 90 feet for the rootwad installation, plus an additional 20 feet more upstream for installation of the diversion around the work area. This would bring the upstream extent to 110 feet. Therefore, including the 31 linear feet of stream area below the bridge and the 80 feet downstream of the bridge and under the work platform gives a potential dewatered area of approximately 221 linear feet; given the average width of the stream at 32 feet; then the total area of channel that could be dewatered would be 7,072 square feet (657 square meters) (0.16 acre).
- May 2, 2022: The Endangered Species Act Section 7(a)(2) Biological Opinion and Magnuson–Stevens Fishery Conservation and Management Act Essential Fish Habitat Response for the Elk Creek Bridge Replacement Project was signed and issued via email to Caltrans.
- May 19 – May 22, 2022: After the release of the biological opinion Caltrans informed NMFS via email and phone calls regarding changes to the stormwater management component of the project and a meeting was held on May 22. Standard stormwater treatment Best Management Practices (BMPs) within the project area ended up being removed (due to North Coast Regional Water Quality Control Board (NCRWQCB) regulations, site topography, and geotechnical guidelines) – including the proposed bio-strips along the road shoulders and abutment slopes as shown in the project plan sets submitted with the Elk Creek Bridge Replacement BA submitted to NMFS in November 2021. New treatments were suggested that still would route most water through a riparian ditch, and through an organic soil medium before entering Elk Creek. There is still uncertainty regarding a stormwater drainage system associated with the project routing water through a treatment before entering Elk Creek.
- June 16, 2022: Caltrans emailed NMFS with a proposed design modification for the remaining drainage system to route stormwater through an infiltration ditch before entering the creek. There is still ongoing discussion regarding what medium (soil/gravel composition) will be used.
- June 22, 2022: Subsequent to the issuance of the May Biological Opinion, NMFS and Caltrans discovered an error in the amount of area to be dewatered and fish relocation estimates. The increase in take of CCC coho and NC steelhead led to reinitiation because there were additional adverse effects to the listed fish.

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

1.3. Proposed Federal Action

Under the ESA, "action" means all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by Federal agencies (see 50 CFR 402.02). The California Department of Transportation (Caltrans), as assigned by the Federal Highway Administration (FHWA), proposes the Elk Creek Bridge Replacement Project along State Route 1 in Mendocino County, California. The project would replace the existing 122-foot-long, 30.5- foot-wide concrete bridge (Bridge No. 10-0120) at post mile (PM) 31.5 with a 140-foot-long, 47-foot-wide full-span concrete box girder bridge. This Project would also widen bridge approaches and upgrade the travel lanes, shoulders, and bridge rails to meet current Caltrans and federal safety design standards.

Table 1: Summary of Existing and Proposed Bridge Dimensions

Bridge	**Existing Bridge Dimensions**			**Proposed Bridge Dimensions**			**Increase in Bridge Dimensions**		
	Length (ft)	Width (ft)	Area (ft^2)	Length (ft)	Width (ft)	Area (ft^2)	Width (ft)	Area (ft^2)	Area (acre)
Elk Creek Bridge (No. 10-0120)	122	30.5	3,721	140	47	6,580	16.5	2,859	0.066

The proposed action includes restoration activities to mitigate potential impacts to fish and habitat resources. Rootwad revetment would be installed along the northern bank of the creek below the bridge, primarily located upstream, to help maintain the new alignment of the channel, protect the eroding bank, and provide habitat for salmonids. The rootwads would help create and maintain a more southerly alignment of the thalweg (lowest elevation of the creek), reduce potential for scour on the northern bank and northern abutment where there has historically been localized scour and bank instability, and direct flow towards the center of the creek.

Other project elements that make up the proposed Project include: the removal of permanent fill (rock slope protection and two concrete piers) from the stream channel, ground disturbance and vegetation clearing, construction of temporary access roads, construction of temporary bridge, temporary stream diversions and fish relocation, bridge removal, pile installation, placement of temporary and permanent fill for installation of construction falsework, temporary and new bridge abutments, and minor road widening. The perennial waters of Elk Creek would be temporarily dewatered during both the first and second in-water construction seasons.

1.3.1. Project Timeline

Currently, construction is anticipated to span three calendar years and approximately 24 months, with two in-water construction seasons (Stage 1 and Stage 2). Work during the first year, preconstruction and site prep, would be limited to the fall/winter and would entail initial clearing of shrubs and trees. The second year would be the first in-water work season (Stage 1) and would entail installation of the stream diversion and dewatering system, the temporary bridge, demolition of the existing structure, and initial construction of the new bridge structure. The third year of project construction, Stage 2, would entail a second stream diversion, removal of the temporary bridge, completion of the new bridge, and installation of the rootwad bank revetment on the northern bank.

The following summarizes the proposed Project timeline of construction activities:

Stage 1

- Place construction area signage and temporary traffic signal.
- Implement water pollution control BMPs and begin vegetation clearing and grubbing.
- Construct temporary fills for temporary bridge approaches, work pads, and to allow temporary equipment access.
- Install temporary creek diversion; water bladders and cofferdams; conduct fish capture and relocation.
- Install debris containment and work platform or gravel pad platform system.
- Excavate for temporary bridge abutments and install 16 driven steel H-piles (14 x 89) to 45 feet depth (8 piles/abutment) and construct abutments for temporary bridge.
- Construct temporary road approaches and place temporary steel truss bridge, and redirect traffic with use of traffic signal for one-way reversing traffic control.
- Demolition of existing bridge, abutments, and pier walls via jackhammer and backhoe, hoe-ram or stripping boom.
- Excavate for new bridge abutments and install 22 driven steel H-piles 14 x 89 (14- inch flanges, 89lbs./ft) at each abutment (44 total) to a depth of 65 feet.
- Bridge structure construction:
    - Form new north and south abutments.
    - Install falsework piles (10-inch steel H-piles) and build falsework.
    - Cast-in-Place bridge construction; prestressing.
- Release falsework and construct new railing.
- Place temporary rock slope protection (RSP) under bridge and begin downstream installation of rootwad revetment.
- Remove temporary stream diversion and install BMPs.

Stage 2:

- Install temporary stream diversion.
- Complete realigned roadway approaches and transitions.
- Signing and striping.
- Shift traffic onto the new bridge structure and remove the temporary bridge.
- Complete installation of rootwad bank revetment along northern bank.

- Remove temporary stream diversion.
- Install permanent erosion control BMPs and implement on-site Revegetation Plan.

1.3.2. Construction Access

Prior to construction, the first task would be to protect aquatic resources at Elk Creek by using BMPs, such as implementation of stormwater control measures and use of temporary high visibility fencing around environmentally sensitive areas (ESAs). Following implementation of protective measures, trees and shrubs within the construction footprint would be removed in the fall/winter prior to construction. In spring of the following year (Stage 1), the site would be cleared and grubbed of regrowth or remaining vegetation to provide access to the existing bridge abutments, to the upstream (east) side of the bridge for installation of the temporary steel truss bridge, and access to the downstream (west) side of the existing bridge for construction of falsework trestle and a work platform. Two temporary stabilized access roads would be constructed to the west, with a maximum width of 30 feet, to accommodate transport of equipment needed for foundation construction (e.g., cranes, excavators) for the new bridge. Construction of temporary access roads account for the majority of anticipated impacts to riparian vegetation—consisting primarily of red alder (*Alnus rubra*) forest, Sitka willow (*Salix sitchensis*) thicket, and coastal bramble vegetation communities.

1.3.3. Temporary Bridge

The temporary bridge would be a prefabricated, modular steel panel truss bridge, approximately 22 feet wide and 140 feet in length; this is a single-span structure and no instream components are proposed. After the temporary fill/temporary shoring is in place and roadway approaches have been constructed, abutments and footings would be constructed for the temporary bridge. Ground disturbance at the temporary bridge abutments on the north and south creek banks is anticipated to be 5 feet deep; this work would be completed from the creek banks, above the 100-year flood line. Upon completion of the abutments, the temporary bridge would be placed, followed by the placement of asphalt on the driving surface and installation of a traffic control system. Traffic would be directed to one traveling lane and across the creek via the temporary bridge and with temporary barrier rail isolating the work area from traffic. Eastbound and westbound traffic would be subject to alternating controlled travel using a temporary signal system.

1.3.4. Work Platform and Debris Containment

A debris containment system would be installed prior to demolition and construction to ensure debris does not enter the stream channel. Equipment would be staged in existing pullouts (along the northbound lane south of the bridge and southbound lane south of the bridge, accessed from the highway) or in a closed traffic lane. Work on the new bridge and abutments would require foot and equipment access on the west (downstream side) and enough space for equipment and construction staff to work safely. To provide adequate space, the contractor may install an elevated work platform or a gravel pad system. Either method the contractor uses would need to span the width of the creek and extend approximately 70 feet downstream from the existing bridge edge. The temporary work platform or gravel pad system would be used to facilitate equipment access, expedite removal of the existing bridge, and construction of the new bridge while protecting waters below.

1.3.5. Stream Diversion, Dewatering, and Fish Relocation

Construction of the debris catchment system and providing an area for a temporary work platform would require a clear water diversion to provide a dry work area. Installation of the bio-engineered revetment and instream fish habitat enhancement would require a second clear water diversion during the second season of construction.

During Stage 1 of construction, the contractor would install the stream diversion prior to the proposed pile driving for the temporary bridge. The stream diversion would start approximately 110 feet upstream of the existing bridge and continue downstream, under the bridge (31 feet) and temporary work platform or gravel pad system, for another approximately 80 feet, giving a total dewatered stream length of 221 linear feet of Elk Creek. The width of the creek up and downstream of the bridge averages about 37 feet below ordinary high water mark (OHWM) and the area of channel to be dewatered is currently estimated at 8,177 square feet (760 square meters) (0.19 acre). The dewatered area may be slightly smaller during the second season (Stage 2) of work than the first, but a conservative estimate is used to anticipate the same dewatered area of the creek for both seasons.

In combination with the construction work platform, the contractor may elect to place K-rail or large concrete blocks to restrict the creek through the work area and may place fabric and temporary fill within the creek and use steel plates or small steel beams with timber decking to create a more effective work area and debris catchment below the existing bridge structure. Alternatively, a gravel pad/culvert stream diversion could be placed across the creek and used as a work platform and debris catchment system. The final diversion method for both seasons of work would be based on permit conditions from natural resources regulatory agencies and site conditions during construction. Special site considerations would include fluctuating water levels in the creek between June and October resulting from intermittent natural closures of the creek mouth.

The Project contractor would be required to propose a diversion plan that meets the objective for downstream smolt migration. To achieve this, a cofferdam and/or bypass culverts or pipes, or a lined, non-erodible diversion ditch or stacked concrete block system would likely be used to divert flow around the dewatered area. The diversion would not result in a significant change to the flow velocity through the project area. The temporary creek diversion would be installed in a manner appropriate to prevent damage to downstream riparian vegetation or stream channels and provide for safe entry of fish and allow fish passage. To the extent possible, diversions would also be designed to maintain water depth within the culvert or constrained creek area such that it is similar to those water depths in the natural stream. If gravel is used to create cofferdams or gravel berms, only washed spawning-sized gravel would be used to construct the gravel berm, with any further specifications to be determined by permitting requirements.

Upon completion of the stream diversion system, a NMFS-approved biologist will initiate a program to capture and relocate native vertebrates to a suitable location upstream or downstream. Fish will be collected using seining, dip netting or electrofishing. The biologist will minimize handling of salmonids, and when handling is necessary, the biologist will always wet hands or nets prior to touching fish. Captured fish will be held in a container with a lid that contains cool, shaded water that will be continuously aerated with a battery-powered external bubbler. Fish will not be subjected to jostling or excess noise and will not be overcrowded in the containers. Two holding containers will be available to segregate young-of-the-year fish from larger fish to avoid predation. Fish will not be removed from the container until the time of release. Captured fish will be relocated to the nearest point downstream or upstream of the dewatered area in a site with suitable habitat conditions. For all captured individuals the biologist will identify species, estimate year-classes, and record numbers at the time of release. The fish will not be anesthetized or measured. A report summarizing the fish relocation activities will be submitted following the relocation effort.

1.3.6. Removal of Existing Bridge

Once the stream diversion and debris catchment are in place, the existing bridge would be demolished using jackhammers, cranes, excavators, and hydraulic hoe-rams. Removal of the existing abutments and concrete walls would require excavation to a depth of approximately 12 feet. To demolish the existing bridge, the bridge deck and girders would be removed, followed by removal of the concrete piers and abutments. Lastly, the bridge foundations would be removed, and the piles would be cut off 3 feet below ground surface.

Dewatering would be required to remove existing foundations. A cofferdam consisting of vibrated or driven sheet piles may be used to dewater the area around each of the existing pier foundations. Alternative to using a cofferdam, the contractor may elect to simply dig a hole to the necessary elevation below grade and dewater the area using pumps. The water pumped from the excavation would be run through settlement tanks, before returning to the creek.

The demolition of the existing abutments would be on land, out of the stream channel. The demolition of Pier 2 would occur within the dewatered stream channel at an estimated 25 feet or greater from the edge of the diverted water column. Demolition of Pier 3 would also occur within the stream channel and potentially within a dewatered cofferdam and may be adjacent to the Temporary Creek Diversion System at a minimum distance of approximately 15 feet.

1.3.7. Falsework

After the existing bridge is demolished, construction of the new bridge would begin. The bridge would be constructed with a cast-in-place, reinforced concrete box girder. Falsework would be constructed to enable the construction of the new structure. Excavation at the footings of Abutments 1 and 2 and pile driving would be required. Installation of the longer bridge would require shifting the abutments by 9 feet to the north and south.

Following the construction of the abutment walls and temporary falsework piers, construction of the new bridge superstructure would begin, including falsework within the creek channel, as follows:

- Falsework would be constructed across the creek, with piles installed on either side of the creek banks and above the OHWM if possible. Falsework materials consist of timber materials and steel beams.

- Steel reinforcement would be installed for the deck, timber forms would be installed, and then concrete would be poured into the forms for the deck. Prestressing operation would occur after the superstructure concrete is cured.

Once the piles are installed, the area around the abutments would be dewatered, then the temporary forms for the foundations and abutments would be constructed using timber materials and steel reinforcement. After the forms are constructed, the concrete abutments would be poured, cured, tested, and accepted, after which the wingwalls would be formed. After the adjoining wingwalls are constructed, the abutments would be backfilled with earth and compacted per engineered specifications with the proper structure drainage in place.

1.3.8. Pile Driving Operations

A large crane with pile leads and diesel hammer would be used to drive piles to the required depths. All proposed pile driving would occur on land and installation of the temporary bridge, falsework, and permanent bridge piles would occur between June 15 and October 15 when the creek is diverted and dewatered.

Temporary Bridge Piles

Caltrans Geotechnical Engineering determined that appropriate pile type for the steel truss bridge would be driven steel H-piles (14-inch flanges x 89 pounds/foot), the same as those recommended for the permanent bridge structure. Eight piles would be installed at each abutment (total of 16). Depths for temporary bridge piles are anticipated to be up to 45 feet. The temporary bridge is the same length as the new bridge structure (140 feet) and the abutments would be placed adjacent to those of the proposed new bridge structure and excavation and installation work would take place on the top of bank at a distance of approximately 33 feet from the diverted stream channel on both the north and south sides.

Falsework Piles

Falsework would be designed by the contractor; therefore, exact type, size, and number of temporary falsework piles are estimated. The contractor may place falsework bents on timber spread footings on land or on the gravel pad/culvert stream diversion; however, there is a high likelihood that pile driving for falsework would be necessary. For the purpose of evaluating maximum impacts in this document, Caltrans anticipates that 28 small size steel H-piles (10-inch) would be used to support the temporary construction falsework, driven to approximately 25 feet. Additionally, falsework piles are anticipated to span the active channel, but if that is not possible, they would be installed as far from the diverted channel as is feasible.

New Bridge Piles

The proposed full span bridge would require 22 driven H-piles (14-inch flanges x 89 pounds/foot) per abutment (44 piles total), driven to a depth of 65 feet. Similar to the temporary bridge, the abutments and pile installation for the permanent bridge abutments are also anticipated to be located more than 33 feet from the temporary stream diversion.

1.3.9. <u>Bridge Construction</u>

Heavy equipment such as excavators, backhoes, and other machinery would be used to excavate the proposed new abutments. After falsework is constructed, the soffit and stem wall would be poured, then cured, followed by construction of the bridge deck and back walls and a 10-day cure period. Temporary falsework would be removed after curing. Completion of the bridge span would be followed by backfilling the structure, constructing approach slabs, and installing bridge barrier rails.

1.3.10. <u>Instream Channel Improvement, RSP Removal, and LWD Installation</u>

The new bridge would be a single-span structure with no piers in the stream channel. The existing pier walls would be completely removed, resulting in an estimated 180 square foot increase of active channel habitat below the OHWM. Approximately 400 square feet of existing unvegetated large diameter rock slope protection (RSP) in the channel along the northern riverbank (installed as part of previous scour countermeasures) would also be removed from below the OHWM and replaced with a combination of bioengineered RSP and Large Woody Debris (LWD) consisting of conifer logs and rootwads set into the bank.

Removing existing unvegetated RSP from the north bank of Elk Creek and in its place installing a bioengineered rootwad bank revetment (bank support system) should stabilize and revegetate the embankment and restore and enhance available natural bank and instream habitat complexity. The design would incorporate and reuse some of the existing RSP material to protect the new north abutment of the proposed bridge structure, and the installation of 8-9 large conifer rootwads with attached trunk would help to slightly redirect and reduce the stream flow and erosion potential on the north bank. The erosion control rootwad system would be constructed along approximately 120 feet of the north stream bank and would incorporate plantings of native riparian plant and tree species. Final design plans would be provided to NMFS for review and approval prior to construction. Additionally, the riparian vegetation plantings along the new edge of bank would be included within the on-site restoration plan and would be subject to monitoring and success criteria.

1.3.11. Riparian Enhancement

As part of the project Revegetation Plan, Caltrans proposes to eradicate an infestation of cape ivy (*Delairea odorata*) on the south bank of Elk Creek. This is intended to prevent further spread of this invasive species and promote diversity and growth of native species, which in turn would improve fish habitat and maintain shade cover over the stream, both at the project site and within adjacent riparian areas.

All disturbed areas throughout the project footprint would be restored to a natural contour and treated with erosion control where appropriate. Furthermore, all temporarily impacted riparian areas would be revegetated with regionally appropriate native plant species, including red alder and willow species, and maintained and monitored to ensure successful restoration of streambank shade and community reestablishment, as defined by permitting agencies. Details for planting and monitoring would be included in a Revegetation Plan and Mitigation and Monitoring Plan that would be submitted to permitting agencies prior to implementation.

The cape ivy removal and revegetation would be monitored and maintained following implementation. Riparian enhancement would be initiated upon completion of construction; the Revegetation Plan would include a species list and number of each species to be planted, planting requirements, and maintenance requirements.

Specific restoration details to replace affected Shaded Riverine Aquatic (SRA) cover would be incorporated into the Revegetation Plan. In addition to providing details about the plant species, number of each species to be planted, planting locations, and maintenance requirements for riparian plantings, the Revegetation Plan also may include, but is not limited to, the following specifications:

- Riparian plantings intended for SRA cover compensation would be planted within 10 feet (horizontal distance) or as close as possible to the OHWM. This maximum planting distance would ensure riparian plantings contribute to SRA cover once they approach maturity.

- Riparian trees that are intended to provide SRA cover would be planted at levels sufficiently dense to provide shade along at least 85 percent of the bank’s length when the plant reaches maturity.

1.3.12. California Endangered Species Act Conformance

A Section 2080.1 consistency determination for CCC coho salmon from the California Department of Fish and Wildlife (CDFW) will be requested for this project. In order for CDFW to issue a consistency determination, Caltrans shall provide funding security for mitigation requirements, in compliance with the Master Funding Agreement entered into by the California Department of Fish and Wildlife and Caltrans on September 3, 2021, to ensure that it has adequate funding to complete the mitigation measures. Prior to construction, Caltrans will create a separate project identified by a new expenditure authorization number (EA #) for the principal purpose of funding security for mitigation and associated monitoring and adaptive management requirements for the rootwad revetment, referred to as a Child EA mitigation project. The rootwad revetment will be monitored for a minimum of five years and a detailed monitoring plan will be submitted to CDFW for review and approval prior to project activities that may impact coho salmon. Caltrans would submit documentation to CDFW to show that sufficient funds have been allocated in the Child EA mitigation project to ensure implementation of all measures to minimize and fully mitigate the incidental take of state-listed species resulting from construction of the proposed project.

1.3.13. Avoidance and Minimization Measures

Section 2.4 of the biological assessment (Caltrans 2021) 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:

- Work windows.
- Fish capture and relocation.
- Erosion and Sediment Control.
- Prevention of Accidental Spills and Pollution.
- Air Quality and Dust Control.
- Vegetation Replacement in Riparian Areas.
- Prevention of Spread of Invasive Species.
- Hydroacoustic Monitoring
    - Hydroacoustic monitoring would be conducted during construction activities that could potentially produce impulsive sound waves within Elk Creek. This would include work requiring land-based pile driving and hoe-ramming or jackhammering associated with bridge demolition and construction, both in and adjacent to the stream channel. Hydroacoustic monitoring would comply with the terms and conditions resulting from Section 7 consultation with NMFS. A Hydroacoustic Monitoring Plan would be prepared by a qualified hydroacoustic specialist prior to construction. NMFS would be provided the Hydroacoustic Monitoring Plan for review prior to initiation of any pile driving or demolition work. The Hydroacoustic Monitoring Plan would describe the monitoring methodology, frequency of monitoring, positions that hydrophones would be deployed, techniques for gathering and analyzing data, quality control measures, and reporting protocols.

Additionally, post construction drainage systems will be constructed to treat runoff from the new impervious areas. The majority of the existing roadside ditches would be filled and then reconstructed onsite to maintain existing water collection from vegetated hillside and recreate similar flow patterns. The existing bridge does have scuppers, which currently allows the bridge to drain directly to the creek. In contrast, the new bridge will not have scuppers, and stormwater originating on the bridge would be discharged to drainage systems on the southwest side of the bridge. An estimated 38% of stormwater runoff within the project area, conveyed through drainage systems 2 and 3, would discharged onto native riparian soils with low gradient slopes (< 2%); runoff conveyed through these two drainage systems would discharge into the riparian zone at a distance of approximately 75 and 50 linear feet (respectively) from the top of bank elevation (15 feet). An additional estimated 29% of stormwater runoff would be conveyed through drainage system 4 at the northwest end of the bridge; runoff associated with this system would be directed over native soils of variable slope across a distance of approximately 75 linear feet from the outlet to the top of bank, and a total distance of approximately 100 feet before reaching OHWM of Elk Creek. Riparian areas would be de-compacted after construction and all disturbed soil would be planted with native vegetation as part of the proposed on-site Revegetation Plan; this would help to increase infiltration, decrease potential for erosion during large storm events, and protect water quality in surface waters.

The remaining stormwater would come from the southern portion of the project; this area is estimated to account for approximately 33% of the stormwater runoff within the project area. In order to reduce the potential for direct discharge of stormwater to Elk Creek at this location, several improvements over existing conditions would be implemented. Approximately 160 feet of existing roadside dike would be removed from the southbound road edge between Station 13+91 to 15+50; this would allow 10% of the runoff from this southern section to sheet flow from the road surface onto the vegetated shoulder and creek bank over a dispersed area rather than concentrating runoff through the existing onsite stormwater detention (OSD) or proposed new OSD location. Modifications to drainage system 1 would include moving the existing OSD from Station 13+50 to Station 13+94 to align with the new low point in the road curve (sag), removing the existing downdrain pipe, and installing an infiltration ditch at the OSD outlet. The 23% of stormwater conveyed through the new OSD would infiltrate through layers of filtration material and through existing vegetated RSP prior to entering waters of Elk Creek.

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

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 relies on the definition of "destruction or adverse modification," which "means a direct or indirect alteration that appreciably diminishes the value of critical habitat for the conservation of a listed species. Such alterations may include, but are not limited to, those that alter the physical or biological features essential to the conservation of a species or that preclude or significantly delay development of such features" (81 FR 7214, February 11, 2016).

The designations of critical habitat for Central California Coast coho salmon and Northern California steelhead 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.

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

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

2.1.1. Use of Best Available Scientific and Commercial Information

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. Additional information regarding the potential effects of the proposed activities at the Elk Creek Bridge Replacement Project on the listed species in question, their anticipated response to these actions, and the environmental effects of the actions as a whole was formulated from the aforementioned resources, and the following:

- NMFS Biological Assessment, Elk Creek Bridge Replacement Project. Caltrans. 2021.

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.

The biological opinion analyses the effects of the federal action on the following Federally-listed species (Distinct Population Segment (DPS) or Evolutionary Significant Unit (ESU)) and designated critical habitat:

Threatened Northern California (NC) steelhead DPS (*Oncorhynchus mykiss*)
Threatened (71 FR 834, January 5, 2006)
Critical habitat (70 FR 52488, September 2, 2005);

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

2.2.1. General Life History of Listed Species

2.2.1.1 CCC Coho Salmon

NMFS listed the CCC coho salmon ESU as threatened on October 31, 1996 (61 FR 56138) and subsequently reclassified it as endangered on June 28, 2005 (70 FR 37160). This ESU includes naturally spawned coho salmon originating from rivers south of Punta Gorda, California, southward to and including Aptos Creek, as well as coho salmon originating from tributaries to San Francisco Bay. Three artificial propagation programs are considered part of the ESU: Don

Clausen Fish Hatchery Captive Broodstock Program, Scott Creek/KingFisher Flats Conservation Program, and Scott Creek Captive Broodstock Program. CDFW listed CCC coho salmon north of San Francisco Bay as endangered under CESA on March 30, 2005.

The life history of coho salmon in California has been well documented by Shapovalov and Taft (1954). In contrast to the life history patterns of other anadromous salmonids, coho salmon in California generally exhibit a relatively simple three-year life cycle. Adult coho salmon typically begin the freshwater migration from the ocean to their natal streams after heavy late fall or winter rains breach the sandbars at the mouths of coastal streams (Sandercock 1991). Delays in river entry of over a month are not unusual (Salo and Bayliff 1958, Eames et al. 1981). Migration continues into March, generally peaking in December and January, with spawning occurring shortly after arrival to the spawning ground (Shapovalov and Taft 1954).

Coho salmon are typically associated with medium to small coastal streams characterized by heavily forested watersheds; perennially-flowing reaches of cool, high-quality water; dense riparian canopy; deep pools with abundant overhead cover; instream cover consisting of large, stable woody debris and undercut banks; and gravel or cobble substrates.

Female coho salmon choose spawning areas usually near the head of a riffle, just below a pool, where water changes from a laminar to a turbulent flow and small to medium gravel substrate are present. The flow characteristics surrounding the redd usually ensure good aeration of eggs and embryos, and flushing of waste products. The water circulation in these areas also facilitates fry emergence from the gravel. Preferred spawning grounds have: nearby overhead and submerged cover for holding adults; water depth of 4 to 21 inches; water velocities of 8 to 30 inches per second; clean, loosely compacted gravel (0.5 to 5-inch diameter) with less than 20 percent fine silt or sand content; cool water ranging from 39 to 50 degrees Fahrenheit (°F) with high dissolved oxygen of 8 mg/L; and inter-gravel flow sufficient to aerate the eggs. Lack of suitable gravel often limits successful spawning.

Each female builds a series of redds, moving upstream as she does so, and deposits a few hundred eggs in each. Fecundity of female coho salmon is directly proportional to size; each adult female coho salmon may deposit from 1,000 to 7,600 eggs (Sandercock 1991). Briggs (1953) noted a dominant male accompanies a female during spawning, but one or more subordinate males may also engage in spawning. Coho salmon may spawn in more than one redd and with more than one mate (Sandercock 1991). Coho salmon are semelparous meaning they die after spawning. The female may guard a redd for up to two weeks (Briggs 1953).

The eggs generally hatch after four to eight weeks, depending on water temperature. Survival and development rates depend on temperature and dissolved oxygen levels within the redd. According to Baker and Reynolds (1986), under optimum conditions, mortality during this period can be as low as 10 percent; under adverse conditions of high scouring flows or heavy siltation, mortality may be close to 100 percent. McMahon (1983) found that egg and fry survival drops sharply when fine sediment makes up 15 percent or more of the substrate. The newly hatched fry remain in the redd from two to seven weeks before emerging from the gravel (Shapovalov and Taft 1954). Upon emergence, fry seek out shallow water, usually along stream margins. As they grow, juvenile coho salmon often occupy habitat at the heads of pools, which generally provide an optimum mix of high food availability and good cover with low swimming cost (Nielsen 1992). Chapman and Bjornn (1969) determined that larger parr tend to occupy the head of pools, with smaller parr found further down the pools. As the fish continue to grow, they move into deeper water and expand their territories until, by July and August; they reside exclusively in deep pool habitat. Juvenile coho salmon prefer: well shaded pools at least 3.3 feet deep with dense overhead cover, abundant submerged cover (undercut banks, logs, roots, and other woody debris); water temperatures of 54° to 59° F (Brett 1952, Reiser and Bjornn 1979), but not exceeding 73° to 77° F (Brungs and Jones 1977) for extended time periods; dissolved oxygen levels of 4 to 9 mg/L; and water velocities of 3.5 to 9.5 inches per second in pools and 12 to 18 inches per second in riffles. Water temperatures for good survival and growth of juvenile coho salmon range from 50° to 59° F (Bell 1973, McMahon 1983). Growth is slowed considerably at 64° F and ceases at 68° F (Bell 1973).

Preferred rearing habitat has little or no turbidity and high sustained invertebrate forage production. Juvenile coho salmon feed primarily on drifting terrestrial insects, much of which are produced in the riparian canopy, and on aquatic invertebrates growing within the interstices of the substrate and in leaf litter in pools. As water temperatures decrease in the fall and winter months, fish stop or reduce feeding due to lack of food or in response to the colder water, and growth rates slow. During December through February, winter rains result in increased stream flows. By March, following peak flows, fish resume feeding on insects and crustaceans, and grow rapidly.

In the spring, as yearlings, juvenile coho salmon undergo a physiological process, or smoltification, which prepares them for living in the marine environment. They begin to migrate downstream to the ocean during late March and early April, and out-migration usually peaks in mid-May, if conditions are favorable. Emigration timing is correlated with peak upwelling currents along the coast. Entry into the ocean at this time facilitates more growth and, therefore, greater marine survival (Holtby et al. 1990). At this point, the smolts are about four to five inches in length. After entering the ocean, the immature salmon initially remain in nearshore waters close to their parent stream. They gradually move northward, staying over the continental shelf (Brown et al. 1994). Although they can range widely in the north Pacific, movements of coho salmon from California are poorly understood.

Based on historical distribution and life history strategies, adult coho salmon may be present within the action area between December and February. Juvenile coho salmon, as small as two grams, may be present in the creek year-round; however, low riparian and instream cover upstream of the bridge may cause coho salmon to seek out shaded refuge outside of the action area farther upstream or move into the pool located approximately 50 feet downstream of the proposed construction area.

2.2.1.2 <u>NC Steelhead</u>

The NC steelhead (*Oncorhynchus mykiss*) DPS is a federally threatened species. NMFS listed the NC steelhead DPS on June 7, 2000 (65 FR 36074) and reaffirmed the listing status as threatened on February 5, 2006 (71 FR 834). This DPS includes all naturally spawned anadromous *Oncorhynchus mykiss* populations below natural and human-made impassable barriers in California coastal river basins from Redwood Creek (Humboldt County) southward to, but not including, the Russian River (71 FR 834). Two artificial propagation programs are considered part of the DPS: the Yager Creek Hatchery and the North Fork Gualala River Hatchery (Gualala River Steelhead Project) (71 FR 834).

Steelhead are the anadromous form of *O. mykiss*, spawning in freshwater and migrating to marine environments to grow and mature. They are further classified as winter or summer steelhead based on the timing of their spawning migration. However, only winter steelhead occur in Elk Creek (65 FR 36081). Steelhead have a complex life history that requires successful transition between life stages across a range of freshwater and marine habitats (i.e., egg-to-fry emergence, juvenile rearing, smolt outmigration, ocean survival, and upstream migration and spawning). Steelhead exhibit a high degree of life history plasticity (Shapovalov and Taft 1954; Thrower et al. 2004; Satterthwaite et al. 2009). The occurrence and timing of these transitions are highly variable and generally driven by environmental conditions and resource availability (Satterthwaite et al. 2009; Sogard et al. 2012).

Steelhead are generally divided into two ecotypes based on timing and state of maturity when returning to freshwater: summer-run and winter-run. Summer-run steelhead return to natal streams in spring and early summer while they are still sexually immature and spend several months maturing before spawning in January and February (Nielson and Fountain 2006). Winter-run steelhead enter natal streams as mature adults with well-developed gonads. They typically immigrate between December and April and spawn shortly after reaching spawning grounds (Shapovalov and Taft 1954; Moyle et al. 2008).

Adult steelhead spawn in gravel substrates with low sedimentation and suitable flow velocities. Females lay eggs in redds, where they are quickly fertilized by males and covered. Egg survival depends on oxygenated water circulating through the gravel, facilitating gas exchange and waste removal. Adults usually select spawning sites in pool-riffle transition areas of streams with gravel cobble substrates between 0.6 to 10.2 centimeters (cm) in diameter and flow velocities from 40 - 91cm per second (Bjornn and Reiser 1991). Eggs incubate in redds for approximately 25 to 35 days depending on water temperature (Shapovalov and Taft 1954). Incubation time depends on water temperature, with warmer temperatures leading to lower incubation periods due to increased metabolic rates. Eggs hatch as alevin and remain buried in redds for an additional two to three weeks until yolk-sac absorption is complete (Shapovalov and Taft 1954). Optimal conditions for embryonic development include water temperatures between 6 and 10°C, dissolved oxygen near saturation, and fine sediments less than 5% of substrate by volume (Bjornn and Reiser 1991; USEPA 2001).

Upon emerging from redds, juvenile steelhead occupy edgewater habitats where flow velocity is lower and cover aids in predator avoidance. Rearing juveniles feed on a variety of aquatic and terrestrial invertebrates. As they grow, juveniles move into deeper pool and riffle habitats where they continue to feed on invertebrates and have been observed feeding on younger juveniles (Chapman and Bjornn 1969; Everest and Chapman 1972). Juveniles can spend up to four years rearing in freshwater before migrating to the ocean as smolts, although they typically only spend one to two years in natal streams (Shapovalov and Taft 1954; Busby et al. 1996). Successful rearing depends on stream temperatures, flow velocities, and habitat availability. Preferred water temperature ranges from 12 to 19°C and sustained temperatures above 25°C are generally considered lethal (Smith and Li 1983; Busby et al. 1996). In Central California streams, juvenile steelhead are able to survive peak daily stream temperatures above 25°C for short periods when food is abundant (Smith and Li 1983). Response to stream temperatures can vary depending on the conditions to which individuals are acclimated, however, consistent exposure to high stream temperatures results in slower growth due to elevated metabolic rates and lower survival rates overall (Hokanson et al. 1977; Busby et al. 1996).

Juveniles undergo behavioral, morphological, and physiological changes in preparation for ocean entry, collectively called smoltification. Juveniles begin smoltification in freshwater and the process continues throughout downstream migration with some smolts using estuaries for further acclimation to saltwater prior to ocean entry (Reiser and Bjornn 1979). Juveniles typically will not smolt until reaching a minimum size of 160 mm (Burgner et al. 1992). Smoltification is cued by increasing photoperiod. Stream temperatures influence the rate of smoltification, with warmer temperatures leading to more rapid transition. Downstream migration of smolts typically occurs from April to June when temperature and stream flows increase. Preferred temperature for smoltification and outmigration is between 10 and 17°C with temperatures below 15°C considered optimal (Hokanson et al. 1977; Wurtsbaugh and Davis 1977; Zedonis and Newcomb 1997; Myrick and Cech 2005). In coastal systems with seasonal lagoons, smolts may take advantage of higher growth potential in productive lagoon habitats before ocean entry (Osterback et al. 2018).

Adult steelhead are known to be highly migratory during ocean residency but little is known of their habitat use and movements. They have been observed moving north and south along the continental shelf, presumably to areas of high productivity to feed (Barnhart 1986). Adults will typically spend one to two years in the ocean, feeding and growing in preparation for spawning (Shapovalov and Taft 1954; Busby et al. 1996). Upstream migration typically begins once winter rains commence and stream flows increase. For coastal systems with seasonal freshwater lagoons, winter storms are required to breach the sandbars and allow access to upstream spawning sites. Unlike most congenerics, steelhead are iteroparous, meaning they can return to spawn multiple times. Adult steelhead may spawn up to four times in their lifetime, although spawning runs predominantly consist of first-time spawners (~59%) (Shapovalov and Taft 1954). The maximum life span of steelhead is estimated to be nine years (Moyle 2002).

2.2.2. CCC Coho Salmon and NC Steelhead Critical Habitat

In designating critical habitat, NMFS considers, among other things, the following requirements of the species: 1) space for individual and population growth, and for normal behavior; 2) food, water, air, light, minerals, or other nutritional or physiological requirements; 3) cover or shelter; 4) sites for breeding, reproduction, or rearing offspring; and, generally; and 5) habitats that are protected from disturbance or are representative of the historic geographical and ecological distributions of this species (50 CFR 424.12(b)). In addition to these factors, NMFS also focuses on physical and biological features, or PBFs, and/or essential habitat types within the designated area that are essential to conserving the species and that may require special management considerations or protection.

PBFs for NC steelhead and CCC coho salmon critical habitat, and their associated essential features within freshwater include:

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

Generally, for NC steelhead and 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 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).

The condition of NC steelhead and CCC coho salmon critical habitat, specifically its ability to provide for their conservation, has been degraded from conditions known to support viable salmonid populations. NMFS 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, dams, wetland loss, and water withdrawals (including unscreened diversions for irrigation). 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 37160; 70 FR 52488). Diversion and storage of river and stream flow has dramatically altered the natural hydrologic cycle in many of the streams within the ESU. Altered flow regimes can delay or preclude migration, dewater aquatic habitat, and strand fish in disconnected pools, while unscreened diversions can entrain juvenile fish.

2.2.3. Global Climate Change

Global climate change presents an additional potential threat to salmonids and their critical habitats. 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 Mountains has declined (Kadir et al. 2013). However, total annual precipitation amounts have shown no discernable change (Kadir et al. 2013). Listed salmonids 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 steelhead experience, and many of these factors have much less influence on steelhead abundance and distribution than human disturbance across the landscape.

The threat to listed salmonids 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).

For Northern California, most models project heavier and warmer precipitation. Extreme wet and dry periods are projected, increasing the risk of both flooding and droughts (OEHHA 2018). Estimates show that snowmelt contribution to runoff in the Sacramento/San Joaquin Delta may decrease by about 20 percent per decade over the next century (Cloern et al. 2011). Many of these changes are likely to further degrade listed salmonid habitat by, for example, reducing stream flows during the summer and raising summer water temperatures. 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 2004; Osgood 2008; Turley 2008; Abdul-Aziz et al. 2011; Doney et al. 2012). The projections described above are for the mid to late 21st Century. In shorter time frames, climate conditions not caused by the human addition of carbon dioxide to the atmosphere are more likely to predominate (Cox and Stephenson 2007; Santer et al. 2011).

2.3. Action Area

"Action area" means all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action (50 CFR 402.02). The action area for the project encompasses the entire construction footprint that would be subject to direct impacts from ground disturbance and vegetation clearing, including the roadway and paved turnouts of SR 1 from approximately 400 feet north of the Elk Creek Bridge to 500 feet south of the bridge where staging and materials storage may occur. It also includes Elk Creek and adjacent wetlands within the vicinity of the bridge that could be exposed to localized, minor occurrences of turbidity resulting from ground disturbance and water diversion, and the extent of potential underwater noise transmittal that could result in hydroacoustic impacts to fish. Turbidity is not expected to extend beyond the temporary impact limits, while hydroacoustic noise levels known to elicit behavior responses in fish (150 decibels (dB)) could theoretically extend up to 1,115 feet (340 meters) from the bridge.

2.4. Environmental Baseline

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

2.4.1. Status of Listed Species and Critical Habitat in the Action Area

Steelhead are distributed throughout the Elk Creek watershed and coho have been found within several miles of the mainstem of Elk Creek (MRC 2017). Historical abundance data are not available, but a number of surveys (including observation, electrofishing, downstream traps, and snorkel) have attempted to gather data on the presence of both species within Elk Creek over the last 48 years; a summary of available data on salmonid presence within Elk Creek is presented in Table 2 below.

Species presence was investigated through technical assistance from NMFS, coordination with CDFW, and surveys conducted by Caltrans and Mendocino Redwood Company (MRC).

- Steelhead (winter-run only) are presumed present in the project action area based on:
    - The 2001 CDFG Elk Creek Stream Inventory Report documented the presence of steelhead observed during the inventory (CDFG 2001).
    - Steelhead were observed in the action area during Caltrans snorkel surveys in both July and August of 2020 as well as during 2016 emergency project dewatering (Caltrans 2017a).
    - Upstream presence/absence surveys across multiple years have documented the presence of steelhead within the watershed (MRC 2017).
    - Out-migrating adults may become trapped within the lower watershed if flows are low and the sandbar closes early in the season.

- Coho is presumed present at Elk Creek, based on the following:
    - The 2001 CDFG Elk Creek Stream Inventory Report referenced historical data indicating that coho had been present within Elk Creek in the past (CDFG 2001).
    - Coho salmon were observed in the action area during Caltrans snorkel surveys in August of 2020 and during emergency project dewatering in 2016 (Caltrans 2017a).
    - Upstream presence/absence surveys across multiple years have documented presence of coho within the watershed (MRC 2017).

Table 2: Summarized Survey Data from Multiple Agencies of Coho Salmon and Steelhead within the Elk Creek Watershed.

Data Source – Location	Year	Species Present / # Observed[1]	
		CCC Coho	NC Steelhead
CDFG[2] – Elk Creek	1973	No	Yes / -
CDFG[2] – Elk Creek	1976	Yes / -	Yes/ -
Louisiana Pacific[2] – adjacent to timber holdings (now MRC)	1994 - 1996	Yes (one sampling event out of 19)	No data
MRC[2] – Elk Creek	2001	No	Yes / -
MRC[3] – South Fork Confluence	2002	Yes / 2	Yes / 85
MRC[3] – South Fork Confluence	2005	Yes / -	No Data
MRC[3] – South Fork Confluence	2010	No	Yes / 125
MRC[3] – South Fork Confluence	2013	No	Yes / 160
MRC[3] – South Fork Confluence	October 2015	Yes / 25	Yes / 65
Caltrans[4] – Elk Creek Bridge	April 2016	Yes / 3	Yes / 69
MRC[5] – Elk Creek	2018	Yes / -	Yes / -
Caltrans[6] – 100 meters downstream of Elk Creek Bridge	July 2019	No	Yes / 8
Caltrans[7] – Elk Creek Bridge Project, Potential Action Area	July 2020	No	Yes / 254
Caltrans[7] – Elk Creek Bridge Project, Potential Action Area	August 2020	Yes / 1	Yes / 87

[1] Numbers of fish are given when data are available; a dash "-" indicates presence, but no fish # data.

[2] 2001 CDFW Stream Inventory Report: Elk Creek, and references therein

[3] Mendocino Redwood Company (MRC) 2017 Fish Distribution Report: most observations are located at the South Fork confluence with the main stem. Presence/Absence data, not abundance.

[4] Caltrans 2016 Emergency Project Dewatering at below Elk Creek Bridge

[5] Personal communication with David Ulrich, MRC biologist

[6] Caltrans 2019 Emergency Project (personal observation)

[7] Caltrans 2020 Snorkel Surveys

The number of juvenile steelhead that may be present during fish collection is difficult to estimate due to the varying conditions within the action area and could be highly variable. The calculated number of fish subject to relocation was based on available historical presence/absence data, survey data, habitat characteristics, and site-specific literature reviews (CDFG 2001; MRC 2017). The estimates rely on fish density rates of an averaged density of 0.15 coho per square meter and 0.5 steelhead per square meter—determined by a combination of data assessment and professional opinion. Additionally, in consideration of the potential variation for inter-annual fish productivity, NMFS will assume that, in some years, up to 25 percent more juvenile salmonids could occur in Elk Creek than observed in past years.

Elk Creek and its main tributaries, which include the upstream branches of the north and south forks of Elk Creek, drain a watershed basin of approximately 20-27 square miles of forested terrain. The main stem of Elk Creek has a well-developed riparian corridor consisting of a canopy of red alder (*Alnus rubra*), and Sitka and arroyo willow (*Salix sitchensis* and *Salix lasiolepis*), with a subcanopy of red elderberry (*Sambucus racemosa*). Elk Creek flows west downstream of the bridge to its confluence with the Pacific Ocean, which is approximately 0.25 miles downstream of the bridge. Watershed elevation within the project ranges from 650 feet at the highest south ridgetop to approximately 5 feet in the channel bottom at the bridge, and the channel gradient at the bridge site is estimated at < 1.2 percent. Lower Elk Creek, inclusive of the action area, maintains water within the channel throughout the year, including during dry season field surveys and throughout extreme drought conditions in 2021 when many other perennial waters regionally dried or stopped flow.

As mentioned above, Elk Creek is a perennial stream, classified by the National Wetland Inventory as Riverine Tidal, Unconsolidated Bottom, Permanently Flooded, Freshwater Tidal throughout the project area, changing to a classification of Estuarine Subtidal downstream. The creek flow was at a higher elevation during the April 2018 site visit as compared to the June 2018 site visit. In June 2018 the visible pool areas within the Project site were measured at approximately 5 feet deep. Like many bar- built estuaries, the timing of sandbar closure depends on the volume of creek flow, as well as tidal variables and wave action, which varies from year to year. As such, the presence of riffles and depth of pools upstream from the estuary is also highly variable and is dependent not only on the tidal heights, but on the timing and/or frequency of sandbar closure. For example, in June 2018, the sandbar at the mouth of Elk Creek was still open and the creek was low under the bridge and flow was confined to a narrow channel; however, in June of 2020, the sandbar had already closed and the water channel spanned from one bank to the other with very little gravel bar visible. Overall, the Project action area provides suitable rearing habitat, moderate spawning habitat, and is a migration corridor for CCC coho and NC steelhead that may spawn upstream.

Under high water winter and fast flowing summer conditions, much of the creek bed immediately adjacent to the bridge (approximately 100 feet downstream and >200 feet upstream) is characterized by run and riffle habitats in months when the sandbar is open, and deeper water runs and pools in years of low flow when the sandbar closes. Under both summer conditions, this area is used by juvenile salmonids for rearing—juveniles were observed in this reach during surveys in June 2018 when the sandbar was open and July 2020 when the sandbar was closed.

There are three pools within the action area that may provide high quality juvenile rearing habitat and during snorkel surveys were observed to have much higher juvenile salmonid abundance as compared to the riffle/run habitats. A small pool (4 x 12 feet) located below exposed conifer rootwads, and approximately 3 feet max depth at OHWM, was observed on the southern creek bank at 300 feet upstream of the existing bridge; a few juvenile salmonids were observed here during snorkel surveys. The pool located directly below the RSP on the northern pier may provide deeper water, but there is no riparian vegetation at this location. The most ideal rearing habitat for salmonids was the downstream pool, which was the location with the highest abundance of juvenile salmonids observed. This pool is shaded by overhanging vegetation for most of its length, starting approximately 50 feet downstream of the bridge and extending downstream for 200 feet, ending slightly past the large rock outcrop at the sharp river bend.

Despite having an appropriate cobble and gravel substrate, the project area was thought to not contain suitable spawning habitat for steelhead or coho salmon. However, two steelhead redds and adult spawning behavior were observed by Caltrans biologists on April 1, 2022 (Dawn Graydon, Caltrans Biologist, Pers. Com. 2022). Until then, no historical observations of spawning salmonids had ever been recorded within the action area and site conditions, such as proximity to the estuary and consequent tidal influence on water depth and flow velocity, were thought unlikely to support successful steelhead or coho spawning (Shaun Thompson, CDFW Env. Scientist, Pers. Com. 2021). Additionally, a redd (salmonid nest) survey conducted on March 16, 2021, by Caltrans fisheries biologist Jason Frederickson resulted in no observations of spawning salmonids, redds, or other evidence of spawning. The redd survey covered the project action area as well as adjacent upstream habitat most likely to support spawning—beginning under the existing bridge and extending approximately 1,600 feet upstream. The water level during the March 2021 survey was high and flow rate was low; consequently, upstream riffles observed in the summer were not observed during the normal spawning season in 2021

Stream habitat data collected by fisheries biologists in June 2018 helped characterize the suitability of the project area for salmonids. From June 11 to June 12, 2018, biologists recorded a stream flow of 8.79 cubic feet per second (conducted with a Marsh-McBirney flow meter) and water temperatures ranging from 55 to 59 degrees Fahrenheit (°F). Similar temperatures were recorded by HOBO temperature data loggers placed at two locations within the project area in 2020; one temperature logger was placed slightly upstream, but immediately adjacent to the Elk Creek Bridge, and the second logger was located approximately 984 feet (300 meters) downstream of the bridge on the eastern bank (attached to overhanging Sitka willow vegetation).

The HOBO temperature data loggers recorded data in 30-minute intervals from July 7 to August 6, 2020. The highest maximum temperature recorded during this time was a high of 61.18°F (16.21°Celsius [ºC]), recorded on August 4, 2020, at Caltrans #2, with a slightly lower maximum temp of 60.03ºF (15.57° C) recorded the same day at the bridge location upstream. Water temperature data taken almost 20 years earlier during the 2001 CDFW Stream Inventory Report: Elk Creek (CDFG 2001) also recorded water temperatures that ranged from 55–62°F during the summer months (June 16–September 12, 2001).

Coho salmon are more sensitive to water temperatures, especially during rearing, where cooler water temperatures (54–57 degrees Fahrenheit [°F]) are preferred and above 68°F is considered unsuitable (Reiser and Bjornn, 1979; Bjornn and Reiser, 1991). Therefore, during most summer months, temperatures within the Elk Creek action area would be fully suitable for coho salmon, however suitability may decrease slightly during the hottest portions of the year. Although water temperatures are within the suitable ranges for rearing coho and steelhead, the maximum recorded temperatures of 62°F, if sustained, is near the upper limits of suitability.

Riparian vegetation is present on both streambanks over most of the channel length. One notable exception is the north bank of Elk Creek, immediately upstream of the bridge, where there currently is unvegetated RSP. Mean percent canopy density within the action area is approximately 58%, based on densitometer measurements taken at the center of each habitat unit. The downstream habitat is characterized by many overhanging branches of willow and alder, virtually obscuring the downstream view and the water from above. The upstream habitat immediately adjacent to the bridge has 70 linear feet of primarily unvegetated large diameter RSP lining the channel on the north side. The creek flows along that north bank and deposits gravel and sediment along the south bank, so willows branches and adjacent red alders do provide some shade along that south bank, but at low flows the bank is farther removed from the active channel and the shade provided is not nearly the extent of riparian cover found downstream. Juvenile salmon densities were highest under the cover of overhanging vegetation.

2.4.2. Factors Affecting Species in the Action Area

The Project area is surrounded by forest habitat to the east, north and west, with red alder forest and coastal scrub dominating estuary and hillslopes to the west. The forest habitats include grazed private timberlands and timberlands owned and operated by Mendocino Redwood Company. In addition to forested terrain, scattered rural developments occur adjacent to grasslands used for cattle grazing to the south and north. Residential development becomes more frequent approaching the town of Elk, approximately 3 miles north of the bridge location.

2.4.3. Previous Emergency Actions Affecting the Action Area

2016 Emergency Project (Bridge Scour)

- United States Army Corps of Engineers (USACE): File Number SPN-2016-00325N. This project installed RSP in response to erosion that was compromising the north bridge abutment. Work began on April 26, 2016, and in-water work was completed May 27, 2016, and a Notice of Completion was submitted on August 10, 2016.

2019 Emergency Project (Bank Scour)

- USACE: File Number SPN-2019-00217N. The emergency project was deemed to be qualified under the "Department of the Army Regional General Permit (RGP) NO. 5 for Repair and Protection Activities in Emergency Situations, pursuant to Section 404 of the Clean Water Act, as amended (33 U.S.C. 1344 et seq.)." No in-water work occurred at the bridge location, but just at the downstream bank restoration. This stream diversion was in place from July 8 through August 22, and all in stream work was completed by August 27, 2019.

2.5. Effects of the Action

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

Construction activities, both during and post-project completion, associated with the proposed project may affect CCC coho and NC steelhead and their habitat. The following may result from construction activities: unintentional direct injury or mortality during fish collection, relocation, and dewatering activities; noise effects from construction, including pile driving activities; insignificant effects due to a temporary loss of benthic habitat; insignificant effects to steelhead and habitat from temporary reductions in riparian vegetation; insignificant effects to 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. <u>Fish Collection and Relocation</u>

To facilitate completion of the project, portions of Elk Creek will need to be dewatered. As discussed above, a maximum amount of 221 linear feet will be dewatered in two consecutive dry seasons. Caltrans proposes to collect and relocate fish in the work areas prior to, and during dewatering, to avoid fish stranding and exposure to construction activities. Before, and during, dewatering of the construction site, juvenile steelhead and 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. Mostly juvenile steelhead and coho are 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. While it is possible out-migrating steelhead kelts may be present in the lower portion of the creek if the sand bar is closed at the mouth, it is unlikely that any would be trapped in the dewatered section of stream.

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 2 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 fish likely to be exposed to competition, but does not expect this short-term stress to reduce the individual performance of juvenile salmonids, or cascade through the watershed population of these species. Fish that avoid capture during relocation may be exposed to risks described in the following section on dewatering (see Section 2.5.2 below).

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 steelhead. Restricting the work window to June 15 to October 15 will limit the effects to stream rearing juvenile salmonids. NMFS expects applying AMMs will effectively minimize injury and mortality to juvenile steelhead in the action area.

Fish exposure and mortality estimates for dewatering and fish relocation activities were calculated with technical assistance from NMFS and CDFW Fisheries Biologists. The calculated number of fish subject to relocation was based on available historical presence/absence data, survey data, habitat characteristics, and site-specific literature reviews (CDFG 2001; MRC 2017). The estimates rely on fish density rates of an averaged density of 0.15 coho per square meter and 0.5 steelhead per square meter—determined by a combination of data assessment and professional opinion. A conservative estimate for the dewatering area of 0.19 acre (768 square meters) was calculated based on the total estimated length of the stream diversion from upstream of the temporary bridge to downstream of the falsework and work platform (221 linear feet) (67 meters), and the averaged width of the channel below the OHWM. The second season of dewatering may require a smaller dewatered area, but since this is not currently expected to be a large decrease, the same dewatered area calculations (768 square meters) are applied to both seasons.

These densities were then applied to the dewatered area at each location and further refined by 25%, based on professional judgment, to account for potential increases in the population, natural flushing, or successful herding of fish from the dewatered areas prior to determining the fish handling estimates. The resulting fish exposure estimate was conservatively approximated to be 114 coho and 380 steelhead for one dewatering event. With these exposure estimates, 3% mortality was calculated for juvenile coho salmon and winter NC steelhead likely resulting from dewatering and relocation activities in the action area during one instream work period. As mentioned above, a 25 percent increase was added to the estimated totals to account for inter-annual variability of fish production in the creek. The highest estimated mortality for both seasons of in-water work would total a combined fish mortality of 8 coho and 30 steelhead.

2.5.2. Stream Diversion and Dewatering

As described above, completion of the project will require dewatering of Elk Creek. Cofferdams or a bladder dam and a series of pipes will be used to temporarily divert flows around the work site during construction. Dewatering of the channel is estimated to affect up to 221 linear feet of Elk Creek. NMFS anticipates temporary changes to instream flow within, and downstream of, the project site during installation of the diversion system, and during dewatering operations. Once installation of the diversion systems are 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 221 linear feet within Elk 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 will be able to find food both upstream and downstream of the action area as needed during dewatering activities.

2.5.3. Pile Driving Activities and Sound Impacts

Impact pile driving is proposed by the Project for the temporary bridge abutments, the new bridge falsework, the new bridge abutments, as well as the use of an excavator mounted hoe ram to demolish existing bridge piers and abutments.

Table 3: Summary of Pile Driving and Demolition Activities

Activity	Location	Approximate Duration (Days)
Impact driving of 10-inch steel H-piles for falsework (28 piles)	On land (minimum 15 feet from water)	3
Impact driving of 14-inch steel H-piles for temporary bridge abutments (16 piles)	On land (minimum 30 feet from water)	2
Impact driving of 14-inch steel H-piles for permanent bridge abutments (44 piles)	On land (minimum 30 feet from water)	7
Use of excavator-mounted hoe-ram(s) to demolish existing bridge piers and abutments	On land or inside dewatered cofferdam	6

Fish may be injured or killed when exposed to impulsive sound sources such as pile driving with impact hammers. Pathologies of fish associated with very high sound level exposure and drastic changes in pressure are collectively known as barotraumas. These include hemorrhage and rupture of blood vessels and internal organs, including the swim bladder and kidneys. Death can be instantaneous, occur within minutes after exposure, or occur several days later. Fish can also die when exposed to lower, continuous sound pressure levels if exposed for longer periods of time. Hastings (1995) found death rates of 50 percent and 56 percent for gouramis (Trichogaster sp.) when exposed for two hours or less to continuous sound at 192 decibels (dB) root-mean-square pressure (RMS) (re: 1micropascal [µPa]) at 400 Hertz (Hz) and 198 dB (re: 1 µPa) at 150 Hz, respectively, and 25 percent for goldfish (Carassius auratus) when exposed to sounds of 204 dB (re: 1 µPa) at 250. Hastings (1995) also reported that acoustic "stunning" a potentially lethal effect resulting in a physiological shutdown of body functions, immobilized gourami within eight to thirty minutes of exposure to these sound levels.

Underwater sound exposures have also been shown to alter the behavior of fishes (see review by Hastings and Popper 2005). The observed behavioral changes include startle responses and increases in stress hormones. Exposure to pile driving sound pressure levels may also result in "agitation" of fishes indicated by a change in swimming behavior detected by Shin (1995) or "alarm" detected by Fewtrell (2003). Other potential changes include reduced predator awareness and reduced feeding. The potential for adverse behavioral effects will depend on a number of factors, including the sensitivity to sound, the type and duration of the sound, as well as life stages of fish that are present in the areas affected by underwater sound produced during pile driving. A fish that exhibits a startle response to a sudden loud sound may not necessarily be injured, but it is exhibiting behavior that suggests it perceives a stimulus indicating potential danger in its immediate environment. However, fish do not exhibit a startle response every time they experience a strong hydroacoustic stimulus.

In order to assess the potential effects to fish exposed to pile driving sound, a coalition of federal and state resource and transportation agencies along the West Coast, the Fisheries Hydroacoustic Working Group (FHWG), used data from a variety of sound sources and species to establish interim acoustic criteria for the onset of injury to fishes from impact pile driving exposure (FHWG 2008). Most historical research has used peak pressure to evaluate the effects on fishes from underwater sound. Current research, however, suggests that sound exposure level (SEL), a measure of the total sound energy expressed as the time-integrated, sound pressure squared, is also a relevant metric for evaluating the effects of sound on fishes. An advantage of the SEL metric is that the acoustic energy can be accumulated across multiple events and expressed as the cumulative SEL (cSEL). Therefore, a dual metric criteria was established by the FHWG and includes a threshold for peak pressure (206 dB) and cSEL (187 dB for fishes 2 grams or larger and 183 dB for fishes smaller than 2 grams). Injury would be expected if either threshold is exceeded. There is uncertainty as to the behavioral response of fish to underwater sound produced when driving piles in or near water. Until new information indicates otherwise, NMFS believes a 150 dB RMS threshold for behavioral responses for salmonids is appropriate. The cumulative SEL threshold is considered the total amount of acoustic energy a fish can receive from single or multiple strikes without injury. The cumulative SEL threshold is based on the total daily exposure of a fish to noise from sources that are discontinuous (in this case, noise that occurs up to 12 hours a day, with 12 hours between exposures). This presumes that fish can recover from any effects during this 12-hour period.

Reference levels used to estimate the noise levels for each of these activities were selected from data reported for projects with similar types of pile driving, demolition operations, and site characteristics (California Department of Transportation 2015). The peak level represents the maximum reported noise level. The single-strike SELs and RMS levels represent noise levels from a typical pile strike; typical pile strike levels are developed by averaging a range of data collected from past projects. The computation of cumulative SELs is based on the maximum number of piles that can reasonably be installed in one day and the estimated number of strikes required to drive each pile. Because of uncertainties in site conditions potentially encountered during pile driving operations (e.g., bed resistance), it is presumed that approximately half the length of each pile can be installed using vibratory pile driving, with impact driving used to drive the remaining half. The computed distances over which pile driving sounds are expected to exceed the injury and behavioral thresholds presume an unimpeded sound propagation path. However, site conditions, such as shallow water (less than 3.5 feet), major channel bends, and other in-water structures, can reduce these distances by impeding the propagation of underwater sound waves.

The estimated number of pile strikes per day was estimated by the project engineers. Because juveniles of some species in the project area could be smaller than 2 grams, the cumulative SEL threshold of 183 dB (i.e., the more protective threshold) was used in this analysis. It should be noted, however, that in cases where the estimated daily number of strikes per day exceeds 5,000 strikes, the distance to the onset of physical injury does not increase because pile driving energy does not accumulate once the single strike SEL drops to 150 dB (i.e., effective quiet); therefore, in these instances, the distance to the 183 dB and 187 dB thresholds are the same. In addition, following NMFS guidance, it is anticipated that pile strikes with single strike SELs of less than 150 dB would not accumulate to cause injury or elicit behavioral effects to fish of any size.

Caltrans conducted a hydroacoustic analysis to evaluate potential underwater noise levels generated by planned construction activities, and determined that peak sound pressure from pile driving would not be expected to exceed currently adopted hydroacoustic noise thresholds known to cause injury to fish of any size within the action area—provided the stream is dewatered prior to impact activities. As currently proposed, Elk Creek would be dewatered prior to any pile driving and hoe- ramming activities. The dewatered area per construction season is estimated to encompass an area of approximately 5,760 square feet (535 square meters).

The most impactful (loudest) scenario for bridge construction was analyzed. This included the use of an impact hammer to install piles for the new bridge and a hoe-ram (most likely an excavator-mounted hydraulic hoe-ram) to remove the existing bridge structure. Both construction activities are considered impulsive noise sources that could potentially exceed peak SPL and would be expected to accumulate over time and cause injury to fish.

The potential for peak sound pressure levels to exceed the injury threshold of 206 dB is low because piles would be installed on land and primarily from the creek banks, and would be further reduced by the installation of the temporary stream diversion prior to demolition or pile driving activities. The stream would be dewatered within the 33-foot (10 m) radius (isopleth) for which elevated peak noise levels are predicted to travel. Additionally, implementation of a Hydroacoustic Monitoring Plan would avoid the injury threshold for accumulated sound exposure levels (SEL) potentially reached outside of the limits of the stream diversion by stopping work prior to reaching the predicted accumulated SEL injury threshold (183 dB). Hydroacoustic noise impacts would be short term, lasting approximately 3-7 days per activity and a maximum of 18 days total, including demolition and pile driving for falsework, temporary, and permanent bridge structures.

Hydroacoustic monitoring would be conducted during all construction activities that could potentially produce impulse sound waves that may affect listed fish species. This includes any foundation work and demolition activities that require impact pile driving, hoe-ramming, or jackhammering. Pile driving and hoe-ram operations could potentially exceed peak SPL and cumulative SEL injury thresholds. However, these activities would not be conducted until after June 15th when the Temporary Creek Diversion System diversion is in place. Peak sound levels are not anticipated to affect a fish moving through the diverted stream channel for several reasons, including:

- A low likelihood of the piles or demolition activities to produce loud enough sounds to reach the diverted channel waters, and

- Low likelihood of fish being present within the diverted channel. Due to the timing of demolition and pile driving to begin after June 15th, the potential for smolts migrating through the project area late in the season would be low, and any fish passing through the diversion would be highly transitory. Furthermore, the diverted water column has very low potential, if any, juvenile rearing capacity—as such, juvenile salmonids are not expected within the diverted water column.

In comparison, fish located outside the limits of the temporary creek diversion, particularly those found within the downstream pool, could be exposed to cumulative SELs injury thresholds from demolition and pile driving activities if protective measures are not implemented. Because of this potential for cumulative SEL 183 dB to reach rearing juvenile salmonids outside of the diversion limits, the project would ensure that appropriate measures, such as a Hydroacoustic Monitoring Plan, would be implemented appropriately during all demolition and pile driving activities. With monitoring in place, the injury threshold for accumulated sound exposure levels (SEL) within unrestricted waters up and downstream of the stream diversion would also be avoided by stopping work prior to reaching the predicted accumulated SEL injury threshold.

Noise levels exceeding the behavioral threshold of 150 dB RMS would theoretically extend hundreds of feet up and downstream from demolition and pile driving activities assuming an unimpeded propagation path. However, under summer flow conditions, site characteristics that would likely impede the propagation of demolition noise and limit the extent of noise levels exceeding the injury thresholds include a shallow gravel riffle approximately 120 feet upstream and a major channel bend approximately 250 feet downstream of the proposed bridge crossing.

Dewatering of the stream channels and the commitment to remain below hydroacoustic injury thresholds (specifically cum SEL 183 dB) would ensure that potential effects stemming from elevated levels of hydroacoustic noise during construction would be insignificant, unlikely to reduce the fitness of individual fish, or have permanent, lasting effects to the rearing/foraging and migratory function of the habitat.

2.5.4. 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 is 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 deposition 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.

2.5.5. 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 adsorbed 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 SWPPP and a SWCP will be implemented to maintain water quality during and after construction within Elk 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.

2.5.6. Post Construction Water Quality

The replacement and widening of the roadway approaches and bridge structures would add approximately 0.13 acre of net new impervious surface area adjacent to Elk Creek. Published work has identified stormwater 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 stormwater 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 not containing scuppers that drain water directly into the creek, directing flows through new drainage systems, and through restoring riparian vegetation and replacing wetland and non-wetland roadside ditches. 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.

2.5.7. Removal of Riparian Vegetation

The proposed project would result in approximately 0.19 acre of temporary, 0.67 acre of temporal impacts, and 0.053 acre of permanent impacts to riparian vegetation adjacent to Elk Creek due to: 1) cut and fill for construction of both the temporary bridge, new bridge abutments, and roadway widening; 2) vegetation removal and grading required for construction of the temporary access roads, expansion of the bridge deck, rootwad bank revetment, and installation of water quality infiltration features; 3) minor temporary and permanent increase in shading from the debris containment system and the new bridge structure; and 4) temporary fill and localized turbidity associated with installation and maintenance of the stream diversions.

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).

Trimmed vegetation is expected to grow back and the native vegetation disturbed during construction will be replanted on-site, following project completion. The project site will be monitored to ensure the success of revegetation efforts to restore areas impacted by removal of native riparian vegetation. Therefore, the services provided by vegetation such as shade and cover, sediment storage and filtering, nutrient inputs, sources of woody debris, and habitat complexity (i.e. cover) will remain degraded at the sites until new vegetation is replanted and becomes established. When considering complete removal of trees, we expect riparian vegetation attributes on-site will return to pre-project levels after native trees are replanted and established; possibly within 5-10 years due to Caltrans' proposed AMMs, revegetation measures, and vegetation growth rates. Because of the timing and establishment of the on-site revegetation and recruitment of new woody debris, loss of riparian vegetation may cause individual steelhead to seek alternative areas for cover and forage. Such temporary displacement of steelhead is not expected to reduce their individual performance because there are sites nearby that provide these features and can accommodate additional individuals without becoming overcrowded. However, a number of individuals could remain in the area directly adjacent to areas where vegetation is either temporarily or permanently impacted. For individuals that choose to stay in the area, the impacts of reduced shade, cover, and other vegetative services (i.e. sediment storage and filtering, nutrient input, etc.) from removal of riparian vegetation is not expected to significantly reduce their performance.

All temporary and temporal impacts to riparian and wetland areas would be restored to pre-existing conditions post construction and permanent impacts would be offset through additional on-site restoration and off-site mitigation. 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.

2.5.8. 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 rootwads along the northern bank. Approximately 400 square feet of existing unvegetated large diameter RSP in the channel along the northern riverbank (installed as part of previous scour countermeasures) would be removed from below the OHWM and replaced with a combination of bioengineered RSP and LWD consisting of conifer logs and rootwads.

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).

However, the Project would result in a net increase of 180 square feet of instream habitat available to salmonids with the full span bridge replacement, which eliminates the existing two pier walls and relocates both the north and south abutments away from the active stream channel. The removal of instream fill would allow for more natural movement of sediment, debris, and flood conveyance. Similarly, removing existing unvegetated RSP and replacing with a bioengineered RSP and rootwad bank revetment on the north side of the creek is expected to improve habitat conditions for salmonids by providing velocity refuge, cover, and the addition of food resources for fish and other aquatic organisms. The change in habitat function is expected to be an improvement from the highly modified conditions that existed with the previous bridge and unvegetated RSP in place. Upon completion of instream work and cofferdam removal, instream habitat may be temporarily decreased due to equipment disturbance and redistribution of gravel within the construction area. Disturbance from using heavy equipment in the streambed is expected to be minimized with winter high flow events that will redistribute gravels and restore channel form.

2.5.9. Impact to Critical Habitat

The action area is designated critical habitat for NC steelhead and CCC coho salmon. Features of critical habitat found within the action area include sites for migration, spawning, 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, NC steelhead, 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 to be temporary and have minor effects on 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 and include methods for removal of invasive cape ivy from the southern creek bank, 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 120 feet of vegetated RSP and associated rootwads on the north side of the channel will hinder channel migration along Elk 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 Elk 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. Also, as mentioned above, the reduction of fill in the creek is expected to allow the stream channel to transport sediment and develop a natural pool and riffle sequence. 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]. 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.

NC steelhead status remains as threatened (Seghesio and Wilson 2016) due to the continuing threats that face this species including poor ocean conditions, drought and reduced freshwater habitat quality. The most current status review for this species shows no strong evidence to indicate conditions for winter-run populations in the DPS have worsened appreciably since the status review by (Seghesio and Wilson 2016). The temporary and minor loss of steelhead habitat along Elk Creek is unlikely to reduce the overall abundance of the steelhead population in the NC steelhead DPS. Juvenile NC steelhead are expected to be present within the action area during construction; however, the number of individuals that are present is expected to be lower due to the small area of stream affected and lower summer streamflows. Those present likely make up a small proportion of steelhead in Elk Creek. Due to the timing of the proposed action, it is highly unlikely adult steelhead or migrating steelhead smolts would be adversely affected by the Project.

The CCC coho salmon ESU is at a high risk of extinction. The availability of rearing habitat for coho salmon has been greatly reduced as the result of numerous developmental activities. Coho salmon require especially cold water in which to rear, and developmental activities have limited the availability of such cold-water habitats. Successful recovery of this species will very likely require protection, restoration, and enhancement of existing rearing habitats, such as Elk Creek. Russian River is the largest watershed occupied by CCC coho salmon and that it is centrally located in this ESU, it is unlikely that the CCC coho can be recovered without a successful restoration of coho salmon habitat and runs in the Russian River. However, recovery and improvement of populations in coastal streams such as Elk Creek are also important to the recovery of the species. Juvenile CCC coho are expected to be present within the action area during construction; however, the number of individuals that are present is expected to be lower due to the small area of stream affected and low summer streamflows. Those present likely make up a small proportion of coho in Elk Creek. Due to the timing of the proposed action, no adult CCC coho or migrating CCC coho smolts would be adversely affected by the Project.

As described in Section 2.5 *Effects of the Action*, NMFS identified the following components of the project that may result in effects to NC 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 and altered channel morphology. Of these, fish collections, relocation, and dewatering have the potential to result in reduced fitness, injury, and/or mortality of NC 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 Elk 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 NC steelhead and CCC coho in Elk 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 instream fill associated with the new free-span bridge and the accompanying 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 NC 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 NC 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 NC 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. The take exemption conferred by this incidental take statement is based upon the proposed action occurring as described in the Biological Opinion and in more detail in the Caltrans Biological Assessment.

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 NC steelhead is likely to occur during fish relocation and dewatering of Elk 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 NC 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 221 linear foot dewatering area of Elk 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. Table 4 below summarizes the potential mortality per season.

Table 4. Fish Exposure and Mortality Estimates for One Season of Stream Diversion, Dewatering, and Fish Relocation.

	Fish Density Estimate* (#/m^2)	**Estimated # Fish within Action Area (535 m^2)**	**Increase by 25%**	**Estimated Mortality (3%)**	**Potential Mortality/Season**
CCC Coho Salmon	0.15	114	143	4.275	**5**
NC Steelhead (winter run)	0.5	380	475	14.25	**15**

Because no more than 143 juvenile CCC coho or 475 NC steelhead are expected to be present within the 221 linear foot dewatered reach of Elk Creek each construction season, NMFS does not expect more than 5 juvenile CCC coho and 15 NC steelhead will be harmed or killed by the project each construction season. Thus, NMFS expects no more than 10 juvenile CCC coho or 30 juvenile NC steelhead would be injured or killed by fish relocation/dewatering over the life of the project.

Incidental take will have been exceeded if:

- More than 143 juvenile CCC coho salmon are captured during a construction season; or
- More than 5 juvenile CCC coho are harmed or killed during a construction season; or
- More than 475 juvenile NC steelhead are captured during a construction season; or
- More than 15 juvenile NC steelhead are harmed or killed during a construction season.

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 NC steelhead:

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

2. Undertake measures to minimize harm to steelhead 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 except 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, CA 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 remove 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) **Hydroacoustic Monitoring** -- A Hydroacoustic Monitoring Plan would be prepared by a qualified hydroacoustic specialist prior to construction. NMFS would be provided the Hydroacoustic Monitoring Plan for review prior to initiation of any pile driving or demolition work. The Hydroacoustic Monitoring Plan would describe the monitoring methodology, frequency of monitoring, positions that hydrophones would be deployed, techniques for gathering and analyzing data, quality control measures, and reporting protocols.

d) **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 five years following project completion, unless the site is documented to be performing poorly, then monitoring requirements will be extended. Reports will document vegetation health and survivorship and percent cover, natural recruitment of native vegetation (if any), and any maintenance or replanting needs. Photographs must be included. If poor establishment 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 the Elk Creek Bridge Replacement Project.

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

3. Data Quality Act Documentation and Pre-Dissemination Review

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

3.1. Utility

Utility principally refers to ensuring that the information contained in this consultation is helpful, serviceable, and beneficial to the intended users. The intended users of this opinion are Caltrans and their contractors. Individual copies of this opinion were provided to Caltrans. The document will be available within 2 weeks at the NOAA Library Institutional Repository [https://repository.library.noaa.gov/welcome]. The format and naming adhere to conventional standards for style.

3.2. Integrity

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

3.3. Objectivity

Information Product Category: Natural Resource Plan

Standards: This consultation and supporting documents are clear, concise, complete, and unbiased; and were developed using commonly accepted scientific research methods. They adhere to published standards including the NMFS ESA Consultation Handbook, ESA regulations, 50 CFR 402.01 et seq., and the MSA implementing regulations regarding EFH, 50 CFR part 600.

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

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