UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southwest Region
501 West Ocean Boulevard, Suite 4200
Long Beach, California 90802-4213

October 25, 2011

In response refer to:
2010/06445

Lieutenant Colonel Torrey A. DiCiro
U.S. Department of the Army
San Francisco District Corps of Engineers
1455 Market Street, 16th Floor
San Francisco, California 94103-1398

Dear Colonel DiCiro:

Thank you for your letter of August 11, 2011, requesting re-initiation of formal consultation with NOAA's National Marine Fisheries Service (NMFS) pursuant to section 7 of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531 *et seq.*) for the California Department of Transportation's (Caltrans) proposed Rattlesnake Creek Culvert Repair and Improvement Project in Mendocino County, California (Corps File No. 2011-00279S). The U.S. Army Corps of Engineers (Corps) proposes to authorize this project under Nationwide Permit 3 ("Maintenance") and Nationwide Permit 33 ("Temporary Construction, Access, and Dewatering") pursuant to section 404 of the Clean Water Act for Caltrans to repair to an existing double arch culvert, upstream debris rack, and an existing weir at the outlet of the culvert on Rattlesnake Creek at Highway 101.

The enclosed biological opinion is based on our review of Caltrans' proposed project and describes NMFS' analysis of potential effects on the threatened California Coastal (CC) Chinook salmon (*Oncorhynchus tshawytscha*) Evolutionary Significant Unit (ESU) and the threatened Northern California (NC) steelhead (*Oncorhynchus mykiss*) Distinct Population Segment (DPS), and critical habitat for Southern Oregon Northern California Coast (SONCC) coho salmon and CC Chinook salmon, in accordance with the ESA.

In the enclosed biological opinion, NMFS concludes the Rattlesnake Creek Culvert Repair and Improvement Project is not likely to jeopardize the continued existence of the CC Chinook salmon ESU, or the NC steelhead DPS. NMFS has also concluded the project is not likely to result in the destruction or adverse modification of critical habitat for SONCC coho salmon or CC Chinook salmon. However, NMFS anticipates take of listed CC Chinook salmon and NC steelhead may occur as a result of project construction. An incidental take statement with non-discretionary terms and conditions is included with the enclosed biological opinion. In addition, conservation recommendations have been included in the enclosed biological opinion.

This letter also transmits NMFS' Essential Fish Habitat (EFH) conclusions pursuant to section 305(b) of the Magnuson-Stevens Fisheries Conservation and Management Act (MSFCMA). Rattlesnake Creek at the Highway 101 crossing includes areas identified as EFH for SONCC coho salmon and CC Chinook salmon, which are managed under the Pacific Coast Salmon Fishery Management Plan (FMP). The proposed action has the potential to adversely affect EFH. However, the proposed action contains adequate measures to avoid, minimize, mitigate, or otherwise offset the adverse effects to EFH. With the terms and conditions set forth in the biological opinion, NMFS has no additional EFH Conservation Recommendations to provide.

If you have any questions regarding the enclosed biological opinion, please contact Mr. Joel Casagrande at (707) 575-6016, or joel.casagrande@noaa.gov.

Sincerely,

for Rodney R. McInnis
Regional Administrator

cc: Chris Yates, NMFS Long Beach
Paula C. Gill, Corps, San Francisco
Dana York, Caltrans Eureka
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Richard Macedo, CDFG
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BIOLOGICAL OPINION

ACTION AGENCY: U.S. Army Corps of Engineers, San Francisco District

ACTION: Rattlesnake Creek Culvert Repair and Improvement Project, Mendocino County, California

CONSULTATION CONDUCTED BY: National Marine Fisheries Service, Southwest Region

TRACKING NUMBER: 2010/06445

DATE ISSUED: **October 25, 2011**

I. CONSULTATION HISTORY

On June 4, 2002, the U.S. Army Corps of Engineers (Corps) requested formal consultation with NMFS pursuant to section 7 of the Endangered Species Act of 1973 (ESA), as amended (16 U.S.C. 1531 *et seq.*) on the effects of the proposed Rattlesnake Creek Culvert Repair and Improvement Project on the threatened Southern Oregon/Northern California Coast (SONCC) coho salmon (*Oncorhynchus kisutch*) Evolutionarily Significant Unit (ESU), the threatened California Coastal (CC) Chinook salmon (*O. tshawytscha*) ESU, and the threatened Northern California (NC) steelhead (*O. mykiss*) ESU and critical habitat designated for SONCC coho salmon. On May 16, 2003, NMFS issued a biological opinion for the Rattlesnake Creek Culvert Repair and Improvement Project which included an incidental take statement for each of the three salmonid species (NMFS 2003). Activities originally proposed included resurfacing of a double-barrel culvert under Highway 101, bolstering the center support for an upstream debris rack, repairing a small concrete weir downstream of the culvert outlet, and construction of a permanent access road from the highway to the creek.

Work completed by the applicant (Caltrans) during 2004 and 2005 included resurfacing the north barrel of the culvert and the construction of the permanent access road. Multiple attempts to dewater the action area were unsuccessful and most of the proposed tasks were not completed. Prior to dewatering, over 800 steelhead (consisting of multiple age classes) were relocated. The project was put on hold by Caltrans due to funding issues and because incidental take had been exceeded.

On December 22, 2008, NMFS was contacted by the applicant (Caltrans) with questions regarding the possible need to re-initiate consultation for the Rattlesnake Creek Culvert Repair and Improvement Project. Caltrans met with the California Department of Fish and Game (CDFG) and NMFS to discuss the remaining work on the debris rack, south barrel of the culvert,

and the outlet weir repairs. NMFS requested additional hydraulic data as well as stream flow and fish passage information.

In 2005, NMFS revised the designated critical habitat for ESA-listed salmonid species (70 FR 52488, September 5, 2005) and as a result, Rattlesnake Creek was designated as critical habitat for CC Chinook salmon. The effects analysis included in the original 2003 biological opinion for the dewatering and fish relocation activities was for one year, however following discussions with NMFS, a second year of dewatering and fish relocation was allowed which again failed and the activities were not completed. In May 2009, NMFS determined re-initiation of consultation was necessary due to the revised critical habitat designation for CC Chinook salmon and the exceedance of take during the initial dewatering attempts. As requested, Caltrans submitted additional hydraulic data and flow and fish passage information to NMFS in August and December 2009. Caltrans put the project on hold in February 2010 because of state budget issues, but resumed work in July 2010. In August 2010, NMFS conducted a site visit and determined additional modifications to the design were not warranted and in January 2011, CDFG also determined the project designs were suitable and additional modifications were not warranted.

On August 15, 2011, NMFS received a letter, dated August 11, 2011, from the Corps requesting re-initiation of formal consultation for the Rattlesnake Creek Culvert Repair and Improvement Project. The letter requested re-initiation of consultation because the Corps determined the project is likely to adversely the following species and critical habitats: the SONCC coho salmon ESU, the CC Chinook salmon ESU, and the NC steelhead DPS, and critical habitat for SONCC coho salmon and CC Chinook salmon. At this time, NMFS determined the information provided was sufficient to initiate consultation.

II. DESCRIPTION OF THE PROPOSED ACTION

The Corps proposes to issue a Clean Water Act permit to Caltrans for the remaining repairs and improvements to a double arch culvert crossing on Rattlesnake Creek (a tributary to the South Fork Eel River) at post mile 84.0 on Highway 101 in Mendocino County, California. Caltrans will repair the bottom of the south barrel of the culvert, repair and elevate the outlet weir, reinforce the culvert entrance, and repair the footing at the upstream debris rack. The repairs and improvements to the culvert and weir include design elements to improve fish passage conditions at the site for adult and juvenile salmonids. All in-water work will be conducted during the dry season (between June 15 and October 15) in 2013 or 2014 to avoid potential impacts on migrating and spawning adult salmon and steelhead. Dewatering will be required at two locations, around the upstream debris rack, and from the culvert inlet downstream through the culvert and past the outlet weir. Caltrans will incorporate several measures to minimize the magnitude, extent, and duration of potential impacts, including limiting in-water construction activities to the summer low flow period, prohibiting heavy equipment in the live stream, using cofferdams to isolate the construction areas from the flowing stream, restricting access to the

stream to a single access road, and implementing a re-vegetation and monitoring plan. There are no interrelated or interdependent actions associated with this project.

A. Description of Project Activities

1. Debris Rack

The debris rack, located upstream of the culvert, consists of four pier-like structures (also called standards) cemented into the creek bed. These structures prevent large debris such as boulders and trees from impinging on the culvert and potentially destroying the structure during storm events. The debris rack is functional but sections of the base have begun to erode. Only one standard needs to be repaired to maintain the function of the debris rack. Repairs will reduce the risk of failure of the debris rack, damage to the culvert, and potential damage to the creek downstream of the culvert.

Repair of the debris rack will require dewatering of approximately 2,500 square feet to allow installation of a reinforced concrete bolster. Caltrans proposes to limit dewatering to the channel area immediately surrounding the debris rack, avoiding the need to dewater the large pool immediately downstream of the debris rack where relatively large numbers of fish typically reside. Prior to construction of the water diversion facilities, block nets will be placed at the upstream and downstream end of the area to be dewatered. Once the nets are in place, a NMFS approved fisheries biologist will capture and relocate salmonids from the isolated area until they are confident few or no fish remain. Fish will be captured using authorized methods and relocated to suitable pool habitat downstream of the construction area.

Cofferdams constructed of clean imported gravel, impermeable liners (*e.g.*, plastic), water bladders, and/or sand bags will be used in conjunction with a pipe (large enough to accommodate the entire stream flow) to isolate the construction area and bypass the flow of the creek around the construction area to the large pool immediately downstream of the debris rack. Cofferdams will be placed within the netted isolated area once fish have been removed.

Water will be pumped out of the isolated construction area to water storage containers or a temporary detention or filtration basin away from the stream channel to prevent direct discharge of this water to the creek. Pump intakes will be screened in accordance with NMFS criteria to prevent accidental entrainment of juvenile salmonids. Fish relocation efforts will continue as needed during pumping activities until all salmonids have been removed.

The isolated construction area around the debris rack standard will be cleared of any loose debris and then refilled with a reinforced concrete bolster. Steel rebar will be drilled and grouted into existing bedrock to hold the concrete bolster in place. The work method will avoid the deposition of concrete into flowing water. Following installation, the concrete will be washed and the wash water removed from the channel before stream flow is restored to the work areas. All wash water will be pumped to storage containers or a temporary detention or filtration basin.

No equipment will be allowed in the flowing water of Rattlesnake Creek. All gravel, sand bags, liners, pipes, concrete debris, and other materials will be removed from the channel before stream flow is restored to the dewatered area.

2. Culvert and Outlet Weir

The culvert is a double arch structure consisting of two barrels (north and south). Each barrel is approximately 18 feet wide, 17.5 feet in height, and 245 feet long. The arch (ceiling) and side walls of the structure are intact. The bottom of each barrel is a concrete slab that is not structurally connected to the arch and side walls. The south barrel is lower in elevation than the north barrel. Consequently, the south barrel maintains flow for longer periods of time; however, the south barrel may be impassable to salmonids at very low flows. The existing concrete slab of the south barrel will be replaced with a new reinforced concrete slab approximately 1 foot thick. To improve fish passage through the culvert, the inlet of the new slab will be lowered 1 foot and the outlet lowered 0.5 foot from the existing elevations. The slope of the south barrel will be reduced from 0.4 percent to 0.2 percent. Lowering the culvert bottom in combination with raising the outlet weir (discussed below) will raise the water surface elevation and depth in the south barrel and create year-round fish passage conditions. The bottom of the north barrel was repaired in 2005. No changes in elevation of the north barrel are required because fish passage at lower flows will be provided by the south barrel. A ¼-inch thick galvanized metal plate will be installed to the concrete face of the inlet of the culvert to protect the face of the inlet and the concrete slabs from debris. The metal plate will not impede flow or fish migration at any flow level.

An existing weir located downstream of the culvert outlet (outlet weir) will be replaced with a larger concrete structure conforming to NMFS fish passage guidelines. The new weir will have a wider crest that will be covered with a ¼-inch thick galvanized metal plate. The weir includes a central notch that will be 0.5 feet above the existing slab. This will create a backwater into the culvert and provide fish passage through the culvert during low flows.

Dewatering will also be necessary to repair the south barrel of the culvert and the downstream (outlet) weir. Prior to construction of the water diversion facilities, block nets will be placed at the upstream and downstream end of the area to be dewatered. Once the nets are in place, a NMFS approved fisheries biologist will capture and relocate salmonids from this section of the creek until they are confident few or no fish remain. Fish will be captured using authorized methods and relocated to suitable habitat downstream of the construction area. Following fish removal, a temporary cofferdam will be constructed immediately upstream of the inlet of the culvert to isolate the construction area and bypass the flow of the creek through a pipe (large enough to accommodate the entire stream flow) that will extend through the culvert to the channel downstream of the weir. Another cofferdam may be needed downstream of the weir to prevent water from entering the work area. Once the cofferdam(s) are in place, fish relocation efforts and pumping activities will proceed as described above for the debris rack. Overall this will dewater approximately 7,500 square feet of live stream.

Cast-in-place methods will be used to repair the debris rack, replace the concrete bottom of the south culvert, and reconstruct the outlet weir. These areas will be completely isolated from the stream by cofferdams and dewatered before any concrete is poured. Preventative measures will be taken to ensure no uncured concrete contacts the flowing water of the creek. All cured concrete will be washed and the wash water pumped to water storage containers or a temporary detention or filtration basin. All gravel, sand bags, liners, pipes, concrete debris, and other materials will be removed from the channel before stream flow is restored to the dewatered areas.

3. Access Road

A permanent access road was constructed in 2004 to provide construction and maintenance access to the culvert and outlet weir. The road is paved and extends from a gravel turnout west of the stream crossing, down the embankment where it stops approximately 80 feet short of the active creek channel downstream of the outlet weir. In order to access the outlet weir and culvert during construction, a temporary access road approximately 80 feet long and 10 feet wide will need to be constructed between the end of the permanent access road and the creek.

Following construction, Caltrans proposes to apply appropriate erosion control treatments to all disturbed areas and implement a re-vegetation and monitoring plan to replace the losses of native trees and shrubs and restore riparian habitat values to pre-construction levels.

B. Description of the Action Area

The action area includes "all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action" (50 CFR § 402.02). The action area for the proposed project includes the in-channel construction area (up to the elevation of ordinary high water), which is approximately 426 feet in length and includes the debris rack, culvert, and downstream weir. NMFS expects there will be temporary increases in turbidity related to the construction and removal of dewatering facilities. Adverse effects related to increased turbidity are not expected to extend beyond approximately 1,000 feet, at which point, much of the suspended material will have settled and the effects related to the turbidity will have become negligible. The 1,000 foot extended impact area is based on observations of the downstream extent of turbidity during similar activities at other where substrate quality was worse (*i.e.*, finer) and summer stream flows were greater (discussed in greater detail in the *Effects of the Action* section).

III. ANALYTICAL FRAMEWORK

A. Jeopardy Analysis

In accordance with policy and regulation, the jeopardy analysis in this biological opinion relies on four components: (1) the Status of the Species, which evaluates the CC Chinook salmon ESU's and NC steelhead DPS's range-wide conditions, the factors responsible for that condition, and the species' likelihood of both survival and recovery; (2) the Environmental Baseline, which evaluates the condition of this listed species in the action area, the factors responsible for that condition, and the relationship of the action area to the likelihood of both survival and recovery of this listed species; (3) the Effects of the Action, which determines the direct and indirect effects of the proposed Federal action and the effects of any interrelated or interdependent activities on this species in the action area; and (4) Cumulative Effects, which evaluates the effects of future, non-Federal activities in the action area on this species.

The jeopardy determination is made by adding the effects of the proposed Federal action and any Cumulative Effects to the Environmental Baseline and then determining if the resulting changes in species status in the action area are likely to cause an appreciable reduction in the likelihood of both the survival and recovery of this listed species in the wild.

The jeopardy analysis in this biological opinion places an emphasis on the range-wide likelihood of both survival and recovery of this listed species and the role of the action area in the survival and recovery of the listed species. The significance of the effects of the proposed Federal action is considered in this context, taken together with cumulative effects, for purposes of making the jeopardy determination. We use a hierarchical approach that focuses first on whether or not the effects on salmonids in the action area will impact their respective population. If the population will be impacted, we assess whether this impact is likely to affect the ability of the population to support the survival and recovery of the ESU and DPS.

B. Adverse Modification Determination

This biological opinion does not rely on the regulatory definition of destruction or adverse modification of critical habitat at 50 CPR 402.02[1]. Instead, we have relied upon the statutory provisions of the ESA to complete the following analysis with respect to critical habitat.

The adverse modification analysis in this biological opinion relies on four components: (1) the Status of Critical Habitat, which evaluates the range-wide condition of critical habitat for the SONCC coho salmon and CC Chinook salmon ESU's in terms of primary constituent elements (PCEs), the factors responsible for that condition, and the intended conservation value of the critical habitat overall; (2) the Environmental Baseline, which evaluates the condition of critical habitat in the action area, the factors responsible for that condition, and the conservation value of the critical habitat in the action area; (3) the Effects of the Action, which determines the direct and indirect impacts of the proposed Federal action and the effects of any interrelated or interdependent activities on the PCEs in the action area and how that will influence the conservation value of affected critical habitat units; and (4) Cumulative Effects, which evaluates

[1] This regulatory definition has been invalidated by Federal Courts.

the effects of future, non-Federal activities in the action area on the PCEs and how that will influence the conservation value of affected critical habitat units.

For purposes of the adverse modification determination, we add the effects of the proposed Federal action on CCC steelhead critical habitat in the action area, and any Cumulative Effects, to the Environmental Baseline and then determine if the resulting changes to the conservation value of critical habitat in the action area are likely to cause an appreciable reduction in the conservation value of critical habitat range-wide. If the proposed action will negatively affect PCEs of critical habitat in the action area we then assess whether or not this reduction will impact the value of the DPS or ESU critical habitat designation as a whole.

C. Use of Best Available Scientific and Commercial Information

To conduct the assessment, 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 effects of the project's actions on the listed species in question, their anticipated response to these actions, and the environmental consequences of the actions as a whole was formulated from the aforementioned resources, the biological assessment for this project, and project meeting notes if applicable. For information that has been taken directly from published, citable documents, those citations have been referenced in the text and listed at the end of this document.

IV. STATUS OF THE SPECIES/CRITICAL HABITAT

This BO analyzes the effects of the proposed action on the salmon ESU and steelhead DPS listed below:

- CC Chinook salmon ESU, listed as threatened under the ESA (70 FR 37160)
- NC steelhead DPS, listed as threatened under the ESA (71 FR 834)

The action area is within the designated critical habitat listed below:

- SONCC coho salmon critical habitat (64 FR 24049)
- CC Chinook salmon critical habitat (70 FR 52488)

Although CC Chinook salmon, SONCC coho salmon, and NC steelhead historically have utilized the Rattlesnake Creek Watershed for spawning and rearing habitat, coho salmon have not been observed in the drainage for many decades (Scott Harris, CDFG, personal communication, 2002, CDFG 1995). Coho salmon were not observed during dewatering and fish capture and relocation efforts in 2004 and 2005, which resulted in the relocation of nearly

800 juvenile steelhead (Caltrans 2011). Based on the typical summer habitat conditions presently in the action area (low riparian canopy cover and warm daytime temperatures), NMFS does not expect juvenile coho salmon to be present during project implementation, and therefore effects to SONCC coho salmon are not assessed further in this BO. This BO will analyze affects to juvenile CC Chinook salmon (rare, but possibly present in early to mid-June) and NC steelhead (abundant at the project site). Rattlesnake Creek is not designated as critical habitat for NC steelhead.

A. Species Description, Life History, and Status

In this opinion, NMFS assesses four population viability parameters to help us understand the status of CC Chinook salmon and NC steelhead and their populations' ability to survive and recover. These population viability parameters are: abundance, population growth rate, spatial structure, and diversity (McElhany *et al.* 2000). While there is insufficient information to evaluate these population viability parameters in a thorough quantitative sense, NMFS has used existing information to determine the general condition of each population and factors responsible for the current status of the ESU and DPS.

We use these population viability parameters as surrogates for numbers, reproduction, and distribution, the criteria found within the regulatory definition of jeopardy (50 CFR 402.20). For example, the first three parameters are used as surrogates for numbers, reproduction, and distribution. We relate the fourth parameter, diversity, to all three regulatory criteria. Numbers, reproduction, and distribution are all affected when genetic or life history variability is lost or constrained resulting in reduced population resilience to environmental variation at local or landscape-level scales.

1. Chinook Salmon

a. General Life History

Chinook salmon return to freshwater to spawn when they are three to eight years old (Healey 1991). Chinook salmon runs are designated on the basis of adult migration timing; however, distinct runs also differ in the degree of maturation at the time of river entry, thermal regime and flow characteristics of their spawning site, and actual time of spawning (Myers *et al*. 1998). Both winter-run and spring-run Chinook salmon tend to enter freshwater as immature fish, migrate far upriver, and delay spawning for weeks or months. For comparison, fall-run Chinook salmon enter freshwater at an advanced stage of maturity, move rapidly to their spawning areas on the mainstem or lower tributaries of rivers, and spawn within a few days or weeks of freshwater entry (Healey 1991).

Fall-run CC Chinook salmon migrate upstream during August through December, with peak migration periods occurring in October and November (Chase *et al*. 2007). Spawning occurs from late September through December.

Regardless of run-time, Chinook salmon generally spawn in gravel beds that are located at the tails of holding pools (Myers *et al.* 1998). Adult female Chinook salmon prepare redds in stream areas with suitable gravel composition, water depth, and velocity. Optimal spawning temperatures range between 6.0 degrees (°) to 14.0° Celsius (C). Preferred spawning substrate is clean, loose gravel, mostly sized between 1 and 10 cm, with no more than 5 percent fine sediment. Chinook salmon require a strong, constant level of subsurface flow, and therefore suitable spawning habitat is more limited in most rivers. After depositing eggs in redds, most adult Chinook salmon guard the redd from 4 to 25 days before dying. Chinook salmon eggs incubate for 90 to 150 days, depending on water temperature. Successful incubation depends on several factors including dissolved oxygen levels, temperature, substrate size, amount of fine sediment, and water velocity. Maximum survival of incubating eggs and pre-emergent fry occurs at water temperatures between 6.0° and 13.0° C with a preferred temperature of 11.0° C. CC Chinook salmon fry emerge from the redd during December through mid-April (Leidy and Leidy 1984).

After emergence, Chinook salmon fry seek out areas behind fallen trees, back eddies, undercut banks, and other areas of bank cover (Everest and Chapman 1972). As they grow larger, their habitat preferences change. Juveniles move away from stream margins and begin to use deeper water areas with slightly faster water velocities, but continue to use available cover to minimize the risk of predation and reduce energy expenditure. Fish size appears to be positively correlated with water velocity and depth (Chapman and Bjornn 1969, Everest and Chapman 1972). Optimal temperatures for both Chinook salmon fry and fingerlings range from 12.0° to 14.0° C, with maximum growth rates at 13.0° C (Boles 1988). Chinook salmon feed on small terrestrial and aquatic insects and aquatic crustaceans. Cover, in the form of rocks, submerged aquatic vegetation, logs, riparian vegetation, and undercut banks provide food, shade, and protect juveniles from predation.

CC Chinook salmon will rear in freshwater for a few months and out-migrate between February and early July (Myers *et al*. 1998, Chase *et al.* 2007). CC Chinook tend to use estuaries and coastal areas for rearing more extensively than Central Valley winter-run or spring-run Chinook salmon. The brackish water areas in estuaries moderate the physiological stress that occurs during parr to smolt transitions.

b. Status of CC Chinook Salmon ESU

The CC Chinook salmon ESU was historically comprised of approximately 38 Chinook salmon populations (Bjorkstedt *et al*. 2005, Spence *et al.* 2008). Many of these populations (about 21) were independent, or potentially independent, meaning they had a high likelihood of surviving for 100 years absent anthropogenic impacts. The remaining populations were likely more dependent upon immigration from nearby independent populations than dependent populations of other salmonids (Bjorkstedt *et al*. 2005, Spence *et al.* 2008).

Data on CC Chinook abundance, both historical and current, are sparse and of varying quality (Bjorkstedt *et al*. 2005, Spence *et al.* 2008). Estimates of absolute abundance are not available for populations in this ESU (Myers *et al.* 1998). In 1965, CDFG estimated escapement for this ESU at over 76,000 (CDFG 1965). Most were in the Eel River (55,500), with smaller populations in Redwood Creek (5,000), Mad River (5,000), Mattole River (5,000), Russian River (500) and several smaller streams in Humboldt County (Myers *et al.* 1998). Currently available data indicate abundance is far lower, suggesting an inability to sustain production adequate to maintain the ESU's populations. Recent growth rates are negative for Chinook salmon coast-wide in California. For example, in 2007, 2008, and 2009, dramatic declines in Chinook salmon returns occurred throughout California (SWFSC 2008, Lindley *et al.* 2009).

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

Because of their prized status in the sport and commercial fishing industries, CC Chinook salmon have been the subject of many artificial production efforts, including out-of-basin and out-of-ESU stock transfers (Bjorkstedt *et al.* 2005). It is therefore likely CC Chinook salmon genetic diversity has been significantly adversely affected despite the relatively wide distribution of populations within the ESU. An apparent loss of the spring-run Chinook life history in the Eel River Basin and elsewhere in the ESU also indicates risks to the diversity of the ESU.

Data from the 2009 adult CC Chinook salmon return counts and estimates indicated a further decline in returning adults across the range of CC Chinook salmon on the coast of California (Jeffrey Jahn, NMFS, personal communication 2010). Ocean conditions are suspected as the principal short term cause because of the wide geographic range of declines (SWFSC 2008, Lindley *et al.* 2009). However, the number of adult CC Chinook salmon returns in the Russian River Watershed increased substantially in 2010/2011 compared to 2008/09 and 2009/10 returns[2]. In addition, the number of CC Chinook salmon returns to the Van Arsdale Fisheries Station located on the Upper Eel River also increased substantially in the fall of 2010, exceeding the number of adult Chinook salmon counted in this system since counts began in 1933 (Jeffrey Jahn, personal communication 2011).

2. <u>Steelhead</u>

a. General Life History

[2] http://www.scwa.ca.gov/chinook/

Steelhead are anadromous forms of *O. mykiss*, spending some time in both freshwater and saltwater. Steelhead young usually rear in freshwater for one to three years before migrating to the ocean as smolts. Migration to the ocean usually occurs in late winter and spring. Steelhead may remain in the ocean for one to five years (two to three years is most common) before returning to their natal streams to spawn (Shapovalov and Taft 1954, Busby *et al*. 1996, Moyle 2002). The distribution of steelhead in the ocean is not well known. Coded wire tag recoveries indicate most steelhead tend to migrate north and south along the continental shelf (Barnhart 1986). The timing of upstream migration steelhead adults is correlated with higher flow events, in winter or spring. In contrast to other species of *Oncorhynchus*, steelhead may spawn more than one season before dying (iteroparity); although one-time spawners represent the majority (Shapovalov and Taft 1954).

Out-migration appears to be more closely associated with size than age. In Waddell Creek, Shapovalov and Taft (1954) found steelhead juveniles migrating downstream at all times of the year, with the largest numbers of young-of-year (YOY, or Age 0+) and yearlings (Age 1+) steelhead moving downstream during spring and summer. Cover is an important habitat component for juvenile steelhead, both as a velocity refuge and as a means of avoiding predation (Meehan and Bjornn 1991). Juvenile steelhead tend to use riffles and other habitats not strongly associated with cover during summer rearing more than other salmonids (Everest and Chapman 1972, Smith and Li 1983). Young steelhead feed on a wide variety of drifting aquatic and terrestrial insects (Everest and Chapman 1972, Moyle 2002). In winter, juvenile steelhead become less active and hide in available cover, including gravel or woody debris (Moyle 2002).

Juvenile steelhead typically reside in freshwater habitats during their first summer (or more), and therefore adequate stream flow and water temperature are critical for their survival. Water temperature can influence the metabolic rate, distribution, abundance, and swimming ability of rearing juvenile steelhead (Barnhart 1986, Myrick and Cech 2005). Optimal temperatures for steelhead growth range between 10 and 20° C (Hokanson *et al.* 1977, Wurtsbaugh and Davis 1977, Myrick and Cech 2005). Fluctuating diurnal water temperatures are also important for the survival and growth of salmonids (Busby *et al.* 1996). Suspended sediment concentrations, or turbidity, also can influence the distribution and growth of steelhead (Bell 1973, Sigler *et al*. 1984, Newcombe and Jensen 1996). Bell (1973) found suspended sediment loads of less than 25 milligrams per liter (mg/L) were typically suitable for rearing juvenile steelhead.

b. Status of NC Steelhead DPS

Overall, population numbers for NC steelhead are severely reduced from pre-1960s levels, when approximately 198,000 adult NC steelhead migrated upstream to spawn in the major rivers of this DPS (65 FR 36074, Busby *et al.* 1996). Adult return data from dams on the upper Eel River and Mad River between the 1930's and 1980's indicate the populations of NC steelhead in these watersheds have declined substantially since the 1930's and 40's (Good *et al.* 2005) and data from the Cape Horn Dam on the Eel River show strong declines prior to 1970 (63 FR 13347). The upper reaches, in particular, have suffered drastic declines since 1988 (CDFG 1997).

Current comprehensive geographic distribution information is not available for this DPS, but NC steelhead are considered to remain widely distributed (NMFS 1997). Good *et al.* (2005) identified barriers to migration, poor forest and other land use practices that cause sedimentation and loss of spawning gravels, and invasive species (*e.g.*, Sacramento pikeminnow, *Ptychocheilus grandis*) as major risks and limiting factors affecting populations of NC steelhead. Two populations, the Mad River and Upper Eel River, have lost considerable amounts of historic habitat due to dams (Spence *et al.* 2008). Hatchery practices in this DPS have exposed the wild population to genetic introgression and the potential for deleterious interactions between native stock and introduced steelhead (65 FR 36074). As with previous reviews, the biological review team concluded the NC steelhead DPS is likely to become endangered (Good *et al.* 2005).

Adult returns of NC steelhead during 2007/08 were considered average, data from the 2008/09 adult NC steelhead were lower and indicate populations remained suppressed across much of their range compared to historic amounts. However, returns during the 2009/10 and preliminary data on the 2010/11 returns indicate increases in many populations of NC steelhead compared to the previous two years (Jeffrey Jahn, personal communication, 2011).

4. Status of Critical Habitat for SONCC coho salmon and CC Chinook salmon

The condition of critical habitat for SONCC coho salmon and CC Chinook salmon, specifically its ability to provide for their conservation, has been degraded from conditions known to support viable salmonid populations. NMFS has determined the present depressed population conditions are, in part, the result of the following human-induced factors affecting critical habitat: logging, agriculture, and mining activities, urbanization, stream channelization, dams, wetland loss, and water withdrawals, including unscreened diversions for irrigation. Migration, rearing and spawning PCEs have been lost.

Numerous studies have demonstrated that land use activities associated with logging, road construction, urban development, mining, agriculture, and recreation have significantly degraded critical habitat quantity and quality in the ESUs. Impacts of concern include alteration of stream bank and channel morphology, alteration of water temperatures, fragmentation of habitat, loss of downstream recruitment of spawning gravels and large woody debris, degradation of water quality, removal of riparian vegetation resulting in increased stream bank erosion, increases in erosion entry to streams from upland areas, loss of shade (higher water temperatures) and loss of nutrient inputs (Busby *et al.* 1996, Myers *et al*. 1998, 70 FR 52488). Depletion and storage of natural river and stream flows have drastically altered natural hydrologic cycles in many of the streams in the ESUs. Alteration of flows results in migration delays, loss of suitable habitat due to dewatering and blockage; stranding of fish from rapid flow fluctuations; entrainment of juveniles into poorly screened or unscreened diversions, and increased water temperatures harmful to salmonids.

B. Factors Responsible for Salmonid Stock Declines

NMFS cites many reasons (primarily anthropogenic) for the decline of salmonids (Busby *et al.* 1996, Myers *et al.* 1998, Adams 2000, Good *et al.* 2005). The foremost reason for the decline in these anadromous populations is the degradation and/or destruction of freshwater and estuarine habitat caused by anthropogenic disturbances such as urban development, agriculture, logging, water resource development, and dams. Additional factors contributing to the decline of these populations include: poor estuary/lagoon management (Smith 1990, Bond 2006), commercial and recreational harvest, artificial propagation (Waples 1991), natural stochastic events, marine mammal predation (NMFS 1999, Hanson 1993), reduced marine-derived nutrient transport (Bilby *et al.* 1996, Bilby *et al.* 1998, and Gresh *et al.* 2000), and most recently poor ocean conditions (Lindley *et al.* 2009).

C. Global Climate Change

Modeling of climate change impacts in California suggests average summer air temperatures are expected to increase (Lindley *et al*. 2007). Heat waves are expected to occur more often, and heat wave temperatures are likely to be higher (Hayhoe *et al*. 2004). Total precipitation in California may decline; critically dry years may increase (Lindley *et al*. 2007, Schneider 2007). The Sierra Nevada snow pack is likely to decrease by as much as 70 to 90 percent by the end of this century under the highest emission scenarios modeled (Luers *et al*. 2006). Wildfires are expected to increase in frequency and magnitude, by as much as 55 percent under the medium emissions scenarios modeled (Luers *et al*. 2006). Vegetative cover may also change, with decreases in evergreen conifer forest and increases in grasslands and mixed evergreen forests. The likely change in amount of rainfall in northern and central coastal streams under various warming scenarios is less certain, although as noted above, total rainfall across the state is expected to decline. For the California North Coast, some models show large increases (75 to 200 percent) while other models show decreases of 15 to 30 percent (Hayhoe *et al*. 2004). Many of these changes are likely to further degrade salmonid habitat by, for example, reducing stream flows during the summer and raising summer water temperatures. Estuarine productivity is likely to change based on changes in freshwater flows, nutrient cycling, and sediment amounts (Scavia *et al.* 2002). In marine environments, ecosystems and habitats important to sub adult and adult salmonids are likely to experience changes in temperatures, circulation and chemistry, and food supplies (Feely *et al.* 2004, Brewer 2008, Osgood 2008, Turley 2008). The projections described above are for the mid to late 21st Century. In shorter time frames natural climate conditions are more likely to predominate (Cox and Stephenson 2007, Smith *et al.* 2007).

V. ENVIRONMENTAL BASELINE

The environmental baseline is the current status of the species and critical habitat in the action area based on analysis of the effects of past and ongoing human and natural factors. 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 impacts of State or private actions which are contemporaneous with the consultation in process (50 CFR 402.02).

The action area is located on Rattlesnake Creek, a large tributary to the South Fork Eel River. Rattlesnake Creek is a perennial stream that drains approximately 37.5 square miles and has 11 miles of blue line stream (Caltrans 2011). Rattlesnake Creek flows west and joins the South Fork Eel River at river mile 74.3, approximately 7 miles southeast of the town of Leggett in northern Mendocino County. Elevations in the South Fork Eel River watershed range from 100 to 4,500 feet. According to Bureau of Land Management (BLM) *et al.* (1996), the South Fork Eel watershed contains 713 miles of United States Geologic Survey (USGS) identified streams. Approximately 20 percent of the watershed is publically owned by California State Parks and BLM (U.S. EPA 1999). Rattlesnake Creek and other eastside tributaries of the South Fork Eel River have relatively high summer water temperatures because of low canopy cover (less than 30 percent) and warm inland air temperatures.

By the early 20th century the South Fork Eel River watershed experienced rapid growth with the development of tanbark harvesting for tannin. After World War II, timber harvesting increased dramatically and continued for about 20 years until all of the Douglas fir on private lands had been harvested (BLM *et al.* 1996). The most recent economic trend in the watershed is illegal marijuana cultivation, which started in the 1970's (BLM *et al.* 1996). Severe floods in 1955, 1964, and 1986, exacerbated by land use practices, were major factors contributing to the population declines and habitat degradation of CC Chinook salmon and steelhead in the Eel River Watershed (Yoshiyama and Moyle 2010). Elevated culverts and dysfunctional fish ladders have reduced fish passage in many tributaries throughout the drainage (Lang 2005, Yoshiyama and Moyle 2010).

A. Status of Critical Habitat in the Action Area

Rattlesnake Creek is considered an eastside basin within the South Fork Eel River watershed, which generally experiences greater daytime air temperatures and has more limited forest cover. CDFG conducted a stream habitat survey of Rattlesnake Creek in 1993, which extended from the confluence with the South Fork Eel River upstream approximately 8.6 miles (CDFG 1995). CDFG ended their survey due to landowner access problems; however they noted un-surveyed anadromous habitat existed beyond this point. Stream flows at the mouth of Rattlesnake Creek were measured at approximately 6-7 cubic feet per second (cfs), with upstream areas measuring about 3-4 cfs at the time of the survey in August.

The channel of Rattlesnake Creek in the project area is dominated by bedrock and patchy willows and alders above the high water mark. The surrounding hill slopes are steep and vegetated with species common to the coastal mountains, including Douglas fir, tanoak, California buckeye, poison oak, and *Ceanothus*. Stream flow is typically less than 5 cubic feet per second (cfs) during the summer months. Pool habitat comprises about 20 percent of the stream length in the project area and many of these pools are greater than 3 feet deep. The pools

provide rearing habitat for larger yearlings and older salmonid age classes and some may provide refuge from high water temperatures. Stream temperatures ranged from 13.0 to 23.0°C during June and July of 1993 (CDFG 1995). Typically, these water temperatures are suitable for summer rearing by juvenile steelhead, but may reach levels that cause temporary stress to rearing steelhead during the warmest days of the summer if food is insufficient (Smith and Li 1983, Bjornn and Reiser 1991). Elevated summer water temperatures in Rattlesnake Creek are a result of both natural (*e.g.*, geographic location) and anthropogenic (*e.g.*, historic logging) conditions. Riparian canopy cover over Rattlesnake Creek averaged approximately 29 percent throughout. Summer water temperatures are generally not suitable for coho salmon rearing, but are adequate for steelhead. Habitat conditions in the action area are suitable for salmon and steelhead spawning.

In the action area, the banks upstream of the culvert consist largely of bedrock, which naturally precludes the development of riparian vegetation. Downstream of the culvert, the banks consist of gravel and cobble, however due to the steep nature of the canyon, riparian vegetation along these banks, particularly along the low flow channel, are scoured during winter high flows. By summer, willow saplings are present with some larger (but still young) willows further from the water's edge. Overall, these trees provide little shade. Shade is provided more by the steep canyon walls than by a riparian tree canopy.

Based on the above information, NMFS believes the overall PCEs for rearing are somewhat degraded because some essential elements (*e.g.*, appropriate water temperatures) may have been adversely impacted by past logging related activities (as described above and below). The PCEs for migration through the action area are considered good, although several natural bedrock falls may cause temporary delays in adult upstream migration and some prevent juvenile passage during low flow conditions (Becker and Reining 2009). Overall, the PCEs for spawning appear to be in good condition throughout Rattlesnake Creek based on availability and quality of spawning gravels in the creek (CDFG 1995, Joel Casagrande, NMFS, personal observation, August 25, 2010).

B. Status of Listed Salmonids within the Action Area

The Rattlesnake Creek Watershed supports a natural run of steelhead, which has been classified as a functionally independent population within the North Coastal Diversity Stratum, and a natural run of Chinook salmon, which was also classified as a functionally independent population within the North Coastal Diversity Stratum (Bjorkstedt *et al.* 2005, Spence *et al.* 2008). Both species currently use Rattlesnake Creek as migration, spawning, and rearing habitat. Habitat conditions in the project action area appear to be suitable for salmon and steelhead spawning (NMFS 2003, CDFG 1995). Biological surveys conducted in 1993 and recent observations in 2001 and 2002 indicate Rattlesnake Creek supports relatively high densities of juvenile steelhead representing multiple age classes both upstream and downstream of the project culvert (CDFG 1995). In 2005, 738 juvenile steelhead, consisting of multiple age classes, were relocated from the project action area as part of the original dewatering attempts

for this project (Caltrans 2011). During a site visit in August 2010, juvenile steelhead of multiple age classes were abundant throughout the project action area (Joel Casagrande, NMFS, personal observation, August 25, 2010).

CDFG conducted carcass surveys in 1987, and found 20 Chinook salmon carcasses and 6 redds, indicating use of Rattlesnake Creek by Chinook salmon for spawning is likely to still occur. Juvenile Chinook salmon were not found during the dewatering attempts in 2004 or 2005. Chinook salmon juveniles typically emigrate from their natal streams by late spring and therefore are not expected to be present during summer and fall surveys.

Summer surveys between 1997 and 2003 failed to detect juvenile coho salmon or Chinook salmon (NMFS 2003). However, CDFG biologists have noted the presence coho salmon in Rattlesnake Creek is possible if suitable habitat conditions (*i.e.,* cool summer water temperatures) were to be present (S. Harris, CDFG, personal communication 2002). CDFG recovery planning recommendations state most tributaries on the east side of the South Fork Eel River Watershed (including Rattlesnake Creek) have little potential for coho salmon recovery (CDFG 2002). No juvenile coho salmon were observed during the fish relocation attempts in 2004 or 2005.

Since the early 1990's, juvenile steelhead in Rattlesnake Creek (including the action area), have been abundant during various surveys and observations. Although the current populations of steelhead and Chinook salmon are thought to be well below historic levels in the South Fork Eel River (Yoshiyama and Moyle 2010), there is no data to suggest the number of returning adults of either species is increasing or decreasing in Rattlesnake Creek. During the winter of 2010/2011, the number of returning adult Chinook salmon to the Eel River drainage (based on counts at the Van Arsdale Fisheries Station on the upper Eel River mainstem) were the highest observed since counts began in 1933. However, one year of high returns to the mainstem of the Eel River following decades of low returns does not confirm an improved population trend in the South Fork Eel River, or its tributary Rattlesnake Creek.

C. Factors Affecting Species Environment within the Action Area

Most of the factors affecting ESA-listed fish species and their environment in the action area are related to fish passage (both natural and anthropogenic causes). Bedrock falls are common along lower Rattlesnake Creek and many form natural barriers to juvenile salmonids during low flow conditions (Becker and Reining 2009). During a survey in 1939, CDFG noted Rattlesnake Creek downstream of its confluence with Mad Creek (located approximately 0.75 miles upstream of the action area), had a number of steep natural falls and cascades that were suspected of limiting juvenile passage during low flow conditions (Becker and Reining 2009). The bedrock fall located at the debris rack is an example of one of these areas that likely restricts juvenile upstream passage during the dry season. Although the debris rack is checked and cleared, adult salmonids migrating upstream during winter may be temporarily blocked if the rack becomes clogged with a significant amount of debris (*e.g.,* woody material). The two barrels of the

culvert currently dry during most summers with the north barrel drying first. If and when the south barrel dries, the stream becomes disconnected and therefore juvenile passage is restricted. As described above, the proposed project seeks to repair the culvert bottom (lower the culvert bottom elevation) and repair the small weir immediately downstream of the culvert outlet which will maintain surface flows through at least the south barrel year round. Other factors include elevated water temperatures during summer that are the result of both natural and past anthropogenic influences at a watershed scale (*i.e.*, historic logging, discussed above).

D. Previous Section 7 Consultations and Section 10 permits in the Action Area

In 2003, NMFS issued its biological opinion (NMFS 2003) for the Rattlesnake Creek Culvert Repair and Improvement Project. Construction was authorized to start in the summer of 2004 and was to be completed by October 15 of the same year. Construction began late due to a delay in awarding of the contract to the contractor. The contractor, Sonoma Engineering Inc. (SEI), had trouble successfully dewatering the project area, yet in the process relocated 63 young-of-the-year (YOY) steelhead with one mortality (64 total fish captured). Following this activity, the project was shut down by the Occupational Safety Health Administration (OSHA). After all OSHA requirements were fulfilled, SEI again attempted to dewater the project area and 30 juvenile steelhead were removed and relocated. However, dewatering was again unsuccessful and the project could not be completed in 2004 (Caltrans 2011). In early 2005, NMFS and Caltrans agreed on a second year of dewatering and fish relocation (Jacqueline Pearson-Meyer, NMFS, personal communication, September 2011). That summer, SEI attempted to dewater the project site again, which was a much larger operation than the attempts in 2004. A total of 675 YOY steelhead, 53 Age 1+ steelhead, and 10 Age 2+ steelhead were removed with three total mortalities (738 total steelhead). Again, the entire project was not completed due to difficulties with dewatering.

The work completed in 2004 and 2005 included repairing the north barrel and construction of the access road. Large storms during the winter of 2005-2006 further damaged the south barrel of the culvert, exposing rebar reinforcement. The weir at the outlet was also further damaged, creating pools that presented a stranding risk to juvenile salmonids.

Aside from the original consultation for this project (described above), no other section 7 consultations have occurred in the action area.

Section 10(a)(1)(A) research and enhancement permits and research under exemptions granted under section 4(d) of the ESA could potentially occur in the Rattlesnake Creek Watershed in the future. Based on NOAA's Authorizations and Permits for Protected Species (APPS) website[3], there are currently five active section 10(a)(1)(A) research and enhancement permits have been issued that authorize research on salmonids in the South Fork Eel River Watershed, of which only Permits 10093 issued to CDFG Region 1, and 1044 issued to NMFS's Southwest Fisheries

[3] https://apps.nmfs.noaa.gov/search/search.cfm

Science Center specifies and authorizes sampling throughout the South Fork Eel River Watershed (including Rattlesnake Creek). There are no authorized research projects under the 2011 4(d) research program, and NMFS is unaware of any potential activities that may request coverage under the 4(d) research program in future years. In general, all research activities are closely monitored and require measures to minimize take during the research activities. As of August 2011, no take of salmonids has occurred in the action area related to research permits and NMFS is unaware of any proposed sampling in the immediate future.

VI. EFFECTS OF THE ACTION

A. Fish Capture and Relocation and Dewatering the Project Area

The repair of the debris rack, culvert inlet, culvert bottom, and the outlet weir will require dewatering of portions of the action area and therefore fish capture and relocation will be necessary. As described above, prior to construction of the dewatering facilities, block nets will be placed at the upstream and downstream end of each dewatered area. Once the nets are in place, a NMFS approved fisheries biologist will capture and relocate salmonids from the dewatered areas until they are confident few or no fish remain. Fish capture and relocation will continue once the dewatering process begins in order to ensure fish are not stranded during the drawdown of the dewatered areas. At the debris rack, captured juvenile steelhead will be relocated upstream of the debris rack, and at the culvert/outlet weir dewatered area, juvenile steelhead will be relocated downstream. All juvenile CC Chinook will be relocated downstream of the outlet weir so they may continue on their out-migration.

Based on the number of fish observed during recent surveys and relocation efforts for this project (738 steelhead relocated in 2005) described above, and the reduced size of the dewatered area, NMFS estimates up to 500 juvenile steelhead may be present within the dewatered areas. The likelihood of juvenile Chinook salmon is very low, but does exist. Juvenile Chinook salmon normally migrate out of their natal stream between 60 and 150 days post-hatching (*i.e.*, by early summer), but under some conditions may remain in freshwater their first year (Myers *et al.* 1998). Although juvenile Chinook salmon were not found during relocation efforts in 2004 and 2005, adult Chinook salmon carcasses have been observed in Rattlesnake Creek in the past, and in wetter years the out-migration period for juvenile Chinook salmon may extend into late June or even early July. Late emigration has been observed in other nearby watersheds within the CC Chinook salmon ESU (Chase *et al.* 2007). Based on this information, NMFS anticipates a small number of CC Chinook salmon (up to 50 individuals) may be present during fish capture and relocation activities.

Caltrans proposes to use seines and backpack electrofishing to capture and relocate salmonids. Fish capture and relocation activities pose a risk of injury or mortality to fish species. 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 both the CDFG and NMFS guidelines, direct effects to and mortality of steelhead and Chinook salmon during capture will be minimized. Data from years of similar salmonid relocation activities indicate average mortality rate is below one percent (Collins 2004; CDFG 2005, 2006, 2007, 2008, 2009, 2010). Based on this information, NMFS will use 2 percent as the maximum amount of mortality likely from fish relocation for the project; or no more than ten juvenile steelhead and one juvenile Chinook salmon.

Although sites selected for relocating fish should have ample habitat, in some instances relocated fish may endure short-term stress from crowding at the relocation sites. Relocated fish may also have to compete with other fish causing increased competition for available resources such as food and habitat (Keeley 2003). Stress from crowding, including increased competition for food among juvenile steelhead in the relocation areas will be minimal and temporary, because when the project is finished steelhead will be able to redistribute in the creek unimpeded. NMFS cannot estimate the number of fish affected by competition, but does not believe this impact will be large enough to affect the survival chances of individual fish. For example, the use of multiple release sites will help facilitate fish dispersion, limiting competition. Once the project is complete and following the first precipitation event, juvenile Chinook salmon and steelhead rearing space will return to the dewatered area. Despite these impacts, fish relocation operations, if necessary, are expected to significantly minimize project impacts to juvenile steelhead and Chinook salmon by removing them from areas where they would have experienced high rates of injury and mortality.

B. Dewatering

Direct effects from dewatering will occur to juvenile salmonids within this reach, and most likely to juvenile steelhead only. Caltrans has worked with NMFS to minimize the area that will be subject to dewatering. As described above, two separate areas will be dewatered: 1) the area immediately around the debris rack and 2) the area encompassing the culvert and outlet weir. Stream flow in the large pool between the debris rack and the culvert inlet will be maintained (river flow will be diverted around debris rack area into the large pool). This will substantially minimize relocation of juvenile salmonids and maintain the maximum amount of rearing habitat within the project area.

Caltrans has proposed to construct cofferdams from a suite of different materials and would like to maintain the flexibility to use clean imported gravel, impermeable liners (*e.g.*, plastic), water bladders, and/or sand bags to accomplish cofferdam construction. Low levels of turbidity are expected to occur as a result of the cofferdam construction. Caltrans will construct the cofferdams without the use of heavy equipment in the live stream. Fish capture and relocation will occur prior to (and after) the construction of the cofferdams. This will remove most, if not all, fish from the areas where the cofferdams will be constructed. Juvenile salmonids that avoid

capture prior to the implementation of site dewatering will die if not captured while the dewatering is underway. Caltrans or its contractors will continue fish capture and relocation during the dewatering process. NMFS expects the number of juvenile salmonids that will be killed as a result of stranding during dewatering activities will be one percent or less of the fish within the action area prior to dewatering, or no more than five steelhead and one Chinook salmon. During the dewatering process, the biologist on site will make every effort to collect and relocate fish that avoided capture prior to the beginning of the dewatering process.

Another manner by which juvenile salmonids may be harmed or killed during dewatering activities is to be entrained into the pumps or discharge line. To eliminate this risk, the applicant will screen all pumps according to NMFS criteria, to ensure juvenile steelhead or Chinook salmon will not be harmed by the pumps during dewatering events.

Juvenile salmonids rearing downstream of the action area may be inadvertently affected by the loss of benthic (*i.e.*, bottom dwelling) aquatic macroinvertebrate production within the dewatered area (Cushman 1985). However, effects to aquatic macroinvertebrates resulting from dewatering will be temporary because construction activities will be relatively short-lived, drift from upstream will continue through the pipe, and rapid re-colonization (about two to three months) of disturbed areas by macroinvertebrates is expected following construction (Cushman 1985, Thomas 1985, Harvey 1986).

C. Effects of Access Road Construction

At the end of the permanent access road some additional disturbance is expected when contractors gain access to the stream channel to conduct work on the weir and both culvert bottom. This area is approximately 80 feet long and 10 feet wide and has a relatively gentle slope, which should reduce the need for major ground disturbance for access. Increases in turbidity caused by the construction of the access road are discussed below and the effects of vegetation removal are discussed below in the *Habitat Loss* section.

D. Turbidity

NMFS anticipates only short-term increases in turbidity will occur during the construction and removal of cofferdams. Suspended sediment may affect salmonid feeding behavior and efficiency, resulting in reduced growth rates (Sigler *et al.* 1984, Newcomb and Jensen 1996). Also, because of turbidity, salmonids disperse from established territories, which can temporarily displace fish into less suitable habitats and which can lead to reduced growth rates (Sigler *et al.* 1984).

Much of the research discussed in the paragraph above focused on turbidity levels higher than those expected to occur during implementation of the proposed activities. As described above in

the Environmental Baseline, substrate throughout the action area consists of course material (cobbles, boulders and bedrock) with very low abundance of fine sediment (Joel Casagrande, NMFS, personal observation, August 25, 2010), and because of these conditions, NMFS expects the increase in turbidity to be minor during the proposed activities. Still, the effects of elevated turbidity may extend downstream approximately 1,000 feet, beyond which, much if not all of the suspended material would settle in the stream channel. Observations of turbidity response during removal of dewatering facilities in a Central California Coast watershed where substrate quality was considerably worse and stream flows were higher indicated a majority of the suspended sediment dropped out in the first 300 to 400 feet from the source (Joel Casagrande, NMFS, personal observation).

Monitoring of newly replaced culverts within Humboldt County indicated temporary increases in turbidity following winter storm events in which the measured turbidity was generally less than the turbidity threshold commonly cited as beginning to cause minor behavioral changes (Humboldt County 2002, 2003, and 2004), and always less than turbidity levels necessary to injure or kill salmonids. Impacts associated with degraded water quality will likely be limited to behavioral effects, such as temporarily vacating preferred habitat or temporarily reduced feeding efficiency. These temporary changes in behavior, may slightly reduce growth rates, but are not likely to reduce the survival chances of individual juvenile salmonids. Caltrans has included BMPs to reduce the likelihood of sediments from entering the stream. NMFS assumes these actions will be effective at reducing sedimentation rates. Any increases in turbidity due to the construction of coffer dams and during the initial re-wetting of the reconfigured channel will likely be minimal due to the minimal amount of fine sediment available for suspension in the action area and the incorporation of BMP's and adherence to the listed terms and conditions in this biological opinion. Therefore, any short-term impact associated with turbidity during implementation of this project is expected to be insignificant.

E. Debris Rack Repair

Reinforced concrete will be used to re-bolster the eroded center debris rack support. This will include filling small portions of the two pools immediately downstream of the rack. NMFS expects the minor reduction in pool volume as a result of filling small portions of these two pools with concrete will not result in substantial impacts to the availability or quality of habitat for rearing steelhead. The filling will not result in a reduction in pool depth and will only marginally impact the width of the pools. The pool on the left bank side of the support often becomes disconnected during low flow conditions. The repaired footing will be constructed with a tunnel-like opening (at the request of CDFG) in order to connect the two pools. This will provide improved habitat connectivity and will prevent the potential stranding of rearing steelhead in the left bank pool during low flow conditions.

F. Habitat Loss

Impacts on riparian and aquatic habitat will occur as a result of the temporary loss of vegetation

within the footprint of the proposed temporary access road and during the repairs to the outlet weir. Riparian zones serve important functions in stream ecosystems by providing shade, sediment storage, nutrient inputs, channel and stream bank stability, habitat diversity, and cover and shelter for fish (Murphy and Meehan 1991). Small streams are especially sensitive to loss of riparian habitat and shade, which moderates stream temperatures by insulating the stream from solar radiation and reducing heat exchange with the surrounding air. This function is particularly important for Rattlesnake Creek, where summer water temperatures frequently exceed optimum levels for rearing salmon and steelhead.

To minimize the temporal loss of riparian vegetation and the potential for incremental effects on stream temperatures, Caltrans proposes to limit the amount of vegetation removed to the least amount possible. Overall, riparian vegetation is sparse throughout the action area. Existing vegetation will be preserved to the extent possible by pruning or, if necessary, cutting individual plants to within a few inches of the ground to allow natural regeneration to occur following construction (*i.e.*, grubbing will not be conducted). Construction of the temporary access road extension will likely require the removal of riparian vegetation from approximately 24 square feet of creek bank. Meanwhile the repair of the outlet weir may require the removal of vegetation from approximately 26 square feet of creek bank. Most of the vegetation to be removed is consists of young willow saplings. Following repairs to the culvert and weir, all of the disturbed areas will be planted with native vegetation in accordance with an approved re-vegetation and monitoring plan. Because of the small areas affected, the rapid re-growth of willows, and the implementation of a re-vegetation and monitoring plan, NMFS does not believe the effects of the small amount of vegetation removal along the bank of Rattlesnake Creek will result in appreciable impacts to listed critical habitat or species.

H. Beneficial Effects

The Rattlesnake Creek Culvert Repair and Improvement Project is expected to have some beneficial effects for ESA-listed salmonids. As discussed above, lowering of the bottom of the south barrel and modifying the existing outlet weir will reduce flow velocities through the culvert during winter and help to maintain summer flow through the culvert which will improve fish passage conditions for adults and juveniles throughout the year.

VII. CUMULATIVE EFFECTS

Cumulative effects include the effects of future State, tribal, local, or private actions that are reasonably certain to occur in the action area considered in this biological opinion. 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. Caltrans is not aware of any additional actions that would cause cumulative effects beyond those that are ongoing and have been analyzed in the environmental baseline of this biological opinion (Caltrans 2011). In the long term, global climate change may produce temperature and

precipitation changes that may adversely affect listed salmonids in the action area. Because this project improves habitat, it may help to provide some resilience to climate change.

VIII. INTEGRATION AND SYNTHESIS

Both the NC steelhead and CC Chinook salmon populations are listed as threatened. Throughout the NC steelhead DPS and CC Chinook salmon ESU and their respective Diversity Strata, stream habitat has been significantly impacted by multiple anthropogenic activities (*i.e.*, logging, agriculture, dams, and stream channelization), which, in turn, have been exacerbated by periodic weather events (*e.g.*, severe floods). Cumulatively, these impacts have contributed to substantial declines in the abundance of both species in many of the watersheds in this region (Good *et al.* 2005, Spence *et al.* 2008). Habitat conditions in the action area are not suitable for coho salmon summer rearing, but are for steelhead, and sufficient for Chinook salmon rearing during spring and early summer emigration. Based on recent observations and sampling, the juvenile steelhead population in Rattlesnake Creek appears to be stable and relatively abundant. Because Chinook salmon juveniles emigrate as YOY in the spring and early summer, they are seldom observed in summer and fall surveys. Monitoring of returning adults in Rattlesnake Creek or the South Fork Eel River has not been conducted in many years, and therefore the population size of CC Chinook salmon in this watershed is not known with precision, but is expected to be relatively small based on the size of the watershed and condition of CC Chinook salmon in other areas of their range.

Past impacts related to timber harvest, rural development, and the construction of migration impediments throughout the DPS/ESU, have slowed or are improving through habitat and passage enhancement projects. For example, in 2009, Caltrans improved fish passage conditions at an upstream location on Rattlesnake Creek (PM 81.4 on Highway 101) by installing a rock weir and improving an existing fish ladder. This has improved migration access for adult salmonids to additional spawning and rearing habitat upstream in the watershed.

Short term impacts from turbidity and vegetation removal during construction are not likely to adversely affect listed salmonids in the action area. During dewatering of the work site, fish rescue and relocation efforts will take place. Juvenile steelhead are likely to be present and juvenile Chinook salmon may be present at the time of construction, but in lower abundance than steelhead. NMFS anticipates up to 500 juvenile steelhead and up to 50 juvenile Chinook salmon may be affected by the project, and no more than 15 juvenile steelhead and 2 Chinook salmon will die as a result of the proposed activities. The number of juvenile steelhead and Chinook salmon captured and relocated during the proposed project will make up a small proportion of the overall Rattlesnake Creek population (which has over 10 miles of anadromous habitat) and the NC steelhead DPS and CC Chinook salmon ESU. It is unlikely the small potential loss of 15 juvenile steelhead or 2 juvenile Chinook salmon as a result of the project will impact future adult returns, due to the relatively large number of juveniles produced by each spawning pair of both species. Therefore, NMFS does not believe the project will appreciably diminish the abundance,

productivity, diversity, or spatial structure of the Rattlesnake Creek population of NC steelhead or CC Chinook salmon.

Short term effects related to turbidity and vegetation removal during the construction and removal of stream flow diversion facilities are expected to be minor and temporary, and NMFS anticipates proposed BMPs will control sediment/turbidity sufficiently to avoid significant adverse effects to listed fish species. No permanent adverse changes in stream flow are anticipated. Therefore, NMFS believes the effects of turbidity increases and flow conditions from the project activities will not have any long-term impacts to the PCEs of SONCC coho salmon and CC Chinook salmon critical habitat. The value of critical habitat in the action area for species conservation is not likely to be appreciably reduced by the activities proposed in this project.

The long term effects to NC steelhead and CC Chinook salmon, and designated SONCC coho salmon and CC Chinook salmon critical habitat, from the proposed project will be beneficial. The project is expected to improve juvenile fish passage opportunities during the summer months by maintaining flow through the culvert and improve the passage conditions for adult salmon and steelhead by reducing velocities in the culvert during periods of high flows.

IX. CONCLUSION

After reviewing the best available scientific and commercial information, the current status of the species and critical habitat, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is NMFS' biological opinion the issuance of the Corps permits for the completion of Caltrans's proposed Rattlesnake Creek Culvert Repair and Improvement Project, in Mendocino County, California is not likely to jeopardize the continued existence of CC Chinook salmon, or NC steelhead.

After reviewing the best available scientific and commercial information, the current status of the species and critical habitat, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is NMFS' biological opinion the issuance of the Corps permits for the completion of Caltrans's proposed Rattlesnake Creek Culvert Repair and Improvement Project, in Mendocino County, California is not likely result in the destruction or adversely modification of designated critical habitat designated for SONCC coho salmon and CC Chinook salmon.

X. INCIDENTAL TAKE STATEMENT

Section 9 of the ESA and Federal regulation pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without 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 NMFS as an act which actually kills or injures fish or wildlife. Such an act may include significant habitat modification or degradation which actually kills or injures fish or wildlife by significantly impairing essential behavioral patterns, including breeding, spawning, rearing, migrating, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the ESA provided that such taking is in compliance with the terms and conditions of this incidental take statement.

The measures described below are nondiscretionary, and must be undertaken by the Corps so that they become binding conditions of the permits issued to Caltrans, for the exemption in section 7(o)(2) to apply. The Corps has a continuing duty to regulate the activity covered by this incidental take statement. If the Corps (1) fails to assume and implement the terms and conditions or (2) fails to require Caltrans to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit document, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, Caltrans must report the progress of the action and its impact on the species to NMFS as specified in the incidental take statement (50 CFR §402.14(i)(3)).

A. Amount or Extent of Take

As described above in the accompanying biological opinion, the number of threatened NC steelhead that may be incidentally taken by capture and relocation during project activities is expected to be no more than 500 individuals and the number of threatened CC Chinook salmon is expected to be low (no more than 50 individuals). NMFS anticipates no more than two percent (15 juvenile steelhead and 2 juvenile Chinook salmon) of either species present in the area will be killed during relocation.

The anticipated take will have been exceeded if more than 500 juvenile steelhead or 50 juvenile Chinook salmon are captured or if more than 15 steelhead or 2 Chinook salmon are killed during relocation efforts.

B. Effect of the Take

In the accompanying opinion, NMFS determined this level of anticipated take is not likely to result in jeopardy to either species.

C. Reasonable and Prudent Measures

The following reasonable and prudent measures are necessary and appropriate to minimize the impacts of the incidental take of NC steelhead and CC Chinook salmon:

1. Undertake measures to ensure harm and mortality to NC steelhead and CC Chinook salmon resulting from fish relocation is low;

2. Undertake measures to maintain water quality and riparian habitat conditions at pre-construction levels to avoid or minimize harm to NC steelhead and CC Chinook salmon;

3. Prepare and submit reports that document the effects and final outcomes of construction, fish relocation activities, and re-vegetation performance.

D. Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the ESA, the Corps, its permittee (Caltrans), and their designees/contractors must comply with the following terms and conditions, which implement the reasonable and prudent measures described above, and outline required reporting/monitoring requirements. These terms and conditions are nondiscretionary.

<u>The following terms and conditions implement Reasonable and Prudent Measure 1, to minimize harm or mortality to listed steelhead and Chinook salmon from fish relocation activities</u>.

1. The applicant (Caltrans) shall provide a list of all BMPs and the Terms and Conditions of this biological opinion to their contractors and ensure they are followed for the length of the project.

2. The applicant, or its contractor, shall provide NMFS with a final Fish Capture and Relocation Plan for review prior to the start of fish collection and relocation activities. The plan must be submitted no less than 30 days prior to the beginning of fish capture and relocation activities (*i.e.*, on or before May 15 of the year to be implemented if beginning on June 15). The plan shall outline all confirmed fish relocation methods, including the location and a description of the habitat where steelhead and Chinook salmon are to be relocated. The plan shall be submitted to NMFS' North Central Coast Office (see address below).

3. The project biologist shall notify NMFS biologist Joel Casagrande at (707) 575-6016 or Joel.Casagrande@noaa.gov no later than one week prior to relocation activities in order to provide an opportunity for NMFS staff to observe the activities.

4. The applicant and its contractors will follow NMFS Guidelines for Electrofishing Waters Containing Salmonids Listed under the Endangered Species Act (NMFS 2000). All live steelhead and Chinook salmon shall be handled with extreme care and kept in water to the maximum extent possible during relocation activities. All captured fish shall be kept in cool, shaded, and aerated water that is protected from excessive noise, jostling, or overcrowding any time they are not in the stream, and fish shall not be removed from this water except when released. If necessary, the biologist shall have at least two containers and segregate young-of-year salmonids from older salmonids and other potential aquatic predators in order

to avoid predation affects. Captured salmonids shall be relocated as soon as possible and will be given highest priority over other non-listed fish species. Both juvenile steelhead and Chinook salmon will be released downstream of the project construction area.

5. The biologist will note the number of each species collected/observed in the affected area, the number of fish relocated, and the date and time of collection and relocation. If any dead or fatally wounded fish are observed, they will be collected and placed in an appropriately sized whirl-pack or zip-lock bag, labeled with the date and time of collection, fork length, and location of capture, and frozen as soon as possible. If any fish are fatally wounded, the applicant, or the Corps, will then notify the NMFS biologist, listed above, no later than 2 days from the occurrence.

<u>The following terms and conditions implement Reasonable and Prudent Measure 2, undertake measures to maintain water quality and riparian habitat conditions at pre-construction levels to avoid or minimize harm to NC steelhead and CC Chinook salmon</u>.

6. The applicant, or its contractors, shall monitor in-channel activities and performance of sediment control or detention devices for the purpose of identifying and reconciling any condition that could result in take of listed salmonids. This would include monitoring of turbidity throughout the construction and removal of creek diversion facilities and for one day following the both the construction and removal of the diversion facilities. The results of this monitoring will be used to confirm NMFS's assumption that increases in turbidity levels within and downstream of the action area will be temporary (*i.e.*, increases in turbidity from the construction and removal of the flow diversion facilities will be limited to one day or less).

7. The applicant (Caltrans), or its contractor, shall submit its final re-vegetation plan for review no less than 30 days prior to implementation of the re-vegetation activities. The plan will include a list of species, estimated number and size of each species to be planted, the number and size of each species removed during construction, and any post implementation monitoring plans.

<u>The following terms and conditions implement Reasonable and Prudent Measure 3, prepare and submit a report to document the effects of construction, fish collection and relocation activities, and re-vegetation activities and performance</u>.

8. The applicant (Caltrans) shall provide NMFS with a summary report by January 15 of the year following the completion of fish relocation and monitoring activities. The report shall include the methods used during the fish relocation and monitoring efforts, location, number and species captured, number of mortalities by species, and other pertinent information related to the monitoring and fish relocation activities. Reports shall be submitted to NMFS North Central Coast Office (see address below).

9. The applicant (Caltrans) shall provide NMFS with a summary turbidity monitoring report by January 15 of the year following the completion of the project (removal of dewatering facilities). The report will include turbidity monitoring data collected throughout the construction and removal of the dewatering facilities as described above. The report shall be submitted to NMFS North Central Coast Office (see address below).

10. The applicant (Caltrans), or its contractor, shall allow any NMFS employee(s) or any other person(s) designated by NMFS, to access the work area during the construction period for the purpose of observing monitoring activities, evaluating fish and stream conditions, monitoring performance of BMPs, monitoring water quality, collecting fish samples, or perform other monitoring/studies. NMFS will notify the Caltrans Resident Engineer 48 hours prior to planning a site visit and will contact Caltrans personnel prior to entering the construction site.

11. A final report describing the re-vegetation activities and monitoring shall be submitted to NMFS on January 15th of the year following the end of the post monitoring period. The report shall document the success of the re-vegetation efforts and include photo documentation of the project.

12. All reports required for the above terms and conditions shall be sent to:

    NMFS North Central Coast Office
    Central Coast Branch Supervisor, Protected Resources Division
    Southwest Region
    National Marine Fisheries Service
    777 Sonoma Avenue, Room 325
    Santa Rosa, California 95404

XI. CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the ESA directs Federal agencies to utilize their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, or to develop information.

1. The Corps and Caltrans, in coordination with NMFS, should identify and prioritize any maintenance and construction projects which, if implemented, can improve ESA-listed salmonid migration or in-stream environmental conditions throughout the North-Central California Coast Recovery Domain.

XII. REINITIATION NOTICE

This concludes formal consultation on Corps issuance of permits for the proposed Rattlesnake Creek Culvert Repair and Improvement Project, Mendocino County, California. As provided in 50 CFR §402.16, reinitiation of formal consultation is required if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered in this opinion; (3) the action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, formal consultation shall be reinitiated immediately.

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