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

July 27, 2012

In response, refer to:
2012/01795

Lieutenant Colonel John K. Baker
Department of the Army
U.S. Army Corps of Engineers
San Francisco District
1455 Market Street
San Francisco, California 94103-1398

Dear Colonel Baker:

Thank you for your letter of April 5, 2012, requesting initiation of 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.*). This letter transmits NMFS' biological opinion for the U.S. Army Corps of Engineers (Corps) proposed issuance of a permit under Section 404 of Clean Water Act for the Feliz Creek Dam Removal Project (Project) in Mendocino County, California. The enclosed biological opinion describes NMFS' analysis of the effect of implementing the proposed Project on threatened Central California Coast (CCC) steelhead (*Oncorhynchus mykiss*) and California Coastal (CC) Chinook salmon (*Oncorhynchus tshawytscha)*; and designated critical habitat for CC Chinook salmon and California Central Coast (CCC) coho salmon (*Oncorhynchus kisutch*), in accordance with section 7 of the ESA. The action area is not within CCC steelhead designated critical habitat. In the enclosed biological opinion, NMFS concludes that the project is not likely to jeopardize the continued existence of CCC steelhead and CC Chinook salmon; and not likely to adversely modify designated critical habitat for CC Chinook salmon and CCC coho salmon. However, NMFS anticipates take of CCC steelhead as a result of the project. An incidental take statement with non-discretionary terms and conditions is included with the enclosed biological opinion.

This letter also serves as consultation under the authority of, and in accordance with, the Essential Fish Habitat (EFH) provisions of the Magnuson Stevens Fishery Conservation and Management Act (MSA), and the provisions of the Fish and Wildlife Coordination Act of 1934 (FWCA), as amended. The Project location includes areas identified as EFH for various life stages of species managed under the Pacific Coast Salmon Fishery Management Plan. Based on our review, NMFS concludes that the Project will adversely affect EFH for Pacific coast salmon. However, the anticipated adverse effects are so minimal in nature that no EFH Conservation Recommendations are necessary to avoid, minimize, mitigate, or otherwise offset the adverse effects to EFH. Therefore, NMFS has no EFH Conservation Recommendations to provide.

Please contact Rick Rogers at (707) 578-8552 if you have any questions concerning this section 7 consultation, or if you require additional information.

Sincerely,

for Rodney R. McInnis
Regional Administrator

Enclosures

cc: Bryant Chesney, NMFS, Long Beach, California
Scott Wilson, California Department of Fish and Game, Yountville
Park Steiner, MCDOT, Ukiah, California
Copy to File ARN: 151422-SWR-2012-SR00232

Enclosure

BIOLOGICAL OPINION

ACTION AGENCY:	California Department of Transportation
ACTION:	Dam Removal on Feliz Creek, Mendocino County, California.
CONSULTATION CONDUCTED BY:	National Marine Fisheries Service, Southwest Region
TRACKING NUMBER:	2012/01795
DATE ISSUED:	**July 27, 2012**

I. CONSULTATION HISTORY

On April 5, 2012, NOAA's National Marine Fisheries Service (NMFS) received by mail a request from the U.S. Army Corps of Engineers (Corps) for formal consultation pursuant to section 7 of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531 *et seq*.), for the Feliz Creek Dam Removal Project (Project). The dam has impeded upstream fish passage to the upper two-thirds of the Feliz Creek watershed since its original construction in 1954. The Corps determined the Project may adversely affect Central California Coast (CCC) steelhead, and CC Chinook salmon and designated critical habitat for California Coastal (CC) Chinook salmon. Formal consultation was initiated on April 5, 2012. On April 18, 2012, NMFS personnel, accompanied by staff from the California Fish and Game and the Mendocino County Department of Transportation, conducted a field visit at the Project site located approximately 4 miles upstream of the Feliz Creek confluence with the Russian River, west of the town of Hopland, Sonoma County, California.

II. PROPOSED ACTION

The Corps proposes to permit through Section 404 of the Clean Water Act (33 USC 1344) the removal of a 12-foot high concrete dam that spans Feliz Creek near a private residence. The Mendocino County Department of Transportation (Applicant) will carry out the project. Gravel and fine sediment have accumulated behind the dam for the past several decades, filling the associated reservoir and creating a hazardous situation where a catastrophic dam failure may occur. The Project proposes to remove the dam and restore a free-flowing fluvial ecosystem by allowing stored gravel and sediments to volitionally meter back into Feliz Creek during high-flow events. The dam impedes upstream fish passage into an estimated six to nine miles of steelhead and Chinook salmon spawning and rearing habitat (primarily steelhead habitat).

Removing the dam will improve upstream passage of both juvenile and adult fish and help restore high-quality spawning gravel to the lower four miles of Feliz Creek, which is generally lacking areas of high-quality spawning gravel. The left segment of the dam (facing downstream) is currently undermined, and a catastrophic failure of the structure in that area could threaten adjacent banks as well as private property above the bank. Thus, in addition to the stream and fisheries enhancements mentioned above, the project objectives include protecting the slope below the private residence from scour. Work is scheduled to begin in early to mid-September 2012 and is expected to be complete by October 15. There are no interrelated or interdependent activities associated with this proposed action.

The project includes the following tasks:

1. remove and haul offsite portions of the reinforced concrete dam (≈300 cubic yards) that cannot otherwise be incorporated into streambank protection;

2. remove and haul offsite the remains of a failed concrete and boulder fishway (≈10 cubic yards) that cannot otherwise be incorporated into streambank protection or instream habitat;

3. remove and haul offsite the remains of an old concrete abutment downstream (≈40 cubic yards) that cannot otherwise be incorporated into streambank protection;

4. remove and recycle or dispose of an old metal tank;

5. excavate approximately 150 feet of keyway for rock slope protection (RSP) at the site of the private residence for added protection of this property's swimming pool and house;

6. install a new domestic water line deep under the stream channel as a replacement for the existing waterline currently located on the downstream face of the dam.

7. import and place RSP along approximately 150 feet of streambank beneath the private residence (not to exceed 2,000 cubic yards). This RSP is to incorporate appropriate native plantings, as practicable, to enhance revegetation;

8. once the dam is removed, v-notch and taper the downstream edge of the accumulated gravel and sediment, near the thalweg, to an appropriate slope to minimize abrupt gravel movement in initial gravel-transport storm events; and

9. re-vegetate disturbed areas with appropriate native riparian vegetation (Mendocino County Resource Conservation District task).

Feliz Creek supports typical riparian vegetation for the region, namely white (*Quercus lobata*) and live oaks (*Q.Wislizenii*), alders (*Alnus rhombifolia*), willows (*Salix* spp.), and bay-laurel (*Umbellularia californica*). Less than 20 alders (< 3" dbh) will be removed at the bank access point, and a <20 sq ft stand of willows (<1" dbh) will be cleared to place RSP. Replacement willows and other indigenous plant species will be interspersed in the RSP placed on the downstream bank above the Ordinary High Water. A historical access point to the streambed

currently exists on the property approximately 100 feet upstream of the dam. A second temporary access point will be created approximately 200 yards upstream of the dam to minimize disturbance and potential vibration to the nearby residence. All ingress and egress to the project site will occur from the stream bank at one of these sites. Nearly all the construction activity will remain within the creek channel; dam removal will occur from upstream and downstream of the structure. Equipment access will be on a temporary road made through the pasture several hundred yards north of the house, dropping off a low bank through sparse vegetation to enter the channel. Equipment will then move up and down a dry gravel bar to and from the dam area; wetted areas, if present, will be avoided. Alternatively, access may be by means of the existing road that runs past the house down to the dam area; however, this latter option is less preferred because of the desire to avoid equipment traffic near the house. In-channel work could extend a few hundred feet upstream and downstream of the dam, but disturbance is not anticipated at other bank locations except for removal of abutments, trenching for the domestic waterline that will cross under the stream channel, and for accessing and removing the abandoned tank downstream of the dam. There is also RSP placement that will occur immediately below the swimming pool area at the site of the current rubble and eroding bank. The intent is to minimize disturbance to the creek channel and its biological resources, and that the stream's gravel and sediment will stay in the channel and not be removed from the creek system.

Feliz Creek at the Project site is typically intermittent or dry during summer months, and a dewatering program of temporary cofferdams and a bypass pipe will be implemented at the Project site if water is present. The work area will be dewatered (approximately 100 linear feet) if necessary. Fish will be captured and relocated prior to dewatering activities. Upon completion of the Project, the temporary dewatering features will be removed and the creek bed returned to its pre-work condition. The work area within the wetted channel of the creek is approximately 500 square feet, which includes cofferdams, diversion pipe, and excavation areas. In-channel Project activities are expected to require two months to complete.

The Project action area[1] encompasses the stream channel and riparian corridor of Feliz Creek for a distance of 150 feet upstream and downstream of the existing dam for the extent of dewatering, fish relocation, and turbidity released due to construction activities. The action area also includes the access routes and stream bed and banks in between these routes and the primary construction area. Feliz Creek is a tributary to the Russian River which flows into the Pacific Ocean. The action area is located in the middle portion of the Russian River watershed.

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 each species' range-wide conditions, the factors responsible for that condition, and the species' likelihood of both survival

[1] The action area includes "all areas to be affected directly or indirectly by the Federal action, and not merely that immediate area involved in the action" (50 CFR § 402.02).

and recovery; (2) the Environmental Baseline, which evaluates the condition of the listed species in the action area and the factors responsible for that condition; (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 the species in the action area; and (4) Cumulative Effects, which evaluates the effects of future, non-Federal activities in the action area on the 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 the 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 the 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 populations. If the populations will be impacted, we assess whether this impact is likely to affect the ability of the populations to support the survival and recovery of the Distinct Population Segment (DPS) or Evolutionarily Significant Unit (ESU).

B. Adverse Modification Analysis

This biological opinion does not rely on the regulatory definition of "destruction or adverse modification" of critical habitat at 50 C.F.R. 402.02, which was invalidated by *Gifford Pinchot Task Force v. USFWS*, 378 F.3d 1059 (9th Cir. 2004), amended by 387 F.3d 968 (9th Cir. 2004) . 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 and watershed-wide condition of critical habitat for the CC Chinook and CCC coho salmon ESUs in terms of primary constituent elements (PCEs – sites for spawning, rearing, and migration), the factors responsible for that condition, and the resulting conservation value of the critical habitat overall; (2) the Environmental Baseline, which evaluates the condition of critical habitat for these species in the action area, the factors responsible for that condition, and the conservation value of 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 critical habitat for these species in the action area and how that will influence the conservation value of affected critical habitat units; and (4) Cumulative Effects, which evaluates the effects of future, non-Federal activities in the action area on critical habitat and how that will influence the conservation value of affected critical habitat units for these species.

For purposes of the adverse modification determination, we add the effects of the proposed Federal action on CC Chinook and CCC coho salmon 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 these species' 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 consultation package supplied by the Corps, and information from the April 18, 2012, site visit. 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 AND CRITICAL HABITAT

This biological opinion analyzes the effects of the proposed action on the following Pacific salmonid distinct population segments (DPS), evolutionarily significant units (ESU) and critical habitat:

1. Threatened CCC steelhead (*Oncorhynchus mykiss*) DPS
   Listing determination (71 FR 834; January 5, 2006);

2. Threatened CC Chinook Salmon (O. *tshawytscha)* ESU
   Listing determination (70 FR 37160; June 28, 2005)
   Designated critical habitat for CC Chinook salmon (70 FR 52488; September 2, 2005);

3. Endangered CCC coho salmon (*O.kisutch*) ESU
   Listing determination (70 FR37160; June 28, 2005)
   Designated critical habitat for CCC coho salmon (64 FR 24049; May 5, 1999).

The best available information on the life history, distribution, and abundance of CCC coho salmon indicate that they did not, nor do they currently rear, spawn, or migrate through the action area (Bjorkstedt *et al.* 2005). Coho salmon in the Russian River are currently found only in a few tributaries of the lower Russian River watershed and do not utilize Feliz Creek or the Russian River in the vicinity of Feliz Creek. Therefore, this project will have no effect on CCC coho salmon. Only one observation of a CC Chinook salmon carcass has been made in Feliz Creek during recent seasons, and juvenile Chinook salmon typically begin their emigration to the ocean immediately after emerging from spawning beds, prior to summer (Healy 1991). Chinook

salmon juveniles migrate relatively quickly from their natal streams and NMFS expects juvenile CC Chinook salmon to leave Feliz Creek before construction activities begin. Although adult CC Chinook have been documented to enter the Russian River watershed as early as late August (Sonoma County Water Agency 2006), NMFS does not anticipate adults to enter the creek until after construction activities are complete because Feliz Creek is unlikely to have a surface flow connection to the Russian River until after October 15 (John McKeon, NMFS, personal communication, 2011). Although they may not be present in the action area during construction and dam removal, adult Chinook salmon may be exposed to elevated levels of turbidity following construction when high winter flows disperse gravels previously stored behind the Feliz Creek dam. However, that effect of dam removal is expected be insignificant and short-term (*e.g.*, likely occurring during the highest winter flows in the first one or two years after dam removal). Given the generally coarse composition of the sediment wedge in question (Park Steiner, Mendocino County Department of Transportation, personal communication, 2012), the increase in turbidity arising from the metering out of the sediment is expected to be minor, with fish likely avoiding and relocating away from turbid zones temporarily. Moreover, it is likely that the elevation of turbidity due to downstream dispersal of gravels from the dam site will be less than those encountered by migrating adult Chinook salmon that successfully navigate the turbid waters of the Russian River mainstem each year. Changes to salmonid habitat in the action area are unlikely to result in adverse effects to listed salmonids not present during the time of construction, as described below in the *Effects of the Action* section. Therefore, CCC coho salmon and CC Chinook salmon are not likely to be adversely affected by the proposed action and will not be considered further in this biological opinion.

Although CCC coho salmon and CC Chinook salmon are absent from the action area during the period in which effects from the action might be experienced or will be present only when insignificant effects occur (as discussed above), the action area does contain designated critical habitat for both species. Feliz Creek was not designated as critical habitat for CCC steelhead; however, steelhead do reside year round in this creek. Thus, the following sections focus on the effects of the action on individual CCC steelhead as well as critical habitat designated for CC Chinook salmon and CCC coho salmon.

A. Steelhead Life History

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, but rearing periods of up to seven years have been reported. Migration to the ocean usually occurs in the 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 (Busby *et al*. 1996). The distribution of steelhead in the ocean is not well known. Coded wire tag recoveries indicate that most steelhead tend to migrate north and south along the continental shelf (Barnhart 1986).

Steelhead can be divided into two reproductive ecotypes, based upon their state of sexual maturity at the time of river entry and the duration of their spawning migration: stream maturing and ocean maturing. Stream maturing steelhead enter fresh water in a sexually immature condition and require several months to mature and spawn, whereas ocean maturing steelhead

enter fresh water with well-developed gonads and spawn shortly after river entry. These two reproductive ecotypes are more commonly referred to by their season of freshwater entry (*i.e.*, summer [stream maturing] and winter [ocean maturing] steelhead). The timing of upstream migration of winter steelhead is correlated with higher flow events, such as freshets or sandbar breaches. Adult summer steelhead migrate upstream from March through September. In contrast to other species of *Oncorhynchus*, steelhead may spawn more than one season before dying (iteroparity); although one-time spawners represent the majority.

Because rearing juvenile steelhead reside in freshwater all year, adequate flow and temperature are important to the population at all times (CDFG 1997). Outmigration 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) and age 1+ steelhead moving downstream during spring and summer. Smolts can range from 14 to 20.3 centimeters (cm) in length.

Survival to emergence of steelhead embryos is inversely related to the proportion of fine sediment in the spawning gravels. However, steelhead are slightly more tolerant than other salmonids, with significant reductions in survival when fine materials of less than 0.6 cm diameter comprise 20 to 25 percent of the substrate. Fry typically emerge from the gravel two to three weeks after hatching (Barnhart 1986).

Upon emerging from the gravel, fry rear in edgewater habitats and move gradually into pools and riffles as they grow larger. Older fry establish territories which they defend. 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). Steelhead, however, tend to use riffles and other habitats not strongly associated with cover during summer rearing more than other salmonids. Young steelhead feed on a wide variety of aquatic and terrestrial insects, and emerging fry are sometimes preyed upon by older juveniles. In winter, juvenile steelhead become less active and hide in available cover, including gravel or woody debris.

Water temperature influences the metabolic rate, population density, and swimming ability of rearing juvenile steelhead (Barnhart 1986, Bjornn and Reiser 1991, Myrick and Cech 2005). Optimal temperatures for steelhead growth range between 10 and 20°C (Hokanson *et al.* 1977, Wurtsbaugh and Davis 1977, Myrick and Cech 2005). Fluctuating diurnal water temperatures also aid in survivability 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 that suspended sediment loads of less than 25 milligrams per liter (mg/L) were typically suitable for rearing juvenile steelhead.

B. Status of CCC Steelhead

In this opinion, NMFS assesses the status of CCC steelhead by examining four types of information, all of which help us understand a population's ability to survive. These population viability parameters are: abundance, population growth rate, spatial structure, and diversity (McElhaney *et al*. 2000). While there is insufficient information to evaluate these population

viability parameters in a quantitative sense, NMFS has used existing information to determine the general condition of each population.

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 perturbation at local or landscape-level scales.

Historically, approximately 70 populations[2] of steelhead existed in the CCC steelhead DPS (Spence *et al.* 2008, Spence *et al.* 2012). Many of these populations (about 20) were independent, or potentially independent, meaning they had a high likelihood of surviving for 100 years absent anthropogenic impacts. The remaining populations were dependent upon immigration from nearby CCC steelhead DPS populations to ensure their viability (McElhaney *et al*. 2000; Bjorkstedt *et al*. 2005).

While historical and present data on abundance is limited, CCC steelhead numbers are substantially reduced from historical levels. A total of 94,000 adult steelhead were estimated to spawn in the rivers of this DPS in the mid-1960s, including 50,000 fish in the Russian River - the largest population within the DPS (Busby *et al.* 1996). Recent estimates for the Russian River are on the order of 4,000 fish (NMFS 1997). Abundance estimates for smaller coastal streams in the DPS indicate low but stable levels with recent estimates for several streams (Lagunitas, Waddell, Scott, San Vincente, Soquel, and Aptos creeks) of individual run sizes of 500 fish or less (62 FR 43937). For more detailed information on trends in CCC steelhead abundance, see: Busby *et al*. *(*1996), NMFS (1997, 2005), and Spence *et al.* (2012).

Some loss of genetic diversity has been documented and attributed to previous among-basin stock transfers and local hatchery production in interior populations in the Russian River (Bjorkstedt *et al*. 2005). Reduced population size and habitat fragmentation in San Francisco streams has likely also harmed genetic diversity in these populations.

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

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

NMFS issued a final determination that the CCC steelhead DPS is a threatened species, as previously listed (71 FR 834).

A more recent viability assessment of CCC steelhead concluded that populations in watersheds that drain to San Francisco Bay are highly unlikely to be viable, and that the limited information available did not indicate that any other CCC steelhead populations could be demonstrated to be viable[3] (Spence *et al.* 2008). Although there were average returns (based on the last ten years) of adult CCC steelhead during 2007/08, research monitoring data from the 2008/09 and 2009/10 adult CCC steelhead returns shows a decline in returning adults across their range compared to the last ten years (Jeffrey Jahn, personal communication, 2010). The most recent status update concludes that steelhead in the CCC steelhead DPS remains "likely to become endangered in the foreseeable future" (Williams *et al.* 2011), as new and additional information available since Good *et al.* (2005) does not appear to suggest a change in extinction risk. On December 7, 2011, NMFS chose to maintain the threatened status of the CCC steelhead (76 FR 76386).

2. Factors Responsible for Stock Declines: Changes to Habitat and Other Impacts

Threats to naturally reproducing salmon and steelhead are numerous and varied. Among the most serious and ongoing threats to steelhead survival in this DPS are changes in hydrology, and habitat degradation and loss. The following discussion provides an overview of the types of activities and conditions that adversely affect steelhead DPS's in California watersheds.

a. Habitat Degradation and Destruction

A major cause of the decline of salmon and steelhead is the loss or severe decrease in quality and function of essential freshwater and estuarine habitat. Most of this habitat loss and degradation has resulted from anthropogenic watershed disturbances caused by agriculture, logging, urban development, water diversion, road construction, erosion and flood control, dam building, and grazing. Most of this habitat degradation is associated with the loss of essential habitat components necessary for salmon and steelhead survival. For example, the loss of deep pool habitat as a result of sedimentation and stream flow reductions has reduced rearing and holding habitat for juvenile and adult salmonids. The alteration of the estuaries in conjunction with increased sediment loads in the watersheds from land use activities and lower stream flows due to water diversions and other watershed changes, have delayed sandbar breaching in the fall, delayed adult salmon and steelhead migration into streams, reduced and degraded estuary rearing habitat for juvenile salmon and steelhead, and created a significantly altered freshwater-saltwater transition zone for salmon and steelhead smolts (CDFG 1998).

b. Natural Stochastic Events

Natural events such as droughts, landslides, floods, and other catastrophes have adversely affected steelhead and salmon populations throughout their evolutionary history. The frequency of, and the resulting effects of these events are now often increased and exacerbated by anthropogenic changes to watersheds such as logging, road building, and water diversion. The ability of these species to rebound from natural stochastic events has been limited as a result of

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

these and other anthropogenic factors which have degraded the freshwater and estuarine habitats upon which these species depend, and thus abundance of these populations have been depressed to critically low levels.

c. Ocean Conditions

Variability in ocean productivity has been shown to affect salmon survival both positively and negatively. Beamish and Bouillion (1993) showed a strong correlation between North Pacific salmon production from 1925 to 1989 and their marine environment. Beamish *et al*. (1997) noted decadal-scale changes in the production of Fraser River sockeye salmon (*O. nerka*) that they attributed to changes in the productivity of the marine environment. They (along with many others) also reported the dramatic change in marine conditions occurring in 1976-77, at the beginning of an El Niño event. El Niño conditions, which occur every 3-5 years, negatively affect ocean productivity for salmonids. Johnson (1988) noted increased adult mortality and decreased average size for Oregon's Chinook salmon and coho salmon during the strong 1982-83 El Niño. It is unclear to what extent ocean conditions have played a role in the decline of salmon and steelhead; however, ocean conditions have likely affected salmon and steelhead population abundance throughout their evolutionary history.

d. Flows

Depletion and storage of natural flows have drastically altered natural hydrological cycles in many California rivers and streams. Alteration of streamflows has increased juvenile salmonid mortality for a variety of reasons: migration delay resulting from insufficient flows or habitat blockages, loss of usable habitat due to dewatering and blockage, stranding of fish resulting from rapid flow fluctuations, entrainment of juveniles into unscreened or poorly screened diversions, and increased juvenile mortality resulting from increased water temperatures (Chapman and Bjornn 1969, Berggren and Filardo 1993, 61 FR 56138).

Important elements of water quality which are correlated with flows include water temperatures within the range that corresponds with migration, rearing, and emergence needs of fish and the aquatic organisms upon which they depend (61 FR 56138). Desired conditions for coho salmon include an abundance of cool (generally in the range of 11.8°C to 14.6°C), well oxygenated water that is present year-round, free of excessive suspended sediments and other pollutants that limit primary production and benthic invertebrate abundance and diversity (Reiser and Bjornn 1979, 61 FR 56138).

e. Harvest

There are few good historical accounts of the abundance of salmon and steelhead harvested along the California coast (Jensen and Swartzell 1967). Early records did not contain quantitative data by species until the early 1950s. In addition, the confounding effects of habitat destruction, drought, and variable ocean conditions on salmon and steelhead survival make it difficult to assess the degree to which recreational and commercial harvest have contributed to the overall decline of salmonids in West Coast rivers.

f. Artificial Propagation

Releasing large numbers of hatchery fish can pose a threat to wild salmon and steelhead stocks through genetic impacts, competition for food and other resources, predation of hatchery fish on wild fish, and increased fishing pressure on wild stocks as a result of hatchery production (Waples 1991). The genetic impacts of artificial propagation programs are primarily caused by the straying of hatchery fish and the subsequent hybridization of hatchery and wild fish. Artificial propagation threatens the genetic integrity and diversity that protects overall productivity and resilience to changes in environment (61 FR 56138). The potential adverse impacts of artificial propagation programs are well documented (Waples 1991, Waples 1999).

g. Marine Mammal Predation

Predation is not known to be a major factor contributing to the decline of West Coast salmon and steelhead populations relative to the effects of habitat degradation and loss, hatchery practices and of fishing. Predation may have substantial impacts in localized areas and on depressed populations. Harbor seal (*Phoca vitulina*) and California sea lion (*Zalophus californianus*) numbers have increased along the Pacific Coast (NMFS 1999).

In a peer reviewed study of harbor seal predation in the Alsea River Estuary of Oregon, the combined results of multiple methodologies led researchers to infer that seals consumed 21 percent (range = 3–63 percent) of the estimated prespawning population of coho salmon. The majority of the predation occurred upriver, at night, and was done by a relatively small proportion of the local seal population (Wright *et al*. 2007).

h. Reduced Marine-derived Nutrient Transport

Reduced marine-derived nutrient (MDN) transport to watersheds is another consequence of the past century of decline in salmon abundance (Gresh *et al*. 2000). Salmon may play a critical role in the survival of their own species in that MDN from salmon carcasses has been shown to be vital for productive invertebrate prey communities in streams providing for the growth of juvenile salmonids (Bilby *et al*. 1996). The return of salmon to rivers makes a significant contribution to the flora and fauna of both terrestrial and riverine ecosystems (Gresh *et al*. 2000). Evidence of the role of MDN and energy in ecosystems infers this deficit may indicate an ecosystem failure that has contributed to the downward spiral of salmonid abundance (Bilby *et al*. 1996).

C. Status of Critical Habitat

1. CC Chinook Salmon Critical Habitat

The PCE's for CC Chinook Salmon include estuarine areas and freshwater spawning sites, rearing sites, and migratory corridors, as further detailed in 50 C.F.R. § 226.211(c). NMFS' assessment of the current condition of critical habitat for the CC Chinook ESU shows PCEs for spawning and rearing habitat in the two major rivers within this ESU, the Eel River and the Russian River, to be degraded by the persistence of highly turbid flows during the winter and

spring, persisting in the Russian River even at low flows. The persistence is considered to be primarily a result of flows released from, respectively, Scott Dam and Coyote Valley Dam (Beach 1996, USACE 1982, Ritter and Brown 1971). Migration and rearing habitat PCEs in the Eel River (both riverine and estuarine) are degraded by diminished flows resulting from water storage in Lake Pillsbury (Scott Dam) and by interbasin diversions to the Russian River through the Potter Valley Project tunnel. Rearing habitat PCEs of the Russian River, both riverine and estuarine, are considered to be degraded as a result of land use patterns changing the channel configuration limiting available habitat, and a program of keeping the Russian River estuary breached open to the ocean throughout the year. Within the smaller coastal streams of the ESU which support populations of Chinook, the status of critical habitat PCEs for rearing, spawning, and migration are considered degraded to a lesser extent from habitat impacts as described above in B(2) Factors Responsible for Stock Declines (*a* and *d*).

2. CCC Coho Salmon Critical Habitat

The condition of 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 present depressed population conditions are, in part, the result of the following human induced factors affecting critical habitat: logging, agricultural and mining activities, urbanization, stream channelization, dams, wetland loss, permitted and illegal water withdrawals, and unscreened diversions for irrigation.

Numerous studies have demonstrated that land use activities associated with logging, road construction, urban development, mining, agriculture, and recreation, have significantly degraded coho salmon critical habitat quantity and quality in the CCC coho salmon ESU. Impacts of concern for migration, rearing, and spawning PCEs include alteration of stream bank and channel morphology, alteration of water temperatures, loss of spawning and rearing habitat, fragmentation of habitat, loss of downstream recruitment of spawning gravels and large woody debris, degradation of water quality, removal of riparian vegetation resulting in increased stream bank erosion and higher water temperatures, increases in erosion entry to streams from upland areas, loss of shade (higher water temperatures), and loss of nutrient inputs (61 FR 56138).

Depletion and storage of natural river and stream flows have drastically altered natural hydrologic cycles in many of the streams in the ESU. 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 (61 FR 56138).

D. Global Climate Change

Global climate change presents an additional threat to CCC steelhead, their critical habitat, and CCC coho salmon critical habitat. Modeling of climate change impacts in California suggests that 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. 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). 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, climate conditions not caused by the human addition of carbon dioxide to the atmosphere are more likely to predominate (Cox and Stephenson 2007; Smith *et al.* 2007).

V. ENVIRONMENTAL BASELINE

The environmental baseline is an analysis of the effects of past and ongoing human and natural factors leading to the current status of the species, its habitat (including designated critical habitat), and ecosystem in the action area. 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).

Feliz Creek is a tributary of the Russian River in Mendocino County, California, near the town of Hopland. The climate is Mediterranean, with much of the annual precipitation falling as rain between the months of November and April. Flows within the watershed are highly variable and during the rainy season can go quickly from low base flow conditions to high flows and then quickly recede again. Flows range from a hundred cubic feet per second (cfs) during winter storm events, to less than 1 cfs during most summers, especially in the lower few miles of the creek. Much of the lower watershed flows through oak chaparral forest; some coniferous species grow within the higher elevations at the top of the Feliz Creek watershed.

A. Status of Listed Species and Habitat in the Action Area

Systematic fish surveys have not been completed for Feliz Creek. However, the California Department of Fish and Game (CDFG) observed juvenile salmonids below the project site in July, 2001 (CDFG 2006a). No Chinook salmon have been identified during summer fish surveys in Feliz Creek (CDFG 1956; CDFG 1966; CDFG 2006a), but it is possible that juvenile Chinook salmon outmigration occurs prior to these surveys in late spring. One adult Chinook salmon

carcass was observed in Feliz Creek in 2001 (Thomas Daugherty, NMFS, personal communication, 2005). In addition to this observation, Feliz Creek is a relatively large tributary to the Russian River and possesses essential features of the Chinook spawning and rearing PCEs (*i.e.*, gravel and cobble dominated substrate with relatively low embeddedness) (CDFG 2006a). As described above, there is no historical or current data suggesting coho salmon presence in the action area.

Water temperature in Feliz Creek ranged from 16-20 degree Celsius (°C) during the month of July, 2001 (CDFG 2006a). These temperatures are considered to be within the preferential range for juvenile steelhead rearing (Barnhart 1986; Bjornn and Reiser 1991). Hundreds to possibly thousands of juvenile salmonids were observed between the Project site and the confluence with the Russian River in July, 2001 (CDFG 2006a). Feliz Creek from the Project site to the confluence with the Russian River is a moderate gradient, riffle-dominated channel with infrequently spaced pools, stable profile and banks, and cobble dominated substrate (CDFG 2006a). Most of the limited cover in Feliz Creek is provided by boulders and the mean riparian canopy is below 28%, well below the 80% riparian canopy generally considered sufficient for maintaining cold water temperatures needed by salmonids (CDFG 2006a). The limited riparian vegetation along Feliz Creek is comprised mostly of deciduous trees (CDFG 2006a).

At the Project site, the substrate of Feliz Creek is predominantly moderately-imbedded gravel and cobble, and the riparian vegetation is primarily willow on both stream banks. Based on the substrate composition and gradient of lower Feliz Creek (CDFG 2006a), salmonid spawning habitat exists throughout the action area, when suitable flow is present. The east stream bank downstream of the dam has severely eroded over time, and the Applicant proposes to armor the eroding bank with riprap and willow tree planting to halt future erosion. Summer flow is low to imperceptible at the Project site, but juvenile salmonids have been observed during multiple summers in disconnected scour holes a few miles downstream (CDFG 2006a). Willows and deciduous trees provide riparian cover and shade at the Project site, but it is unknown whether salmonids persist through the summer in the action area. Therefore, the overall condition of Chinook salmon critical habitat PCEs present in the action area is moderately degraded. Adequate flows and substrate condition are likely to be present during Chinook salmon spawning, rearing, and outmigration; but embedded gravel and cobble could affect the quality of the spawning substrate. Coho salmon in the Russian River are currently found only in a few tributaries of the lower Russian River watershed. Juvenile coho salmon generally rear in freshwater for approximately one year before outmigration and typically over-summer in low gradient channels with pools and associated large woody debris and riparian canopy. Therefore, the overall condition of coho salmon critical habitat PCEs present in the action area is poor. Adequate flows and substrate condition are likely to be present during coho salmon spawning but juvenile rearing habitat is poor (imperceptible and sporadic summer flows) and suitable rearing habitat is not accessible within any reasonable distance of the action area. Juvenile steelhead also typically rear in freshwater through the summer, and low summer flows in the action area could also affect juvenile steelhead survival.

Imperceptible and sporadic summer flows were documented in Feliz Creek during fisheries surveys in 1954, 1956, and 2001 (CDFG 1956; CDFG 2006a). Evidence from past sampling, however, indicates that Feliz Creek provides summer rearing habitat for steelhead in water

temperatures found to exceed optimal ranges in laboratory settings (23.9°C and 26.7°C in July 1954 and August 1956 respectively) (CDFG 2006a; Moyle and Marchetti 1992; CDFG 1956). Therefore, juvenile salmonids can be present in relatively warm, intermittent reaches of Feliz Creek; and water temperatures commonly termed "unsuitable" are not necessarily indicators of steelhead presence or absence in Feliz Creek.

B. Factors Affecting Species Environment within the Action Area

Summer flows, riparian canopy, and fish passage barriers are factors limiting salmonid production in the Project action area. Low summer flows limit summer rearing in much of the action area, save for the large plunge pool below the dam that retains water year-round. Heavy erosion on the downstream east stream bank has threatened a home and swimming pool at the top of the 80-foot high terrace. However, a dense band of willow trees has established near the water edge, and will be preserved while riprap and willow plantings are positioned behind the willow band at the toe of the eroded terrace. The cement dam proposed for removal has impaired fish passage since its construction several decades ago, even after construction of a dysfunctional rock and cement plunge-pool "ladder". Sediment accumulation upstream of the dam has caused the channel to braid within the action channel, and streamflow typically travels subsurface in the aggraded section of channel. The property owner currently diverts water directly from Feliz Creek when creek flows are high. This diversion fills an off channel pond used for frost protection in the spring (Park Steiner, Mendocino County, personal communication 7-18-12).

C. Previous Section 7 Consultations and Section 10 Permits in the Action Area

Pursuant to section 7 of the ESA, NMFS has previously conducted only one interagency consultation for a project in Feliz Creek. The previous section 7 consultation addressed replacing the aging bridge on Mendocino County Road CR 110 at mile post (MP) 0.10 where the road crosses Feliz Creek west of Hopland (PCTS reference 2010/06179). However, the bridge is located approximately 2 miles downstream of the Project site, and thus did not take place within this action area.

Stream restoration actions occur in the CCC steelhead DPS (as well as in critical habitat designated for both CC Chinook salmon and CCC coho salmon) and may include the action area. These programmatic consultations include the NOAA Restoration Center's (RC) restoration program and the Regional General Permit programmatic consultation with the CDFG. Both of these consultations authorize a limited amount of take for juvenile salmonids during instream work conducted in the summer months. To date, no activities from these programs have occurred in Feliz Creek.

Research projects under the auspices of issued Section 10(a)(1)(A) research and enhancement permits and section 4(d) limits or exceptions could potentially occur in the Feliz Creek watershed. Salmonid monitoring approved under these programs includes carcass surveys, smolt outmigration trapping, and juvenile density surveys. In general, these activities are closely monitored and require measures to minimize take during the research activities. Through June

2012 no research activities have occurred in Feliz Creek, and research is not proposed for Feliz Creek this year.

VI. EFFECTS OF THE PROPOSED ACTION

The purpose of this section is to identify the direct and indirect effects of the proposed action, and any interrelated or interdependent activities, on threatened CCC steelhead. Our approach was based on knowledge and review of the ecological literature and other relevant materials. We used this information to gauge the likely effects of the proposed project via an exposure and response framework that focuses on what stressors (physical, chemical, or biotic), directly or indirectly caused by the proposed action, that salmonids are likely to be exposed to. Next, we evaluate the likely response of salmonids to these stressors in terms of changes to salmonids survival, growth, and reproduction, and changes to the ability of PCEs to support the value of critical habitat in the action area. PCEs include sites essential to support one or more life stages of the species. These sites for migration, spawning, and rearing in turn contain physical and biological features that are essential to the conservation of the species. Where data to quantitatively determine the effects of the proposed action on CCC steelhead and their critical habitat were limited or not available our assessment of effects focused mostly on qualitative identification of likely stressors and responses.

A. Fish Relocation Activities

Fish relocation activities will occur during the summer low-flow or dry period after emigrating steelhead smolts have left, and before adults have immigrated into the action area. Due to the degraded rearing conditions and limited stream flow, the presence of significant numbers of rearing juvenile steelhead in the action area during project construction is unlikely. Based on familiarity with juvenile steelhead numbers in similar habitat conditions, and the available fish survey data for Feliz Creek, NMFS expects the number of juvenile steelhead relocated will be small, likely less than 85 fish.

There is always the potential for injury or mortality when relocating juvenile salmonids. 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 depends on the method used, the ambient conditions, and the expertise and experience of the field crew. Based on similar relocation efforts with which NMFS is familiar, up to three percent of the fish may be injured or killed during relocation activities (CDFG 2006b, 2007, 2008, 2009) (here, no more than 3 fish). Those fish that avoid capture may be exposed to risks described in the following section on dewatering.

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 face increased competition for available resources such as food and habitat. Some of the fish released at the relocation sites may choose not to remain in these areas and may move either upstream or downstream to areas that have more habitat and a lower density of fish. Because relocated fish will have the opportunity to quickly relocate into adjacent areas, thereby

minimizing competition and crowding stress to insignificance, NMFS does not believe relocation activities will reduce the fitness of individual fish.

B. Dewatering

Stream flow diversions could harm individual rearing juvenile steelhead by concentrating or stranding them in residual wetted areas before they are relocated (Cushman 1985). Rearing steelhead could be killed or injured if crushed during diversion and construction activities, though direct mortality is expected to be minimal due to relocation efforts prior to installation of the diversion. Fish that avoid capture in the Project work area will likely die during dewatering activities due to desiccation or thermal stress. Based on similar dewatering projects (Alley 2004, Rich 2005, Michaud 2006, Cressey 2009), NMFS expects the number of juvenile steelhead that will be killed is no more than one percent of the maximum number of steelhead anticipated to be in the area subject to dewatering (here, 85 fish as explained above). Thus, NMFS expects the total number of juvenile steelhead that will be killed as a result of stranding will be no more than one fish.

NMFS anticipates temporary changes in stream flow within and downstream of the Project site during dewatering activities. Where they occur, fluctuations in flow are anticipated to be small, gradual, and short-term. Stream flow in the vicinity of the Project site should be the same as free-flowing conditions, except during dewatering. NMFS anticipates that only a small reach of stream habitat at the Project site will be dewatered for in-channel excavation activities, representing a very minor portion of habitat currently utilized by steelhead within the Feliz Creek watershed.

Benthic (*i.e.*, bottom dwelling) aquatic macroinvertebrates within the construction site may be killed or their abundance reduced when creek habitat is dewatered (Cushman 1985), although large numbers of stream-dwelling invertebrates are not expected within the action area due to the benthic characteristics at the site (*i.e.*, highly embedded cobble/gravel substrate). However small, this effect will be temporary since construction activities will be relatively short-lived, and rapid recolonization (about one to two months) of disturbed areas by macroinvertebrates is expected following rewatering (Cushman 1985; Thomas 1985; Harvey 1986). In addition, the effect of lost macroinvertebrate production on juvenile steelhead is likely negligible, since even during project construction food (i.e., invertebrates) from upstream sources (via drift) would be available downstream of the dewatered areas because upstream flow and drifting invertebrates will be continuously diverted around the construction site). Therefore, the effects of benthic macroinvertebrate reduction on juvenile steelhead food supply are insignificant. Adult steelhead, and adult and juvenile Chinook salmon, will not be present downstream of the construction area during dewatering due to their life cycle timing. Based on these considerations, NMFS anticipates that any impacts to habitat, including CC Chinook and CCC coho salmon critical habitat, caused by dewatering activities will be minor and short-lived.

C. Turbidity

Disturbing the streambed or bank during cofferdam construction and channel excavation may temporarily increase turbidity levels within and downstream of the Project site. NMFS

anticipates that short-term increases in turbidity may occur during cofferdam construction and removal, and the following winter when storm flows shape the newly excavated channel. Actual excavation work is unlikely to elevate instream sediment concentrations since the work will be performed within an isolated dry channel.

Sediment may affect salmonids in several ways. High concentrations of suspended sediment can disrupt normal feeding behavior and efficiency (Cordone and Kelly 1961; Bjornn *et al*. 1977; Berg and Northcote 1985), reduce growth rates (Crouse *et al*. 1981), and increase plasma cortisol levels (Servizi and Martens 1992). High turbidity concentrations can lower dissolved oxygen in the water column, reduce respiratory function, lower disease tolerance, and even cause fish mortality (Sigler *et al.* 1984; Berg and Northcote 1985; Gregory and Northcote 1993; Velagic 1995; Waters 1995). Even small pulses of turbid water 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 survival. In addition, increased sediment deposition can fill pools and reduce the amount of cover available to fish, decreasing the survival of juvenile salmonids (Alexander and Hansen 1986).

Turbidity levels in the action area during construction are expected to be less intense than the conditions encountered in the above-mentioned studies, due largely to BMPs designed to minimize water quality degradation (*e.g.*, isolating construction area from running water, stockpiling excavated material away from sensitive areas, use of silt fences/hay bales to isolate erosional sites, *etc.*). Any elevation in turbidity would most likely occur following the first storm event following excavation, as flows could mobilize any recently disturbed sediment that remained. However, based on the proposed BMPs to control erosion, NMFS anticipates Project turbidity effects will be insignificant, and fall below the threshold necessary to injure or kill fish. Instead, the most likely result of Project turbidity levels will be minor behavioral responses (*e.g.*, avoidance, relocation, *etc.*) that are not expected to appreciably reduce the fitness of individual fish.

Upon removing the dam, the accumulated sediment wedge upstream of the dam will be contoured to form a new stream channel through the action area; however, most accumulated sediment will be left in place to slowly meter downstream during winter storm events. Much of the accumulated sediment wedge consists of high quality spawning gravel (Park Steiner, Mendocino County Department of Transportation, personal communication, 2012), which should benefit downstream reaches of Feliz Creek that currently lack suitable spawning habitat (CDFG 2006a). Turbidity levels directly downstream of the sediment wedge may be elevated above natural background levels during high flow events until the stream channel in the action area adjusts to the new channel morphology and sediment transport out of the reach equals sediment input. However, as stated previously, given the generally coarse composition of the sediment wedge in question (Park Steiner, Mendocino County Department of Transportation, personal communication, 2012), the increase in turbidity arising from the metering out of the sediment is expected to be short-term (likely only one or two winters) and insignificant, with steelhead likely avoiding and relocating away from turbid zones with no reduction to their fitness. For the reasons discussed above and taking into account the lifecycles of the respective species, the effects of turbidity on the function of critical habitat is insignificant.

D. Impacts to Stream Banks, Shade, and Riparian Vegetation

NMFS expects that long-term and permanent impacts to PCEs of critical habitat at the site will be minor and in some cases beneficial. Removing the cement dam and dysfunctional fish ladder will immediately allow upstream passage by steelhead and salmon into several miles of previously inaccessible habitat. Also, stabilizing the 150 feet of east streambank directly below the dam with rock riprap (slope toe) and riparian planting (upslope bank) will abate the chronic erosion occurring at the site and increase riparian density and diversity. Under certain circumstances, bank armoring may constrain natural channel dynamics that help create and maintain instream habitat; given the lack of artificial bank stabilization within most of the Feliz Creek watershed, impacts to channel dynamics are expected to be discountable. A few mature trees will be removed to allow equipment access to the work area, and to remove unstable trees that pose a safety hazard. The existing riparian corridor of established willow trees on the downstream left bank (in front of the eroded bank) will remain in place. Canopy cover over the water surface (important for shade and reduction of water temperatures), bank stability, sediment buffering, nutrient input (leaf fall), and other ecological functions of the riparian area will not appreciably diminish during the project's implementation due to the small number of trees affected. Instead, these functions will increase in the future as native grasses and trees planted to reduce hillside erosion mature. Therefore, the small number of trees that will be removed within the action area are unlikely to have a significant effect on available salmonid habitat within the Feliz Creek watershed.

The sediment load below the Project site will increase during the several seasons following dam removal as stored sediment is slowly released downstream during significant winter storm events. The released sediment will increase the abundance of high quality spawning gravel in the lower four miles of Feliz Creek, but will also increase the amount of fine sediment in lower Feliz Creek. Considering that the stored sediment is predominantly gravel size and larger (Park Steiner, Mendocino County Department of Transportation, personal communication, 2012), NMFS expects the fine sediment released by dam removal to be minimal and unlikely to result in decreases in habitat space or additions of fine sediments to spawning gravels that would adversely affect salmonids.

VII. CUMULATIVE EFFECTS

Cumulative effects are defined in 50 CFR § 402.02 as "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". Many actions occurring in the watershed upstream may affect the action area of this proposed project. Any future federal actions will be reviewed through separate section 7 consultation processes and not considered here.

During removal of the dam, an off-channel water collection structure (vertical perforated pipe or "infiltration gallery") will be installed. This water collection structure will be suitable for pumping to off-channel storage by the property owner. Because the off-channel water collection structure will be installed outside of the bed and banks of Feliz Creek, NMFS anticipates no construction impact to salmonids or their habitat in Feliz Creek from installation. The off-

channel water collection structure will be used to continue the collection of water for frost protection from Feliz Creek when flows in Feliz Creek are high, as noted above in the *Environmental Baseline*. Such timing of water collection for frost protection is likely to reduce impacts on flows needed by fish because water withdrawals will not occur during the spring and summer when flows are naturally low and rearing space for salmonids is limited. In addition, withdrawing water from an infiltration gallery well is likely to reduce impacts by avoiding the need for fish screens to prevent fish entrainment. Use of the structure will require the owner to obtain an approved water right from the State Water Board (Mendocino County 2011).

Given current baseline conditions and trends, NMFS does not expect to see significant improvement in most habitat conditions (other than the large improvement in fish passage resulting from this project) in the near future due to existing land and water development in the watershed. In the long term, climate change may produce temperature and precipitation changes that may adversely affect steelhead habitat in the action area.

NMFS does not anticipate any other cumulative effects in the action area other than those ongoing actions already described in the Environmental Baseline above, and resulting from climate change.

VIII. INTEGRATION AND SYNTHESIS

The CCC steelhead DPS is not viable at the present time, given the current depressed population abundance and productivity, poor spatial distribution, and compromised genetic and life-history diversity. The Project will likely adversely affect CCC steelhead, and designated critical habitat for CC Chinook and CCC coho salmon. However, the number of impacted CCC steelhead will likely be small, considering few juvenile steelhead are expected within the action area due to low water levels and a construction schedule that avoids adult and smolt migration periods. Therefore, NMFS expects few juvenile steelhead are likely to be encountered during the Project. Furthermore, combined mortality rates during relocation and dewatering activities are likely below four percent (<3% mortality in relocation activities, and <1% mortality in dewatering activities), so the risk of mortality to any encountered juvenile steelhead is low. Elevated turbidity will likely cause minor and temporary changes to salmonid behavior. Where construction-related turbidity effects exist, they will be minimized by fish relocation activities and specific Project design considerations, such as construction site dewatering, best management practice implementation, *etc*.

NMFS does not believe the Project will appreciably diminish the numbers, reproduction, or distribution of the Feliz Creek sub-population of CCC steelhead. Any steelhead present in the action area during the construction window likely make up a small proportion from the Feliz Creek population or the CCC steelhead DPS. It is unlikely that the potential loss of several juvenile steelhead as a result of the Project will impact future adult returns, due to the relatively large number of juveniles produced by each spawning pair and the relatively large juvenile steelhead population in the watershed unaffected by the project compared to the small number of juveniles likely in the action area.

The Project will isolate Chinook salmon and coho salmon critical habitat at the Project site during the approximately two-month work window. The action area represents a very small portion of the overall Feliz Creek watershed, and will become available to salmonids again once the project is complete. NMFS expects that the small, temporary loss of available habitat from dewatering the action area will have insignificant effects on spawning, rearing, and migration PCEs of salmonid critical habitat in the action area. Overall, the Project is unlikely to appreciably diminish the value of designated CC Chinook or CCC coho salmon critical habitat.

The anticipated benefits resulting from the Project are substantial. Removing the dam will allow unimpeded passage for steelhead and Chinook salmon into the upper two-thirds of the Feliz Creek watershed for the first time in more than 50 years. Furthermore, the release of high quality spawning gravel stored behind the dam will improve spawning habitat within the lower 4 miles of Feliz Creek, a section of the stream recently noted as lacking suitable spawning habitat. These habitat improvements are likely to increase steelhead numbers in Feliz Creek and improve the resistance of steelhead in Feliz Creek to climate change.

IX. CONCLUSION

After reviewing the best available scientific and commercial data, the current status of the species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is NMFS' biological opinion that the Project is not likely to jeopardize the continued existence of threatened CCC steelhead.

After reviewing the best available scientific and commercial data, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is NMFS' biological opinion that the Project is not likely to result in the destruction or adverse modification of designated critical habitat of CC Chinook salmon or CCC coho 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 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 any permittee to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to any permit, grant document, or contract, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the Corps 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

The installation/removal of cofferdams and fish relocation during the Project is expected to result in minimal incidental take of threatened CCC steelhead. Up to 85 steelhead will be captured and relocated. Based on the low mortality rates for typical relocation efforts, NMFS anticipates less than four percent of the juvenile steelhead encountered (no more than 4 fish) will be killed or injured during relocation and dewatering efforts. If more than 85 juvenile steelhead are captured for relocation, or more than 4 juvenile steelhead are killed or injured during relocation activities, incidental take will have been exceeded and consultation will need to be reinitiated.

B. Effect of the Take

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

C. Reasonable and Prudent Measures

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

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

D. Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the ESA, the Applicant, its permittee, and their contractors or designees 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.

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

    a. The Applicant shall retain a qualified biologist with expertise in the areas of anadromous salmonid biology, including handling, collecting, and relocating salmonids; salmonid/habitat relationships; and biological monitoring of

salmonids. The Applicant shall ensure that all biologists working on this Project 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 biologist and conducted according to the *NMFS Guidelines for Electrofishing Waters Containing Salmonids Listed under the Endangered Species Act* (NMFS 2000).

b. A qualified biologist shall monitor the construction site during placement and removal of channel diversions and cofferdams to ensure that any adverse effects to steelhead are minimized. The biologist shall be on site during all dewatering events to ensure that ESA-listed salmonids are captured, handled, and relocated safely. The biologist shall notify NMFS biologist Rick Rogers at (707) 578-8552 or rick.rogers@noaa.gov at least one week prior to capture activities in order to provide an opportunity for NMFS staff to observe the activities.

c. ESA-listed fish 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, aerated water 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. To avoid predation, the biologist shall have at least two containers and segregate young-of-year fish 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 condition are present to allow for adequate survival of transported fish and fish already present.

d. If any salmonids are found dead or injured, the biologist shall contact NMFS biologist Rick Rogers by phone immediately at (707) 578-8552 or the NMFS North Central Coast Office at (707) 575-6050. The purpose of the contact is to review the activities resulting in take and to determine if additional protective measures are required. All salmonid mortalities shall be retained, placed in an appropriately-sized sealable plastic bag, labeled with the date and location of collection, fork length measured, and frozen as soon as possible. Frozen samples shall be retained by the biologist until specific instructions are provided by NMFS. The biologist may not transfer biological samples to anyone other than the NMFS North Central Coast Office without obtaining prior written approval from the North Central Coast Office, Supervisor of the Protected Resources Division. Any such transfer will be subject to such conditions as NMFS deems appropriate.

e. The Applicant shall allow any NMFS employee(s) or any other person(s) designated by NMFS, to accompany field personnel to visit the Project site.

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 the threatened and endangered species. Conservation recommendations are discretionary measures suggested to minimize or avoid adverse effects of a proposed action on listed species, to minimize or avoid adverse modification of critical habitat, or develop additional information.

NMFS is not including any conservation recommendations at this time.

XII. REINITIATION NOTICE

This concludes formal consultation on the proposed Project. As provided in 50 CFR §402.16, 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 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; (3) the identified action is subsequently modified in a manner that causes an effect to listed species or critical habitat that was not considered in the biological opinion; or (4) a new species is listed or critical habitat designated that may be affected by the identified action. In instances where the amount or extent of incidental take is exceeded, formal consultation shall be reinitiated immediately.

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