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

May 29, 2012

In response refer to:
2011/00447

Ms. Jane M. Hicks
Chief, Regulatory Division
U.S. Army Corps of Engineers
San Francisco District
1455 Market Street
San Francisco, California 94103-4573

Dear Ms. Hicks:

This letter transmits NOAA's National Marine Fisheries Service's (NMFS) biological opinion (Opinion) regarding the District #1 Telegraph Creek Water Intake Installation project (Project) in accordance with section 7 of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. § 1531 *et seq.*). The Opinion (enclosure 1) addresses the effects of the Project on Southern Oregon/Northern California Coast (SONCC) coho salmon (*Oncorhynchus kisutch*), California Coastal (CC) Chinook Salmon (*Oncorhynchus tshawytscha*), Northern California (NC) Steelhead (*Oncorhynchus mykiss*) and their respective designated critical habitats.

After reviewing the best available scientific and commercial information, the current status of SONCC coho salmon, CC Chinook salmon and NC steelhead, the environmental baseline for the action area, the anticipated effects of the Project, and the cumulative effects, it is NMFS' biological opinion that the Project, as proposed, is not likely to jeopardize the continued existence of SONCC coho salmon or NC steelhead, or result in the destruction or adverse modification of SONCC coho salmon, NC steelhead, or CC Chinook salmon designated critical habitat. NMFS also concurred that the action may affect, but is not likely to adversely affect CC Chinook salmon.

In addition, amendments to the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA) require Federal agencies to consult with NMFS regarding any action or proposed action that may adversely affect Essential Fish Habitat (EFH) for Federally-managed fish species. NMFS evaluated the Project for potential adverse effects to EFH pursuant to section 305(b)(2) of the MSFCMA (enclosure 2). The action area of the Project includes areas

identified as EFH for various life stages of Chinook salmon and coho salmon, Federally managed under the Pacific Coast Salmon Fishery Management Plan. Based on the best available information, NMFS has determined that the Project would adversely affect EFH. Because the effects to EFH are short-term and minimal, no EFH Conservation Recommendations are necessary.

Please contact Chuck Glasgow at (707) 825-5170, or via email at chuck.glasgow@noaa.gov, if you have any questions concerning these consultations.

Sincerely,

for Rodney R. McInnis
Regional Administrator

Enclosures (2)

cc: David Ammerman, U.S. Army Corps of Engineers
Copy to file – ARN 151422SWR2007AR00105

Enclosure 1

BIOLOGICAL AND CONFERENCE OPINION

ACTION AGENCY: U.S. Army Corps of Engineers

ACTION:
Resort Improvement District #1 Telegraph Creek Water Intake Installation Project, Shelter Cove, California

CONSULTATION CONDUCTED BY: National Marine Fisheries Service, Southwest Region

FILE NUMBER: 151422SWR2011AR00105

DATE ISSUED: **May 29, 2012**

I. BACKGROUND AND CONSULTATION HISTORY

A. Background

The proposed project area consists of a channel reach of Telegraph Creek and adjacent riparian areas located approximately 1.1 miles upstream from the Pacific Ocean in Shelter Cove, California. Telegraph Creek is a small coastal stream that flows year-round. However, the stream historically exhibits subsurface flows near the stream mouth during late summer and early fall. The Telegraph Creek watershed drains approximately 2.94 square miles of privately owned land, and elevations range from sea level at the stream mouth to 1,600 feet above Mean Sea Level (MSL) in the headwater regions.

Operated by the Shelter Cove Resort Improvement District #1 (District), the dam on Telegraph Creek acts as a partial barrier to fish migration. The District has completed several projects in attempt to improve over-dam fish passage, none of which has proven adequate. Following NOAA's National Marine Fisheries Service's (NMFS) recommendations, the District installed a Denil fish ladder in 2005 to improve fish passage. However, NMFS found the fish ladder inadequate for providing over-dam fish passage for all salmonid life stages.

The Humboldt County Department of Public Works owns and maintains a triple-culvert watercourse crossing located approximately 75 feet upstream of the dam. This triple-culvert watercourse crossing is a barrier to both juvenile and adult salmonid migration.

B. Consultation History

On January 31, 2011, NMFS received a January 25, 2011, letter and biological bssessment (BA) from the U.S. Army Corps of Engineers (USACE), initiating consultation regarding potential effects to salmonids protected under the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531 § *et seq*.), and associated implementing regulations (50 CFR Part 402), arising from the proposed Resort Improvement District #1 Telegraph Creek Water Intake Installation Project (project) located in Shelter Cove, Humboldt County, California. The USACE requested that NMFS concur with its determination that the Project will adversely affect threatened Southern Oregon/Northern California Coast (SONCC) coho salmon (*Oncorhynchus kisutch*); California Coastal (CC) Chinook salmon (*O. tshawytscha*); Northern California (NC) steelhead (*O. mykiss*); designated critical habitat for the aforementioned species; and designated Essential Fish Habitat (EFH) for Chinook salmon and coho salmon.

On March 3, 2011, NMFS received an October 27, 2010-dated revision of a BA prepared by Alice Berg and Associates, LLC, on September 1, 2010, for SHN Consulting Engineers and Geologists, Inc., the Project applicant's contractor (hereinafter SHN).

On March 25, 2011, District, SHN, and NMFS staff inspected the site.

On April 13, 2011, NMFS initiated section 7 formal consultation pursuant to the ESA regarding potential impacts to SONCC coho salmon, CC Chinook salmon, NC steelhead, and designated critical habitat for these species. Pursuant to the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA), NMFS initiated consultation on potential project effects to essential fish habitat (EFH) for Chinook salmon and coho salmon EFH within Telegraph Creek.

On August 2, 2011, SHN notified NMFS that time delays regarding water rights point-of-diversion applications might preclude project implementation during 2011 and result in at least a one-year project work delay. Based upon NMFS recommendations and with project contractor agreement, the consultation may be issued to allow project work to occur between July 1 and October 30, to be completed within a five-year time span beginning in 2012 and concluding in 2016.

On March 7, 2012, a water resources engineer employed by SHN modified the project final design plans in response to a NMFS staff hydrologist's concerns regarding scour effects, diversion pipe location, right-bank silt fence installation, proposed gravel road stream crossing-induced turbidity, 100-year flood flow velocity, and likelihood of a greater than six-inch drop in water surface elevation across the weir during low flow periods if scour occurs on the weir's downstream side. An SHN Engineer responded to the above concerns as follows:

- *Riprap scour protection (RSP) downstream of the weir will be tamped to compact sand and angular gravel between RSP to minimize voids.*
- *The diversion pipe will be moved onto the right bank (looking downstream).*

- *The silt fence will be removed from the right bank.*
- *The originally proposed gravel road stream crossing downstream of the intake structure will be changed to a temporary flatcar bridge.*
- *The flow that will overtop the intake structure is estimated to be greater than 232 cfs (estimated 100-year flood flow event), due to the stream slope. Due to velocity prohibitions, it is unlikely that fish will be in the stream at this time.*
- *Annual measurements will be taken to determine if scour is occurring on the downstream side of the concrete weir that would result in a greater than six-inch hydraulic drop across the weir during low flow. If such is the case, a boulder weir, located downstream from the existing concrete weir, will be installed to provide drop elevation control and reestablish a six-inch-jump.*

This biological opinion (BO) analyzes the effects of the proposed project upon ESA-listed salmonids and their designated critical habitat. A complete administrative record for this consultation is located at the NMFS Northern California Office.

II. DESCRIPTION OF THE PROPOSED ACTION

The USACE proposes to issue a Nationwide Permit number 12 (Utility Line Activities), to the District for the Project. This section of the BO describes the proposed work and action area.

Established in 1965, the non-profit, public utility District provides the Shelter Cove community with electricity, water, and wastewater treatment. The District operates the existing community water system, including a concrete diversion dam that has been in place for more than 40 years and a point of diversion downstream of the dam, for a total water diversion that provides 70 percent of the community's water supply needs. Throughout the year, water is drawn from Telegraph Creek under an existing water right of 0.775 cubic feet per second (cfs) with low-flow requirements to maintain 0.80 cfs in the stream at all times. Raw water is treated at the Water Treatment Plant (WTP), which is then transferred into the wash water tank and clear well. From the clear well, the treated water is pumped up to the distribution reservoir, which is situated approximately 200-feet above the WTP, and distributed to Shelter Cove residents.

NMFS identified the District's dam as a partial barrier to fish migration. The District received funding from the California Department of Fish and Game (CDFG) to design a fish passage corridor through the dam and a triple-culvert stream crossing at Telegraph Creek Road, directly upstream of the dam, in coordination with Humboldt County Public Works. Permitting and environmental review for construction of this fish passage project will be completed separately because of different funding sources and lead agencies.

To facilitate future dam modifications , construction of a new, upstream water intake that will provide the District with raw water supply is proposed. Storage tanks will be installed to provide the water treatment plant with adequate raw water to meet the District's existing water needs. The District anticipates new water intake project

construction will begin in the spring of 2012 and be completed by fall of 2012. The intake is being designed as a fish-friendly system and will allow the District to proceed with future dam modifications. The proposed project has been developed in close coordination with NMFS and CDFG. The District and SHN met with NMFS on several occasions to discuss project design and associated impacts to biological resources.

A. Description of Proposed Work

1. Project Design Elements

The Project includes the following project design elements:

a. Water is proposed to be drawn through a side-channel concrete intake structure. An approximately 35-foot-long, 1-foot-high concrete weir with flashboards will span the stream bank-to-bank to control the bypass flow and divert the water allowed under the District's existing water rights into the new intake structure. The diversion structure will be constructed approximately 700 feet upstream of the existing intake at the dam.

- All in-stream construction work will be performed during the dry season (low flow period) between June 15 and October 30.
- Equipment will access the project site from Telegraph Creek Road on an existing graded roadbed along the north bank of Telegraph Creek that terminates near the new intake location. Minor tree clearing may be required to allow access to the project site.
- A temporary, flatcar bridge spanning the stream channel will be installed downstream of the intake structure to facilitate equipment access.
- Equipment will include, but is not limited to, a backhoe or excavator to excavate for the diversion structure and piping.
- Portions of the channel will be dewatered, as needed, through the new intake area and channel reach (including all necessary measures to relocate aquatic species).
- Instream boulders at the project site will be relocated, as needed.
- The instream channel bed will be excavated to construct the concrete wall to control the bypass flow and divert water to the new intake.
- A side channel will be excavated along the left bank of the stream to construct the concrete intake canal box.
- A Coanda screen system will be installed at the downstream end of the intake canal box, and the Coanda flume will connect back to the stream. The screen is hydraulically self-cleaning without moving parts,

will require minimal maintenance, and is capable of screening out small debris and aquatic organisms from the intake pipe.

- Stream banks will be armored with rock at both ends of the concrete weir.

b. Installation of up to two, 7,500-gallon, cone-bottom settling tank(s), east of the WTP, across Telegraph Creek Road.

- Up to two, 15 foot by 15 foot concrete slab(s) will be poured approximately 25 feet south of the top bank of Telegraph Creek to serve as the settling tanks foundations. The settling tank yard will be excavated using a backhoe or excavator in order to construct the slab and asphalt surface around the tanks.
- The settling tank(s) will be approximately 12 feet in diameter by 13 feet high. Seismic tie downs will be installed at the tank(s) in accordance with seismic Zone 4 and to address high wind loads.
- A concrete drainage channel will be constructed around the perimeter of the settling tank yard to allow for drainage. Baffles will be placed within the concrete channel to catch sediment prior to water being discharged back to the stream within a rock lined channel.
- An overflow will be constructed below top of bank from the water storage tank to Telegraph Creek in accordance with designs and specifications. An energy dissipater will be installed at the outlet of the overflow/bypass pipe.
- A chain link fence with double locking gates will be constructed around the settling tank(s), and will include a graded and asphalt access area for working around the tank(s).

c. Installation of up to six, 12,000-gallon, polyethylene raw water storage tanks south of the existing settling basin at the WTP.

- Removal of existing chain link fencing south of the basin and construction of a new chain link fence along the property line, approximately 10 to 15 feet south of the existing fence line, to accommodate the new tanks.
- The new tanks (approximately 13.5-foot-diameter by 16-foot-high) will be plumbed together.
- The tank area will be excavated about one foot, compacted, and a ring with a graded gravel base constructed below the tanks.
- Seismic tie downs will be installed to the tank(s) in accordance with seismic Zone 4 and to resist high wind loads.

d. A gravity-fed piping system will be installed from the new upstream intake to the cone-bottom settling tanks, situated east of Telegraph Creek Road.

- Pipe will be laid above ground along the left bank (facing downstream) and anchored to the valley slope in accordance with designs and specifications.
- Necessary air valves will be installed at periodic increments in accordance with design requirements.
- Vegetation removal will be necessary for the piping alignment.

e. A gravity-fed piping system will be constructed from the cone-bottom settling tanks to the raw water storage tanks situated south of the WTP settling basin.

- With permission from Humboldt County Public Works, Telegraph Creek Road asphalt will be trenched to allow for subsurface placement of piping and electrical conduit underneath the road.

f. A gravity-fed piping system will be constructed from the raw water storage tanks to the existing WTP supply pipe situated near the existing pumping station at the dam.

- This raw water intake will connect into the existing system, where it will be treated, filtered, pumped to the distribution system, and become ready for use.

2. Fisheries Effects Minimization Measures

- All in-stream construction work will be performed during the dry season (low flow period – from July 1, 2012 through October 30, 2012).
- Concrete weir water diversion structural features will facilitate water flow over the weir at fish passage flow levels.
- Riprap scour protection downstream of the weir will be tamped to compact sand and angular gravel between RSP to minimize voids.
- Water surface drop elevation across the concrete weir to the downstream pool will be monitored annually. If the drop elevation is greater than six inches during low flow periods, a boulder weir will be added approximately 10 feet downstream of the concrete weir to provide drop elevation control.
- All water intake structures and water diversion will be screened according to NMFS (1996) criteria.
- For all work proposed, the applicant must prevent the release of silt, sediment or sediment-laden water, raw concrete or concrete leachate, or any other deleterious substances into any ditch, watercourse, ravine or storm system.

- For all work proposed, the applicant must ensure that equipment and machinery is in good operating condition, clean (power-washed offsite) and free of leaks, excess oil and grease.
- No equipment refueling or servicing should be undertaken within 100 feet of any watercourse or surface water drainage.
- A spill containment kit must be readily accessible on-site in the event of release of a deleterious substance.
- During site preparation, the work area must be isolated from all flowing water, but flow to downstream portions of the stream may not be cut off at any time during construction. Water must be temporarily diverted, enclosed, or pumped around the work site. The point of discharge to the creek must be located immediately downstream of the work site to minimize disturbance to downstream populations and habitats.
- A temporary, flatcar bridge spanning the stream channel will be installed downstream of the intake structure to facilitate equipment access and thus reduce turbidity levels that would otherwise be greater if a temporary culvert covered with clean, washed gravel fill was used to provide the same equipment access.
- During pipeline trenching, every effort should be made to backfill any trenches so that the first layer excavated is the last to be replaced; this detail is particularly important if the initial surface layer is rocky material. Any material that cannot be returned to the trench during back filling should be removed to a point outside of stream and riparian zones, and temporary storage of material should not be left in a manner by which it could become a source of silt in the event of rain. Upon completion of back filling within stream channels, the trenched portion, as well as any part of the shore above the water level that had been covered by rock prior to excavation or that was disturbed by the storage of excavated material, should be covered with a shallow layer of clean, washed gravel consistent with surrounding substrates.
- All work areas below the high water mark/top of bank should be left in a smooth condition and free of any depressions that could result in fry entrapment.

3. Sediment Control

- Disturbance to existing vegetation on and adjacent to stream banks and within riparian zones must be minimized.
- Sediment control measures (*e.g.*, biodegradable straw waddles, bales, silt cloth) must be installed before starting any work that may result in sediment mobilization.
- Excavated material and debris must be removed from the site or placed in a stable area outside of the stream/riparian zone (at least 200 feet from streams). Such material and any remaining exposed soils within the work site must be protected from erosion and reintroduction to the watercourse by using mitigation measures

including, but not limited to, covering the material with biodegradable erosion blankets and/or seeding/planting with native vegetation.

- When material is moved off-site, it must be disposed in such a manner as to prevent its entry into any watercourse, floodplain, ravine, or storm sewer system.
- Vegetation clearing for access to and within the work area must be limited, and disturbed areas must be replanted/replaced with vegetation in-kind. Re-vegetation plans should manage for the colonization and spread of invasive plant species.
- Disturbed areas above the high water mark/top of bank must be graded to a stable angle of repose after work is completed and these areas must be re-vegetated to prevent surface erosion and subsequent siltation of the watercourse.
- Disturbed soil areas on and adjacent to the banks of streams and lakes may be protected from surface erosion by hydroseeding with a heavy mulch, tackifier and seed mix; by installing erosion blankets; and/or by heavily seeding/planting with native vegetation.
- Any remaining sediment and erosion control measures (*e.g.*, silt fences) must be removed post-construction.
- All construction equipment, supplies and non-biodegradable materials must be removed from the site.
- Post-construction monitoring to ensure successful revegetation must be completed.

4. Channel Dewatering and Fish Relocation

If surface flows are present during construction, dewatering of the work area, fish relocation, and water management will be required to minimize effects upon juvenile salmonids in the following sequence:

- Two fish exclusion fences will be installed in Telegraph Creek to isolate the in-channel work area: one fence will be installed on the upstream end of the work area and one on the downstream end. Exclusion fences must be installed to prohibit fish from moving into the work area. Fences will consist of T-posts on each end with 0.125-inch mesh hardware cloth as the fence/barrier that is anchored into a trench (dug perpendicular to flows) in the channel bottom and with the base anchored using sandbags filled with clean gravel.
- If surface flows are present in the construction work area, the area will first be isolated by fencing as described above and then electrofished by a qualified biologist following NMFS Guidelines (NOAA 2000). Captured salmonids will be placed into shaded buckets equipped with aerators and relocated to suitable habitat upstream of work areas immediately after capture.
- Water will be diverted into a flexible, plastic pipe that skirts around the Project site to avoid dewatering downstream areas. The diversion pipe will be located on the right stream bank (looking downstream.) This work must proceed quickly once water is diverted into the pipe. Only after fish are relocated and flows have been rerouted will the work site then be pumped dry.

5. Equipment Crossings

Equipment crossings will occur at the beginning and end of the work window. The following minimization measure is required:

- Only pressure-washed equipment will be allowed to cross the channel.

B. Description of the Action Area

The project area consists of a channel reach of Telegraph Creek and adjacent riparian areas located approximately 1.1 miles upstream from the Pacific Ocean in Shelter Cove, California. Telegraph Creek is a small, perennial, coastal stream; however, the stream historically exhibits subsurface flows near the stream mouth during late summer and early fall. The Telegraph Creek watershed drains approximately 2.9 square miles of privately owned land, and elevations range from sea level at the stream mouth to 1,600 feet above Mean Sea Level (MSL) in the headwater regions. Vegetation within the watershed is dominated by hardwoods and Douglas-fir (*Pseudotsuga menziesii*). Elevation at the site is approximately 230 feet above MSL and approximately one-half-mile upstream of the confluence with the ocean. The action area is the project site downstream to the estuary (figure 1).

Comprehensive assessments to catalog habitat and fish populations within the Telegraph Creek watershed have not been undertaken. Stream inventory reports conducted by CDFG, the California Conservation Corps and Watershed Stewards Project/AmeriCorps, and the California Cooperative Fishery Research Unit indicate that good water temperature and flow regimes exist in Telegraph Creek, and the stream affords good salmonid rearing conditions.

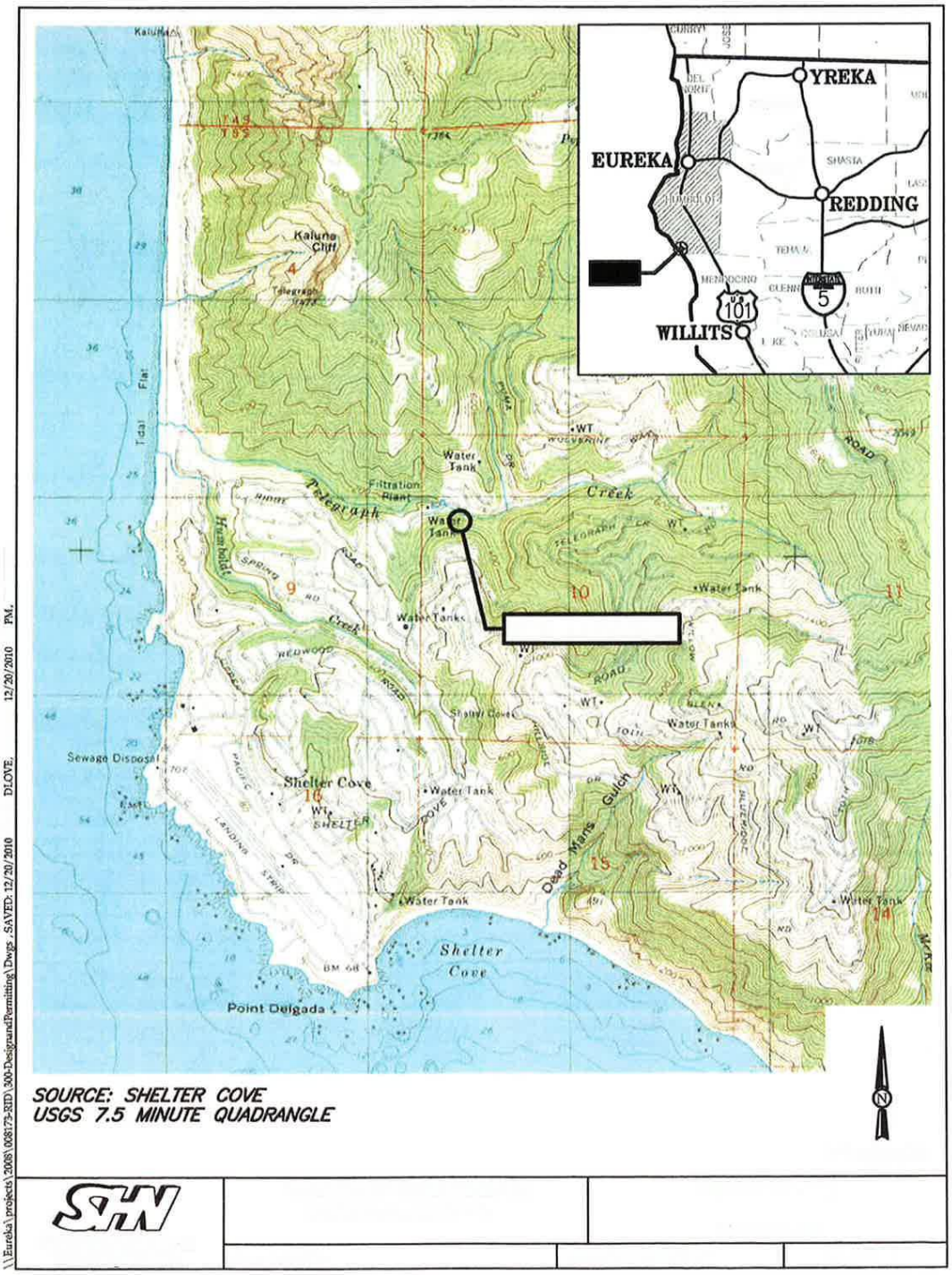

Figure 1. Location of Project site in Telegraph Creek.

III. STATUS OF THE SPECIES AND CRITICAL HABITAT

In the *Status of the Species* section, effects of all past human and natural activities or events that have led to the current status of the species are summarized. In this section of the biological opinion, NMFS focuses specifically upon the discrete recovery unit at the ESU or DPS scale, as appropriate. A companion analysis is completed when designated critical habitat may be affected. Appropriate information regarding the species' life history, habitat and distribution, and other data examining factors necessary for species survival is included to provide background for analysis presented in later sections.

The proposed action may affect the Southern Oregon/Northern California Coast (SONCC) coho salmon, California Coastal (CC) Chinook salmon, Northern California (NC) steelhead, and their designated critical habitat in the action area. Therefore, in this biological opinion NMFS analyzes the effects of the proposed action upon SONCC coho salmon, CC Chinook salmon, NC steelhead and their designated critical habitats. The SONCC coho salmon ESU and CC Chinook salmon ESU include hatchery-born salmon.

A. Salmonid Life History, Current Distribution, and Abundance

1. SONCC Coho salmon

a. Life History

Adult coho salmon reach sexual maturity at 3 years and die after spawning. Precocious 2 year olds, especially males, also comprise a small percentage of the spawning population. Coho salmon adults migrate and spawn in small streams that flow directly into the ocean, or tributaries and headwater creeks of larger rivers (Sandercock 1991, Moyle 2002). Adults migrate upstream to spawning grounds from September through late December, with migration rates peaking in October and November. Spawning occurs mainly in November and December, and fry emerge from the gravel approximately three to four months later. Juvenile rearing usually occurs in tributary streams with a gradient of 3 percent or less, although rearing may also take place in streams of 4 or 5 percent gradient. Juveniles have been found in streams as small as 1 to 2 meters wide and may spend 1 to 2 years rearing in freshwater (Bell and Duffy 2007), or emigrate to an estuary shortly after emerging from spawning gravels. Emigration from streams to the estuary and ocean generally takes place from March through May.

a. Current Distribution and Abundance

Reliable current time series of naturally produced adult migrants or spawners are not available for SONCC coho salmon ESU rivers (Good *et al.* 2005). For a summary of historical and current distributions of SONCC coho salmon in northern California, refer to CDFG's (2002) coho salmon status review; historical population structure by Williams *et al.* (2006); and the presence and absence update for the northern California portion of the SONCC coho salmon ESU (Brownell *et al.* 1999). Good *et al.* (2005) concluded that SONCC coho salmon were likely to become endangered in the foreseeable future; this conclusion is consistent with an earlier assessment (Weitkamp *et al.* 1995). Although there are few data, available SONCC coho salmon information indicates that the

component populations are in decline and strongly suggests the ESU is at risk (Weitkamp *et al.* 1995, CDFG 2002, Good *et al.* 2005). NMFS (2001) concluded that population trend data for SONCC coho salmon from 1989 to 2000 show a continued downward trend throughout most of the California portion of the SONCC coho salmon ESU.

The main stocks in the SONCC coho salmon ESU, comprised of the Rogue, Klamath, and Trinity Rivers, remain heavily influenced by hatcheries and have little natural production in mainstem rivers (Weitkamp *et al.* 1995, Good *et al.* 2005). The listing of SONCC coho salmon includes all hatchery-produced coho salmon in the ESU range (70 FR 37160, June 28, 2005). Trinity River Hatchery maintains high production, with a significant number of hatchery SONCC coho salmon straying into the wild population (NMFS 2001). The Mad River Hatchery ceased coho salmon production in 1999, and Iron Gate Hatchery has reduced production in recent years to a production goal of 75,000 juveniles. The apparent decline in wild production in these rivers, in conjunction with significant hatchery production, suggests that natural populations of coho salmon are not self-sustaining (Weitkamp *et al.* 1995, Good *et al.* 2005). Coho salmon populations continue to be depressed relative to historical numbers, and there are strong indications that breeding groups have been lost from a significant percentage of streams within their historical range (Good *et al.* 2005).

Brown *et al.* (1994) estimated that the rivers and tributaries in the California portion of the SONCC coho salmon ESU produced an average of 7,080 naturally spawning coho salmon and 17,156 hatchery returns, including 4,480 wild fish occurring in tributaries having little history of supplementation with nonnative fish. Combining the California run-size estimates with Rogue River estimates, Weitkamp *et al.* (1995) arrived at a rough minimum run-size estimate for the SONCC coho salmon ESU of about 10,000 natural fish and 20,000 hatchery fish.

Brown and Moyle (1991) suggested that naturally-spawned adult coho salmon runs in California streams were less than one percent of their abundance at mid-century and estimated that wild coho salmon populations in California did not exceed 100 to 1,300 individuals. CDFG (1994) summarized most information for the northern California portion of this ESU, and concluded that "coho salmon in California, including hatchery stocks, could be less than 6 percent of their abundance during the 1940s, and have experienced at least a 70 percent decline in numbers since the 1960s." Further, CDFG (1994) reported that coho salmon populations have been virtually eliminated in many streams and that adults are observed only every third year in some streams, suggesting that two of three brood cycles may have already been eliminated.

Scientists at the NMFS Southwest Fisheries Science Center compiled a presence-absence database for the SONCC coho salmon ESU similar to that developed by CDFG (Good *et al.* 2005). The data set includes information for coho salmon streams listed in Brown and Moyle (1991), as well as other streams for which NMFS found historical or recent evidence of coho salmon presence. The database is a composite of information contained in the NMFS (2001) status review update, additional information gathered by NMFS since publication of the 2001 status review, data used in the CDFG (2002) analysis, and

additional data compiled by CDFG (Jong 2002) for streams not on the Brown and Moyle (1991) list. Using the NMFS database, Good *et al.* (2005) compiled information on the presence of coho salmon in streams throughout the SONCC ESU, which closely matched the results of Brown and Moyle (1991; Figure 2).

Annually, the estimated percentage of streams in the SONCC coho salmon ESU for which coho salmon presence was detected generally fluctuated between 36 percent and 61 percent between brood years 1986 and 2000 (Figure 2). Data reported for the 2001 brood year suggest a strong year class, as indicated by an occupancy rate of more than 75 percent; however, the number of streams for which data were reported is small compared to previous years. For the period of record, the data suggest that occupancy rates in the SONCC coho salmon ESU were highest (54 to 61 percent) between brood years 1991 and 1997, then declined between 1998 and 2000 (39 to 51 percent) before rebounding in 2001. However, the number of streams surveyed in 2001 was roughly 25 percent of the number surveyed in previous years (Good *et al.* 2005).

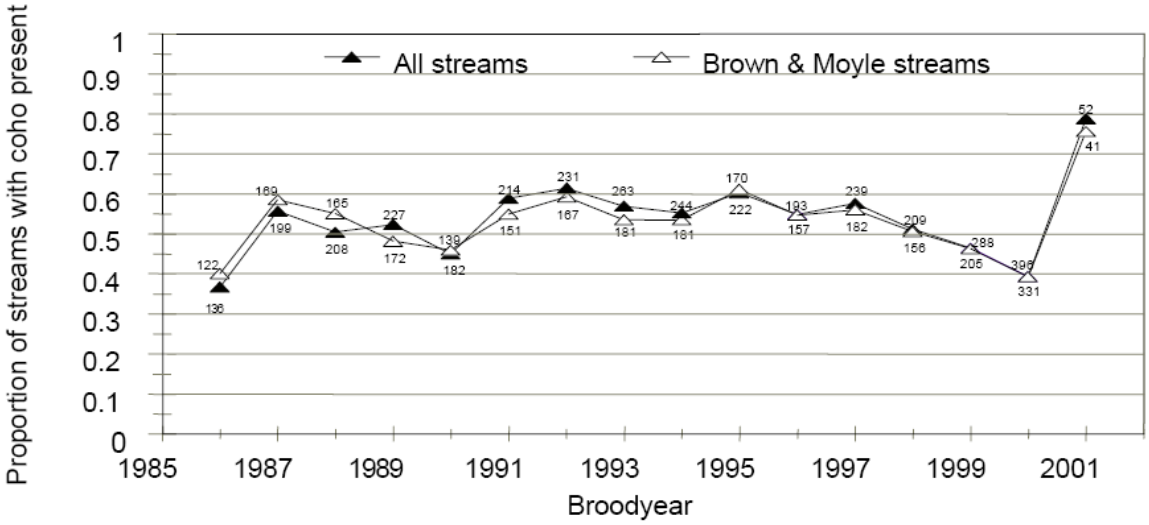

Figure 2. Proportion of surveyed streams where coho salmon were found (Good *et al.* 2005). The number of streams surveyed is shown next to the data.

2. CC Chinook salmon (*Oncorhynchus tshawytscha*)

NMFS concurs that CC Chinook salmon individuals will not be exposed to the project, and that the action may affect, but is not likely to adversely affect individual CC Chinook salmon. Thus, CC Chinook salmon will not be considered further in this biological opinion.

3. NC Steelhead (*Oncorhynchus mykiss*)

a. Life History

Steelhead have the most diverse range of any salmonid life history strategies (Quinn 2005). There are two basic steelhead life history patterns, winter-run and summer-run (Quinn 2005, Moyle 2002). Winter-run steelhead enter rivers and streams from

December to March in a sexually mature state and spawn in tributaries to mainstem rivers, often ascending long distances (Moyle 2005). Summer steelhead (also known as spring-run steelhead) enter rivers in a sexually immature state during receding flows of spring and migrate to headwater reaches of tributary streams where they hold in deep pools until spawning the following winter or spring (Moyle 2002). Spawning for all runs generally takes place in the late winter or early spring. Eggs hatch in 3 to 4 weeks and fry emerge from the gravel 2 to 3 weeks later (Moyle 2002). Juveniles spend 1 to 4 years in freshwater before migrating to estuaries and the ocean where they spend 1 to 3 years before returning to freshwater to spawn. "Half pounder" steelhead are sexually immature steelhead that spend about 3 months in estuaries or the ocean before returning to lower river reaches on a feeding run (Moyle 2002). Subsequently, they return to the ocean where they spend 1 to 3 years before returning to freshwater to spawn. Unlike Pacific salmon, steelhead are iteroparous, or capable of spawning more than once before death (Busby *et al.* 1996). However, steelhead rarely spawn more than twice before dying and most that do so are female (Busby *et al.* 1996). Some steelhead "residualize," becoming resident trout and never adopting the anadromous life history.

b. Current Distribution and Abundance

Along the eastern Pacific, rainbow trout, including steelhead, are distributed from Southern California north to Alaska and range west to Siberia. In California, steelhead occur in coastal streams from the Oregon border south to San Diego County and up to migration barriers throughout their distribution. The NC steelhead DPS includes all naturally spawning populations of steelhead in California coastal river basins from Redwood Creek, Humboldt County to just south of the Gualala River, Mendocino County (Spence *et al.* 2007). This distribution includes the Eel River, the third largest watershed in California, with its four forks (North, Middle, South, and Van Duzen) and their extensive tributaries. Spence *et al.* (2007) identified 32 historically self-sustaining populations in the DPS region based on habitat availability and gene flow among watersheds. An additional 33 small populations are likely dependent upon immigration of non-natal steelhead from the more permanent populations (Bjorkstedt *et al.* 2005). With few exceptions, NC steelhead are present wherever streams are accessible to anadromous fishes and there are sufficient flows. Big and Stone lagoons, between Redwood Creek and Little River, contain steelhead following the lagoons' opening to the ocean in the early winter, although the source of these fish is unknown (Moyle *et al.* 2008).

There is a notable lack of quantitative information on NC steelhead, but there are a few survey index estimates of stock trends. Most data come from fish counts from the 1930s and 1940s at three dams: Sweasey Dam on the Mad River (annual adult average 3,800 in the 1940s); Cape Horn Dam on the upper Eel River (4,400 annual average in the 1930s); and Benbow Dam on the South Fork Eel River (18,784 annual average in the 1940s; Murphy and Shapovalov 1951, Busby *et al.* 1996). These data can be compared to the annual average at Sweasey Dam at 2,000 in the 1960s; at Cape Horn Dam at 1,000 in the 1980s; and at Benbow Dam at 3,355 in the 1970s (McEwan and Jackson 1996, Busby *et*

al. 1996). In the mid-1960s, CDFG estimated steelhead spawning in many rivers in this ESU to total about 198,000 adults (McEwan and Jackson 1996).

Currently, the most abundant run is in the Middle Fork Eel River, with approximately 2,000 fish in 1996 (McEwan and Jackson 1996). Substantial declines from historic levels at major dams indicate a probable decline from historic levels at the DPS scale. Based on the declining abundance and the inadequate implementation of conservation measures, NMFS concluded that the NC steelhead ESU (now DPS) warranted listing as a threatened species (June 7, 2000, 65 FR 36074).

Steelhead abundance estimates are summarized in the most recent NMFS west coast steelhead status reviews (Good *et al.* 2005). The Biological Review Team (BRT) made a few conclusions, albeit with limited data: (1) population abundances are low, compared to historical estimates; (2) recent trends are downward (except for a few small summer-run stocks); and (3) summer-run steelhead abundance was "very low" (Good *et al.* 2005). Lack of data on run sizes within the DPS was a major source of uncertainty in the BRT's assessment.

B. Factors Responsible for Salmonid Decline (ESU or DPS Scale)

The factors that caused declines in the SONCC coho salmon ESU, and NC steelhead DPS are similar. These factors include habitat loss due to dam building; degradation of freshwater habitats due to a variety of agricultural and forestry practices; water diversions; urbanization; mining; and severe recent flood events, which are exacerbated by land use practices (Good *et al.* 2005). Sedimentation and loss of spawning gravels associated with poor forestry practices and road building are particularly acute problems that can reduce the productivity of salmonid populations. Nonnative Sacramento pikeminnow (*Ptychocheilus grandis*) occupy the Eel River basin, prey on juvenile salmonids (Good *et al.* 2005), and compete for the same resources. Droughts and unfavorable ocean conditions in the late 1980s and early 1990s were identified as additional likely causes of decline (Good *et al.* 2005).

1. Timber Harvest

Timber harvest and associated activities occur over a large portion of the range of the affected species. Timber harvest has caused widespread increases in sediment delivery to channels through both increased land sliding and surface erosion from harvest units and log decks. Much of the riparian vegetation has been removed, reducing future sources of large woody debris (LWD) needed to form and maintain stream habitat upon which salmonids depend during various life stages.

In the smaller Class II and III streams, recruited wood usually cannot be washed away; hence logs remain in place and act as check-dams that store sediment eroded from hillsides (Reid 1998). Sediment storage in smaller streams can persist for decades (Nakamura and Swanson 1993). In assessing the characteristics of Class III watercourses, Simpson (2002) found that coniferous woody debris was the predominant

channel bed grade control. Furthermore, where channels are prone to sediment debris flows, woody debris and adjacent riparian stands can provide roughness that limit the distance debris flows may travel down into channels [Ketcheson and Froehlich 1978 Pacific Watershed Associates (PWA) 1998]. In Bear Creek, a tributary to the Eel River, PWA (1998) noted that debris flows now travel farther downstream and channel aggradation extends farther downstream because of inadequate quantities of large wood arising from landslide source areas and streamside vegetation.

On larger channels, wood stores sediment, and provides a critical element in the habitat of aquatic life forms (Spence *et al.* 1996, Reid 1998). Sullivan *et al.* (1987) found that woody debris forms abundant storage sites for sediment in forested streams as large as fourth-order (20 to 50 km^2 drainage area), where storage is otherwise limited by steep gradients and confinement of channels between valley walls. Studies of this storage function in Idaho by Megahan and Nowlin (1976) and in Oregon by Swanson and Lienkamper (1978) indicated that annual sediment yields from small forested watersheds are commonly less than 10 percent of the sediment stored in channels.

In fish-bearing streams, woody debris is important for storing sediment, halting debris flows, and decreasing downstream flood peaks; its role as a habitat element becomes directly relevant for Pacific salmon species (Reid 1998). LWD alters the longitudinal profile and reduces the local gradient of the channel, especially when log dams create slack pools above or plunge pools below them, or when they are sites of sediment accumulation (Swanston 1991).

Cumulatively, the increased sediment delivery and reduced woody debris supply have led to widespread impacts to stream habitats and salmonids. These impacts include reduced spawning habitat quality; loss of pool habitat for adult holding and juvenile rearing; loss of velocity refugia; and increases in the levels and duration of turbidity that reduce the ability of juvenile fish to feed and, in some cases, may cause physical harm by abrading the gills of individual fish. These changes in habitat have led to widespread decreases in the carrying capacity of streams that support salmonids.

2. Road Construction

Road construction, whether associated with timber harvest or other activities, has caused widespread impacts to salmonids (Furniss *et al.* 1991). Where roads cross salmonid-bearing streams, improperly placed culverts have blocked access to many stream reaches. Land sliding and chronic surface erosion from road surfaces are large sources of sediment across the affected species' ranges. Roads increase sediment loads and have the potential to increase peak flows and reduce summer base flows with consequent effects upon stream substrate and bank stability. Resulting habitat impacts include reductions in spawning, rearing and holding habitat, and increases in turbidity.

Sediment delivery to streams may be either chronically delivered or more episodic in nature. Chronic delivery, or surface erosion, occurs through rainsplash and overland flow; therefore, surface erosion occurs often and is associated with rainfall. Episodic

delivery, on the order of every few years, occurs in the form of mass wasting events, or landslides, that deliver large volumes of sediment during large storm events.

Tree-felling, log hauling, slash disposal, site preparation for replanting, soil compaction by logging equipment; and road construction, use, and maintenance are all potential sources of fine sediment that can ultimately deliver to streams (Hicks *et al.* 1991, Murphy 1995). The potential for delivering sediment to streams increases as hillslope gradients increase (Murphy 1995). The soils in virgin forests generally resist surface erosion because their coarse texture and thick layer of organic material and moss prevent overland flow (Murphy 1995). All of the activities associated with timber management in the action area have been known to decrease the ability of forest soils to resist erosion and contribute to the production of fine sediment, non-point sources of stream pollution. Yarding activities that cause extensive soil disturbance and compaction can increase splash erosion and channelize overland flow. Site preparation and other actions resulting in the loss of the protective humic layer can increase the potential for surface erosion (Hicks *et al.* 1991). Controlled fires can also consume downed wood, including that which formerly acted as sediment dams on hillslopes. After harvesting, root strength declines, which often results in slumps, landslides, and surface erosion (Thomas *et al.* 1993). Riparian tree roots provide bank stability, and streambank sloughing and erosion often increase if these trees are removed, leading to increases in sediment, and loss of overhanging banks, which is important habitat for rearing Pacific salmonids (Murphy 1995). Where rates of timber harvest are high, the effects of individual harvest units on watercourses are cumulative. In sub-watersheds where timber harvest is concentrated in a relatively short period of time, presumably fine sediment impacts will be similarly concentrated.

Construction of road networks can also greatly accelerate erosion rates within a watershed (Haupt 1959, Swanson and Dyrness 1975, Swanston and Swanson 1976, Reid and Dunne 1984, Hagans and Weaver 1987). Once constructed, roads are a chronic source of sediment to streams (Swanston 1991) and are generally considered the main cause of accelerated surface erosion in forests across the western United States (Harr and Nichols 1993). Processes initiated or affected by roads include landslides; surface erosion; secondary surface erosion (landslide scars exposed to rainsplash); and gullying. Roads and related ditch networks, which are often connected to streams via surface flow paths, provides a direct conduit for sediment delivery. Where roads and ditches are maintained periodically by blading, the amount of sediment delivered continuously to streams may temporarily increase as bare soil is exposed and ditch roughness features that store and route sediment and armor the ditch are removed. Hagans and Weaver (1987) found that fluvial hillslope erosion associated with roads in the lower portions of the Redwood Creek watershed produced nearly as much sediment as landslide erosion between 1954 and 1980. In the Mattole River watershed, which is south of the action area, the Mattole Salmon Group (1997) found that roads, including logging haul roads and skid trails, were the source of 76 percent of all erosion problems mapped in the watershed, although this figure does not specifically address road surface erosion. Roads are a primary source of sediment in managed watersheds.

Road surface erosion is particularly affected by traffic, which increases sediment yields substantially (Reid and Dunne 1984). Other important factors that affect road surface erosion include condition of the road surface, timing of when the roads are used in relation to rainfall, road prism moisture content, location of the road relative to watercourses, road construction methods, and hillslope steepness on which the road is located.

3. Hatcheries

Artificial propagation is a factor in the decline of salmonids due to: genetic impacts upon wild populations, increased disease transmission, predation, depletion of wild stock to supply and enhance brood stock, and competition to wild fish from hatchery stocks. Artificial propagation and other human activities, such as harvest and habitat modification, alter selective pressures and cause significant directional genetic changes in natural populations to the point that such propagated and genetically impacted fish no longer represent an evolutionarily significant component of the biological species (Waples 1991). NMFS specifically identified the past practices of the Mad River Hatchery as potentially damaging to NC steelhead. CDFG out-planted non-indigenous Mad River Hatchery brood stocks to other streams within the ESU and attempted to cultivate a run of non-indigenous summer-run steelhead within the Mad River. CDFG ended these practices in 1996. The currently operating Mad River Hatchery, Trinity River Hatchery and Iron Gate Hatchery have all been identified as having potentially harmful effects.

4. Water Diversions and Habitat Blockages

Stream-flow diversions are common throughout the species' ranges. Unscreened diversions for agricultural, domestic and industrial uses are a significant factor for salmonid declines in many basins. Reduced stream-flows due to diversions decrease the amount of available salmonid habitat and can degrade water quality by causing water temperatures to elevate more easily. Reductions in water quantity will reduce the carrying capacity of the affected stream reach. When warm return flows enter the stream, fish may seek reaches with cooler water, thus increasing competitive pressures in other areas.

As discussed previously, habitat blockages arising from road construction have occurred. Additionally, hydropower, flood control, and various municipal and private entity water supply dams, particularly in the Klamath Basin, have permanently blocked or hindered salmonid access to historical spawning and rearing grounds. Since 1908, Potter Valley Project dams have blocked access to a majority of the historic salmonid habitat within the Eel River watershed. The percentage of habitat loss for steelhead is presumably greatest because steelhead were more extensively distributed upstream compared to Chinook salmon. As a result of migration barriers, salmon and steelhead populations have been confined to lower elevation mainstems that historically were used only for migration and rearing. Population abundances have declined in many streams due to decreased quantity, quality, and spatial distribution of spawning and rearing habitat (Lindley *et al.*

2009). Higher temperatures at these lower elevations during late-summer and fall are also a major stressor to adult and juvenile salmonids.

5. Predation

Predation is not believed to have been a major cause in species decline; however, predation may have exercised substantial impacts within local areas. For example, Higgins *et al.* (1992) and CDFG (1994) reported that Sacramento River pikeminnow have been found in the Eel River basin and are considered a major threat to native salmonids. Furthermore, California sea lions and Pacific harbor seals, which occur in most estuaries and rivers where salmonid runs occur on the West Coast, are known predators of salmonids. However, salmonids appear to be a minor component of the diet of marine mammals (Scheffer and Sperry 1931, Jameson and Kenyon 1977, Graybill 1981, Brown and Mate 1983, Roffe and Mate 1984, Hanson 1993). In the final rule listing the SONCC coho salmon ESU (62 FR 24588, May 6, 1997), NMFS indicated that pinniped predation was not a significant factor in coho salmon decline on the West Coast, although pinniped predation may threaten existing depressed local populations. Ultimately, NMFS (1997) determined that although pinniped predation did not cause the decline of salmonid populations, such predation may preclude recovery of populations in localized areas, particularly in regions where pinnipeds co-occur and salmonids concentrate or salmonid passage is constricted. Specific areas where pinniped predation may preclude recovery cannot be determined without extensive studies.

6. Disease

Infectious disease is one of many factors that can influence adult and juvenile salmonid survival. Disease and predation are not believed to have been major causes in the species' decline; however, they may have had substantial impacts in local areas. Salmonids are exposed to numerous bacterial, protozoan, viral, and parasitic organisms in spawning and rearing areas, hatcheries, migratory routes, and the marine environment. Recent disease infection data, specifically regarding ceratomyxosis on juvenile coho salmon suggest disease may have impacted Klamath Basin populations. Little current or historical information exists to quantify changes in salmonid infection levels and mortality rates attributable to these diseases. However, studies suggest that naturally spawned fish tend to be less susceptible to pathogens compared to hatchery-reared fish (Sanders *et al.* 1992).

7. Sport and Commercial Harvest

Commercial and recreational ocean salmon fisheries precipitate adult mortality of listed SONCC coho salmon, some of which may originate from the action area. Steelhead are rarely caught in the ocean fisheries. Ocean salmon fisheries are managed by NMFS to achieve Federal conservation goals for West Coast salmon in the Pacific Coast Salmon Fishery Management Plan (FMP). The goals specify numbers of adults that must be allowed to spawn annually, or maximum allowable adult harvest rates. In addition to the

FMP goals, salmon fisheries must meet requirements developed through NMFS intra-agency section 7 consultations.

Ocean exploitation rate estimates are available for tagged hatchery coho salmon from the Klamath, Trinity, and Rogue rivers and serve as an index for the impact rates on SONCC coho salmon. NMFS (1999) requires that management measures developed under the FMP achieve an ocean exploitation rate on Rogue/Klamath hatchery coho salmon stocks of no more than 0.13 (13 percent). The mortality is a result of post-release mortality associated with mark selective fisheries for coho salmon off Washington and Oregon and Chinook salmon fisheries. Retention of coho salmon is prohibited off California. Post-season estimates of exploitation rates on Rogue/Klamath hatchery stocks have been below the maximum 0.13 (13 percent) since 1998.

Over-fishing in non-tribal fisheries is believed to have been a significant factor in the decline of salmonids. Further, NMFS notes that under some circumstances, freshwater recreational fishing is of concern, particularly during years of decreased refugia availability as is common in drought years.

8. Climate Change

Climate change is postulated to have a negative effect upon salmonids throughout the Pacific Northwest due to large reductions in available freshwater habitat (Battin *et al.* 2007). Widespread declines in springtime snow water equivalent (SWE), which is the amount of water contained in the snowpack, have occurred in much of the North American West since the 1920s, especially since mid-twentieth-century (Knowles and Cayan 2004, Mote 2006). SWE decreases can be attributed to a general warming trend occurring in the western United States since the early 1900s (Mote *et al.* 2005, Regonda *et al.* 2005, Mote 2006), in spite of simultaneous, modest upward precipitation trends (Hamlet *et al.* 2005). The largest decreases in SWE are taking place at low to mid elevations (Mote 2006) because the warming trend overwhelms the effects of increased precipitation (Hamlet *et al.* 2005, Mote *et al.* 2005, Mote 2006). These climactic changes have resulted in earlier onsets of springtime snowmelt and streamflow across western North America (Hamlet and Lettenmaier 1999, Regonda *et al.* 2005, Stewart *et al.* 2005), as well as lower flows in the summer (Hamlet and Lettenmaier 1999, Stewart *et al.* 2005).

The projected runoff-timing trends over the course of the twenty-first century are most pronounced in the Pacific Northwest, Sierra Nevada, and Rocky Mountain regions, where the eventual temporal centroid of streamflow (*i.e.*, peak streamflow) change amounts to 20 to 40 days in many streams (Stewart *et al.* 2004). Although climate models diverge with respect to future trends in precipitation, there is widespread agreement that the trend toward lower SWE and earlier snowmelt will continue (Zhu *et al.* 2005, Vicuna *et al.* 2007). Thus, availability of water resources under future climate scenarios is expected to be most limited during the late summer (Gleick and Chalecki 1999, Miles *et al.* 2000). A one-month advance in timing centroid of streamflow would also increase the length of the summer drought that characterizes much of western North America, with important

consequences for water supply, ecosystem, and wildfire management (Stewart *et al.* 2004). These changes in peak streamflow timing and snowpack will negatively impact salmonid populations due to habitat loss associated with lower water flows, higher stream temperatures, and increased human demand for water resources.

The global effects of climate change on river systems and salmon are often superimposed upon the local effects of logging, water utilization, harvesting, hatchery interactions, and development within river systems (Van Kirk and Naman 2008).

9. Ocean Conditions

Variability in ocean productivity has been shown to affect fisheries production both positively and negatively (Chavez *et al.* 2003). Beamish and Bouillion (1993) showed a strong correlation between North Pacific salmon production and marine environmental factors from 1925 to 1989. Beamish *et al.* (1997) noted decadal-scale changes in the production of Fraser River sockeye salmon that they attributed to changes in the productivity of the marine environment. Warm ocean regimes are characterized by lower ocean productivity (Behrenfeld *et al.* 2006, Wells *et al.* 2006), which may affect salmon by limiting the availability of nutrients regulating the food supply, thereby increasing competition for food (Beamish *et al.* 1997). Data from across the range of coho salmon on the coast of California and Oregon reveal a 72 percent decline in returning adults in 2007/08 compared to the same cohort in 2004/05 (MacFarlane *et al.* 2008). The Wells Ocean Productivity Index, an accurate measure of Central California ocean productivity, revealed poor conditions during the spring and summer of 2006, when juvenile coho salmon and Chinook salmon from the 2004/05 spawn entered the ocean (McFarlane *et al.* 2008). Data gathered by NMFS suggests that strong upwelling in the spring of 2007 may have resulted in better ocean conditions for the 2007 coho salmon cohort (NMFS 2008). The quick response of salmonid populations to changes in ocean conditions (MacFarlane *et al.* 2008) strongly suggests that density dependent mortality of salmonids is a mechanism at work in the ocean (Beamish *et al.* 1997, Levin *et al.* 2001, Greene and Beechie 2004).

C. Critical Habitat Description

This BO analyzes the effects of the Project upon critical habitat for SONCC coho salmon (64 FR 24049, May 5, 1999), CC Chinook salmon (70 FR 52488, September 2, 2005), and NC steelhead (70 FR 52488, September 2, 2005).

Critical habitat is defined as the specific areas within the geographical areas occupied by the species, at the time it is listed, on which are found those physical and biological features essential to the conservation of the species and which may require special management considerations or protection, or specific areas outside the geographical area occupied by the species at the time it is listed when the Secretary determines that such areas are essential for the conservation of listed species.

The ESA defines conservation as "to use and the use of all methods and procedures which are necessary to bring any endangered species or threatened species to the point at which the measures provided pursuant to this Act [the ESA] are no longer necessary." As a result, NMFS approaches its "destruction and adverse modification" determinations by examining the effects of actions on the conservation value of the designated critical habitat, *i.e.*, the value of the critical habitat for the conservation of threatened or endangered species.

1. NC Steelhead and CC Chinook Salmon

Designated critical habitat for NC steelhead and CC Chinook salmon includes the stream channels up to the ordinary high-water line (50 CFR 226.211). In areas where the ordinary high-water line has not been defined, the lateral extent is defined by the bankfull elevation. Critical habitat in estuaries is defined by the perimeter of the water body as displayed on standard 1:24,000 scale topographic maps or the elevation of extreme high water, whichever is greater.

Critical habitat for NC steelhead was designated as occupied watersheds from the Redwood Creek watershed south to and including the Gualala River watershed. Critical habitat for CC Chinook salmon was designated as occupied watersheds from the Redwood Creek watershed south to and including the Russian River watershed (70 FR 52488). Humboldt Bay and the Eel River estuary are designated as critical habitat for both the NC steelhead DPS and CC Chinook salmon ESU. Some areas within the geographic range were excluded due to economic considerations or because they overlap with Tribal lands (see 70 FR 52488 for additional information).

Designated critical habitat for NC steelhead and CC Chinook salmon overlaps the action area. In designating critical habitat for NC steelhead and CC Chinook salmon, NMFS focused on the known primary constituent elements (PCEs) essential for the conservation of each species. PCEs are those sites and habitat components that support one or more life stages, including: freshwater spawning, freshwater rearing, freshwater migration, estuarine areas, nearshore marine area, and (offshore marine areas). Within the PCEs, essential elements of CC Chinook salmon and NC steelhead critical habitats include adequate (1) substrate, (2) water quality, (3) water quantity, (4) water temperature, (5) water velocity, (6) cover/shelter, (7) food, (8) riparian vegetation, (9) space, (10) safe passage conditions, and (11) salinity conditions (70 FR 52488, September 2, 2005).

2. SONCC Coho Salmon

Critical habitat for the SONCC coho salmon ESU encompasses accessible reaches of all rivers (including estuarine areas and tributaries) between Cape Blanco, Oregon and Punta Gorda, California (64 FR 24049, May 5, 1999). Excluded areas include: (1) areas above specific dams identified in the FR notice, (2) areas above longstanding natural impassible barriers (*i.e.*, natural waterfalls in existence for at least several hundred years), and (3) tribal lands.

Designated critical habitat for SONCC coho salmon overlaps the action area. In designating critical habitat for SONCC coho salmon, NMFS focused upon the known physical and biological features within the designated area that are essential to the conservation of the species. These essential features may include, but are not limited to, spawning sites, food resources, water quality and quantity, and riparian vegetation. Within the essential habitat types (*e.g.*, spawning, rearing, migration corridors), essential features of coho salmon critical habitat include adequate (1) substrate, (2) water quality, (3) water quantity, (4) water temperature, (5) water velocity, (6) cover/shelter, (7) food, (8) riparian vegetation, (9) space, and (10) safe passage conditions (64 FR 24049, May 5, 1999). The current condition of critical habitat for SONCC coho salmon is discussed in the factors affecting the species below.

3. Conservation Value of Critical Habitat

The essential habitat types of designated critical habitat for SONCC coho salmon and PCE of designated critical habitat for NC steelhead and CC Chinook salmon are those accessible, freshwater habitat areas that support spawning, incubation and rearing; migratory corridors free of obstruction or excessive predation; and estuarine areas with good water quality and that are free of excessive predation. Timber harvest and associated activities, road construction, urbanization and increased impervious surfaces, migration barriers, water diversions, and large dams throughout a large portion of the freshwater range of the ESUs and DPS continue to result in habitat degradation, reduction of spawning and rearing habitats, and reduction of stream flows. On-going land management in many locations have limited reproductive success; reduced rearing habitat quality and quantity; and caused migration barriers to both juveniles and adults. These factors likely limit the conservation value (*i.e.*, limiting the numbers of salmonids that can be supported) of designated critical habitat within freshwater habitats at the ESU/DPS scale.

Watershed restoration activities have improved freshwater critical habitat conditions in some areas, especially on Federal lands. In addition, the five northern California counties affected by the Federal listing of coho salmon, including Humboldt County, have created a 5 County Conservation Plan that will establish continuity among the counties for managing anadromous fish stocks (Voight and Waldvogel 2002). The plan identifies priorities for monitoring, assessment, and habitat restoration projects.

Although watershed restoration activities have improved freshwater critical habitat conditions in isolated areas, reduced habitat complexity, poor water quality, and reduced habitat availability as a result of on-going land management practices continue to persist in many locations.

D. Viability of the ESUs/DPS and Condition of the Critical Habitats

1. Viability of the ESUs/DPS

An ESU or DPS is made up of multiple populations. The viability of an ESU or DPS can be assessed by considering the viability of its component populations. The effects of a

proposed action upon an ESU or DPS can be assessed by first considering the effects of the proposed action upon its component populations. To integrate population information into viability criteria at the ESU/DPS scale, NMFS has identified "diversity strata," which are "groups of populations that span the diversity and distribution that currently exists or historically existed within an ESU" (Bjorkstedt *et al.* 2005). Diversity strata account for the important variability that exists in environments and in the physical characteristics and genetic makeup of salmonids. Bjorkstedt *et al.* (2005) and Williams *et al.* (2006) provide a set of rules that are expected to result in certain population configurations within each diversity stratum that they believe will result in a viable ESU. A population is part of a particular diversity stratum, which is part of a particular ESU or DPS. The ESU or DPS cannot be considered viable unless all its diversity strata are viable, and each diversity stratum cannot be considered viable unless its populations meet the criteria described by Bjorkstedt *et al.* (2005) and Williams *et al.* (2006). A diversity stratum could be considered viable even if one or more of its component populations were not viable, if the remaining populations met all the viability characteristics including, abundance, productivity, diversity, and spatial structure (Bjorkstedt *et al.* 2005, Williams *et al.* 2006).

Consideration of the viability of all diversity strata within a particular ESU or DPS is beyond the scope of this BO. Similarly, in this BO NMFS will not determine the viability of all the populations making up the diversity stratum of which Telegraph Creek is a part. Instead, NMFS will consider the viability of the SONCC coho salmon ESU and the NC steelhead DPS. Telegraph Creek salmon and steelhead population viability will be discussed in the *Environmental Baseline* section. Finally, Project impacts upon Telegraph Creek salmon and steelhead population viability and the implications for viability of the ESUs and DPS will be analyzed in the *Effects of the Action* section.

In order to determine the current viability of each ESU or DPS, we use the concept of a Viable Salmonid Population (VSP) and the parameters for evaluating populations described by McElhany *et al.* (2000). The four parameters are population size, productivity, spatial structure, and diversity. Each parameter is described below, followed by an assessment of the viability of each parameter for each ESU or DPS that may be affected by the Project.

a. Population Size

Information about population size provides an indication of the sort of extinction risk that a population faces. For instance, smaller populations are at a greater risk of extinction than large populations because the processes that affect populations operate differently in small populations than in large populations (McElhany *et al.* 2000). One risk of low population sizes is depensation. Depensation occurs when populations are reduced to very low densities and per capita growth rates decrease as a result of a variety of mechanisms [*e.g.*, failure to find mates and therefore reduced probability of fertilization, failure to saturate predator populations (Liermann and Hilborn 2001)]. Depensation results in a negative feedback that accelerates a decline toward extinction (Williams *et al.* 2007).

Status reviews for the SONCC coho salmon ESU and the NC steelhead DPS concluded data were insufficient to set specific numeric population size targets for viability (Spence *et al.* 2007, Williams *et al.* 2007). In the absence of such targets, McElhany *et al.* (2000) suggested ESUs ". . . have been historically self-sustaining and the historical number and distribution of populations serves as a useful 'default' goal in maintaining viable ESUs."

(1) NC steelhead. Steelhead abundance has been monitored at three dams in the NC steelhead ESU since the 1930s. Reviewers participating in the most recent status review determined these data showed population abundances were low relative to historical estimates and that summer-run steelhead abundance was very low (Good *et al.* 2005). Regarding abundance, reviewers concluded, "Although there are older data for several of the larger river systems that imply run sizes became much reduced since the early twentieth century, there are no recent data suggesting much of an improvement" (Good *et al.* 2005). Experts consulted during the status review gave this DPS a risk score of 3.7 out of 5, with 5 equaling the highest risk, for the abundance category (Good *et al.* 2005). This DPS's reduced abundance contributes significantly to long-term risk of extinction and may contribute to short-term risk of extinction in the foreseeable future. NMFS concludes this DPS falls far short of McElhany's "default" goal of historic population numbers and distribution and is therefore not viable in regards to the population size VSP parameter.

(2) SONCC coho salmon. The most recent status review concluded SONCC coho salmon populations ". . . continue to be depressed relative to historical numbers, and [there are] strong indications that breeding groups have been lost from a significant percentage of streams within their historical range" (Good *et al.* 2005). Experts consulted during the status review gave this ESU a mean risk score of 3.8 out of 5 for the abundance category (Good *et al.* 2005), indicating this ESU's reduced abundance contributes significantly to long-term risk of extinction and is likely to contribute to short-term risk of extinction in the foreseeable future. NMFS concludes this ESU falls far short of McElhany's "default" goal of historic population numbers and distribution and is therefore not viable in regards to the population size VSP parameter.

b. Population Productivity

Population productivity (*i.e.*, the number of individuals generated over a specified time interval) can reflect conditions (*e.g.*, environmental conditions) that influence the population dynamics and determine abundance. In turn, the population productivity facilitates understanding of population performance across the landscape and habitats in which the population exists and the populations's response to those habitats (McElhany *et al.* 2000). Status reviews for the SONCC coho salmon ESU and the NC steelhead DPS concluded data were insufficient to set specific numeric population productivity targets for viability (Spence *et al.* 2007, Williams *et al.* 2007). McElhany *et al.* (2000) suggested a population's natural productivity should be sufficient to maintain its abundance above the viable level. This guideline serves as a reasonable goal in the absence of numeric abundance targets.

(1) NC steelhead. As summarized in the *Status of the Species and Critical Habitat* section, populations of NC steelhead have declined substantially from historic levels. Experts consulted during the status review gave this DPS a risk score of 3.3 out of 5 for the growth rate/productivity VSP category (Good *et al.* 2005), indicating the DPS's current impaired productivity level contributes significantly to long-term risk of extinction and may contribute to short-term risk of extinction in the foreseeable future. As productivity does not appear sufficient to maintain viable abundances in many NC steelhead populations, NMFS concludes this DPS is not viable in regards to the population productivity VSP parameter.

(2) SONCC Coho salmon. As summarized in the *Status of the Species and Critical Habitat* section, populations of SONCC coho salmon have declined substantially from historic levels. Experts consulted during the status review gave this ESU a risk score of 3.5 out of 5 for the growth rate/productivity VSP category (Good *et al.* 2005), indicating this ESU's current impaired productivity level contributes significantly to long-term risk of extinction and may contribute to short-term risk of extinction in the foreseeable future. As productivity does not appear sufficient to maintain viable abundances in many SONCC coho salmon populations, NMFS concludes this ESU is not viable in regards to the population productivity VSP parameter.

c. Spatial Structure

Understanding the spatial structure of a population is important because the population structure can affect evolutionary processes and therefore alter the ability of a population to adapt to spatial or temporal changes in the species' environment (McElhany *et al.* 2000). Status reviews for the SONCC coho salmon ESU, the CC Chinook salmon ESU, and the NC steelhead DPS concluded data were insufficient to set specific population spatial structure targets (Spence *et al.* 2007, Williams *et al.* 2007). In the absence of such targets, McElhany *et al.* (2000) suggested the following: "As a default, historic spatial processes should be preserved because we assume that the historical population structure was sustainable but we do not know whether a novel spatial structure will be."

(1) NC steelhead. Experts consulted during the most recent status review gave this DPS a mean risk score of 2.2 out of 5 for the spatial structure and connectivity VSP category (Good *et al.* 2005), indicating this factor does not significantly contribute to risk of extinction acting alone, but there is some concern that it may, in combination with other factors. Blockages to fish passage exist on two major rivers in the DPS and on numerous small tributaries (Good *et al.* 2005). These blockages degrade the spatial structure and connectivity of populations within the DPS. As the "default" historic spatial processes described by McElhany *et al.* (2000) have likely not been preserved, NMFS concludes this DPS is not viable in regards to the spatial structure VSP parameter.

(2) SONCC coho salmon. Relatively low levels (32 to 56 percent from 1986 to 2000) of observed presence in historically occupied coho salmon streams indicate continued low abundance in the California portion of the SONCC coho salmon ESU. The relatively

high occupancy rate of historical streams observed in broodyear 2001 suggests that much habitat remains accessible to coho salmon (June 28, 2005, 70 FR 37160). Brown *et al.* (1994) found survey information on 115 streams within the SONCC coho salmon ESU, of which 73 (64 percent) still supported coho salmon runs while 42 (36 percent) did not. The streams Brown *et al.* (1994) identified as presently lacking coho salmon runs were all tributaries of the Klamath River and Eel River systems. The Biological Review Team (BRT) was also concerned about the loss of local populations in the Trinity, Klamath, and Rogue River basins (June 28, 2005, 70 FR 37160). CDFG (2002) reported a decline in SONCC coho salmon occupancy, with reported percent reduction dependent upon the data sets used. Although there is considerable year-to-year variation in estimated occupancy rates, no dramatic change in the percent of coho salmon streams occupied from the late 1980s and early 1990s to 2000 has transpired (Good *et al.* 2005). In summary, recent information for SONCC coho salmon indicates that their distribution within the ESU has been reduced and fragmented, as evidenced by an increasing number of previously occupied streams from which they are now absent (NMFS 2001). However, extant populations can still be found in all major river basins within the ESU (70 FR 37160, June 28, 2005).

Experts consulted during the status review gave this ESU a mean risk score of 3.1 out of 5 for the spatial structure and connectivity VSP category (Good *et al.* 2005), indicating this ESU's current spatial structure contributes significantly to long-term risk of extinction but does not in itself constitute a danger of extinction in the near future. As the "default" historic spatial processes described by McElhany *et al.* (2000) have not been preserved due to the habitat fragmentation described above, NMFS concludes this ESU is not viable in regards to the spatial structure VSP parameter.

d. Diversity

Diversity, both genetic and behavioral, is critical to success in a changing environment. Salmonids express variation in a suite of traits, including: anadromy, morphology, fecundity, run timing, spawn timing, juvenile behavior, age at smolting, age at maturity, egg size, developmental rate, ocean distribution patterns, male and female spawning behavior, and physiology and molecular genetic characteristics. The more diverse these traits (or the more these traits are not restricted), the more diverse a population is and the more likely that individuals, and therefore the species, will survive and reproduce in the face of environmental variation (McElhany *et al.* 2000). However, when diversity is reduced due to loss of entire life history strategies (*e.g.*, loss of summer-run NC steelhead), or to loss of habitat used by fish exhibiting variation in life history traits, the species is less able to survive and reproduce given environmental variation.

Negative effects to genetic diversity can result from hatchery production and stocking of hatchery-bred fish into wild streams. Hatchery-reared fish may be less genetically diverse than wild fish due to artificial selection and may have originated in areas with different environmental conditions. Once in the hatchery, artificial selection for fish that survive well in the hatchery is likely to occur (Allendorf and Ryman 1987). If the hatchery-bred fish later interbreed with wild fish, they can reduce the genetic diversity of

the wild population. Even if the overall genetic diversity of the wild population is unchanged, the introduction of non-native or less diverse genetic material into a native salmonid population can "dilute" the native population's adaptation to its local environment and make it less able to survive and reproduce (McElhany *et al.* 2000).

Genetic variability of wild stocks is naturally altered by straying from natural populations in nearby streams, which results in gene flow and often sustains or even increases the genetic diversity of a population over time. Straying is a normal and important part of the life history and evolution of Pacific salmon (Quinn 2005), but human activities can increase the rate of straying and cause more genetic interaction between populations than would naturally occur. Founding hatchery populations with broodstock from outside the watershed can make straying more common, as witnessed in the Columbia River (Pascual *et al.* 1995). Therefore, the genetic makeup of hatchery steelhead from the Mad River could detrimentally affect steelhead in many other rivers within and even outside the geographic range of the NC steelhead DPS. Excessive straying can also be detrimental to wild fish populations born in their natal streams. When habitat becomes degraded or inaccessible due to dams or road crossings, salmonid spatial distribution can become fragmented. In this situation, straying into non-natal streams is likely to increase when salmonids are denied access to their natal areas and are forced to enter other accessible streams. Increased stray rates would be expected to reduce population viability, particularly if the strays are accessing unsuitable habitat or are mating with genetically unrelated individuals (McElhany *et al.* 2000).

Status reviews for the SONCC coho salmon ESU, and the NC steelhead DPS concluded data were insufficient to set specific numeric diversity targets (Spence *et al.* 2007, Williams *et al.* 2007). McElhany *et al.* (2000) suggested the following in the absence of specific targets for diversity: "Historically, salmonid populations were generally self-sustaining, and the historical representation of phenotypic diversity serves as a useful 'default' goal in maintaining viable populations."

(1) NC steelhead. Millions of steelhead from outside Telegraph Creek or outside the DPS have been stocked into rivers in the NC steelhead DPS many times since the 1970s. Bjorkstedt *et al.* (2005) documented 39 separate releases of this kind, and many of these releases occurred over multiple years. Of particular concern is the practice of rearing Eel River-derived steelhead in a hatchery on the Mad River before restocking them into the Eel River (Bjorkstedt *et al.* 2005). Over ten years, more than one-half million yearlings were reared and released in this way. This practice may have reduced the effectiveness of adult homing to the Eel River (Bjorkstedt *et al.* 2005). In addition, the abundance of summer-run steelhead was considered "very low" in 1996 (Good *et al.* 2005), indicating an important part of the life history diversity in this DPS may be at risk.

Experts consulted during the most recent status review gave this DPS a mean risk score of 2.5 out of 5 for the diversity VSP category (Good *et al.* 2005), indicating this factor may contribute significantly to the long-term risk of extinction but does not itself constitute a danger of extinction in the near future. NMFS concludes the current behavioral diversity in this DPS is much reduced compared to historic levels. Using

McElhany's criteria, the DPS is not viable in regards to the diversity VSP parameter. In addition, the genetic integrity of the DPS may have been compromised by hatchery introductions.

(2) SONCC coho salmon. Genetic variability is important because differing genetic traits favor a population being able to survive and reproduce under changing environmental conditions. With regard to the SONCC coho salmon ESU, human activities ,including construction of migration barriers (*e.g.*, Iron Gate Dam on the Klamath River and Lewiston Dam on the Trinity River), have eliminated portions of some coho salmon populations from the ESU. In addition, coho salmon runs within the Klamath River basin are now composed largely of hatchery fish from Iron Gate and Trinity River Hatcheries.

High hatchery production in some systems within the SONCC coho salmon ESU may mask trends in ESU population structure and pose risks to ESU diversity (June 28, 2005, 70 FR 37160). NMFS determined that the Cole Rivers Hatchery, Trinity River Hatchery, and Iron Gate Hatchery coho salmon hatchery programs are part of the ESU. Moreover, NMFS found that these artificially propagated stocks are no more divergent relative to the local natural populations regarding expected diversity between closely related, natural populations within the ESU (70 FR 37160, June 28, 2005). Within the 10 historical populations that have dams, 26.4 percent of historical habitat is currently located upstream of the dams (Table 5 in Williams *et al.* 2007). Loss of or limited spawning and rearing opportunities are expected to adversely affect the species' basic demographic and evolutionary processes, causing the ESU's reduced potential to withstand environmental fluctuations. Activities that affect evolutionary processes (*e.g.*, natural selection) have the potential to alter the diversity of the species.

The primary factors affecting SONCC coho salmon diversity include hatcheries' influences and out-of-basin introductions. In addition, some brood years have abnormally low abundance levels or may even be absent in some areas (*e.g.*, Shasta River and Scott River), further restricting ESU diversity. Experts consulted during the most recent status review gave this ESU a mean risk score of 2.8 out of 5 for the diversity VSP category (Good *et al.* 2005). This score indicates the ESU's current genetic variability and variation in life history factors contribute significantly to long-term risk of extinction but do not, in themselves, constitute a danger of extinction in the near future. NMFS concludes the current phenotypic diversity in this ESU is much reduced compared to historic levels, and by McElhany's criteria, the ESU is not viable in regards to the diversity VSP parameter.

e. Summary

(1) NC steelhead. Based upon the above population viability parameter descriptions and qualitative viability criteria presented in Spence *et al.* (2007), NMFS believes that the NC steelhead DPS is currently not viable and is at an elevated risk of extinction.

(2) *SONCC coho salmon.* Based upon the above population viability parameters and qualitative viability criteria presented in Williams *et al.* (2007), NMFS believes that the SONCC coho salmon ESU is currently not viable and is at moderate risk of extinction.

2. Current Condition of Critical Habitats

As part of the critical habitat designation process, NMFS convened Critical Habitat Analytical Review Teams (CHARTs) for steelhead and Chinook salmon. These CHARTs determined the conservation value of Hydrologic Subareas (HSAs) of watersheds under consideration. A CHART was not convened for SONCC coho salmon, because critical habitat had already been designated in 1999. NMFS determined the condition of SONCC coho salmon critical habitat based on other, readily available information.

a. NC Steelhead

For NC steelhead, the CHART identified 50 occupied HSAs within the freshwater and estuarine range of the DPS. Nine HSAs were rated low in conservation value, 14 were rated medium, and 27 were rated high in conservation value (NMFS 2005). Within the DPS, the CHART ratings and economic benefits analysis resulted in designation of critical habitat with essential features for spawning, rearing and migration in approximately 3,148 miles of occupied stream habitat. NMFS believes the status of NC steelhead critical habitat in the 50 HSAs has not changed substantially since the 2005 assessment.

b. CC Chinook Salmon

NMFS's assessment of the current condition of CC Chinook salmon ESU critical habitat shows PCEs for spawning and rearing habitat to be severely degraded by the persistence of highly turbid flows during the winter and spring, persisting even at low flows, within this ESU's two major rivers, the Eel and Russian Rivers.. Turbid flow persistence is primarily the result of flows released from Scott Dam and Coyote Valley Dam (Ritter and Brown 1971, USACE 1982, Beach 1996). Within the Eel River, riverine and estuarine migration and rearing habitat PCEs are degraded by diminished flows resulting from water storage in Lake Pillsbury (Scott Dam) and by inter-basin diversions to the Russian River through the Potter Valley Project tunnel. Russian River riverine and estuarine rearing habitat PCEs are degraded as a result of land use patterns that change channel configuration, limiting available habitat, and a program of keeping the Russian River estuary breached throughout the year. Within the smaller coastal streams of the ESU, the status of critical habitat PCEs for rearing, spawning, and migration are considered degraded to a lesser extent.

For CC Chinook salmon, the CHART identified 45 occupied HSAs within the freshwater and estuarine range of the ESU. Eight HSAs were rated low in conservation value, 14 were rated medium, and 27 were rated high in conservation value (NMFS 2005). Within the ESU, CHART ratings and economic benefits analysis resulted in the designation of

critical habitat with essential features for spawning, rearing and migration in approximately 1,634 miles of occupied habitat. NMFS believes the status of CC Chinook salmon critical habitat in the 45 HSAs has not changed substantially since the 2005 assessment.

c. SONCC Coho Salmon

The condition of SONCC coho salmon critical habitat, specifically the habitat's ability to provide for species conservation, has been degraded from conditions known to support viable salmonid populations. NMFS has determined that present depressed population conditions arepartially the result of the following human-induced factors affecting critical habitat: logging; agricultural and mining activities; urbanization; stream channelization; dams; wetland loss; and water withdrawals for irrigation. All of these factors were identified when SONCC coho salmon were listed as threatened under the ESA, and they all continue to affect this ESU. However, efforts to improve SONCC coho salmon critical habitat have been widespread and are expected to benefit the ESU. From 2000 to 2006, the following improvements were completed within the SONCC coho salmon recovery domain: 242 stream miles were treated; 31 stream miles of instream habitat were stabilized; 41 cubic feet per second of water were returned for instream flow; and thousands of acres of upland, riparian, and wetland habitat were treated (NMFS 2007). Because of these efforts, SONCC coho salmon critical habitat is likely improved or trending toward improvement compared to its 1999-designated status.

d. Summary

Although watershed restoration activities have improved freshwater critical habitat conditions in isolated areas, reduced habitat complexity, poor water quality, and reduced habitat availability resulting from on-going land management practices continue to persist in many locations and are likely factors limiting the conservation value of designated critical habitat at the ESU scale.

IV. ENVIRONMENTAL BASELINE

The environmental baseline includes "the past and present impacts of all Federal, State, or private actions and other human activities in the action area, the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal or early section 7 consultation, and the impact of State or private actions which are contemporaneous with the consultation in process" (50 CFR 402.02). The environmental baseline provides a reference point to which Project effects are added, as required by regulation (*effects of the action* in 50 CFR 402.02).

Telegraph Creek is within BLM's King Range National Conservation Area (KRNCA) boundary. The west slope of the KRNCA contains 39 perennial streams, ranging from small, narrow channels containing neither fish nor amphibians to large, broad channels containing both anadromous and resident fishes as well as an assortment of amphibians

and riparian-dependent reptiles. Thirteen streams contain anadromous fish populations on the west slope of the KRNCA: Fourmile Creek, Cooskie Creek, Randall Creek, Spanish Creek, Oat Creek, Kinsey Creek, Big Creek, Big Flat Creek, Shipman Creek, Buck Creek, Gitchell Creek, Horse Mountain Creek, and Telegraph Creek. Researchers (Engle 2001, Baldwin in progress) have found each stream to have relatively small populations of winter-run steelhead. Coho salmon were observed in Fourmile Creek and Telegraph Creek, although these creeks do not appear to regularly support populations of coho salmon. A few juvenile coho salmon were captured in Big Creek during the summer of 1999, but extensive efforts to observe and capture coho salmon in 2000 and 2001 found none present.

In general, the west-side streams are short and steep. The largest streams, Big Creek and Big Flat Creek, appear to transport a relatively high volume of bedload originating from a number of large landslides found in their headwaters and major tributaries. West-side streams tend to have cool summer water temperatures; the notable exception to this is Cooskie Creek, which regularly exceeds 80 °F during summer months. Fish habitat quality in these streams is generally good but quite variable depending upon channel morphology and gradient. Even during periods of high streamflow, none of these streams forms an estuary.

Telegraph Creek watershed drains approximately 2.9 square miles. Elevations range from sea level at the mouth of the stream to 1,600 feet in the headwater areas. Vegetation within the watershed is dominated by Douglas-fir and tan oak. Telegraph Creek is a perennial stream; however, the stream exhibits subsurface flows during late summer and early fall. Assessments to catalog habitat and fish populations within the Telegraph Creek watershed have not been undertaken. Stream inventory reports conducted by CDFG, the California Conservation Corps and Watershed Stewards Project/Americorps, and the California Cooperative Fishery Research Unit indicate that good water temperature and flow regimes exist in Telegraph Creek.

The District's dam on Telegraph Creek has been identified as a barrier to fish migration. The District has completed several projects in attempts to improve fish passage over the dam, none of which have proven completely successful. The projects included: removal of metal pipes and catch basins from the dam apron that were remnants of a fish hatchery project, installation of 3/32-inch screens over the water intake structure of the water treatment plant, installation of a temporary metal fish ladder provided by CDFG, and survey data collection for stream cross sections and profiles for use in a permanent fish ladder design. All of this work was completed by the District with assistance from CDFG.

Following NMFS recommendations, the District installed a Denil fish ladder in 2005 to improve fish passage. However, the fish ladder does not provide over-dam fish passage for all salmonid life stages. The District is currently designing and permitting a new water intake system on Telegraph Creek, upstream of the dam and triple-culvert. This intake system is being designed as a "fish friendly" gravity feed system and is designed to work during all seasons so that future removal of downstream barriers will be feasible.

Once built, the District will test the new intake system's performance for a winter season prior to beginning demolition of the existing dam. The new intake will allow the District to abandon the existing water intake system at the dam face and move forward with dam removal. The District is fully committed to funding this new water intake system in order to move forward with the full barrier removal project.

Along with the dam, the Humboldt County Department of Public Works owns and maintains a triple-culvert watercourse crossing located approximately 75-feet upstream of the dam. The County culvert crossing has been classified as a barrier for juvenile and adult salmonid migration (Taylor and Associates 2003), and plans to replace the crossing with a bottomless arched culvert are in progress.

Small populations of juvenile NC steelhead, up to 9 inches long, were observed in Telegraph Creek between 1965 and 2006. According to CDFG records, coho salmon were observed in 1986.

The specific observations are as follows:

- 09/24/65: CDFG observed 45 NC steelhead juveniles three to nine inches in length
- 05/27/86: CDFG fish survey found SONCC coho salmon fry less than a half-mile above the dam
- 10/11/02: California Cooperative Fishery Research Unit, Humboldt State University observed 91 NC steelhead juveniles below the dam
- 06/26/03: Taylor and Associates observed several juvenile salmonids of three to six inches in length in the stream channel upstream and downstream of the County triple-culvert (Revised Humboldt County Migration Barrier Inventory-Culvert Catalog 2003)

A. Status of Pacific Salmonids in the Action Area

The following species of Pacific salmonids are within the action area:

> Southern Oregon/Northern California Coast (SONCC) coho salmon (*Oncorhynchus kisutch*); listed under the Endangered Species Act (ESA) as threatened (62 FR 24588; May 6, 1997). Designated critical habitat (64 FR 24049; May 5, 1999) for SONCC coho salmon encompasses accessible reaches of all rivers between the Mattole River in California and the Elk River in Oregon, inclusive.
>
> California Coastal (CC) Chinook salmon (*O. tshawytscha*) critical habitat was designated on September 2, 2005.
>
> Northern California (NC) steelhead (*O. mykiss*); listed under the ESA as threatened (65 FR 36094, June 7, 2000; threatened status reaffirmed on January 5, 2006). The Distinct Population Segment (DPS) includes all naturally spawned anadromous *O. mykiss* (NC steelhead) populations below natural and manmade

impassable barriers in California coastal river basins from Redwood Creek southward to, but not including, the Russian River, as well as two artificial propagation programs: the Yager Creek Hatchery and North Fork Gualala River Hatchery (Gualala River Steelhead Project) steelhead hatchery programs. Critical habitat was designated on September 2, 2005.

V. EFFECTS OF THE PROPOSED ACTION

The proposed action may affect threatened CC Chinook salmon, SONCC coho salmon, and NC steelhead, and their designated critical habitat, from physical or chemical changes to migrating, spawning, and rearing habitat. As mentioned in the *Status of the Species* section CC Chinook salmon individuals are not expected to be exposed to the project, and thus are not considered further in the opinion. The following components of the proposed action may affect listed species and their designated critical habitat: capture and relocation of juvenile SONCC coho salmon, and NC steelhead; dewatering a short segment of Telegraph Creek; constructing a concrete weir and water diversion intake, trenching for water pipe and electrical conduit installation, and preparing sites and placing water tanks.

A. Capturing and Relocating Juvenile Coho Salmon and Steelhead

Fish capture and relocation will occur if surface water exists within the dewatering reach. Due to the proposed timing of instream work (August through early October), Telegraph Creek is expected to be subsurface. However, if surface flows are present, few juvenile coho salmon and steelhead would likely be present in the action area. Most juvenile coho salmon and steelhead within the 75-foot dewatered reach would likely be captured by electrofishing, and transported downstream to suitable rearing habitat. Any fish not captured, and remaining within the project area will likely perish. Electrofishing and transportation would likely cause stress from shocking, handling, and decreased oxygen, and mortality to approximately 3 percent of the total caught (Wedemeyer *et al.* 1990).

B. Temporarily Dewatering a 75-Foot Segment of Telegraph Creek

Dewatering, if necessary, would temporarily render rearing habitat unusable, strand any present fish, and elevate turbidity. Due to project timing and low-summer flows through the action area, a few juvenile coho salmon and steelhead would likely be present. During low flow conditions, expected at the time of dewatering, any exposed juvenile coho salmon and steelhead would likely be found in pools. Temporarily dewatering a 75-foot segment of Telegraph Creek will likely deprive juvenile coho salmon and steelhead from rearing for about 21 days. Following reintroduction of stream flows into the dewatered area, turbidity would increase within the dewatered segment, as well as up to several hundred feet downstream, for a few hours. Elevated turbidity would be insignificant in extent and duration, and have an insignificant effect on juvenile coho salmon and steelhead, or designated critical habitat for CC Chinook salmon, SONCC coho salmon, and NC steelhead.

C. Constructing a Concrete Weir and Water Diversion Intake

Constructing a concrete weir and water diversion intake under a dewatered channel condition would involve much disturbance of stream channel substrate and bank, and may result in elevated turbidity once dewatering ceases. Following weir construction and stream water is allowed to return to the channel, sediment sorting, scour below weirs, and general channel adjustment would elevate turbidity within the 75-foot dewatered reach, and up to several hundred feet downstream, for a few hours following cessation. Elevated turbidity would be insignificant, and have an insignificant effect on juvenile coho salmon and steelhead. Scouring below weirs and general channel adjustment would continue in response to precipitation and associated water flow volume, likely increasing pool frequency. If channel adjustment and flow interact to create a hydraulic drop greater than six inches during low flow, one or more additional rock weirs would be installed that result in all hydraulic drops within the work site to be less than six inches.

Heavy equipment operating within the Telegraph Creek channel may leak fuel or lubricating fluids that are toxic to fish. However, effects are discountable because equipment will be cleaned and free of leaks prior to entering the low flow channel of Telegraph Creek.

The proposed intake structure would be screened to meet NMFS (1997) criteria to avoid entrainment and capture of salmonids and is designed to meet NMFS (2001) and CDFG (2003) minimum fish passage criteria. During low flow, the inlet canal will not permit fish passage because the Coanda screen outlet will lack flow, and a fish screen will be installed at the inflow. During high flow periods, a fish may be able to enter the canal, which will be a low-velocity backwater. The maximum possible diversion of 0.775 cfs is mandated by the State Water Board and will be controlled by a valve in the pipe protected by the Coanda screen. Water withdrawal will be consistent with current use, resulting in no changes to instream flow relative to existing (pre-project) condition. If stream flow levels diminish to 0.80 cfs, the canal's inlet weir elevation placement will preclude water from entering the canal. Due to minimization measures, including fish screen usage, fish passage design, and limiting water withdrawals to existing amounts, operation results in insignificant effects upon coho salmon, Chinook salmon, and steelhead.

D. Trenching and Preparing Sites and Placing Water Tanks

Earthwork and vegetation disturbance associated with trenching for water pipe and electrical conduit and preparing sites and placing water tanks may expose soil to erosion, and lead to increased turbidity during the first couple precipitation events following the activities, or decrease bank stability or stream shading. Precautionary measures such as the timing and method of trenching and backfilling, and controlling erosion, are expected to result in a minor increase in turbidity, which would likely have an insignificant effect on juvenile coho salmon, and steelhead. Vegetation clearing (including trees and shrubbery) would likely have a discountable effect on fish due to the minimal extent and minor influence on stream shading and bank stability.

VI. CUMULATIVE EFFECTS

Regulations implementing section 7(a)(2) of the ESA require NMFS to consider the effects of future State, tribal, or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action subject to consultation (50 CFR 402.02). NMFS is not aware of any future State, tribal, or private activities, not involving Federal activities that are reasonably certain to occur within the action area.

VII. INTEGRATION AND SYNTHESIS OF EFFECTS

The project will occur during the summer low-flow period after coho salmon and steelhead smolts have migrated downstream and before adults have immigrated to the proposed Project site. Further, NMFS expects that juvenile Chinook salmon would have migrated downstream of the action area prior to project initiation and will therefore not be exposed to project activities. Therefore, NMFS expects only juvenile SONCC coho salmon, and NC steelhead will be exposed to the Project. As discussed in the *Environmental Baseline* section, Telegraph Creek salmonid populations are small because of the region's steep gradient and lack of year-round rearing habitat. Therefore, very few juvenile SONCC coho salmon or NC steelhead are expected in the action area during Project construction, and of those that are present during construction, they will be less likely to die from stranding and capture because of protective measures designed to reduce take. The Project will result in a localized reduction in SONCC coho salmon, and NC steelhead abundance but will not effectively alter the population growth rate, spatial structure, or diversity of their greater populations within their respective ESUs and DPS. The extremely few mortalities resulting from the Project are unlikely to reduce future adult returns. The slight reduction in SONCC coho salmon, and NC steelhead abundance within Telegraph Creek will not reduce their abundance, distribution, or reproduction at the ESU/DPS scale. The project, however, is expected to minimize fish entrapment during future water withdrawls. Thus, the project will result in fewer fish becoming impounded in ditches during water diversions and that the action will increase survival of individuals exposed to the project location during water diversions.

Overall, habitat effects will be episodic and ephemeral in nature. Approximately 75 feet of designated critical habitat will be dewatered and thus inaccessible for three weeks. However, reduced flow factors will not cause injury or mortality and will result in insignificant effects upon salmonids and critical habitat.

VIII. 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, as proposed, is not likely to jeopardize the continued existence of SONCC coho salmon, CC Chinook,

or NC steelhead. NMFS also concludes that the project is not likely to result in the destruction or adverse modification of SONCC coho salmon, CC Chinook, or NC steelhead salmon critical habitat.

IX. INCIDENTAL TAKE STATEMENT

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 the purpose 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 USACE for the exemption in section 7(o)(2) to apply. The USACE has a continuing duty to regulate the activity covered by this incidental take statement. If the USACE: (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 USACE 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 USACE's proposed issuance of a Nationwide Permit 12, Utility Line Activities, for implementation of the Telegraph Creek Water Intake Installation Project is expected to result in incidental take of threatened SONCC coho salmon, and NC steelhead. Juvenile SONCC coho salmon, and NC steelhead will likely be injured or killed during dewatering and associated capture and relocation activities as a result of stranding, handling, and stress. The exact number of juvenile SONCC coho salmon and NC steelhead that will be captured and relocated is unknown. However, given the current condition of habitat and low flows during the project implementation window, NMFS expects that no more than 30 juvenile SONCC coho salmon and 30 NC steelhead will be captured and relocated. Of those 30 individuals (juvenile SONCC coho salmon and NC steelhead), approximately three percent (three percent of 30 individuals is approximately 1 fish) of these fish will die during fish relocation. Also, NMFS expects that a couple of juvenile coho salmon and juvenile steelhead will avoid capture and perish when the site is dewatered. Thus, anticipated amount of project-related mortality is approximately three juvenile coho salmon and three juvenile steelhead.

B. Effect of the Take

In the biological opinion, NMFS determined that this level of anticipated take is not likely to jeopardize the continued existence of SONCC coho salmon, or NC steelhead.

C. Reasonable and Prudent Measures

The following reasonable and prudent measure is necessary and appropriate to minimize or monitor the impact of the incidental take of SONCC coho salmon and NC steelhead:

1. Monitor and report the effects of construction and relocation activities and performance.

D. Terms and Conditions

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

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

   a. If any SONCC coho salmon, CC Chinook salmon, or NC steelhead die, the project permittee shall contact NMFS by phone immediately at (707) 825-5165. The purpose of notifying NMFS is to review the activities resulting in the lethal take and to determine if additional protective measures are required. All salmonid mortalities must be retained, placed in an appropriately-sized whirl-pak or zipper lock bag, labeled with the date and time of collection, fork length, location of capture, and frozen as soon as possible. Frozen samples must be retained until specific instructions are provided by NMFS.

   b. A written report shall be submitted by January 15 of the year following completion of the Project to:

      NMFS Arcata Area Office
      Attention: Irma Lagomarsino
      1655 Heindon Road
      Arcata, California 95521.

      The report shall contain the following information:

      i. Construction-related Activities — The report shall include the dates construction began and ended; a discussion of any unanticipated effects or unanticipated levels of effect, and a statement as to whether or not the

unanticipated effects had any effect on SONCC coho salmon, and NC steelhead; the number of known salmonids killed or injured during the Project; and photographs taken from the same reference point that clearly show the condition of the dewatered area before, during, and after the activities.

ii. Fish Relocation — The report shall include a description of the location from which SONCC coho salmon, and NC steelhead were removed and the release site, including photographs of the release site; date and time of the relocation; description of equipment and methods used to collect, hold, and transport salmonids; number of SONCC coho salmon and NC steelhead relocated; and number of SONCC coho salmon and NC steelhead injured or killed, and a brief narrative of the circumstances surrounding any coho salmon injury or mortality.

X. REINITIATION OF CONSULTATION

This concludes formal consultation on the proposed Telegraph Creek Water Intake Installation 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.

XI. LITERATURE CITED

Alice Berg and Associates. 2002. Salmonid distribution and habitat preference observations in the South Fork Eel River 2002 – Benbow State Recreation Area. Prepared for California Department of Parks and Recreation, Sacramento, CA.

Allendorf, F. W. and N. Ryman. 1987. Genetic management of hatchery stocks. In: Population Genetics and Fishery Management. N. Ryman and F.W. Utter (Editors), Washington Sea Grant Program, University of Washington Press, Seattle, WA (1987), pp. 141–159.

Araki, H., B. Cooper, and M. S. Blouin. 2007. Genetic Effects of Captive Breeding Cause a Rapid, Cumulative Fitness Decline in the Wild. Science 318(5847):100.

Battin, J., M.W. Wiley, M.H. Ruckelshaus, R.N. Palmer, E. Korb, K.K. Bartz, and H. Imaki. 2007. Projected impacts of climate change on salmon habitat restoration. Proceedings of the National Academy of Sciences of the United States of America 104:6720-6725.

Beamish, R. J. and D. R. Bouillon. 1993. Pacific salmon production trends in relation to climate. Can. J. Fish. Aquat. Sci. 50:1002-16.

Beamish, R. J., C. Mahnken, and C. M. Neville. 1997. Hatchery and wild production of Pacific salmon in relation to large-scale, natural shifts in the productivity of the marine environment. ICES Journal of Marine Science. 54:1200-1215.

Bell, E. and W. G. Duffy. 2007. Previously undocumented two-year freshwater residency of juvenile coho salmon in Prairie Creek, California. Transactions of the American Fisheries Society 136:966-970.

Bjorkstedt, E. P, B. C. Spence, J. C. Garza, D. G. Hankin, D. Fuller, W. E. Jones, J. J. Smith, and R. Macedo. 2005. An analysis of historical population structure for evolutionarily significant units of Chinook salmon, coho salmon, and steelhead in the North-Central California Coast Recovery Domain. NOAA TM-NMFS-SWFSC-382. 231 p.

Brown, L. R and P. B. Moyle. 1991. Status of coho salmon in California. Report to the National Marine Fisheries Service. 114 pp. Available from National Marine Fisheries Service, Environmental and Technical Services Division, 525 N.E. Oregon Street, Portland, Oregon 97232.

Brown, L. R., P. B. Moyle, and R. M. Yoshiyama. 1994. Historical decline and current status of coho salmon in California. North American Journal of Fisheries Management 14(2):237-261.

Brown, R.F. and B.R. Mate. 1983. Abundance, movement and feeding habits of harbor seals, Phoca vitulina, at Netarts and Tillamook bays, Oregon. NOAA Fishery Bulletin 81(2):291-301.

Brownell, N. F., W. M. Kier, and M. L. Reber. 1999. Historical and current presence and absence of coho salmon, *Oncorhynchus kisutch*, in the northern California portion of the southern Oregon-northern California evolutionary significant unit. Prepared by Kier and Associates, Sausalito, California for the U.S. Department of Commerce, NOAA National Marine Fisheries Service, Southwest Fisheries Science Center, Santa Cruz, California.

Busby, P.J., T.C. Wainwright, G.J. Bryant, L.J. Lierheimer, R.S. Waples, F.W. Waknitz, and I.V. Lagomarsino. 1996. Status review of west coast steelhead from Washington, Idaho, Oregon and California. U.S. DOC, NOAA Technical Memo NMFS-NWFSC-27, Seattle, WA.

California Department of Fish and Game. 1965. California Fish and Wildlife Plan, Vol. I: Summary, 110 pp.; Vol. II: Fish and Wildlife Plans, 216 pp.; Vol. III: Supporting Data, 180 pp. 1416 Ninth Street, Sacramento, CA 95814.

California Department of Fish and Game. 1965. California fish and wildlife plan, Volume III: Supporting data, Part B: Inventory, salmon-steelhead marine resources. 679 pp.

California Department of Fish and Game. 1994. Petition to the California Board of Forestry to list coho salmon (Oncorhynchus kisutch) as a sensitive species. California Department of Fish and Game Report. 35 pp. plus appendices. (Available from California Board of Forestry, 1416 Ninth, Sacramento, CA 95814). In: Weitkamp *et al.* (1995).

California Department of Fish and Game. 2002. Status Review of California Coho Salmon North of San Francisco: Report to the California Fish and Game Commission. April 2002.

Chilcote, M. W. 2003. Relationship between natural productivity and the frequency of wild fish in mixed spawning populations of wild and hatchery steelhead (Oncorhynchus mykiss). Can. J. Fish. Aquat. Sci. 60:1057–1067.

Furniss, M.J., T.D. Roelofs, and C.S. Yee. 1991. Road construction and maintenance, in W.R. Meehan (1991). Pp. 297-323.

Gleick, P. H. and E. L. Chalecki. 1999. The impacts of climatic changes for water resources of the Colorado and Sacramento-San Joaquin river basins. Journal of the American Water Resources Association 35:1429-1441.

Good, T. P., R. S. Waples, and P. Adams (Editors). 2005. Updated status of federally listed ESUs of West Coast salmon and steelhead. U.S. Dept. of Commerce, NOAA Tech. Memo. NMFS-NWFSC-66. 597 pp.

Graybill, M.R. 1981. Haul out patterns and diet of harbor seals, *Phoca vitulina*, in Coos County, Oregon. Master's Thesis. University of Oregon, Eugene, OR. 55 pp.

Greene, C. M. and T. J. Beechie. 2004. Consequences of potential density-dependent mechanisms on recovery of ocean-type chinook salmon (*Oncorhynchus tshawytscha*). Can. J. Fish. Aquat. Sci. 61(4):590–602.

Hagans, D.K., and W.E. Weaver. 1987. Magnitude, cause and basin response to fluvial erosion, Redwood Creek basin, northern California. In Erosion and Sedimentation in the Pacific Rim. Beschta, R.L., Blinn, T., Grant, G.E., Ice, G.G., and F.J. Swanson [Eds.]. IAHS Publication No. 165. International Assoc. of Scientific Hydrology: Wallingford, Oxfordshire. p. 419-428.

Hamlet, A. F., P. W. Mote, M. P. Clark, and D. P. Lettenmaier. 2005. Effects of temperature and precipitation variability on snowpack trends in the western United States. Journal of Climate 18:4545-4561.

Hankin, D.G. and M.C. Healey. 1986. Dependence of exploitation rates for maximum yield and stock collapse on age and sex structure of chinook salmon (Oncorhynchus tshawytscha) stocks. Canadian Journal of Fisheries and Aquatic Sciences 43:1746-1759.

Hankin, D.G. and R. McKelvey. 1985. Comment on fecundity of chinook salmon and its relevance to life history theory. Canadian Journal of Fisheries and Aquatic Sciences 42:393-394.

Hanson, L.C. 1993. The foraging ecology of harbor seals, Phoca vitulina, and California sea lions, Zalophus californianus, at the mouth of the Russian River, California. Master's Thesis. Sonoma State University, Rohner Park, CA. 70 pp.

Harr, R.D and R.A. Nichols. 1993. tabilizing forest roads to help restore fish habitats: A northwest Washington example. Fisheries 18(4):18-22

Haupt, H.F. 1959. Road and slope characteristics affecting sediment movement from logging roads. J. Forestry 57(5): 329-339.

Healey, M.C. 1986. Optimum size and age at maturity in Pacific salmon and effects of size-selective fisheries. Canadian Special Publication of Fisheries and Aquatic Sciences 89:39-52.

Healey, M.C. 1991. The life history of chinook salmon (Oncorhynchus tshawytscha). Pp. 213-393 In: Groot and Margolis (1991).

Hicks B.J., Hall J.D., Bisson P.A. and J.R. Sedell. 1991. Responses of salmonids to habitat changes. Am Fish Soc Spec Publ 19: 483-518.

Higgins, P., S. Dobush, and D. Fuller. 1992. Factors in northern California threatening stocks with extinction. Unpublished manuscript, Humboldt Chapter American Fisheries Society. 24 pp. Available from Humboldt Chapter of the American Fisheries Society, P.O. Box 210, Arcata, CA 95521.

Jameson, R.J. and K.W. Kenyon. 1977. Prey of sea lions in the Rogue River. Oregon Journal of Mammalogy 58(4):672.

Jong, W. 2002. Unpublished data provided to BRT on 21 October 2002 by Bill Jong, California Department of Fish and Game, North Coast Region, Arcata Field Office, 5341 Ericson Way, Arcata, CA 95521.

Ketcheson, G.L. and H.A. Froehlich. 1978. Hydrology factors and environmental impacts of mass soil movements in the Oregon Coast Range. Report by the Water Resources Research Institute. Oregon State University. Corvallis, OR.

Knowles, N. and D. R. Cayan, 2004. Elevational dependence of projected hydrologic changes in the San Francisco estuary and watershed. Climate Change 62:319-336.

Levin, P. S., R. W. Zabel and J. G. Williams. 2001. The road to extinction is paved with good intentions: negative association of fish hatcheries with threatened salmon. Proc. R. Soc. Lond. B. 268:1153–1158.

Liermann, M and R. Hilborn. 2001. Depensation: Evidence Models and Implications. Northwest Fosheries Science Center, Seattle, WA. pp 26.

MacFarlane, R. B., S. Hayes, and B. Wells. 2008. Coho and Chinook Salmon Decline in California during the Spawning Seasons of 2007/08. National Marine Fisheries Service, Southwest Region, Santa Cruz, CA.

Mattole Salmon Group. 1997. Mattole Salmon Recovery Progress. Mattole Watershed Document #8. Mattole Salmon Group, Petrolia, CA.

McElhany, P., M. H. Ruckelshaus, M. J. Ford, T. C. Wainwright, and E. P. Bjorkstedt. 2000. Viable salmonid populations and the recovery of evolutionarily significant units. U.S. Dept. Commer., NOAA Tech. Memo. NMFS-NWFSC-42. 156 pp.

McEwan, D., and T. A. Jackson. 1996. Steelhead restoration and management plan for California. California Dep. Fish Game, 234 p. (Available from California Department of Fish and Game, Inland Fisheries Division, 1416 Ninth Street, Sacramento, CA 95814.)

Megahan, W.F. and R.A. Nowlin. 1976. Sediment storage in channels draining small forested watersheds in the mountains of central Idaho. Third Federal Inter-agency Sedimentation Conference, Denver, CO.

Miles, E. L., A. K. Snover, A. F. Hamlet, B. Callahan, and D. Fluharty. 2000. Pacific Northwest regional assessment: the impacts of climate variability and climate change on the water resources of the Columbia River basin. Journal of the American Water Resources Association 36:399-420.

Mote, P.W., 2006. Climate-driven variability and trends in mountain snowpack in western North America. Journal of Climate 19:6209-6220.

Mote, P. W., A. F. Hamlet, M. P. Clark, and D. P. Lettenmaier. 2005. Declining snowpack in western North America. Bulletin of the American Meteorological Society. January 2005:39-49.

Moyle, P.B. 2002. Inland Fishes of California. Second Edition. University of California Press. Berkeley, CA.

Murphy, M.L. 1995. Forestry impacts on freshwater habitat of anadromous salmonids in the Pacific Northwest and Alaska -- requirements for protection and restoration. NOAA Coastal Ocean Program Decision Analysis Series No. 7. NOAA Coastal Ocean Office, Silver Spring, MD. 156 pp.

Murphy, G.I. and L. Shapovalov. 1951. A preliminary analysis of northern California salmon and steelhead runs. California Fish and Game 37:497-507. In: Busby *et al.* (1996).

Myers, J.M, R.G. Kope, G.J. Bryant, D. Teel, L.J. Lierheimer, T.C. Wainwright, W.S. Grant, F.W. Waknitz, K. Neely, S.T.Lindley, and R.S. Waples. 1998. Status review of chinook salmon from Washington, Idaho, Oregon, and California. U.S. Deptartment of Commerce. NOAA Technical Memorandum NMFS-NWFSC-35. Northwest Fisheries Science Center, Seattle, WA. 443 pp.

Nakamura, F. and J.F. Swanson. 1993. Effects of coarse woody debris on morphology and sediment storage of a mountain stream system in western Oregon. Earth Surface Processes and Landforms 18:43-61.

National Marine Fisheries Service. 1996. Juvenile fish screen criteria for pump intakes. Environmental and Technical Services Division. Portland, Oregon. May 9.

National Marine Fisheries Service. 1997. Fish screening criteria for anadromous salmonids. Southwest Region. January.

National Marine Fisheries Service. 1997. Impact of California sea lions and Pacific harbor seals on salmonids and on the coastal ecosystems of Washington, Oregon, and California. NOAA Technical Memorandum NMFS-NWFSC-28. NMFS Northwest Fisheries Science Center, Seattle, WA.

National Marine Fisheries Service. 1999. Biological BO and Incidental Take Statement- Effects of The Pacific Coast Salmon Plan on Oregon Coast Coho salmon, Southern Oregon/Northern California Coast Coho Salmon, and Central California Coast Coho Salmon. National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Long Beach, CA. 29 pp.

National Marine Fisheries Service. 2000. Biological BO and Incidental Take Statement – Effects of The Pacific Coast Salmon Plan on California Central Valley Spring-Run Chinook, and California Coastal Chinook Salmon. National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Long Beach, CA. 29 pp.

National Marine Fisheries Service. 2001. Status review update for coho salmon (Oncorhynchus kisutch) from the Central California Coast and the California Portion of the Southern Oregon/Northern California Coast Evolutionarily Significant Units. Southwest Fisheries Science Center, Santa Cruz Laboratory. April 12. 43 pp.

National Marine Fisheries Service. 2005. Final Assessment of the National Marine Fisheries Service's Critical Habitat Analytical Review Teams (CHARTs) for Seven Salmon and Steelhead Evolutionarily Significant Units (ESUs) in California. NOAA Fisheries Protected Resources Division, Long Beach, California. 23 pp. plus seven appendices.

National Marine Fisheries Service. 2007. 2007 Report to Congress: Pacific Coast Salmon Recovery Fund FY 2000-2006. U.S. Dept. Commerce. 46 pp.

Pacific Fishery Management Council. 1999. Amendment 14 to the Pacific Coast Salmon Plan, Appendix A: Identification and description of essential fish habitat, adverse impacts, and recommended conservation measures for salmon. Portland, Oregon. 146 pp. August.

Pacific Watershed Associates. 1998. Sediment Source Investigation and Sediment Reduction Plan for the Bear Creek Watershed, Humboldt County, California. Report prepared for The Pacific Lumber Company. Pacific Watershed Associates, Arcata, CA.

Pascual, M. A., T. P. Quinn and H. Fuss. 1995. Factors affecting the homing of fall Chinook salmon from Columbia River hatcheries. Transactions of the American Fisheries Society 124:308-320.

Quinn, T. P. 2005. The Behavior and Ecology of Pacific Salmon and Trout. University of Washington Press, Seattle, WA.

Regonda, S. K., B. Rajagoplan, M. Clark, and J. Pitlick. 2005. Seasonal shifts in hydroclimataology over the western United States. Journal of Climate 18:372-384.

Reid, L.M. 1998. Review of the: Sustained yield plan/habitat conservation plan for the properties of the Pacific Lumber Company, Scotia Pacific Holding Company, and Salmon Creek Corporation. Unpublished report. USDA Forest Service. Pacific Southwest Research Station. Redwood Sciences Laboratory. Arcata, CA. 63 pp.

Reid, L.M. & Dunne, T. 1984. Sediment production from forest road surfaces. Water Resources Research 20(11): 1753-1761.

Ricker, W.E. 1980. Causes of the decrease in age and size of chinook salmon (Oncorhynchus tshawytscha). Canadian Technical Report on Fisheries and Aquatic Sciences 944. 25 pp.

Roffe, T.J. and B.R. Mate. 1984. Abundance and feeding behavior of pinnipeds in the Rogue River, Oregon. Journal of Wildlife Management 48(4):1262-1274.

Sandercock, F. K. 1991. Life history of coho salmon. In: C. Groot and L. Margolis (editors), Pacific salmon life histories, p. 397-445. UBC Press, Vancouver, British Columbia, Canada.

Sanders, J.E., J.J. Long, C.K. Arakawa, J.L. Bartholomew, and J.S. Rohovec. 1992. Prevalence of Renibacterium salmoninarum among downstream-migrating salmonids in the Columbia River. Journal of Aquatic Animal Health 4:72-75.

Scheffer, T.H. and C.C. Sperry. 1931. Food habits of the Pacific harbor seal, Phoca vitulina richardsi. Journal of Mammalogy 12(3):214-226.

Shelton, J.M. 1955. The hatching of chinook salmon eggs under simulated natural conditions. Prog. Fish-Cult. 17:20-35.

Sparkman, M.D. 2002. Juvenile Steelhead Downstream Migration Study in the Mad River, Humboldt County, California – Spring 2001. Project 2a3. 2000-2001 Annual Report. California Department of Fish and Game. Steelhead Research and Monitoring Program. 52 pp.

Spence, B.C., G.A. Lomnicky, R.M. Hughes, and R.P. Noviztki. 1996. An ecosystem approach to salmonid conservation. TR-4501-96-6057. Management Technology Environmental Research Services Corp., Corvallis, OR.

Spence, B., E. Bjorkstedt, J. C. Garza, D. J. Hankin, J. Smith, D. Fuller, W. Jones, R. Macedo, T. H. Williams, and E. Mora. 2007. A framework for assessing the viability of threatened and endangered salmon and steelhead in North-Central California Coast recovery domain. Public review draft. June 14, 2007. 160 p.

Stewart, I. T., D. R. Cayan, and M. D. Dettinger. 2005. Changes toward earlier streamsflow timing across western North America. Journal of Climate 18:1136-1155.

Sullivan, K., T.E. Lisle, C.A. Dolloff, G.E. Grant, and L.M. Reid. 1987. Stream channels: the link between forests and fishes. In E.O. Salo and T.W. Cundy (eds.), Streamside Management: Forestry and Fishery Interactions, pgs. 191-232. Contribution 57, University of Washington., Inst. of Forest Resources, Seattle.

Swanson, F.J., Dryness C.T. 1975. Impact of clearcutting and road construction on soil erosion and landsliding in the Western Cascade Range, Oregon. Geology 3(7): 393-396.

Swanson, F.J. and G.W. Lienkaemper. 1978. Physical consequences of large organic debris in Pacific northwestern streams. USDA For. Serv. Gen. Tech. Rep. PNW-59. 12p.

Swanston, D.N. and F.J. Swanson. 1976. Timber harvesting, mass erosion, and steepland forest geomorphology in the Pacific Northwest. In Coates, D.R. ed., Geomorphology and Engineering. Dowden, Hutchison, and Ross, Inc., Pages 199-221. Stroudsburg, PA.

Swanston, D. N. 1991. Natural processes. pp. 139-179. In W. R. Meehan, editor. Influences of forest and rangeland management on salmonid fishes and their habitats. Amer. Fish. Soc. Spec. Publ. 19. 751 p.

Tauzer, M. 2007. Personal communication. Hydrologist, National Marine Fisheries Service.

Taylor, R.N. 2000. Final Report: Humboldt County Culvert Inventory and Fish Passage Evaluation. CDFG contract # FG-7068 IF. 36 pp.

Thomas, J. W., M. G. Raphael, R. G. Anthony, E. D. Forsman, A. G. Gunderson, R. S. Holthausen, B. G. Marcot, G. H. Reeves, J. R. Sedell, and D. M. Solis. 1993. Viability assessments and management considerations for species associated with late-successional and old-growth forest of the Pacific Northwest. Research Report of the Scientific Analysis Team. U.S. Forest Service, Washington, D.C. 530 pp

Voight, H. and J. Waldvogel. 2002. Smith River Anadromous Fish Action Plan (SRAFAP). Smith River Advisory Council and California Department of Fish and Game Contract #P9985009.

Waples, R. S. 1991. Genetic interactions between hatchery and wild salmonids: lessons from the Pacific Northwest. Canadian Journal of Fisheries and Aquatic Sciences 48:124-133.

Waples, R.S. 1991. Definition of "species" under the Endangered Species Act: Application to Pacific salmon. U.S. Department of Commerce. NOAA Technical Memorandum. NMFS, F/NWC-194. 29 pp.

Wedemeyer G. A., B. A. Barton, D. J. McLeay. 1990. Stress and acclimation in C. B. Schreckand P. B. Moyle, editors. Pages 451-489. Methods for fish biology. American FisheriesSociety, Bethesda, Maryland.

Weitkamp, L. A., T. C. Wainwright, G. J. Bryant, G. B. Milner, D. J. Teel, R. G. Kope, and R. S. Waples. 1995. Status review of coho salmon from Washington, Oregon, and California. U.S. Department of Commerce. NOAA Technical Memorandum NMFS-NWFSC-24, Northwest Fisheries Science Center, Seattle, Washington. 258 pp.

Williams, T. H., E. P. Borkstedt, W. G. Duffy, D. Hillemeier, G. Kautsky, T. E. Lisle, M. McCain, M. Rode, R. G. Szerlong, R. S. Schick, M. N. Goslin, and A. Agrawal. 2006. Historical population structure of coho salmon in the Southern Oregon/Northern California Coasts Evolutionarily Significant Unit. U.S. Dept. Commer. NOAA Tech. memo. NMFS-NWFSC-390. June. 71 p.

Williams, T. H., B. C. Spence, W. Duffy, D. Hillemeier, G. Kautsky, T. Lisle, M. McCain, T. Nickelson, G. Garman, E. Mora, and T. Pearson. 2007. Framework for assessing viability of threatened coho salmon in the Southern Oregon/Northern California Coast Evolutionarily Significant Unit. Oregon-California Technical Recovery Team external review draft. July 5. 88 p.

A. Federal Register Notices Cited

64 FR 24049. National Marine Fisheries Service. Designated Critical Habitat; Central California Coast and Southern Oregon/Northern California Coasts Coho Salmon. May 5, 1999.

64 FR 50394. National Marine Fisheries Service. Endangered and Threatened Species: Threatened Status for Two Chinook Salmon Evolutionarily Significant Units (ESUs) in California; Final Rule. September 16, 1999.

65 FR 36074. National Marine Fisheries Service. Endangered and Threatened Species;

Threatened Status for One Steelhead Evolutionarily Significant Unit in California; Final Rule. June 7, 2000.

70 FR 37160. National Marine Fisheries Service. Final Rule. Endangered and Threatened Species: Final Listing Determinations for 16 ESUs of West Coast Salmon, and Final 4(d) Protective Regulations for Threatened Salmonid ESUs. June 28, 2005.

70 FR 52488. National Marine Fisheries Service. Endangered and Threatened Species: Designation of Critical Habitat for Seven Evolutionarily Significant Units of Pacific Salmon and Steelhead in California. Final Rule. September 2, 2005.

Enclosure 2

Magnuson-Stevens Fishery Conservation and Management Act

ESSENTIAL FISH HABITAT CONSULTATION AND CONSERVATION RECOMMENDATIONS

The 1996 amendments to the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA) set forth new mandates for NOAA's National Marine Fisheries Service (NMFS), regional fishery management councils, and Federal action agencies to identify and protect important marine and anadromous fish habitat. The Councils, with assistance from NMFS, are required to delineate "essential fish habitat" (EFH) in fishery management plans (FMPs) or FMP amendments for all managed species. Federal action agencies which fund, permit, or carry out activities that may adversely affect EFH are required to consult with NMFS regarding potential adverse effects of their actions on EFH, and respond in writing to NMFS' Conservation Recommendations. In addition, NMFS is required to comment on any state agency activities that would impact EFH.

Identification of Essential Fish Habitat

Essential fish habitat is defined in the MSFCMA as "…those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity..." NMFS regulations further define "waters" to include aquatic areas and their associated physical, chemical, and biological properties that are used by fish and may include aquatic areas historically used by fish where appropriate; "substrate" to include sediment, hard bottom, structures underlying the waters, and associated biological communities; "necessary" to mean the habitat required to support a sustainable fishery and the managed species' contribution to a healthy ecosystem; and "spawning, breeding, feeding, or growth to maturity" to cover a species' full life cycle
(50 CFR 600.10).

The Pacific Fishery Management Council (PFMC) has delineated EFH for Pacific Coast Salmon (PFMC 1999). The action area identified in the associated biological opinion (*i.e.*, Telegraph Creek, from the action area to the estuary, Humboldt County, California) provides EFH for Chinook salmon (*Oncorhynchus tshawytscha*) and coho salmon (*O. kisutch*) from the Pacific Coast Salmon FMP.

Proposed Action

The U.S. Army Corps of Engineers (Corps) proposes to issue a Nationwide Permit 12 to the Resort Improvement District #1, for a proposed water intake installation in Telegraph Creek, Shelter Cove, Humboldt County, California (Project). Water is proposed to be drawn through a side-channel concrete intake structure. An approximately 35-foot long, 1-foot-high concrete weir with flashboards would span the stream bank to bank to control the bypass flow and divert the water allowed under the District's existing water rights

into the new intake structure. The diversion structure will be constructed approximately 700 feet upstream of the existing intake at the dam.

Install up to two, 7,500-gallon cone bottom settling tank(s), east of the WTP, across Telegraph Creek Road.

Install up to six, 12,000-gallon polyethylene raw water storage tanks, south of the existing settling basin at the WTP.

A gravity-fed piping system will be installed from the new upstream intake to the cone bottom settling tank(s), situated east of Telegraph Creek Road.

A gravity–fed piping system will be constructed from the cone bottom-settling tank to the raw water storage tanks, situated south of the WTP settling basin.

A gravity-fed piping system will be constructed from the raw water storage tanks to the existing WTP supply pipe, situated near the existing pumping station at the dam.

After installing the water intake, all of the temporary structures, would be removed, and the area re-watered.

Essential Fish Habitat (EFH) provisions of the Magnuson-Stevens Act (MSA, as amended 1996) require heightened consideration of habitat for commercial species in resource management decisions. EFH is defined in Section 3 of the MSA as "those waters and substrates necessary to fish for spawning, breeding, feeding, or growth to maturity." NMFS interprets EFH to include aquatic areas and their associated physical, chemical, and biological properties used by fish that are necessary to support a sustainable fishery and the contribution of the managed species to a healthy ecosystem. Freshwater EFH for Pacific salmonids includes all those streams, lakes, ponds, wetlands, and other water bodies currently, or historically, accessible to salmon in Washington, Oregon, Idaho, and California, except areas upstream of certain impassable man-made barriers, and long-standing impassable natural barriers. The MSA and its implementing regulations at 50 CFR 600.92(j) require that before a federal agency may authorize, fund or carry out any action that may adversely affect EFH, it must consult with NOAA Fisheries. All streams accessible to coho salmon and Chinook salmon contain EFH.

Effects of the Proposed Action

The Project entails dewatering a portion of the channel, which would temporarily exclude fish from utilizing habitat at the Project site. Suspended sediment and turbidity would be increased by channel bed and bank disturbance. These effects to habitat would be minor and short-term.

The associated biological opinion analyzed the effects of the Project on SONCC coho salmon CC Chinook salmon habitat. Habitat in the biological opinion is hereby incorporated by reference to describe the effects to Pacific Coast Salmon EFH.

Conclusion

NMFS determines that the Project would adversely affect EFH for Pacific Coast Salmon species.

EFH Conservation Recommendations

The following conservation measures are necessary to avoid, mitigate, or offset the impact of the proposed action on EFH. These conservation recommendations are a subset of the ESA terms and conditions.

1. Construction Activities.

- Timing of In-water Work. Work within the active channel of Telegraph Creek will be completed during the period of June 15 – October 31. All work must be completed within these dates unless otherwise approved in writing by NMFS.
- Minimum Area. The permittee will confine construction impacts to the minimum area necessary to achieve project goals.
- Cessation of Work. Operations will cease under high flow conditions that may result in inundation of the project area, except for efforts to avoid or minimize resource damage presented in the incidental take statement of the accompanying biological opinion.

Reference

Pacific Fishery Management Council. 1999. Amendment 14 to the Pacific Coast Salmon Plan, Appendix A: Identification and description of essential fish habitat, adverse impacts, and recommended conservation measures for salmon. Portland, Oregon. 146 pp. August.