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 6 2003

In reply please refer to:
151422SWR02SR6251:JTJ

Robert R. Ziemer, Director
Redwood Sciences Laboratory
United States Forest Service
1700 Bayview Drive
Arcata, California 95521

Dear Mr. Ziemer:

This document transmits the National Marine Fisheries Service's (NOAA Fisheries) biological opinion based on NOAA Fisheries' review of activities carried out by the United States Forest Service (USFS) in both North Fork Caspar Creek (NFC) and South Fork Caspar Creek (SFC) in Jackson Demonstration State Forest (JDSF) near Fort Bragg, California. The specific projects include; (1) the proposed continuation of maintenance of weir ponds at monitoring facilities located on NFC and SFC, and (2) the proposed fish passage improvement at monitoring facilities located on NFC and SFC. The assessment submitted by the USFS also included a third project (Hydrologic Research in NFC and SFC), however, NOAA Fisheries did not include this project in the consultation due to the lack of specific details on future activities.

NOAA Fisheries has examined the project's effects to threatened Central California Coast coho salmon and threatened Northern California steelhead, including effects to designated Central California Coast coho salmon critical habitat, in accordance with section 7 of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.). In addition, this letter transmits NOAA Fisheries' Essential Fish Habitat (EFH) consultation pursuant to Section 305(b)(2) of the Magnuson-Stevens Fisheries Conservation and Management Act.

Endangered Species Act Consultation

NOAA Fisheries received your February 28, 2002, request for formal consultation on March 4, 2002. The enclosed biological opinion is based on information provided with your request and other sources of scientific and commercial information. A complete administrative record of this consultation is on file in NOAA Fisheries' Santa Rosa Field Office in Santa Rosa, California.

NOAA Fisheries anticipates that take of listed species as a result of these projects will be in the nature of temporary harassment with a possible minimal level of mortality; will be of limited duration; and will have no long-term effects on the survival of listed species. It is our finding in the biological opinion that the proposed action is not likely to jeopardize the continued existence of Central California Coast coho salmon and threatened Northern California steelhead, or adversely modify Central California Coast coho salmon designated critical habitat.

Essential Fish Habitat Consultation

The Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA), as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-267), established new requirements for EFH descriptions in Federal fishery management plans and requires Federal agencies to consult with NOAA Fisheries on activities that may adversely affect EFH. EFH for Pacific Coast salmon has been described in Appendix A, Amendment 14, to the Pacific Coast Salmon Fishery Management Plan. These projects affect both NFC and SFC, which has been designated as EFH for coho salmon.

NOAA Fisheries has evaluated the proposed project for potential adverse effects to EFH pursuant to Section 305(b)(2) of the MSFCMA. After reviewing the effects of the project, NOAA Fisheries believes that the project action, as proposed, will have minimal adverse effects to EFH of coho salmon in both the NFC and SFC.

Section 305(b)(4)(A) of the MSFCMA authorizes NOAA Fisheries to provide EFH Conservation Recommendations that will minimize adverse effects of an activity on EFH. For this project, conservation measures were already included in the project description. Therefore, NOAA Fisheries does not recommend any additional EFH Conservation Recommendations for Pacific coast salmon.

If you have any questions about this section 7 consultation and EFH consultation or if you require additional information, please contact Mr. Jeffrey Jahn at (707) 575-6097.

Sincerely,

P. Scott Hill

for Rodney R. Mcinnis
Acting Regional Administrator

cc: Rodney Nakamoto, USFS Redwood Sciences Laboratory, Arcata, CA
Marc Jamison, CDF, Fort Bragg, CA
Liam Davis, CDFG, Yountville, CA
Jim Lecky, NOAA Fisheries
Penny Ruvelas, NOAA Fisheries
Joe Blum, NOAA Fisheries

BIOLOGICAL OPINION

AGENCY: United States Forest Service, Redwood Sciences Laboratory

ACTION: Continued Maintenance of Weir Ponds and Proposed Fish Passage Improvement at Monitoring Facilities Located on North Fork Caspar Creek and South Fork Caspar Creek, Jackson Demonstration State Forest, Mendocino County, California

CONSULTATION CONDUCTED BY: NOAA Fisheries, Southwest Region

FILE NUMBER: 151422SWR02SR6251

DATE ISSUED: ____________________

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I. CONSULTATION HISTORY

On August 20, 2001, personnel from the National Marine Fisheries Service (NOAA Fisheries), United States Forest Service (USFS), California Department of Forestry and Fire Protection (CDF), and the California Department of Fish and Game (CDFG) met to discuss proposed fish passage improvements for the North Fork Caspar Creek (NFC) and South Fork Caspar Creek (SFC) monitoring facilities within the Jackson Demonstration State Forest (JDSF) near Fort Bragg in Mendocino County, California. On September 13, 2001, NOAA Fisheries sent a letter to CDF to follow up on the August 20, 2001 meeting and site visits. The letter informed CDF that the Caspar Creek watershed supports populations of Central California Coast coho salmon and Northern California steelhead which are both listed as threatened Evolutionarily Significant Units pursuant to the Endangered Species Act (ESA). In order to ensure that ESA-listed salmonids are not delayed, trapped or excluded from available habitat, NOAA Fisheries recommended that fish passage improvements be made at both facilities for both adult and juvenile salmonid passage for all times of the year.

On October 22, 2001, NOAA Fisheries received an e-mail from CDFG inviting NOAA Fisheries personnel to attend site visits and a meeting on November 7, 2001 to discuss fish passage at the NFC and SFC monitoring facilities in JDSF. On November 6, 2001, personnel from NOAA Fisheries, USFS, CDF and CDFG met to discuss permitting issues for the maintenance of the weir ponds for both NFC and SFC monitoring facilities. During the meeting, NOAA Fisheries informed USFS and CDF of the need to obtain incidental take coverage for the maintenance and clean out of the weir ponds in NFC and SFC.

On November 7, 2001, personnel from NOAA Fisheries, USFS, CDF, and CDFG attended a multi-agency meeting at the CDF office in Fort Bragg to discuss research activities, maintenance of the weir ponds, and fish passage improvements for the NFC and SFC monitoring facilities within JDSF. NOAA Fisheries reiterated the need to obtain incidental take coverage and to improve fish passage conditions for both adult and juvenile salmonids at the NFC and SFC monitoring facilities. On November 15, 2001, Jeffrey Jahn (NOAA Fisheries) sent an e-mail to Bob Zeimer (USFS) and Robert Horvat (CDF) to inform them again of their options for Endangered Species Act compliance and take coverage for monitoring activities in NFC and SFC within JDSF. On December 4, 2001, Rodney Nakamato (USFS) contacted Jeffrey Jahn (NOAA Fisheries) via telephone to confirm that the USFS would prepare an assessment for their activities and would initiate formal section 7 consultation.

On February 28, 2002, the USFS requested formal consultation with NOAA Fisheries pursuant to section 7 of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.) regarding the effects of monitoring activities in NFC and SFC watersheds in JDSF on threatened Central California Coast (CCC) coho salmon (*Oncorhynchus kisutch*) and threatened Northern California (NC) steelhead (*Oncorhynchus mykiss*) and to designated CCC coho salmon critical habitat and Essential Fish Habitat.

Formal consultation began on March 4, 2002, the date USFS's request was received by the NOAA Fisheries Santa Rosa Field Office. Acknowledgment of USFS's request was sent on March 14, 2002. In late spring of 2002, USFS notified Jeffrey Jahn NOAA Fisheries that the projects would not be implemented in the summer of 2002 as originally planned. Since the projects were not going to occur until the summer of 2003 and beyond, NOAA Fisheries verbally requested and USFS agreed to an extension of the consultation period.

In January 2003, Rodney Nakamoto (USFS) notified Jeffrey Jahn (NOAA Fisheries) that the current conceptual designs of the fish ladders would be sent to NOAA Fisheries by CDF. Rodney Nakamoto (USFS) also explained that the plans are only conceptual and that he was unsure when final detailed plans will be available.

On January 16, 2003, NOAA Fisheries received the current conceptual designs for the fish ladders from CDF. In late January 2003, Jeffrey Jahn (NOAA Fisheries) notified Rodney Nakamoto (USFS) by telephone and requested more specific information on the future timber harvest in SFC associated with the third project (Hydrologic Research in NFC and SFC). Rodney Nakamoto (USFS) explained that at this time there are no specific details on the future timber harvest associated with the research, only that it is planned to occur in SFC within the next five years or so as presented in the assessment.

In early February 2003, Jeffrey Jahn (NOAA Fisheries) verbally notified Rodney Nakamoto (USFS) that the maintenance of foot trials and flumes within sub-basins of SFC associated with the third project (Hydrologic Research in NFC and SFC) likely has no effect on ESA-listed salmonids. However, the planned future timber harvest associated with the hydrologic research may adversely affect ESA-listed salmonids. Jeffrey Jahn (NOAA Fisheries) noted that due to the lack of specific details on the planned future timber harvest, NOAA Fisheries can not analyze the associated effects at this time. Therefore, the third project (Hydrologic Research in NFC and SFC) is not included in this consultation due to the lack of specific details of future activities. A complete administrative record of this consultation is on file at the NOAA Fisheries Santa Rosa Field Office.

II. DESCRIPTION OF THE PROPOSED ACTION

The USFS proposes to continue maintenance of two weir ponds and to improve two associated fish passage facilities in the Caspar Creek watershed within the Jackson Demonstration State Forest located in Mendocino County, California. Since 1962, two similar monitoring facilities have been in place, one is within the NFC watershed and the other is within the SFC watershed (Figure 1). Each facility includes a sediment/debris stilling pond created by a concrete broad-crested weir with a 120º low-flow v-notch. A fish ladder is located just downstream of each v-notch weir to allow fish passage.

These monitoring facilities are a component of the Caspar Creek Watershed Study, a long-term monitoring and research program conducted by the USFS and CDF since 1962. There are only three other locations in the United States with similar long-term continuous stream flow data from small forested watersheds (USDA-CDF 1999). The Caspar Creek data also represent the only long-term hydrologic information from watersheds located in second-growth conifer forest (USDA-CDF 1999). Due to the long record and unique conditions, information from NFC and SFC will continue to be valuable to both the research and the land management communities (USDA-CDF 1999). Currently, a 100-year Memorandum of Understanding between the USFS and CDF describes the relationship between the two agencies pertaining to watershed research conducted in the NFC and SFC. The agreement was signed August 17, 1999 and is available on the world wide web at: http://www.rsl.psw.fs.fed.us/projects/water/100yearMOU.pdf

A. Project Number 1: Maintenance of the North Fork Caspar Creek and South Fork Caspar Creek weir ponds.

The weir pond on the NFC is located at N39º 21.685" W123º 44.124" and the weir pond on the SFC is located at N39º 20.546" W123º 45.235". Periodically, usually with a five year reoccurrence interval, the ponds require sediment and debris removal to retain their sediment trapping efficiency and stream gauging accuracy. The proposed cleanout of each weir pond will occur during the summer base flow period between June and September. The SFC weir pond is anticipated to be cleaned out in 2003. The NFC weir pond was last cleaned out in 1999 and is predicted to be cleaned out in 2004. The procedures below will be utilized for cleanout and sediment removal at each pond.

Initially, discharge will be diverted through an existing pipe line around the weir pond. The weir pond will then be gradually drained. In an effort to minimize increases in turbidity, a majority of the water will be siphoned from the water column over the weir. In addition, two small settling pools will be temporarily created downstream of the dam to trap suspended sediments. These settling pools will be created using clean washed gravel and will be removed before the winter flows.

After significant reduction in the pond water volume, qualified fishery biologists from CDFG will remove as many fish as possible using a 91.4 m beach seine with 6.3 mm mesh and a 4.8 mm mesh bag. Catch will be supplemented using a Smith -Root Model 12 backpack electrofishing unit. Fish will be held and transported in aerated plastic buckets with leaf litter placed on top for cover. The fish will then be dispersed in pool habitat located upstream of the project site. Temporary holding time is expected to be less than twenty minutes. The most recent cleanout activity occurred during 1999 in NFC and approximately 250 steelhead and 125 coho were relocated. Similar data for the most recent cleanout of the SFC weir pond were not provided by USFS. Estimated capture and handling mortality is expected to be less than five percent of the fish relocated. Fish recovery efforts will not be executed if water temperatures exceed 20ºC.

Once the pond is drained, sediment may be allowed to dry prior to mechanical removal. Sediment and debris will be removed from the weir pond using excavating equipment and will be loaded into a dump truck. The volume of sediment removed from each weir pond generally varies between 700 and 1200 m^3. Access to the NFC pond will be via a spur road off the 620 road and access to the SFC pond will be via a spur road off the 600 road. In order to minimize sediment from entering the creek, each spur road will have additional rock placed on the surface and a temporary berm will be constructed on the outside of the road. Mulch in the form of hay will also be placed on the area below each access road as an additional measure to catch any sediment that may be released from the road during the project.

Safeguards to prevent fuel and oil spills from the heavy equipment will include: 1) operators will follow proper and safe refueling and servicing procedures and 2) all refueling and maintenance activities will occur on a flat area on the road where an accidental spill could be easily contained and cleaned up prior to the chemicals entering the stream.

Excavated sediments and debris will be transported to a closed logging spur road which is approximately one-quarter of a mile in length. The topography of the area is generally flat and is located approximately 1 km north of mainstem Caspar Creek, minimizing the possibility of sediment mobilization during rainy periods. The sediment will be deposited on the road surface to dry. Five to seven days will be required for removal and transport of sediment and debris. Sediment will be graded over the existing roadway and landing areas within one year of the completion of the dumping operation.

Once the pond is cleaned out, creek flow will be partially and gradually restored to the pond. In order to prevent dewatering of downstream areas during pond filling, a portion of the flow will remain diverted around the pond. Once the pond is filled and water is flowing through the weir, the diversion will be removed.

B. Project Number 2: Demolition of existing fish ladders and construction of new fish ladders at the weir ponds.

A fish ladder is located just downstream of each v-notch weir and is designed to allow fish passage past the v-notch weir. Surveys conducted by CDFG have identified the fish ladders as partial barriers to anadromous salmonid passage. The existing structures are constructed of wood and are in poor structural condition with a high probability that the ladders may collapse during high winter flows. In addition, during the summer and early fall the entire discharge in both the creeks leaks through gaps in the ladders trapping juvenile fish upstream until fall rains. The USFS, CDF, and CDFG believe that the best course of action would be to replace the wooden fish ladders on both NFC and SFC with concrete fish ladders.

Initiation of the project is dependent on funding but is expected to occur within the next couple of years. The proposed construction of each fish ladder would occur when the creeks reach summer base flow, sometime between June and September. During the project, discharge from the creek will be captured at the v-notch and will be diverted downstream of the fish ladder. Once the discharge has been detoured around the fish ladder, fish remaining between the fish ladder and the v-notch weir will be captured and relocated downstream of the fish ladder. Fish will be captured with nets by trained CDFG personnel using a Smith-Root backpack electrofishing unit. Holding, transport, and release of captured fish will follow the same protocol as described in the previous section.

Once as many fish as possible have been relocated, demolition of the existing fish ladder will commence. Demolition and construction equipment will access the NFC fish ladder area via a spur road off the 620 road and will access the SFC fish ladder area via a spur road off the 600 road. Precautions to minimize sediment transport from the roads and to prevent accidental fuel and oil spills as outlined in the previous section will be followed for the fish ladder project. All construction materials associated with the demolition of the existing fish ladders will be trucked to the Caspar Waste Transfer Station operated by Mendocino County.

A preliminary conceptual design for the fish ladders was presented in the Biological Assessment (BA). However, a subsequent conceptual design dated May 2002 was provided to NOAA Fisheries that was inconsistent with the conceptual design and narrative description presented in the BA. Since designs are still conceptual and not yet finalized, NOAA Fisheries will not evaluate the designs in this BO. However, as stated in the BA, final design for the fish ladders will allow year-round passage of salmonids in both upstream and downstream directions.

C. Description of the Action Area

The action area for this project includes the area directly impacted by the proposed pond maintenance and the proposed demolition and construction of the fish ladders. The proposed actions will occur in two separate areas. The NFC action area consists of the v-notch weir located at N39° 21.685" W123° 44.124" and extends 0.5 km upstream of the weir and 1 km downstream of the weir and is completely within NFC. The SFC action area consists of the v-notch weir located at N39° 20.546" W123° 45.235" and extends 0.5 km upstream of the weir and 1 km downstream of the weir. The SFC action area is within SFC but does extend into the mainstem Caspar Creek approximately 0.5 km downstream of the confluence with NFC and SFC (Figure 1). These two tributary watersheds are located in the headwaters of the 2,167-ha Caspar Creek watershed which discharges into the Pacific Ocean near the community of Caspar, just south of Fort Bragg in Mendocino County, California.

III. STATUS OF THE SPECIES/CRITICAL HABITAT

A. Coho Salmon

1. <u>Species Description</u>

Coho salmon are native to the north Pacific Ocean. The historic distribution of coho salmon in North America included coastal streams from Alaska south to northwestern Mexico (Moyle 1976; Weitkamp *et al*. 1995). Currently the San Lorenzo River in Santa Cruz County, California is thought to have the southern-most persistent population of coho salmon in North America (Weitkamp *et al*. 1995). Coho salmon are also found in Asia from the Anadyr River, Russia, south to Hokkaido, Japan and tributaries of Peter the Great Bay on the Sea of Japan (Hart 1973; Sandercock 1991).

2. Life History and Biological Requirements

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

The life history of the coho salmon in California has been well documented by Shapovalov and Taft (1954) and Hassler (1987). In contrast to the life history patterns of other anadromous salmonids, coho salmon in California generally exhibit a relatively simple 3-year life cycle. Adult salmon typically begin the freshwater migration from the ocean to their natal streams after heavy late-fall or winter rains breach the sand bars at the mouths of coastal streams (Sandercock 1991). Delays in river entry of over a month are not unusual (Salo and Bayliff 1958; Eames *et al*. 1981). Migration continues to March, generally peaking in December and January, with spawning occurring shortly after returning to the spawning ground (Shapovalov and Taft 1954).

Female coho salmon choose spawning sites usually near the head of a riffle, just below a pool, where water changes from a laminar to a turbulent flow and there is small to medium gravel substrate. The flow characteristics of the location of the redd usually ensure good aeration of eggs and embryos, and flushing of waste products. The water circulation in these areas also facilitates fry emergence from the gravel. Preferred spawning grounds have nearby overhead and submerged cover for holding adults; water depth of 10-54 cm; water velocities of 20-80 cm/s; clean, loosely compacted gravel (1.3-12.7 cm diameter) with less than 20 percent fine silt or sand content; cool water (4-10EC) with high dissolved oxygen (8 mg/l); and an intergravel flow sufficient to aerate the eggs. The lack of suitable gravel often limits successful spawning in many streams.

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

The eggs generally hatch between 4 to 8 weeks, depending on water temperature. Survival and development rates depend on temperature and dissolved oxygen levels within the redd. According to Baker and Reynolds (1986), under optimum conditions, mortality during this period can be as low as 10 percent; under adverse conditions of high scouring flows or heavy siltation, mortality may be close to 100 percent. McMahon (1983) found that egg and fry survival drops sharply when fines make up 15 percent or more of the substrate. The newly-hatched fry remain in the gravel from two to seven weeks until emergence from the gravels (Shapovalov and Taft 1954). Upon emergence, fry seek out shallow water, usually along stream margins. As they grow, they often occupy habitat at the heads of pools, which generally provide an optimum mix of high food availability and good cover with low swimming cost (Nielsen

1992). Chapman and Bjornn (1969) determined that larger parr tend to occupy the head of pools, with smaller parr found further down the pools. As the fish continue to grow, they move into deeper water and expand their territories until, by July and August, they are in the deep pools. Juvenile coho salmon prefer well shaded pools at least 1 meter deep with dense overhead cover; abundant submerged cover composed of undercut banks, logs, roots, and other woody debris; preferred water temperatures of 12-15EC, but not exceeding 22-25EC for extended time periods; dissolved oxygen levels of 4-9 mg/l; and water velocities of 9-24 cm/s in pools and 31-46 cm/s in riffles. Water temperatures for good survival and growth of juvenile coho salmon range from 10-15EC (Bell 1973; McMahon 1983). Growth is slowed considerably at 18EC and ceases at 20EC (Stein *et al*. 1972; Bell 1973).

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

In the spring, as yearlings, juvenile coho salmon undergo a physiological process, called smoltification, which prepares them for living in the marine environment. They begin to migrate downstream to the ocean during late March and early April, and out migration usually peaks in mid-May, if conditions are favorable. At this point, the smolts are about 10-13 cm in length. After entering the ocean, the immature salmon initially remain in nearshore waters close to their parent stream. They gradually move northward, staying over the continental shelf (Brown *et al*. 1994). Although it is thought that they range widely in the north Pacific, movements of coho salmon from California are poorly known.

3. <u>Listing status</u> -

a. Central California Coast coho salmon ESU

On October 31, 1996, NOAA Fisheries issued a final determination that the CCC coho salmon ESU was a “species” under the ESA, and that it would be listed as a threatened species (61 FR 56138). The effective date of the determination was December 2, 1996. In a technical correction to the final listing determination (62 FR 1296), NOAA Fisheries defined the CCC coho salmon ESU to include all coho salmon naturally-reproduced in streams between Punta Gorda in Humboldt County, California, and the San Lorenzo River in Santa Cruz County, California (inclusive), and included tributaries to San Francisco Bay. The taking of this species was prohibited, pursuant to section 4(d) and section 9 of the ESA in the final determination (61 FR 56138). Certain limitations to this taking prohibition were provided, including research and enhancement permits pursuant to section 10 of the ESA.

4. <u>Status of stocks</u>
A comprehensive review of estimates of historic abundance, decline and present status of coho salmon in California is provided by Brown *et al*. (1994). They estimated that coho salmon annual spawning population in California ranged between 200,000 and 500,000 fish in the 1940s, which declined to about 100,000 fish by the 1960s, followed by a further decline to about 31,000 fish by 1991, of which 57 percent were artificially propagated. The other 43 percent (13,240) were natural spawners, which included naturally-produced, wild fish and naturalized (hatchery-influenced) fish. Brown *et al*. (1994) cautioned that this estimate could be overstated by 50 percent or more. Of the 13,240, only about 5,000 were naturally-produced, wild coho salmon without hatchery influence, and many of these were in individual stream populations of less than 100 fish each. In summary, Brown *et al*. (1994) concluded that the California coho salmon population had declined more than 94 percent since the 1940s, with the greatest decline occurring since the 1960s.

a. Central California Coast coho salmon ESU

NOAA Fisheries' status review (Weitkamp *et al*. 1995) concluded that abundance data for the CCC coho salmon ESU were very limited. It has been conservatively estimated that the population in this ESU has declined from 50,000 to 6,000 naturally reproducing coho; a population decline of approximately 88 percent (61 FR 56138). Recent population estimates vary from approximately 600 to 5,500 adults (Brown *et al*. 1994). Indigenous, naturally reproducing populations of coho are believed to be in severe decline throughout this ESU.

NOAA Fisheries's Southwest Fisheries Science Center updated the status review for the CCC coho salmon ESU on April 12, 2001 (NOAA Fisheries 2001). The review found that the limited data available strongly suggest that the ESU's population continues to decline. Declines are now also observed in several stream sub-populations previously considered stable. The review concludes that the CCC coho salmon ESU is presently in danger of extinction and the condition of CCC coho salmon populations in this ESU is worse than indicated by previous reviews.

b. Status of CDFG Listing

The CDFG recently completed a report titled "Status Review of California Coho Salmon North of San Francisco: Report to the California Fish and Game Commission." The report concluded that the California portion of the Southern Oregon/Northern California Coast Coho Salmon ESU (SONCC) should be listed as threatened under the California Endangered Species Act, and the CCC coho salmon ESU, which occur south of the SONCC coho salmon ESU, should be listed as endangered (CDFG 2002a). The commission will decide whether are not to formally adopt the recommendations in the near future.

B. Steelhead

1. Species Description

Steelhead are native to the north Pacific Ocean and in North America are found in coastal streams from Alaska south to northwestern Mexico (Moyle 1976; Busby *et al*. 1996). At this time NOAA Fisheries has listed only the anadromous life form of *Oncorhynchus mykiss*: steelhead.

2. Life History and Biological Requirements

Steelhead spend from one to five years in saltwater, however, two to three years are most common (Busby *et al.* 1996). Some return as "half-pounders" that over-winter one season in freshwater before returning to the ocean in the spring. The distribution of steelhead in the ocean is not well known. Coded-wire tag recoveries indicate that most steelhead tend to migrate north and south along the continental shelf (Barnhart 1986).

The timing of upstream migration is correlated with higher flow events, such as freshets or sand bar breaches, and associated lower water temperatures. The minimum stream depth necessary for successful upstream migration is 13 cm (Thompson 1972). The preferred water velocity for upstream migration is in the range of 40-90 cm/s, with a maximum velocity, beyond which upstream migration is not likely to occur, of 240 cm/s (Thompson 1972; Smith 1973). There are two types of steelhead, summer steelhead and winter steelhead. Summer steelhead return to freshwater during June through September, migrate inland toward spawning areas, overwinter in the larger rivers, and then resume migration to natal streams and spawn (Meehan and Bjornn 1991). Winter steelhead return to freshwater in autumn or winter, migrate to spawning areas, and then spawn in late winter or early spring. Only winter steelhead are found in Caspar Creek. Winter steelhead begin returning to Caspar Creek in December, with the run continuing into April. Most spawning takes place from January through April. Steelhead may spawn more than once before dying (iteroparity), in contrast to other species of the *Oncorhynchus* genus. Repeat spawning rates typically range from 13-24 percent in California coastal streams.

Because rearing juvenile steelhead reside in freshwater all year, adequate flow and temperature are important to the population at all times (CDFG 1997). Generally, throughout their range in California, steelhead that are successful in surviving to adulthood spend at least two years in freshwater before emigrating downstream. Emigration appears to be more closely associated with size than age. In Waddell Creek, Shapovalov and Taft (1954) found steelhead juveniles migrating downstream at all times of the year with the largest numbers of age 0+ and yearling steelhead moving downstream during spring and summer. Smolts can range from 14-21 cm in length.

Steelhead spawn in cool, clear streams featuring suitable water depth, gravel size, and current velocity. Intermittent streams may be used for spawning (Barnhart 1986; Everest 1973). Reiser and Bjornn (1979) found that gravels of 1.3-11.7 cm in diameter and flows of approximately 4 cfs (cubic feet per second) were preferred by steelhead. The survival of embryos is reduced when fines of less than 6.4 mm comprise 20-25 percent of the substrate. Studies have shown a higher survival of embryos when intragravel velocities exceed 20 centimeter per hour (Phillips and Campbell 1961; Coble 1961). The number of days required for steelhead eggs to hatch is inversely proportional to water temperature and varies from about 19 days at 15.6ºC to about 80 days at 5.6ºC. Fry typically emerge from the gravel two to three weeks after hatching (Barnhart 1986).

Upon emerging from the gravel, fry rear in edgewater habitats and move gradually into pools and riffles as they grow larger. Older fry establish territories which they defend. Cover is extremely important in determining distribution and abundance, with more cover leading to more fish (Bjornn and Reiser 1991). Young steelhead feed on a wide variety of aquatic and terrestrial insects, and emerging fry are sometimes preyed upon by older juveniles. In winter, they become inactive and hide in any available cover, including gravel or woody debris.

Water temperature influences the growth rate, population density, swimming ability, ability to capture and metabolize food, and ability to withstand disease of these rearing juveniles (Barnhart 1986; Bjornn and Reiser 1991). Rearing steelhead juveniles prefer water temperatures of 7.2-14.4ºC and have an upper lethal limit of 23.9ºC. They can survive up to 27EC with saturated dissolved oxygen conditions and a plentiful food supply. Fluctuating diurnal water temperatures also aid in survivability of salmonids (Busby *et al.* 1996).

Dissolved oxygen (DO) levels of 6.5-7.0 mg/l affected the migration and swimming performance of steelhead juveniles at all temperatures (Davis *et al.* 1963). Reiser and Bjornn (1979) recommended that DO concentrations remain at or near saturation levels with temporary reductions no lower than 5.0 mg/l for successful rearing of juvenile steelhead. Low DO levels decrease the rate of metabolism, swimming speed, growth rate, food consumption rate, efficiency of food utilization, behavior, and ultimately the survival of the juveniles.
During rearing, suspended and deposited fine sediments can directly affect salmonids by abrading and clogging gills, and indirectly cause reduced feeding, avoidance reactions, destruction of food supplies, reduced egg and alevin survival, and changed rearing habitat (Reiser and Bjornn 1979). Bell (1973) found that silt loads of less than 25 mg/l permit good rearing conditions for juvenile salmonids.

3. <u>Listing Status</u>
In February 1994, NOAA Fisheries received a petition seeking protection under the ESA for 178 populations of steelhead in Washington, Idaho, Oregon, and California. At the time, NOAA Fisheries was conducting a status review of coastal steelhead populations in Washington, Oregon, and California. In response to the broader petition, NOAA Fisheries expanded the ongoing review to include inland steelhead occurring east of the Cascade Mountains in Washington, Idaho, and Oregon. After considering biological and environmental information, NOAA Fisheries identified 15 ESUs; 12 for coastal steelhead and 3 for the inland form (Busby *et al*. 1996).

a. Northern California Steelhead ESU

Following completion of a comprehensive status review of west coast steelhead (*Oncorhynchus mykiss*, or *O. mykiss*) populations throughout Washington, Oregon, Idaho, and California, NOAA Fisheries published a proposed rule to list 10 ESUs as threatened or endangered under the ESA on August 9, 1996 (61 FR 41541). One of these steelhead ESUs, the Northern California ESU, was proposed for listing as a threatened species. Because of scientific disagreements, NOAA Fisheries deferred its final listing determination for five of these steelhead ESUs, including the Northern California ESU, on August 18, 1997 (62 FR 43974). After soliciting and reviewing additional information to resolve these disagreements, NOAA Fisheries published a final rule in March 1998 that the Northern California ESU did not warrant listing under the ESA because available scientific information and conservation measures indicated the ESU was at a lower risk of extinction than at the time of the proposed rule (63 FR 13347).

NOAA Fisheries's March 1998, decision not to list the NC steelhead ESU was based largely on a determination that sufficient Federal and State conservation measures were in place to reduce threats to the ESU such that the proposed threatened listing was unnecessary. Many of these measures were described in a Memorandum of Agreement (MOA) between NOAA Fisheries and the State of California. Because of NOAA Fisheries's concerns regarding the preponderance of private timber lands and timber harvest in the NC steelhead ESU, the NOAA Fisheries/California MOA contained several provisions calling for the review and revision of California's forest practice rules (FPRs), and a review of their implementation and enforcement by January 1, 2000. NOAA Fisheries considered full implementation of these critical provisions within the specified time frame to be essential for achieving properly functioning habitat conditions for steelhead in this ESU.

Because the timber conservation measures were not being implemented by the state of California, NOAA Fisheries determined that a formal reconsideration of the status of this ESU was warranted. As part of the reconsideration, the Southwest Fisheries Science Center completed an updated status review for NC steelhead. Their conclusion was that the ESU's biological status had changed little since the original Biological Review Team had concluded that the ESU was likely to become endangered in the foreseeable future. Therefore this ESU was listed as threatened on June 7, 2000 (65 FR 36074). On January 9, 2002 NOAA Fisheries promulgated take prohibitions for NC steelhead (67 FR 1116).

4. Status of Stocks

West coast steelhead are presently distributed across 15 degrees of latitude, from approximately 49EN at the U.S.-Canada border south to 34EN at the mouth of Malibu Creek, California. In some years steelhead may be found as far south as the Santa Margarita River in San Diego County (Busby *et al.* 1996). Historically, steelhead likely inhabited most coastal and many inland streams along the west coast of the United States. During this century, however, over 23 indigenous, naturally reproducing stocks have been extirpated, and many more are at risk for extinction.

a. Northern California Steelhead ESU

NOAA Fisheries initial status review of NC steelhead (Busby *et al.* 1996) determined that population abundance was very low relative to historical estimates (1930s dam counts) and recent trends were downward in most stocks for which data were available. An updated status review reached the same conclusion, and noted the poor amount of data available, especially for winter run steelhead (NOAA Fisheries 1997). The most complete set of data available for winter steelhead comes from Cape Horn Dam on the Eel River. This abundance data showed that moderate declines were occurring short-term and long-term, with a strong decline prior to 1970 and no significant trend thereafter. For the seven other sub-populations with recent trend data, only small populations of summer steelhead in the Mad River and winter steelhead in Prairie Creek showed recent increases in abundance. It is unclear if these increases are the result of better monitoring or mitigation efforts. Overall, population numbers are severely reduced from pre-1960s levels. (65 FR 36074; Busby *et al.* 1996).

C. Threats to Salmon and Steelhead Populations

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

1. <u>Habitat Degradation and Destruction</u>
A major cause of the decline of salmon and steelhead is the loss or severe decrease in quality and function of essential habitat. Most of this habitat loss and degradation has resulted from anthropogenic watershed disturbances caused by agriculture, logging, urban development, water diversion, road construction, erosion and flood control, dam building, and grazing. Most of this habitat degradation is associated with the loss of essential habitat components necessary for salmon and steelhead survival. For example, the loss of deep pool habitat as a result of sedimentation and stream flow reductions has reduced rearing and holding habitat for juvenile and adult salmonids.

The alteration of the estuaries in conjunction with increased sediment loads in the watersheds from land use activities and lower stream flows due to water diversions and other watershed changes have delayed sandbar breaching in the fall, delayed adult salmon and steelhead migration into streams, reduced and degraded estuary rearing habitat for juvenile salmon and steelhead, and created a poor freshwater-saltwater transition zone for salmon and steelhead smolts (CDFG 1998).

2. Natural Stochastic Events

Natural events such as droughts, landslides, floods, and other catastrophes have adversely affected salmon and steelhead populations throughout their evolutionary history and yet they have survived. The effects of these events are oftentimes exacerbated by anthropogenic changes to watersheds such as logging, road building, and water diversion. Additionally, the ability of species to rebound from natural stochastic events may be limited as a result of other existing anthropogenic factors or depressed populations.

3. Ocean Conditions

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

4. Flows

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

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

5. Harvest

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

6. Artificial Propagation
Releasing large numbers of hatchery fish can pose a threat to wild salmon and steelhead stocks through genetic impacts, competition for food and other resources, predation of hatchery fish on wild fish, and increased fishing pressure on wild stocks as a result of hatchery production (Waples 1991). The genetic impacts of artificial propagation programs are primarily caused by the straying of hatchery fish and the subsequent hybridization of hatchery and wild fish. Artificial propagation threatens the genetic integrity, and diversity that protects overall productivity against changes in environment (61 FR 56138). The potential adverse impacts of artificial propagation programs are well documented (reviewed in Waples 1991; National Research Council 1995; National Research Council 1996; Waples 1999).

7. Marine Mammal Predation
Predation is not believed to be a major factor contributing to the decline of West Coast salmon and steelhead populations relative to the effects of fishing, habitat degradation, and hatchery practices. Predation may have substantial impacts in localized areas. Harbor seal (*Phoca vitulina*) and California sea lion (*Zalophus californianus*) numbers have increased along the Pacific Coast (NOAA Fisheries 1999). However, at the mouth of the Russian River, Hanson (1993) reported that the foraging behavior of California sea lions and harbor seals with respect to anadromous salmonids was minimal. Hanson (1993) also stated that predation on salmonids appeared to be coincidental with the salmonid migrations rather than dependent upon them.

8. Reduced Marine-Derived Nutrient Transport
Reduced marine-derived nutrient (MDN) transport to watersheds is another consequence of the past century of decline in salmon abundance (Gresh *et al.* 2000). Salmon may play a critical role in the survival of their own species in that MDN (from salmon carcasses) has been shown to be vital for the growth of juvenile salmonids (Bilby *et al.* 1996; Bilby *et al.* 1998). The return of salmon to rivers makes a significant contribution to the flora and fauna of both terrestrial and riverine ecosystems (Gresh *et al.* 2000). Evidence of the role of MDN and energy in ecosystems infers this deficit may indicate an ecosystem failure that has contributed to the downward spiral of salmonid abundance (Bilby *et al.*1996).

D. Critical Habitat

Section 4(a)(3)(A) of the ESA requires that, to the extent prudent and determinable, critical habitat be designated concurrently with the listing of a species. Critical habitat is defined in section 3(5)(A) of the ESA as "(I) the specific areas within the geographical area occupied by the species . . . on which are found those physical or biological features (I) essential to the conservation of the species and (II) which may require special management considerations or protection; and (ii) specific areas outside the geographical area occupied by the species . . . upon a determination by the Secretary of Commerce (Secretary) that such areas are essential for the conservation of the species" (see 16 U.S.C. 1532(5)(A)). The term 'conservation', as defined in section 3(3) of the ESA, means "... 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 are no longer necessary" (see 16 U.S.C. 1532(3)). Therefore, critical habitat is the geographic area and habitat functions necessary for the recovery of the species.

In designating critical habitat, NOAA Fisheries considers the following requirements of the species: (1) space for individual and population growth, and for normal behavior; (2) food, water, air, light, minerals, or other nutritional or physiological requirements; (3) cover or shelter; (4) sites for breeding, reproduction, or rearing offspring; and, generally, (5) habitats that are protected from disturbance or are representative of the historic geographical and ecological distributions of this species (50 CFR 424.12(b)). In addition to these factors, NOAA Fisheries also focuses on known physical and biological features (primary constituent elements) within the designated area that are essential to the conservation of the species and that may require special management considerations or protection. These essential features may include, but are not limited to, spawning sites, food resources, water quality and quantity, and riparian vegetation. NOAA Fisheries has excluded from critical habitat designation all tribal lands in northern California and areas identified as inaccessible reaches of rivers that are above longstanding, naturally impassable areas or dams which block access to historical habitats of listed salmonids.

1. <u>Coho Salmon</u>

On May 5, 1999 NOAA Fisheries designated critical habitat for the CCC coho salmon ESU (64 FR 24049). The designations include all accessible reaches of rivers between Punta Gorda and the San Lorenzo River in Santa Cruz County, California; this designation also includes two rivers entering the San Francisco Bay: Arroyo Corte Madera Del Presidio and Corte Madera Creek. Critical habitat includes the water, substrate, and adjacent riverine and estuarine riparian zones. Adjacent riparian areas are defined as the area adjacent to a stream that functions to provide shade, sediment, nutrient or chemical regulation, streambank stability, and input of large woody debris and other organic matter.

Areas that are excluded from critical habitat designation include tribal lands in northern California and areas that NOAA Fisheries has identified as inaccessible reaches of rivers that are above longstanding, naturally impassable areas, or above dams which block anadromy. Dams identified by NOAA Fisheries as barriers to CCC coho salmon are:

- Warm Springs Dam on Dry Creek
- Coyote Dam on the Russian River

Logging, agricultural and mining activities, urbanization, stream channelization, dams, wetland loss, and water withdrawals and unscreened diversions for irrigation have been identified as causes contributing to the modification and curtailment of coho salmon habitat within the CCC coho salmon ESU (64 FR 24049). Essential features of the designated 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.

NOAA Fisheries has identified activities that may require special management considerations for the conservation of the freshwater and estuarine life stages of coho salmon. These activities include, but are not limited to (1) land management; (2) timber harvest; (3) point and non-point water pollution; (4) livestock grazing; (5) habitat restoration; (6) irrigation water withdrawals and returns; (7) mining; (8) road construction; (9) dam operation and maintenance; (10) diking and streambank stabilization; and (11) dredge and fill activities.

The condition of the CCC coho salmon critical habitat, specifically its ability to provide for the species long-term survival and recovery, has been degraded from conditions known to support a viable population. The relative significance of each contributing factor will vary based on the frequency and magnitude of its occurrence in the ESU, and the ecological conditions of the ESU. NOAA Fisheries determined that present depressed population conditions were the result of human induced factors including, logging, agricultural and mining activities, urbanization, stream channelization, dams, wetland loss, and water withdrawals and unscreened diversions for irrigation. Other factors, such as over fishing and artificial propagation have also contributed to the current population status of coho salmon. All these human induced factors have exacerbated the adverse effects of natural environmental variability from such factors as drought and poor ocean conditions (64 FR 24049).

2. Steelhead

To date, NOAA Fisheries has not yet designated critical habitat for the NC steelhead ESU.

3. Condition of Habitat/Critical Habitat

The condition of freshwater river and stream habitat used by NC steelhead and the critical habitat of CCC coho salmon has been degraded from conditions known to support viable salmonid populations. NOAA Fisheries determined that present depressed population conditions were the result of the following human induced factors (among others) affecting habitat[1]: Logging, agricultural and mining activities, urbanization, stream channelization, dams, wetland loss, and water withdrawals and unscreened diversions for irrigation.

Habitat in the NC steelhead ESU is impacted from sedimentation in channels due to poor land management practices and channel restructuring due to floods. Much of this is related to timber harvest. Pikeminnow (*Ptychocheius grandis*), a known steelhead predator, are abundant in many areas, including the Eel River. Dams on the Eel and Mad River prevent steelhead access to historical spawning habitat. Smaller impassable structures fragment habitat throughout the ESU. In addition to causing sedimentation, timber harvest has also reduced riparian habitat.

[1]All these human induced factors have exacerbated the adverse effects of natural environmental variability from such factors as drought, poor ocean conditions and predation.

Numerous studies have demonstrated that land use activities associated with logging, road construction, urban development, mining, agriculture, and recreation have significantly degraded CCC coho salmon critical habitat. Impacts of concern include alteration of stream bank and channel morphology, alteration of water temperatures, loss of spawning and rearing habitat, fragmentation of habitat, loss of downstream recruitment of spawning gravels and large woody debris, degradation of water quality, alteration of natural hydrologic cycles, entrainment of juveniles in poorly screened or unscreened diversions, increases in erosion entry to streams from upland areas, and loss of nutrient inputs (61 FR 56138; CDFG 1965; Botkin *et al.* 1995; Brown *et al.* 1994; McEwan and Jackson 1996; Bergren and Filardo 1991).

IV. ENVIRONMENTAL BASELINE

North Fork Caspar Creek and South Fork Caspar Creek are approximately 7 km from the Pacific Ocean (Henry 1998) and are located within the Caspar Creek watershed in northwestern California, south of Fort Bragg. The Caspar Creek watershed is located within the Jackson Demonstration State Forest which is managed by the State of California for multiple use and timber production. The watershed is currently primarily forested with second growth coast redwood (*Sequoia sempervirens*) and Douglas-fir (*Pseuedotsuga menziesii*) trees (Nakamoto 1998). The climate can be described as Mediterranean with most of the rainfall occurring during the winter months. The mean annual precipitation in the Caspar Creek watershed was 1,190 mm from 1962 through 1997 (Henry 1998). Due to the moderating effect of the Pacific Ocean air temperatures are mild with muted annual extremes and narrow diurnal fluctuations (Henry 1998).

This section details factors affecting the abundance of salmonids in the Caspar Creek watershed; including both North Fork Caspar Creek and South Fork Caspar Creek. The extent to which there are species specific differences between coho salmon and steelhead in population limiting factors is not clear; however, the freshwater ecosystem characteristics necessary for the maintenance of self-sustaining populations of all Caspar Creek salmonids are quite similar.

A. Salmonid Population Trends

Salmonids have suffered population declines within the Caspar Creek watershed, including the action area. These declines have been attributed to long-standing human induced factors that exacerbate the adverse effects of natural environmental variability. In the Caspar Creek watershed, habitat degradation, decreased carrying capacity, recent droughts and poor ocean conditions are among explanations for the current low abundance of salmonids. Logging activities are primarily responsible for the decline of salmonids within the Caspar Creek watershed. This land use activity has altered streambank and channel morphology, stream temperatures, spawning and rearing habitats, connectivity of habitats, and recruitment of large organic debris and spawning gravels.

Extensive electrofishing surveys conducted between 1986 and 1995 document the presence of ESA-listed coho salmon and steelhead in NFC and SFC both upstream and downstream of the weir ponds (Nakamoto 1998). Surveys in NFC and SFC have shown that steelhead populations have remained relatively stable (Nakamoto 1998). In contrast, coho salmon numbers in the NFC and SFC have dwindled substantially in the last decade (Nakamoto 1998).

Recent population estimates of outmigrating juvenile coho salmon and juvenile steelhead within Caspar Creek have been produced by CDFG for 2000, 2001 and 2002. The three year average population estimate for outmigrating juvenile coho salmon is approximately 3,200 and the three year average population estimate of outmigrating steelhead is approximately 2,300 (CDFG 2002b). In addition, a recent coho salmon redd distribution survey in Caspar Creek for return year 2001/02 shows that coho salmon spawning was relatively well distributed throughout the watershed, with the exception of a higher concentration of redds below the SFC weir (CDFG 2002c).

B. Factors Affecting Species Environment Within the Caspar Creek Watershed

Primarily, aquatic habitat impacts associated with timber harvest have played a role in the decline of salmonids in the Caspar Creek watershed. The following is a summary of the natural and anthropogenic factors affecting salmonid spawning and rearing in the Caspar Creek watershed.

1. <u>Timber Harvest</u>

Logging of coastal redwood forests in northwestern California began in the 1850's and has continued since, with some areas recently logged for a third time (Rice *et al.* 2001). Between 1860 and 1906, the Caspar Creek watershed including the NFC and SFC watersheds were clearcut and burned (Rice *et al.* 2001). During this time, the main stream channels were extensively modified with splash dams to accommodate log drives (Rice *et al.* 2001). The watershed was primarily reforested by coast redwood (*Sequoia sempervirens*) and Douglas-fir (*Pseuedotsuga menziesii*) (Nakamoto 1998). Logging activities in the Caspar Creek watershed did not occur again until the early 1960s (Henry 1998).

Lands within the Jackson Demonstration State Forest are managed for multiple use, timber production and research. Cooperative watershed management research in Caspar Creek conducted by the USFS and CDF began in 1962 (Henry 1998). The first phase of research at Caspar Creek was a paired-watershed experiment initiated in 1962 when sediment trapping weirs were installed on both NFC and SFC. Selective cut logging occurred in SFC from 1971 to 1973; approximately 67 percent of the timber volume within the watershed was harvested and 15 percent of the watershed was in roads, landings and skidtrails (Keppeler and Zeimer 1990). Clearcut logging activities occurred in NFC from 1989 through 1991; approximately 44 percent of the watershed was harvested using high-lead cable (Nakamoto 1998). Riparian buffer zones, 30-60 m wide, were maintained along the entire length of the mainstem channel (Nakamoto 1998).

2. <u>NFC and SFC Research Facilities</u>
Initially, the USFS/CDF watershed research used a paired-watershed design to assess the effects of road construction and selection harvesting by tractor on streamflow, suspended sediment, and bedload. During the fall of 1962, concrete broad-crested weirs with a 120º low-flow v-notch were constructed on the NFC and SFC. Fish ladders located just downstream of each v-notch weir are designed to allow fish passage past the v-notch weirs. The existing structures are constructed of wood and are in poor structural condition. There is a high probability that the ladders will collapse during high winter flows. Winter-time failure of the ladders could not be remedied until the following summer. Surveys conducted by CDFG have identified the fish ladders as partial barriers to anadromous salmonid passage. During years when creek discharge is not sufficient enough to allow fish passage at the ladders, habitat above the fish ladders is largely inaccessible to adult salmonids (Nakamoto 1998), especially coho salmon which have a harder time negotiating barriers. During these years, the ladders limit accessability to approximately 2,700 m of habitat in NFC and at least 3,000 m of habitat in SFC (Nakamoto 1998). Limited accessibility to habitat above the weirs in some years may have limited spawning and rearing success.

In addition, the current fish ladders also preclude juvenile fish passage both up and downstream during the late-spring through early-fall period. Therefore, juvenile salmonids are trapped upstream of the fish ladders virtually all summer until the rain occurs in the fall. Numerous studies show that it is critical that juvenile salmonids have access to a variety of habitats to meet their needs during various times of the year, including the summer. Juvenile salmonids often migrate relatively long distances (i.e., several km) in response to 1) changes in their environment (e.g., summer warming, pollution events), 2) changes in resource needs as they grow, and 3) competition with other individuals. The movements of stream-dwelling salmonids have been the subject of extensive research (Chapman 1962; Edmundson *et al.* 1968; Fausch and White 1986; Gowan *et al.* 1994; Bell 2001; Kahler *et al.* 2001). Although many juvenile salmonids are territorial or exhibit limited movement, many undergo extensive migrations (Gowan *et al.* 1994; Fausch and Young 1995). For example, salmonid fry often disperse downstream from headwater spawning sites. Additional movements can occur as intraspecific competition for resources causes the additional dispersal of subordinate individuals (Chapman 1966; Everest and Chapman 1972; Hearn 1986). Movements of juveniles may also occur in response to growth or simply because environmental conditions such as water depth or velocity are no longer suitable (Edmundson *et al.* 1968; Leider *et al.* 1986; Lau 1994; Kahler *et al.* 2001).

In a recent study with coho salmon and steelhead in streams in the state of Washington, 28 to 60 percent of the salmonids moved during the summer within the study streams and 14 to 36 percent of them moved more than once (Kahler *et al.* 2001). Upstream movement of juvenile salmonids was predominate (Kahler *et al.* 2001). However, in the stream with more step-pool/cascade channel types there was less upstream movement and more movement further downstream (Kahler *et al.* 2001). Over 60 percent of tagged coho salmon in a study in Prairie Creek, California also illustrated that coho salmon did not rear exclusively in the habitat that they were initially tagged (Bell 2001). A study with coho salmon in Caspar Creek noted that summer survival in lateral scour pool habitats was at 115 percent and concluded that these habitats must have received coho recruits from other habitat types (Lau 1994). The ladders in both NFC and SFC have prevented juvenile salmonid movement past the research facility during the summer months since installation in the 1960s which may have contributed to a decrease in rearing success and survival.

C. Critical Habitat

Critical habitat considerations are primarily related to water quality and quantity, availability of clean spawning gravel and spawning areas, and access to important spawning and rearing areas.

Forestry management on non-Federal timberlands, which utilizes existing California Forest Practice Rules, falls short of providing adequate protections for salmonid habitats (65 FR 36074). Ongoing forest activities on non-Federal lands are likely to continue to degrade essential salmonid habitat values. Environmental impacts identified with timber harvest may include increased sediment production from roads and other sources, loss of large woody debris recruitment, reduced function of riparian areas, reductions in water quality and quantity, increased water temperatures and loss of channel complexity. Timber harvest activities have altered watershed conditions by changing the quantity and size distribution of sediment, leading to stream channel instability, pool filling by coarse sediment, or introduction of fine sediment to spawning gravels. These conditions may have contributed to a reduction in overall habitat complexity within the action area which in turn reduces the survival of salmonid populations.

V. EFFECTS OF THE PROPOSED ACTION

The NFC and SFC weir ponds and fish ladders are similar in design and function and are both within the Caspar Creek watershed. Similar procedures will be utilized at both NFC and SFC for the cleanout of the weir ponds, demolition of the existing fish ladders and construction of the new fish ladders. Since both facilities are within the Caspar Creek watershed in close proximity and similar procedures will be utilized, effects at both locations are anticipated to be similar. Data to quantitatively determine the precise effects of the proposed actions on coho salmon and steelhead, and their habitats, are limited or not available; this assessment of effects therefore focuses mostly on qualitative identification. This approach was based on a review of ecological literature concerning the effects of loss and alteration of habitat elements important to salmonids, including water, substrate, food, and adjacent riparian areas; the primary constituent elements of critical habitat that will be affected. This information was then compared to the likely effects associated with the proposed projects, including: diversion of stream flow; changes to habitat diversity and complexity; loss of water quality (sediment and turbidity); loss of fish passage; and harm during capture, transport, and release.

A. Duration and Timing

Depending on the amount of sediment in the weir ponds, maintenance and cleanout of each weir pond is expected to occur approximately every five years. The entire cleanout of each pond including dewatering, fish relocation, cleanout and refilling should take seven to ten days. The SFC weir pond is nearing capacity and is proposed to be cleaned out in the summer of 2003 dependent on funding. The NFC weir pond is not yet nearing capacity and would be cleaned out in a subsequent year, possibly in 2004. The cleanout of each weir pond should continue to occur every five years during alternate summers. However, depending on storage capacity and funding, it may be necessary to clean both ponds during the same summer.

The demolition and construction of each fish ladder is anticipated to take ten to fourteen days. Due to funding limitations, the precise schedule for construction of the new fish ladders is unknown. The USFS will try to schedule the construction of the fish ladder during the same year the pond is cleaned out, however, this may not be possible due to funding and storage capacity (personal communication, Rodney Nakamoto). Effects would be minimized if both the weir pond cleanout and fish ladder project were to occur during the same summer in the same sub-watershed. However, this may not be possible due to time constraints and funding. Therefore, the fish ladder projects may have to be done in subsequent years. The benefits of improving the fish ladders (discussed below) outweigh the additional minimal effects that would occur if the projects did not occur during the same year that the pond is cleaned out. Impacts associated with the fish ladder project will occur only once in each sub-watershed and are anticipated to be minimal due to the limited rearing habitat in and around each fish ladder.

The projects are expected to occur sometime between June and September during summer base flows which would avoid outmigrating juvenile salmonids and upstream migration and spawning periods for adult coho salmon and steelhead. However, the timing of the project will affect rearing juvenile coho salmon and steelhead that are within the immediate project area. Temporary loss of rearing habitat for juvenile coho salmon and steelhead will result during the draining of the weir ponds. According to the BA, this would result in a temporary loss of 1,939 m^2 of rearing habitat in NFC and a loss of 1,762 m^2 in SFC. Temporary loss of rearing habitat for juvenile coho salmon and steelhead will result during each fish ladder project, but will be minimal due to the limited rearing habitat available in and around each fish ladder. According to the BA, this would result in a temporary loss of 50 m^2 of rearing habitat in and around each fish ladder.

The duration and timing of the projects is expected to result in minor disruptions to rearing salmonids and to salmonid habitat. However, these disruptions are expected to be short-term events that will not occur very often.

B. Fish Relocation

Fish relocation activities are proposed for the cleanout of the weir ponds and for the demolition and new construction of the fish ladders. Fish relocation activities pose risk of injury or mortality of juvenile coho salmon and steelhead. Any fish collecting gear, whether passive (Hubert 1983) or active (Hayes 1983) has some associated risk to the fish, including stress, disease transmission, injury, or death. Fish in the project area will first be captured for relocation using a seine. After as many fish as possible are captured and relocated using a seine, electrofishing will then be utilized to capture and relocate the remaining fish. The effects of seining include stress, scale loss, physical damage, suffocation, and dessication. The amount of unintentional injury and mortality attributable to seining may vary widely depending on the seine used, the ambient conditions, and the expertise and experience of the field crew. However, adverse effects are minimal for seining compared to electrofishing, using a seine first to capture and relocate fish will minimize the adverse effects of electrofishing.

Electrofishing can kill both juvenile and adult fish, and researchers have found serious sublethal effects including spinal injuries (Reynolds 1983; Habera *et al.* 1996; Habera *et al.* 1999; Nielsen 1998; Nordwall 1999). The long-term effects of electrofishing on both juvenile and adult salmonids are not well understood; although chronic effects may occur, it is assumed that most impacts from electrofishing occur at the time of sampling.

During the last cleanout of the NFC weir pond in 1999, approximately 125 juvenile coho salmon were relocated. Coho salmon affected by this cleanout would be expected to outmigrate in the spring of 2000. The CDFG estimated that the population of outmigrating coho salmon during the spring of 2000 was approximately 3,500 (CDFG 2002b). Therefore, the cleanout of the NFC weir pond in 1999 possibly resulted in the handling and relocation of approximately four percent of the total juvenile coho salmon population within the Caspar Creek watershed. The majority of these fish were subjected to harassment, pursuit, capture, relocation, and related stresses. Based on earlier relocation activities during the cleanout of the pond, less than five percent of the captured fish may die as a result of their capture and handling. That means that approximately six coho salmon died as a result of the relocation activities which represents only 0.17 percent of the total juvenile coho salmon population within Caspar Creek watershed. This demonstrates that effects associated with the cleanout of the ponds only affects a small percentage of the total population of juvenile coho salmon within the Caspar Creek watershed.

It is anticipated that future cleanout of the ponds would result in similar numbers of coho salmon being relocated. However, when the fish ladders are replaced and fish passage is improved, it is anticipated that the number of coho salmon rearing within and upstream of each pond may increase, and thus the number of fish that need to be relocated may also increase. Although the numbers may increase, it is anticipated that the effects would still only affect a small percentage of the total population of juvenile coho salmon within the Caspar Creek watershed.

During the last cleanout of the NFC weir pond in 1999, approximately 250 steelhead were relocated. Since steelhead do not have a simple three year life history like coho salmon, multiple year classes of steelhead were affected during the last pond cleanout. In order to make the following calculations, NOAA Fisheries utilized the three year average (2000-2002) population estimate for outmigrating steelhead. Based on the three year average of approximately 2,300 (CDFG 2002b), 250 steelhead represents approximately 11 percent of the total population of outmigrating juvenile steelhead within Caspar Creek. Based on earlier relocation activities during the cleanout of the pond, less than five percent of the captured fish may die as a result of their capture and handling. Therefore, approximately 13 steelhead may be killed, which would represent approximately only 0.6 percent of the total population of outmigrating steelhead within the Caspar Creek watershed.

The number of coho salmon and steelhead that would need to be relocated during demolition and construction of the fish ladders would be smaller than the numbers affected by the pond cleanouts, based on the limited extent of rearing habitat around the ladders. Therefore, the effects associated with the ladder project are anticipated to affect a smaller percentage of the total population of coho salmon and steelhead within Caspar Creek.

Relocated fish may also endure stress from crowding at the relocation sites and have to compete with other salmonids causing increased competition for available resources such as food and habitat. Some of the fish at the relocation sites may choose not to remain in these areas and may move either upstream or downstream to areas that have more habitat and less density of fish. As each fish moves, competition remains either localized to a small area or quickly diminishes as fish disperse. NOAA fisheries cannot accurately estimate the number of fish affected by competition, but does not believe this impact will cascade through the Casper Creek watershed populations of these species based on the small area that will likely be affected. Despite these impacts, fish relocation operations are expected to minimize project impacts to coho salmon and steelhead by removing them from areas where they would have experienced high rates of injury and mortality.

C. Fish Passage

Due to the existing fish ladders, juvenile salmonids can not migrate upstream or downstream of the NFC fish ladder and SFC fish ladder during the summer months. After completion of the new fish ladders, upstream juvenile fish passage could be totally precluded during stream diversion for cleanout of the ponds. Preclusion of fish passage during pond cleanout is expected to be minimal because cleanout would only occur approximately every five years (at each sub-watershed) and would be temporary with a duration of approximately seven to ten days.

D. Sedimentation and Turbidity

Research with salmonids has shown that high turbidity concentrations can: reduce feeding efficiency, decrease food availability, reduce dissolved oxygen in the water column, result in reduced respiratory functions, reduce tolerance to diseases, and can also cause fish mortality (Berg and Northcote 1985; Gregory and Northcote 1993; Velagic 1995; Waters 1995). Mortality of very young coho salmon and steelhead fry due to suspended sediment levels of 500 to 1,500 mg/L has been reported by Sigler *et al.* (1984). Even small pulses of turbid water will cause salmonids to disperse from established territories (Waters 1995), which can displace fish into less suitable habitat and/or increase competition and predation, decreasing chances of survival. Siphoning the majority of pond water from the water column and the construction of settling ponds will minimize turbidity levels downstream of the project site.

Sediment deposition downstream of the project site may also decrease the available rearing habitat. Sedimentation can reduce water depth and cover in pools and riffles which decreases the physical carrying capacity for juvenile fish during summer growth periods (Waters 1995). During the cleanout of the ponds and fish ladder project, measures to minimize sediment deposition have been included in the project description. Rocking of access roads and construction of berms will reduce sediment transport from the roads to the creek. Mulch in the form of hay will also be used below the access road as an additional measure to catch any sediment that may be released from the road during the project.

During pond cleanout and the demolition of the fish ladders, temporary increases in turbidity and sedimentation are expected to affect less than 0.5 km of the creek downstream of each weir pond. Increases in turbidity are expected to be short in duration and the amount of sedimentation is anticipated to be minimal. Effects to rearing salmonids downstream of the weir ponds are also expected to be minimal and is anticipated to be in the form of short-term stress only.

E. Alteration in Flow

Changes in flow are also anticipated to occur within and downstream of the weir ponds. Initially flow into the pond will be diverted around the pond to the creek and then the pond will be slowly drained. This will slightly increase flow below the project site until the pond is empty, but not to an extent that could harm salmonids (by flushing them downstream or stranding them once flows recede) due to measures (discussed in the Description of the Proposed Action section) that will result in the gradual draining of the weir pond. After cleanout of the pond is complete, measures during pond fill up will also minimize changes in flow below the project site. In order to prevent dewatering the creek below the project during pond fill up, a portion of the flow will remain diverted around the pond until it is filled. These fluctuations in flow are anticipated to be small, gradual, and short-term which should not result in any harm to salmonids.

F. Loss of Invertebrates (salmonid food)

Direct loss of aquatic macro invertebrates would likely result when organisms are buried or crushed during in-channel work on the proposed projects. Localized losses in benthic macro invertebrate abundance are expected when substrates are modified (Thomas 1985; Harvey 1986). These organisms are consumed by salmonids, and may represent a substantial portion of their diet at various times of a year. The effect of macro invertebrate loss on salmonids is likely to be temporary because rapid recolonization of the disturbed areas is expected. Reported rates of recolonization range from about one month (Thomas 1985) to 45 days (Harvey 1986). Drift from upstream is likely to provide food supply downstream, as well as insect drop from riparian plants in the action area and upstream unaffected by the projects. Since impacts to the substrate will only occur approximately every five years, will be short in duration, and recolonization is expected, no adverse effects to salmonids are anticipated.

G. Water Quality

Equipment refueling, fluid leakage and maintenance activities within the stream channel pose some risk of contamination and potential take. Measures included in the project proposal address this risk. Therefore, NOAA Fisheries does not anticipate any localized or appreciable water quality degradation associated with the equipment used for the projects. However, water that comes in contact with wet cement during the construction of the fish ladders can impair water quality that can adversely affect salmonids.

H. Beneficial Impacts

Since the fish ladder designs are still conceptual and not yet finalized, NOAA Fisheries can not evaluate the designs in this BO. However, according to the BA, the final design for the fish ladders will allow year-round passage of salmonids in both upstream and downstream directions. Replacing the existing fish ladders with new fish ladders would be beneficial to adult and juvenile salmonids. The existing fish ladders are functioning poorly and have been identified as a partial migration barrier by CDFG. Coho salmon and even steelhead in some years may be unable to ascend the ladder during certain flows. The fish ladders currently limit access to available spawning and rearing habitat in some years. Replacement of the fish ladders will provide access to habitat above the ladders in all years, which is anticipated to increase the distribution and abundance of both coho salmon and steelhead. In addition, the current fish ladders impedes juvenile fish passage both up and downstream during the late-spring through early-fall period. Replacement of the fish ladders is expected to provide year-round passage for adult and juvenile salmonids in both the upstream and downstream directions. This will enable juvenile salmonids to distribute more freely throughout the creek and should increase rearing success.

VI. CUMULATIVE EFFECTS

Cumulative effects include the effects of future State, tribal, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

The action area is within the JDSF which is managed for timber production and multiple uses.

A. Logging Activities

Timber harvest activities are a major human activity in the Caspar Creek watershed. Future timber harvest levels in the action area cannot be precisely predicted, but harvest is reasonably certain to occur given the purposes of the JDSF. Reasonably foreseeable effects of timber harvest activities, including the direct, indirect, and cumulative effects of timber harvesting, may degrade habitat features identified as essential for designated coho salmon critical habitat.

VII. INTEGRATION AND SYNTHESIS OF EFFECTS

CCC coho salmon and NC steelhead are suffering severe and long-term declines, both range-wide and within the Caspar Creek watershed. Important factors in this decline include destruction and modification of habitat, overutilization, and natural and human-made factors (62

FR 43937). Across the region, significant destruction and degradation of spawning and rearing habitat has occurred. Threats to naturally reproducing salmonids are numerous, varied, and ongoing.

Only a small percentage of the coho salmon and steelhead population within Caspar Creek watershed will be affected as a result of these projects. Take of listed species will be caused by fish relocation activities and the temporary effects of sediment mobilization, decreased habitat values and modified hydrology. Salmonids present may be disturbed, displaced, injured or killed by project activities, and salmonids present in the work area will be subject to capture, relocation, and related stresses. Short-term impacts from activities will be minimal and localized at the project site.

The new fish ladders are expected to improve passage conditions for both adult and juvenile salmonids. Replacement of the fish ladders will provide adult salmonids access to habitat above the ladders in all years. In addition, the ladders will allow juvenile salmonid passage both up and downstream during the late-spring through early fall period. Therefore, the fish ladders are anticipated to increase the survival and distribution of both coho salmon and steelhead.

The cleanout of the weir ponds and demolition and construction of the fish ladders are expected to result in minimal incidental take of threatened CCC coho salmon and threatened NC steelhead, and is not expected to diminish the value of designated critical habitat. NOAA Fisheries anticipates that take of listed species as a result of these projects will be in the nature of temporary harassment with a possible minimal level of mortality of juveniles; will be of limited duration, and will have no long-term effects on the survival or recovery of the listed species population in the Caspar Creek watershed, or the ESU.

VIII. CONCLUSION

After reviewing the best available scientific and commercial information, the current status of Central California Coast coho salmon, and Northern California steelhead, the environmental baseline for the action area, the effects of the proposed projects and the cumulative effects, it is NOAA Fisheries' biological opinion that the proposed projects are not likely to jeopardize the continued existence of Central California Coast coho salmon or Northern California steelhead, and is not likely to destroy or adversely modify designated coho salmon critical habitat.

IX. INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by NOAA Fisheries as an act which actually kills or injures fish or wildlife. Such an act may include significant habitat modification or degradation which actually kills or injures fish or wildlife by significantly impairing essential behavioral patterns, including breeding, spawning, rearing, migrating, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act 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 USFS for the exemption in section 7(o)(2) to apply. The USFS has a continuing duty to regulate the activity covered by this incidental take statement. If the USFS (1) fails to assume and implement the terms and conditions or (2) fails to require its designees to adhere to the terms and conditions of the incidental take statement, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the USFS must report the progress of the actions and its impact on the species to NOAA Fisheries as specified in the incidental take statement. (50 CFR §402.14(I)(3))

A. Amount or Extent of Take

The projects are expected to result in minimal incidental take of threatened Central California Coast coho salmon and threatened Northern California steelhead. Fish in the vicinity of the project could be disturbed by the project construction activities. Some juvenile coho salmon and steelhead could be adversely affected when NFC and/or SFC is diverted for both the cleanout of the weir ponds and the demolition and construction of the fish ladders. Juvenile salmonids that are displaced due to the diversion may suffer an increase risk of competition and predation.

The last cleanout of the NFC pond resulted in the relocation of approximately 250 steelhead and 125 coho with less than five percent mortality. However, the number of coho salmon and steelhead that may be incidentally taken during project activities cannot be accurately quantified due to (1) the unknown number of fish that may be present; and (2) the level of harm or mortality that might occur when juvenile fish are displaced to other habitat areas of the stream.

Therefore, take is quantified as: All fish present in the action area between June 15 and October 15 (of the year that the project occurs, and during the period that project action occurs) may be captured and/or harassed by relocation activities. No more than five percent of juvenile salmonids captured during relocation efforts are anticipated to be killed. In addition, take may occur if fish ladders impede fish passage due to inadequate design or operation.

B. Effect of the Take

In the accompanying biological opinion, NOAA Fisheries determined that this level of anticipated take is not likely to result in jeopardy to the species or destruction or adverse modification of critical habitat.

C. Reasonable and Prudent Measures

NOAA Fisheries believes the following reasonable and prudent measures are necessary to minimize the incidental take of threatened Central California Coast coho salmon and Northern California steelhead that may result from the project activities:

1. Measures shall be taken to reduce injury or harm to coho salmon and steelhead.

2. Measures shall be taken to assure that effects to water quality are minimized.

3. Measures shall be taken to ensure that the fish ladders are adequately designed and evaluated in order to ensure that salmonid passage is not impeded.

D. Terms and Conditions

The USFS and their designee(s) must comply with the following terms and conditions, which implement the reasonable and prudent measure described above and outline required reporting/monitoring requirements. These terms and conditions are non-discretionary. The USFS is responsible for compliance with the following terms and conditions that implement the reasonable and prudent measure.

The following terms and conditions implement Reasonable and Prudent Measure 1, which states that measures shall be taken to reduce injury or harm to coho salmon and steelhead.

1. The USFS must notify the NOAA Fisheries Santa Rosa Office, by letter stating the project commencement date, at least fourteen days prior to implementation at:

   National Marine Fisheries Service
   Northern California Supervisor
   Protected Resources Division
   777 Sonoma Avenue, Room 325
   Santa Rosa, CA 95404

2. Work within the creek channel may only occur from June 15 to October 15.

3. A qualified biologist will be present to conduct fish relocation activities. The fishery biologist shall ensure the capture and relocation of any salmonids in the area to be dewatered. Captured salmonids will be relocated as soon as possible to

a suitable instream location upstream or downstream of the work area. Water temperature in the stream and in containers holding captured fish should not exceed 18EC at any time during the relocation effort.

4. In order to limit death and injury to fish, electrofishing will only be used once seining has been proven ineffective. A minimum of three passes through the entire area to be dewatered will be made with a seine. Electrofishing will then be used in areas where instream cover exists in order to remove fish that may not have been captured by the seine.

5. Electrofishing efforts shall start with voltage, pulse width, and pulse rate set at the minimum values needed to capture fish. Settings shall gradually be increased only to the point where fish are immobilized for capture. Individuals that are netting immobilized fish should remove fish immediately from the water, and not allow the fish to remain in the electrical field for an extended period of time.

6. In order to decrease lethal take, the mortality rate associated with fish relocation activities should be reduced from five percent to at least three percent. NOAA Fisheries has found that experienced electrofishers can reduce mortality rates to three percent and below. NOAA Fisheries *Guidelines for Electrofishing Waters Containing Salmonids Listed Under the Endangered Species Act* are enclosed with this biological opinion. In order to decrease mortality, the USFS and their designee(s) shall compare their electrofishing procedures with these guidelines and make every reasonable effort to achieve the level of skill demonstrated by others.

7. In order to monitor the impact of incidental take, USFS must notify the NOAA Fisheries Santa Rosa Office by letter within 90 days after project completion detailing any incidental take that occurred during the project. This shall include the species taken, date taken, type of take (capture and relocate, injury, mortality), number taken, and fork length of any mortalities. This should be sent to:

National Marine Fisheries Service
Northern California Supervisor
Protected Resources Division
777 Sonoma Avenue, Room 325
Santa Rosa, CA 95404

The following terms and conditions implement Reasonable and Prudent Measure 2, which states that measures shall be taken to assure that effects to water quality are minimized.

1. Water that comes in contact with wet concrete and has a pH greater than 9.0 must not be allowed to enter the ground or stream but may be pumped to a separate, lined basin constructed in the gravel bar, and then pumped to a truck or upland for

disposal or treatment (not within the bank to bank of any waterway). Another option is that the water can be retested later, and if the pH is less than 9.0, these waters may be discharged to the sediment-stilling basin. Alternatively, the material may be pumped directly to a truck for disposal at a site that is not within the top of bank to top of bank of any waterway.

The following terms and conditions implement Reasonable and Prudent Measure 3, which states that measures shall be taken to ensure that the fish ladders are adequately designed and evaluated in order to ensure that salmonid passage is not impeded.

1. USFS shall submit the final fish ladder design to NOAA Fisheries for evaluation and approval prior to implementation. This should be sent to:

   National Marine Fisheries Service
   Northern California Supervisor
   Protected Resources Division
   777 Sonoma Avenue, Room 325
   Santa Rosa, CA 95404

2. USFS and/or their designee(s) shall conduct hydraulic and biological evaluation of the fish ladders (validation of design/project goals) as prescribed by NOAA Fisheries upon completion of ladder construction.

This incidental take statement is based on implementation of the proposed pond cleanout and proposed demolition and construction of fish ladders at the NFC and SFC monitoring facilities as described in the February 2002 Biological Assessment, and described in the Description of the Proposed Action section of this biological opinion. Failure to implement the project as proposed, or implementation of the project in a manner that results in effects to ESA-listed salmonids and/or to instream habitat that exceed the level of take described in this biological opinion may cause coverage of section 7(o)(2) to lapse and require reinitiation of consultation to ensure compliance with section 7(a)(2) of the ESA.

X. REINITIATION OF CONSULTATION

This concludes formal consultation on the proposed pond cleanout and proposed demolition and construction of fish ladders at the NFC and SFC monitoring facilities. As provided in 50 CFR §402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered; (3) the identified action is subsequently modified in a manner that causes an effect to listed species or critical habitat that was not considered in the biological opinion; or (4) a new species is listed or critical habitat designated that may be affected by the identified action. In instances where the amount or extent of incidental take is exceeded, formal consultation shall be reinitiated immediately.

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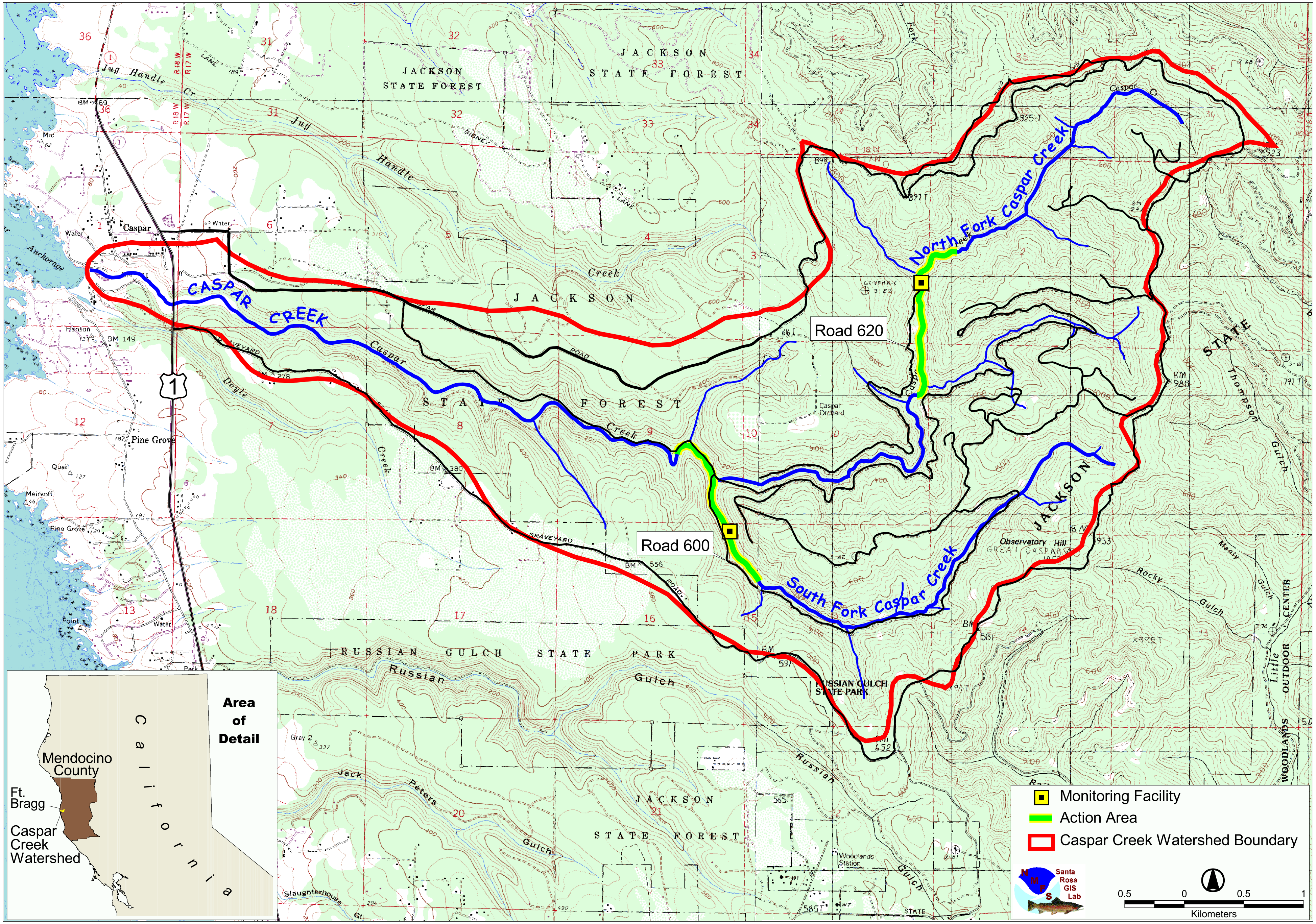

Figure 1. Caspar Creek Watershed, Mendocino County, California