UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Northwest Region
7600 Sand Point Way N.E., Bldg. 1
Seattle, WA 98115

Refer to:
2003/00078

August 13, 2003

Mr. Lawrence C. Evans
Portland District, Corps of Engineers
CENWP-OP-GP (Mr. Ron Marg)
P.O. Box 2946
Portland, OR 97208-2946

Re: Endangered Species Act Section 7 Formal Consultation and Magnuson-Stevens Fishery and Conservation Management Act Essential Fish Habitat Consultation for the Donald Cameron Marine Railway, Nehalem River Basin, Tillamook County, Oregon (Corps No. 200300034)

Dear Mr. Evans:

Enclosed is a biological opinion (Opinion) prepared by NOAA's National Marine Fisheries Service (NOAA Fisheries) pursuant to section 7(a)(2) of the Endangered Species Act (ESA) on the effects of the proposed issuance of a Department of the Army permit to Donald Cameron for the construction of a marine railway in Tillamook County, Oregon. In this Opinion, NOAA Fisheries concludes that the proposed action is not likely to jeopardize the continued existence of Oregon Coast coho salmon (*Oncorhynchus kisutch*). As required by section 7 of the ESA, NOAA Fisheries included reasonable and prudent measures with nondiscretionary terms and conditions that NOAA Fisheries believes are necessary to minimize the potential for incidental take associated with this project.

This document also serves as consultation on essential fish habitat pursuant to section 305(b) of the Magnuson-Stevens Fishery Conservation and Management Act and implementing regulations (50 CFR Part 600).

Please direct any questions regarding this consultation to Robert Anderson of my staff in the Oregon Habitat Branch at 503.231.2226.

Sincerely,

for D. Robert Lohn
Regional Administrator

Endangered Species Act - Section 7 Consultation
Biological Opinion

&

Magnuson-Stevens Fishery Conservation and Management Act
Essential Fish Habitat Consultation

Donald Cameron Marine Railway
Nehalem River Basin
Tillamook County, Oregon
(Corps No. 200200034)

Agency:	U.S. Army Corps of Engineers, Portland District
Consultation Conducted By:	NOAA's National Marine Fisheries Service, Northwest Region
Date Issued:	August 13, 2003
Issued by:	for _____ D. Robert Lohn Regional Administrator
Refer to:	**2003/00078**

TABLE OF CONTENTS

1. INTRODUCTION

The Endangered Species Act (ESA) of 1973 (16 USC 1531-1544), as amended, establishes a national program for conserving threatened and endangered species of fish, wildlife, plants, and the habitat on which they depend. Section 7(a)(2) of the ESA requires Federal agencies to consult with U.S. Fish and Wildlife Service and NOAA's National Marine Fisheries Service (NOAA Fisheries), as appropriate, to ensure that their actions are not likely to jeopardize the continued existence of endangered or threatened species or adversely modify or destroy their designated critical habitats. This biological opinion (Opinion) is the product of an interagency consultation pursuant to section 7(a)(2) of the ESA and implementing regulations found at 50 CFR 402.

The analysis also fulfills the essential fish habitat (EFH) requirements under the Magnuson-Stevens Fishery Conservation and Management Act (MSA). The MSA, as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-267), established procedures designed to identify, conserve, and enhance EFH for those species regulated under a Federal fisheries management plan. Federal agencies must consult with NOAA Fisheries on all actions, or proposed actions, authorized, funded, or undertaken by the agency, that may adversely affect EFH (§305(b)(2)).

1.1 Background and Consultation History

On March 3, 2003, NOAA Fisheries received a letter from the U.S. Army Corps of Engineers (Corps) requesting formal consultation pursuant to section 7(a)(2) of the ESA, and EFH consultation pursuant to section 305(b)(2) of the MSA for issuance of a permit by the Corps under section 10 of the Rivers and Harbors Act to authorize Donald Cameron to construct a marine railway on the Nehalem River in Tillamook County, Oregon. Enclosed with the letter was a proposal describing the proposed action and its potential effects. In the proposal, the Corps determined that the proposed action was likely to adversely affect Oregon Coast (OC) coho salmon (*Oncorhynchus kisutch*), an ESA-listed species.

This Opinion considers the potential effects of the proposed action on OC coho salmon, which occur in the proposed action area. OC coho salmon were listed as threatened under the ESA on August 10, 1998 (63 FR 42587) and protective regulations were issued on July 10, 2000 (65 FR 42422). The objective of this Opinion is to determine whether the proposed action is likely to jeopardize the continued existence of OC coho salmon. This consultation is conducted pursuant to section 7(a)(2) of the ESA and its implementing regulations, 50 CFR 402.

1.2 Proposed Action

The proposed action is issuance of a permit by the Corps under section 10 of the Rivers and Harbors Act to Donald Cameron to authorize construction of a marine railway near river mile 1.1 on the Nehalem River. The proposed project includes the construction of an 80-foot long by 8-foot wide walkway, driving four steel piles using a vibratory hammer, and constructing a 73-foot steel railway on top of the piles to launch and retrieve a fishing vessel. The project proponent proposes to plant three areas above top-of-bank with spruce trees. Proposed conservation measures include a pollution control plan and use of straw bales, silt fencing, and equipment walking pads. Any disturbed areas would be straw-bedded and seeded as required. All in-water work (defined as all work below mean high tide) is proposed to occur during the in-water work period of the Oregon Department of Fish and Wildlife (ODFW) (November 1 through February 15).

1.3 Description of the Action Area

The action area is defined as all areas to be affected directly or indirectly by the Federal action and not merely the immediate area (project site) involved in the proposed action (50 CFR 402.02). For this consultation, the action area includes all riverine habitats accessible to OC coho salmon in the Nehalem River from RM 0.5 to RM 1.7, and includes the channel migration zone (CMZ).

2. ENDANGERED SPECIES ACT

2.1 Biological Information

OC coho salmon use the action area for spawning, rearing, and migration. The timing of life history events of OC coho salmon in the Nehalem River basin is summarized in Table 1.

Table 1. OC Coho Salmon Life History Events (Weitkamp 1995, Steelquist 1992, ODEQ 2002). Light shading represents low-level abundance, dark shading represents peak abundance.

	J	F	M	A	M	J	J	A	S	O	N	D
River Entry												
Spawning												
Intragravel Development												
Juvenile Rearing												
Juvenile Out-migration												

Estimated escapement of coho salmon in Coastal Oregon was about 1.4 million fish in the early 1900s, with harvest of nearly 400,000 fish (Weitkamp *et al.* 1995). Abundance of wild OC coho salmon declined during the period from about 1965 to 1975 and then fluctuated at low levels (Nickelson *et al.* 1992). Lichatowich (1989) concluded that production potential (based on stock recruit models) for OC coho salmon in coastal Oregon rivers was only about 800,000 fish, and associated this decline with a reduction in habitat capacity of nearly 50%. Recent estimates of wild spawner abundance in this evolutionarily significant unit (ESU) has ranged from about 16,500 adults in 1990 to near 60,000 adults in 1996, and 238,700 in 2002 (ODFW 2003).

Estimated size of spawning populations for naturally-produced coho in the Nehalem River basin averaged 2672 adults from 1990 through 2001 (Table 2).

Table 2. Estimated Spawning Populations for Naturally-Produced Coho in the Nehalem River Basin (Jacobs *et al*. 2001, ODFW 2002).

Year:	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Estimated Nehalem River Basin Population:	1552	3975	1268	2265	2007	1463	1057	1173	1190	3713	4575	7825

Survey data collected by ODFW from 1950 to 1998 in the Nehalem River basin estimated adult coho densities ranging from 29 fish m^{-2} in 1950 to 5 fish m^{-2} in 1998 (PSU 1999). Survey data collected by ODFW from 1998 and 1999 in the Nehalem River basin estimated juvenile coho densities ranging from 0.00 fish m^{-2} to 0.72 fish m^{-2} with an average of 0.14 fish m^{-2} (Rodgers 2001). The Nehalem River population is the fifth most productive watershed in the geographic

range of the OC coho salmon ESU (ODFW 2002). Total escapement of wild OC coho salmon, and the contribution of the Nehalem River to that total, varies widely from year to year. Nonetheless, the Nehalem River is generally among the most productive watersheds within the ESU and, in 2001, accounted for 22% of the naturally-spawning OC coho salmon.

2.1.1 Evaluating Proposed Actions

The standards for determining jeopardy are set forth in section 7(a)(2) of the ESA as defined by 50 CFR 402.02 (the consultation regulations). In conducting analyses of habitat-altering actions under section 7 of the ESA, NOAA Fisheries uses the following steps of the consultation regulations and when appropriate combines them with the Habitat Approach[1] (NOAA Fisheries 1999): (1) Consider the biological requirements of the listed species; (2) evaluate the relevance of the environmental baseline in the action area to the species' current status; (3) determine the effects of the proposed or continuing action on the species; and (4) determine whether the species can be expected to survive with an adequate potential for recovery under the effects of the proposed or continuing action, the effects of the environmental baseline, and any cumulative effects, and considering measures for survival and recovery specific to other life stages. In completing this step of the analysis, NOAA Fisheries determines whether the action under consultation, together with all cumulative effects when added to the environmental baseline, is likely to jeopardize the ESA-listed species. If either or both are found step 5 occurs. In step 5, NOAA Fisheries may identify reasonable and prudent alternatives for the action that avoid jeopardy, if any exists.

The fourth step above requires a two-part analysis. The first part focuses on the action area and defines the proposed action's effects in terms of the species' biological requirements in that area (*i.e.*, effects on essential habitat features). The second part focuses on the species itself. It describes the action's effects on individual fish–or populations, or both–and places these effects in the context of the ESU as a whole. Ultimately, the analysis seeks to answer the questions of whether the proposed action is likely to jeopardize a listed species' continued existence

2.1.2. Biological Requirements

The first step in the methods NOAA Fisheries uses for applying the ESA section 7(a)(2) to listed salmon is to define the species' biological requirements that are most relevant to each consultation. NOAA Fisheries also considers the current status of the listed species taking into account population size, trends, distribution and genetic diversity. To assess to the current status

[1] The Habitat Approach is intended to provide guidance to NOAA staff for conducting analyses, and to explain the analytical process to interested readers. As appropriate, the Habitat Approach may be integrated into the body of Opinions. NOAA staff are encouraged to share the Habitat Approach document with colleagues from other agencies and private entities who are interested in the premises and analysis methods.

of the listed species, NOAA Fisheries starts with the determinations made in its decision to list the species for ESA protection and also considers new data available that is relevant to the determination.

The biological requirements are population characteristics necessary for OC coho salmon to survive and recover to naturally-reproducing population levels, at which time protection under the ESA would become unnecessary. Adequate population levels must safeguard the genetic diversity of the listed stock, enhance its capacity to adapt to various environmental conditions, and allow it to become self-sustaining in the natural environment.

For actions that affect freshwater habitat, NOAA Fisheries usually describes the habitat portion of a species' biological requirements in terms of a concept called properly functioning condition (PFC). PFC is defined as the sustained presence of natural,[2] habitat-forming processes in a watershed that are necessary for the long-term survival of the species through the full range of environmental variation (NOAA Fisheries 1999). PFC, then, constitutes the habitat component of a species' biological requirements. OC coho salmon survival in the wild depends upon the proper functioning of ecosystem processes, including habitat formation and maintenance. Restoring functional habitats depends largely on allowing natural processes to increase their ecological function, while at the same time removing adverse effects of current practices. For this consultation, the biological requirements are improved habitat characteristics that would function to support successful adult migration and holding, spawning, incubation, migration, over-wintering, juvenile out-migration, and smoltification.

2.1.3 Environmental Baseline

Step two of NOAA Fisheries' analysis evaluates the relevance of the environmental baseline in the action area. Regulations implementing section 7 of the ESA (50 CFR 402.02) define the environmental baseline as the past and present effects of all Federal, state, or private actions and other human activities in the action area. The environmental baseline also includes the anticipated effects of all proposed Federal projects in the action area that have undergone section 7 consultation, and the effects of state and private actions that are contemporaneous with the consultation in progress. Land uses in the action area include rural-residential, agricultural, commercial-industrial, and commercial forestry. Riparian areas and stream channels in the action area have been damaged by activities related to these land uses, the use of splash dams, and instream gravel mining. Habitat changes that have contributed to the decline of OC coho in the action area include: (1) Reduced biological, chemical, and physical connectivity between streams, riparian areas, flood plains, and uplands; (2) elevated fine sediment yields; (3) reduced in-stream large woody debris; (4) loss or degradation of riparian vegetation; (5) altered stream

[2] The word "natural" in this definition is not intended to imply "pristine," nor does the best available science lead us to believe that only pristine wilderness will support salmon.

channel morphology; and (6) altered base and peak stream flows (FEMAT 1993, Botkin *et al.* 1995, OCSRI 1997). The Nehalem River is on the Oregon Department of Environmental Quality (ODEQ) 303(d) List of Water Quality Limited Water Bodies for temperature.

NOAA Fisheries concludes that not all of the biological requirements of the listed species within the action area are being met under current conditions. Based on the best available information on the status of OC coho salmon, including population status, trends, and genetics, and the environmental baseline conditions within the action area, significant improvement in habitat conditions is needed to meet the biological requirements of OC coho salmon for survival and recovery.

2.1.4 Analysis of Effects

2.1.4.1 Effects of Proposed Action

Step three of NOAA Fisheries' jeopardy analysis evaluates the effects of proposed actions on listed species and seeks to answer the question of whether the species can be expected to survive with an adequate potential for recovery if those actions go forward.

Water Quality – Turbidity

Potential effects from project related increases in turbidity on OC coho salmon include, but are not limited to: (1) Reduction in feeding rates and growth; (2) increased mortality; (3) physiological stress; (4) behavioral avoidance; (5) reduction in macroinvertebrate populations; and (6) temporary beneficial effects. Potential beneficial effects include a reduction in piscivorous fish/bird predation rates, enhanced cover conditions, and improved survival conditions.

Turbidity is defined as a measurement of relative clarity due to an increase in dissolved or suspended, undissolved particles. At moderate levels, turbidity can reduce primary and secondary productivity and, at high levels, has the potential to interfere with feeding and to injure and kill adult and juvenile fish (Spence *et al.* 1996, Bjornn and Reiser 1991). Other behavioral effects on fish, such as gill flaring and feeding changes, have been observed in response to pulses of suspended sediment (Berg and Northcote 1985). Fine, redeposited sediments can also reduce primary and secondary productivity (Spence *et al.* 1996), and reduce incubation success and interstitial rearing space for juvenile salmonids (Bjornn and Reiser 1991).

Salmonid fishes have been observed to move laterally and downstream to avoid turbid plumes (Sigler *et al.* 1984, Lloyd 1987, Servizi and Martens 1991). Juvenile salmonid fishes tend to avoid streams that are chronically turbid, such as glacial streams or those disturbed by human activities, except when the fish must traverse these streams along migration routes (Lloyd *et al.* 1987). In addition, a potential positive effect is providing refuge and cover from predation. Fish

that remain in turbid waters experience a reduction in predation from piscivorous fish and birds (Gregory and Levings 1998). In habitats with intense predation pressure, this provides a beneficial trade-off of enhanced survival in exchange for physical effects such as reduced growth.

Exposure duration is a critical determinant of the occurrence and magnitude of physical or behavioral effects (Newcombe and MacDonald 1991). Salmonid fishes have evolved in systems that periodically experience short-term pulses (days to weeks) of high suspended sediment loads, often associated with floods, and are adapted to such high pulse exposures. Adult and larger juvenile salmonid fishes appear to be little affected by the high concentrations of suspended sediments that occur during storm and snowmelt runoff episodes (Bjornn and Reiser 1991). However, chronic exposure can cause physiological stress that can increase maintenance energy and reduce feeding and growth (Redding *et al.* 1987, Lloyd 1987, Servizi and Martens 1991).

Increases in TSS can adversely affect filter-feeding macroinvertebrates and fish feeding. At concentrations of 53 to 92 ppm (24 hours) macroinvertebrate populations were reduced (Gammon 1970). Concentrations of 250 ppm (1 hour) caused a 95% reduction in feeding rates in juvenile coho salmon (Noggle 1978). Concentrations of 1200 ppm (96 hours) killed juvenile coho salmon (Noggle 1978). Concentrations of 53.5 ppm (12 hours) caused physiological stress and changes in behavior in coho salmon (Berg 1983).

The proposed pile installation without work area isolation is likely to temporarily increase turbidity upstream and downstream of the work area for sustained periods. These increases in turbidity are likely to increase physiological stress and displace rearing juveniles. Salmon are likely to avoid waters that are chronically turbid, and therefore adverse effects are less likely after initial exposure. Installing piles during the proposed in-water work window is likely to minimize the above effects as juvenile OC coho salmon abundance in the action area would be low.

Pile Installation - Effects of Increases in Acoustic Energy

Pile driving can generate intense underwater sound pressure waves that may adversely affect fishes. These pressure waves have been shown to injure, and kill, fishes (Caltrans 2001, Longmuir and Lively 2001, Stotz and Colby 2001, J. Stadler, NOAA Fisheries, Washington Habitat Branch, pers. obs. 2002). Injuries associated directly with pile driving are poorly studied, but include rupture of the swimbladder and internal hemorrhaging (Caltrans 2001, Abbott and Bing-Sawyer 2002, Stadler, NOAA Fisheries, Washington Habitat Branch, pers. obs. 2002). Sound pressures 100 decibels (dB) above the threshold for hearing likely are sufficient to damage the auditory system in many fishes (Hastings 2002).

The type and intensity of the sounds produced during pile driving depend on a variety of factors, including, but not limited to, the type and size of the pile, the firmness of the substrate into

which the pile is being driven, the depth of water and the type and size of the pile-driving hammer. Sound pressures are positively correlated with the size of the pile, as more energy is required to drive larger piles. Hollow steel piles as small as 14 inches in diameter have been shown to produce sound pressures that can injure fish (Reyff 2003). Firmer substrates require more energy to drive piles, and produce more intense sound pressures. Sound attenuates more rapidly with distance from the source in shallow than in deep water (Rogers and Cox 1988).

Driving hollow steel piles with impact hammers produce intense, sharp spikes of sound which can easily reach levels that injure fishes. Vibratory hammers, on the other hand, produce sounds of lower intensity, with a rapid repetition rate. Sounds produced by impact hammers and those produced by vibratory hammers evoke different responses in fishes. When exposed to sounds which are similar to those of a vibratory hammer, fishes consistently displayed an avoidance response (Enger *et al*. 1993, Dolat 1997, Knudsen *et al*. 1997, Sand *et al*. 2000), and did not habituate to the sound, even after repeated exposure (Dolat 1997, Knudsen *et al*. 1997). Fishes may respond to the first few strikes of an impact hammer with a startle response. After these initial strikes, the startle response wanes and the fishes may remain within the field of a potentially-harmful sound (Dolat 1997, NOAA Fisheries 2001). The differential responses to these sounds are due to the differences in the duration and frequency of the sounds.

Impact hammers, however, produce such short spikes of sound with little energy in the infrasound range, that fishes fail to respond to the particle motion (Carlson *et al*. 2001). Thus, impact hammers may be more harmful than vibratory hammers for two reasons: first, they produce more intense pressure waves, and second, the sounds produced do not elicit an avoidance response in fishes, which will expose them for longer periods to those harmful pressures.

Potential adverse effects to juvenile OC coho salmon due to the installation of the piles are likely to be minimized if work is completed during the proposed in-water work window, when fish abundance in the action area would be low, and by using a vibratory hammer instead of an impact hammer.

Construction

As with all construction activities, accidental release of fuel, oil, and other contaminants may occur. Operation of pile driving equipment requires the use of fuel, lubricants, and other petroleum products, which if spilled into a waterbody could injure or kill aquatic organisms. Petroleum-based contaminants contain PAHs which can cause acute toxicity to salmonid fishes at high levels of exposure, and also can cause lethal as well as sublethal effects to fish and other aquatic organisms (Neff 1985).

2.1.4.2 Cumulative Effects

Cumulative effects are defined in 50 CFR 402.02 as "those effects of future State or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action subject to consultation."

NOAA Fisheries is not aware of any specific future non-federal activities within the action area that would cause greater effects to listed species than presently occurs. The action area includes significant tracts of private and state lands. Land use on these non-federal lands include rural development, agricultural, commercial-industrial, and commercial forestry. Chemical fertilizers or pesticides are used on many of these lands, but no specific information is available regarding their use. NOAA Fisheries does not consider the rules governing timber harvests, agricultural practices, and rural development on non-federal lands within Oregon to be sufficiently protective of watershed, riparian, and stream habitat functions to support the survival and recovery of listed species. Therefore, these habitat functions likely are at risk due to future activities on non-federal forest lands within the basin.

Non-federal activities within the action area are likely to increase due to a projected 34% increase in human population between 2000 and 2025 in Oregon (Oregon Department of Administrative Services 1999). Thus, NOAA Fisheries assumes that future private and state actions will continue within the action area, increasing as population density rises. As the human population in the state continues to grow, demand for actions similar to the subject project likely will continue to increase as well. Each subsequent action may have only a small incremental effect, but taken together they may have a significant effect that would further degrade the watershed's environmental baseline and undermine the improvements in habitat conditions necessary for listed species to survive and recover.

2.1.5 Conclusion

After reviewing the best available scientific and commercial information available regarding the current status of the OC coho salmon ESU considered in this consultation, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is NOAA Fisheries' opinion that the action, as proposed, is not likely to jeopardize the continued existence of OC coho salmon.

Our conclusion is based on the following considerations: (1) All in-water work will be completed between November 1 and February 15, when the fewest number of OC coho salmon are likely to be present in the action area; (2) a pollution and erosion control plan will avoid or minimize contamination due to construction; (3) piles will be driven using a vibratory hammer; (4) taken together, these conservation measures applied to each part of the project will ensure that any short-term effects to aquatic habitat conditions will be minor and timed to occur at times

that are least sensitive for the species' life-cycle; and (5) the effects of this action not expected to impair currently properly functioning habitats, appreciably reduce the functioning of already impaired habitats, or retard the long-term progress of impaired habitats toward proper functioning condition essential to the long-term survival and recovery at the population or ESU scale.

2.1.6 Conservation Recommendations

Section 7(a)(1) of the ESA directs Federal agencies to use their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of the threatened and endangered species. Conservation recommendations are discretionary measures suggested to minimize or avoid adverse effects of a proposed action on listed species, to minimize or avoid adverse modification of critical habitats, or to develop additional information. The following conservation recommendation is consistent with these obligations, and therefore should be carried out by the Corps for activities conducted under Corps authorization:

> The Corps should develop a monitoring program to evaluate the effects of increases in acoustic energy on salmonid fishes and benthic prey species resulting from pile driving authorized by the Corps.

For NOAA Fisheries to be kept informed of actions minimizing or avoiding adverse effects, or those that benefit listed salmon and their habitats, it requests notification of any actions leading to the achievement of the conservation recommendation.

2.1.7 Reinitiation of Consultation

This concludes formal consultation on these actions in accordance with 50 CFR 402.14(b)(1). Reinitiation of consultation is required: (1) If the amount or extent of incidental take is exceeded; (2) the action is modified in a way that causes an effect on the listed species that was not previously considered in the biological assessment and this Opinion; (3) new information or project monitoring reveals effects of the action that may affect the listed species in a way not previously considered; or (4) a new species is listed or critical habitat is designated that may be affected by the action (50 CFR 402.16).

2.2 Incidental Take Statement

The ESA at section 9 [16 USC 1538] prohibits take of endangered species. The prohibition of take is extended to threatened anadromous salmonids by section 4(d) rule [50 CFR 223.203]. Take is defined by the statute as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct." [16 USC 1532(19)] Harm is defined by regulation 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 behavior patterns, including, breeding, spawning, rearing, migrating, feeding or sheltering." [50 CFR 222.102] Harass is defined as "an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering." [50 CFR 17.3] Incidental take is defined as "takings that result from, but are not the purpose of, carrying out an otherwise lawful activity conducted by the Federal agency or applicant." [50 CFR 402.02] The ESA at section 7(o)(2) removes the prohibition from any incidental taking that is in compliance with the terms and conditions specified in a section 7(b)(4) incidental take statement [16 USC 1536].

2.2.1 Amount or Extent of Take

NOAA Fisheries anticipates that the proposed action covered by this Opinion is reasonably certain to result in incidental take of listed species due to temporary increases in turbidity and acoustic energy. Effects of actions such as these are largely unquantifiable in the short term, but are likely to be largely limited to non-lethal take in the form of behavior modification.

Therefore, even though NOAA Fisheries expects some low level of non-lethal incidental take to occur due to the action covered by this Opinion, the best scientific and commercial data available are not sufficient to enable it to estimate a specific amount of incidental take of the species. In instances such as this, NOAA Fisheries designates the expected level of take in terms of the extent of take allowed. Therefore, NOAA Fisheries limits the extent of take to non-lethal take from pile installation occurring in the aquatic area within 593 meters of the proposed marine railway. Lethal take, or non-lethal incidental take occurring beyond the specified area is not authorized by this consultation.

2.2.2 Reasonable and Prudent Measures

NOAA Fisheries believes that the following reasonable and prudent measures are necessary and appropriate to minimize take of the above species.

The Corps shall:

1. Avoid or minimize the likelihood of incidental take by requiring that in-water work is limited to the time when the fewest number of OC coho salmon are likely to be present in the work area.

2. Avoid or minimize the likelihood of incidental take by requiring that the measures to control pollution and erosion are fully implemented.

3. Avoid or minimize the likelihood of incidental take by requiring construction equipment to be stored so that petroleum products or other fluids do not enter the river.

4. Avoid or minimize the likelihood of incidental take from acoustic energy created by pile driving.

5. Ensure the completion of an effective monitoring and reporting program to confirm this Opinion is meeting its objective of avoiding or minimizing take from permitted activity.

2.2.3 Terms and Conditions

To be exempt from the prohibitions of section 9 of the ESA, the Corps must comply with the following terms and conditions, which implement the reasonable and prudent measures described above for each category of activity.

1. To implement reasonable and prudent measure #1 (in-water work), the Corps shall ensure that all work shall take place during November 1 through 15 February. No in-water work (defined as all work below mean high tide) shall take place outside the proposed in-water work period without prior written authorization from NOAA Fisheries.

2. To implement reasonable and prudent measure #2, (pollution and erosion control), the Corps shall ensure that:

    a. The proposed conservation measures are fully implemented.
    b. A pollution and erosion control plan will be prepared and carried out to prevent pollution related to construction operations. The plan must be available for inspection on request by NOAA Fisheries.
    c. The pollution and erosion control plan must contain the pertinent elements listed below, and meet requirements of all applicable laws and regulations.

(1) Practices to prevent erosion and sedimentation associated with construction sites, equipment and material storage sites, fueling operations and staging areas.
(2) A description of any hazardous products or materials that will be used for the project, including procedures for inventory, storage, handling, and monitoring.
(3) Practices to prevent construction debris from dropping into any stream or waterbody, and to remove any material that does drop with a minimum disturbance to the streambed and water quality.

3. To implement reasonable and prudent measure # 3 (staging of equipment), the Corps shall ensure that:

a. Equipment operated within 150 feet of top-of-bank is free of fluid leaks. Equipment will be examined daily for leaks.
b. Equipment staging, maintenance, refueling, and fuel storage will not occur within 150 feet of top-of-bank.
c. At the end of each work shift, equipment will be stored no less than 150 feet (horizontal distance) from top-of-bank.
d. No pollutants of any kind (*e.g.*, petroleum products, coolants) will come in contact with the area below the mean high tide.

4. To implement reasonable and prudent measure #4 (acoustic energy), the Corps shall ensure that acoustic energy from pile driving is minimized by not permitting use of an impact hammer to install or proof piles.

5. To implement reasonable and prudent measure #5 above (monitoring), the Corps shall ensure that:

a. Within 60 days of completing the project, the applicant will submit a monitoring report to NOAA Fisheries describing the applicant's success meeting permit conditions. This report will consist of the following information.
b. A post-construction monitoring report that describes 1) the success and/or failure, and actions taken to correct failures, of all conservation measures, and 2) confirmation of as-built condition. The Post-construction report shall include a description of:
    i. The downstream extent, duration, and frequency of any turbidity plume related to project activities.
    ii. Specific methods used to minimize sediment mobilization and increases in turbidity.

iii. Any observed injury and/or mortality of fish resulting from project activities.

c. The monitoring report shall be submitted to:

NOAA Fisheries
Habitat Conservation Division
Attn: 2003/00078
525 NE Oregon Street, Suite 500
Portland, OR 97232

d. If a dead, injured, or sick endangered or threatened species specimen is found, initial notification must be made to the NOAA Fisheries Law Enforcement Office, at the Vancouver Field Office, 600 Maritime, Suite 130, Vancouver, Washington 98661; phone: 360.418.4246. Care should be taken in handling sick or injured specimens to ensure effective treatment and care or the handling of dead specimens to preserve biological material in the best possible state for later analysis of cause of death. In conjunction with the care of sick or injured endangered and threatened species or preservation of biological materials from a dead animal, the finder has the responsibility to carry out instructions provided by Law Enforcement to ensure that evidence intrinsic to the specimen is not disturbed.

3. MAGNUSON-STEVENS ACT

3.1 Magnuson-Stevens Fishery Conservation and Management Act

The MSA, as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-297), requires the inclusion of EFH descriptions in Federal fishery management plans. In addition, the MSA requires Federal agencies to consult with NOAA Fisheries on activities that may adversely affect EFH. The objective of this EFH consultation is to determine whether the proposed action may adversely affect designated EFH for relevant species, and to recommend conservation measures to avoid, minimize, or otherwise offset potential adverse effects to EFH resulting from the proposed action.

EFH means those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity (MSA §3). For the purpose of interpreting the definition of essential fish habitat: "Waters" include aquatic areas and their associated physical, chemical, and biological properties that are used by fish and may include aquatic areas historically used by fish where appropriate; "substrate" includes sediment, hard bottom, structures underlying the waters, and associated biological communities; "necessary" means the habitat required to support a

sustainable fishery and the managed species' contribution to a healthy ecosystem; and "spawning, breeding, feeding, or growth to maturity" covers a species' full life cycle (50 CFR 600.110).

Section 305(b) of the MSA (16 U.S.C. 1855(b)) requires that:

- Federal agencies must consult with NOAA Fisheries on all actions, or proposed actions, authorized, funded, or undertaken by the agency, that may adversely affect EFH;

- NOAA Fisheries shall provide conservation recommendations for any Federal or state activity that may adversely affect EFH;

- Federal agencies shall within 30 days after receiving conservation recommendations from NOAA Fisheries provide a detailed response in writing to NOAA Fisheries regarding the conservation recommendations. The response shall include a description of measures proposed by the agency for avoiding, mitigating, or offsetting the impact of the activity on EFH. In the case of a response that is inconsistent with the conservation recommendations of NOAA Fisheries, the Federal agency shall explain its reasons for not following the recommendations.

The MSA requires consultation for all actions that may adversely affect EFH, and does not distinguish between actions within EFH and actions outside EFH. Any reasonable attempt to encourage the conservation of EFH must take into account actions that occur outside EFH, such as upstream and upslope activities, that may have an adverse effect on EFH. Therefore, EFH consultation with NOAA Fisheries is required by Federal agencies undertaking, permitting or funding activities that may adversely affect EFH, regardless of their locations.

3.2 Identification of EFH

The Pacific Fisheries Management Council (PFMC) has designated EFH for Federally-managed fisheries within the waters of Washington, Oregon, and California. The designated EFH for groundfish and coastal pelagic species encompasses all waters from the mean high water line, and upriver extent of saltwater intrusion in river mouths, along the coasts of Washington, Oregon and California, seaward to the boundary of the U.S. exclusive economic zone (200 miles) (PFMC 1998a, 1998b). Freshwater EFH for Pacific salmon includes all those streams, lakes, ponds, wetlands, and other waterbodies currently, or historically accessible to salmon in Washington, Oregon, Idaho, and California, except areas upstream of certain impassable man-made barriers (as identified by the PFMC), and longstanding, naturally-impassable barriers (*e.g.*, natural waterfalls in existence for several hundred years) (PFMC 1999). In estuarine and marine areas, designated salmon EFH extends from the nearshore and tidal submerged environments

within state territorial waters out to the full extent of the exclusive economic zone offshore of Washington, Oregon, and California north of Point Conception to the Canadian border.

Detailed descriptions and identifications of EFH for the groundfish species are found in the final environmental assessment/regulatory impact review for Amendment 11 to *The Pacific Coast Groundfish Management Plan* (PFMC 1998a) and the NOAA Fisheries *Essential Fish Habitat for West Coast Groundfish Appendix* (Casillas *et al.* 1998). Detailed descriptions and identifications of EFH for the coastal pelagic species are found in Amendment 8 to the *Coastal Pelagic Species Fishery Management Plan* (PFMC 1998b). Detailed descriptions and identifications of EFH for salmon are found in Appendix A to Amendment 14 to the *Pacific Coast Salmon Plan* (PFMC 1999). Assessment of the potential adverse effects to these species' EFH from the proposed action is based on this information.

3.3 Proposed Actions

The proposed action is detailed above in section 1.2 of this document. The action area includes the Nehalem River from river mile 0.5 to river mile 1.7, and includes the channel migration zone. This area has been designated as EFH for various life stages of numerous groundfish species, coastal pelagic species, and chinook and coho salmon (Table 2).

3.4 Effects of Proposed Action

As described in detail in section 2.1.4.1 of this document, the proposed action is likely to temporarily degrade water quality and near-shore habitat for ground fish species, coastal pelagic species, chinook and coho salmon.

3.5 Conclusion

The proposed action will adversely affect the EFH for the groundfish, coastal pelagic, chinook, and coho salmon species listed in Table 2.

3.6 EFH Conservation Recommendations

Pursuant to section 305(b)(4)(A) of the MSA, NOAA Fisheries is required to provide EFH conservation recommendations for any Federal or state agency action that would adversely affect EFH. The conservation measures proposed for the project by the Corps, all conservation recommendations outlined above in section 2.1.6 and all of the reasonable and prudent measures and the terms and conditions contained in sections 2.2.2 and 2.2.3 are applicable to salmon EFH. Therefore, NOAA Fisheries incorporates each of those measures here as EFH conservation recommendations.

3.7 Statutory Response Requirement

Please note that the MSA (section 305(b)) and 50 CFR 600.920(j) requires the Federal agency to provide a written response to NOAA Fisheries after receiving EFH conservation recommendations within 30 days of its receipt of this letter. This response must include a description of measures proposed by the agency to avoid, minimize, mitigate or offset the adverse impacts of the activity on EFH. If the response is inconsistent with a conservation recommendation from NOAA Fisheries, the agency must explain its reasons for not following the recommendation.

3.8 Supplemental Consultation

The Corps must reinitiate EFH consultation with NOAA Fisheries if either action is substantially revised or new information becomes available that affects the basis for NOAA Fisheries' EFH conservation recommendations (50 CFR 600.920).

Table 2. Species with Designated EFH in the Estuarine EFH Composite in the State of Oregon.

Groundfish Species	
Leopard Shark (southern OR only)	*Triakis semifasciata*
Soupfin Shark	*Galeorhinus zyopterus*
Spiny Dogfish	*Squalus acanthias*
California Skate	*Raja inornata*
Spotted Ratfish	*Hydrolagus colliei*
Lingcod	*Ophiodon elongatus*
Cabezon	*Scorpaenichthys marmoratus*
Kelp Greenling	*Hexagrammos decagrammus*
Pacific Cod	*Gadus macrocephalus*
Pacific Whiting (Hake)	*Merluccius productus*
Black Rockfish	*Sebastes maliger*
Bocaccio	*Sebastes paucispinis*
Brown Rockfish	*Sebastes auriculatus*
Copper Rockfish	*Sebastes caurinus*
Quillback Rockfish	*Sebastes maliger*
English Sole	*Pleuronectes vetulus*
Pacific Sanddab	*Citharichthys sordidus*
Rex Sole	*Glyptocephalus zachirus*
Rock Sole	*Lepidopsetta bilineata*
Starry Flounder	*Platichthys stellatus*
Coastal Pelagic Species	
Pacific Sardine	*Sardinops sagax*
Pacific (Chub) Mackerel	*Scomber japonicus*
Northern Anchovy	*Engraulis mordax*
Jack Mackerel	*Trachurus symmetricus*
California Market Squid	*Loligo opalescens*
Pacific Salmon Species	
Chinook Salmon	*Oncorhyncus tshawytcha*
Coho Salmon	*Oncorhyncus kisutch*

4. LITERATURE CITED

Section 7(a)(2) of the ESA requires biological opinions to be based on the best scientific and commercial data available. This section identifies the data used in developing this Opinion.

Abbott, R. and E. Bing-Sawyer. 2002. Assessment of pile driving impacts on the Sacramento blackfish (*Othodon microlepidotus*). Draft report prepared for Caltrans District 4. October 10, 2002.

Berg, L. and T.G. Northcote. 1985. Changes In Territorial, Gill-Flaring, and Feeding Behavior in Juvenile Coho Salmon (*Oncorhynchus kisutch*) Following Short-Term Pulses of Suspended Sediment. Canadian Journal of Fisheries and Aquatic Sciences 42:1410-1417.

Berg, L. 1983. Effects of short-term exposure to suspended sediments on the behavior of juvenile coho salmon. Mater's Thesis. Iuniversity of British Columbia, Vancouver, B.C. Canada.

Bjornn, T.C., and D.W. Reiser. 1991. Habitat requirements of salmonids in streams. Pages 83-138 *in* W.R. Meehan, ed. Influences of forest and rangeland management on salmonid fishes and their habitats. American Fisheries Society Special Publication 19:83-138.

Botkin, D., K. Cummins, T. Dunne, H. Regier, M. Sobel, and L. Talbot. 1995. Status and future of salmon of western Oregon and northern California: findings and options. Report #8. The center for the study of the environment, Santa Barbara, California.

Caltrans. 2001. Fisheries Impact Assessment, Pile Installation Demonstration Project for the San Francisco - Oakland Bay Bridge, East Span Seismic Safety Project, August 2001 59 pp.

Carlson, T.J., G. Ploskey, R.L. Johnson, R.P. Mueller, M.A. Weiland and P.N. Johnson. 2001. Observations of the behavior and distribution of fish in relation to the Columbia River navigation channel and channel maintenance activities. Prepared for the U.S. Army, Corps of Engineers, Portland District by Pacific Northwest National Laboratory, U.S. Department of Energy, Richland, WA. 35 p. + appendices.

Casillas, E., L. Crockett, Y. deReynier, J. Glock, M. Helvey, B. Meyer, C. Schmitt, M. Yoklavich, A. Bailey, B. Chao, B. Johnson and T. Pepperell,. 1988. Essential Fish Habitat West Coast Groundfish Appendix. National Marine Fisheries Service. Seattle, Washington. 778 p.

Dolat, S.W. 1997. Acoustic measurements during the Baldwin Bridge demolition (final, dated March 14, 1997). Prepared for White Oak Construction by Sonalysts, Inc, Waterford, CT.. 34 p. + appendices.

Enger, P.S., H.E. Karlsen, F.R. Knudsen, and O. Sand. 1993. Detection and reaction of fish to infrasound. Fish Behaviour in Relation to Fishing Operations., 1993, pp. 108-112, ICES marine science symposia. Copenhagen vol. 196.

FEMAT (Forest Ecosystem Management Assessment Team). 1993. Forest ecosystem management: an ecological, economic, and social assessment. Report of the Forest Ecosystem Management Assessment Team. U.S. Government Printing Office 1993-793- 071. U.S. Government Printing Office for the U.S. Department of Agriculture, Forest Service; U.S. Department of the Interior, Fish and Wildlife Service, Bureau of Land Management, and National Park Service; U.S. Department of Commerce, National Oceanic and Atmospheric Administration and National Marine Fisheries Service; and the U.S. Environmental Protection Agency.

Gammon, J.R. 1970. The effects of inorganic sediment on stream biota. Environmental Protection Agency, Water Quality Office, water pollution control research series 18050DWCI2/70.

Gregory, R.S., and C.D. Levings. 1998. Turbidity Reduces Predation on Migrating Juvenile Pacific Salmon. Transactions of the American Fisheries Society 127: 275-285.

Hastings, M.C. 2002. Clarification of the meaning of sound pressure levels and the known effects of sound on fish. Document in support of Biological Assessment for San Francisco-Oakland Bay Bridge East Span Seismic Safety Project. August 26, 2002; revised August 27, 2002. 8 pp.

Jacobs, S., J. Fimlan, and G. Susac. 2001. Status of Oregon coastal stocks of anadromous salmonids, 1999-2000: Monitoring program report number OPSW-ODFW-2001-3, Oregon Department of Fish and Wildlife, Portland, Oregon.

Knudsen, F.R., C.B. Schreck, S.M. Knapp, P.S. Enger, and O. Sand. 1997. Infrasound produces flight and avoidance responses in Pacific juvenile salmonids. Journal of Fish Biology, 51:824-829.

Lichatowich, J.A. 1989. Habitat alteration and changes in abundance of coho (Oncorhynchus kisutch) and chinook (Oncorhynchus tshawyscha) salmon in Oregon's coastal streams. In C. D. Levings, L. B. Holtby, and M.A. Henderson (editors), proceedings of the national workshop on effects of habitat alteration on salmonids stocks, May 6-8, 1987, Nanaimo, B.C., p. 92-99. Can. Spec. Publ. Fish. Aquat. Sci. 105. *In* C.D. Levings, L. B. Holyby.

Lloyd, D.S. 1987. Turbidity as a Water Quality Standard for Salmonid Habitats in Alaska. North American Journal of Fisheries Management 7:34-45.

Lloyd, D.S., J.P. Koenings, and J.D. LaPerriere. 1987. "Effects of Turbidity in Fresh Waters of Alaska." North American Journal of Fisheries Management 7:18-33.

Longmuir, C., and T. Lively. 2001. Bubble curtain systems for use during marine pile driving. Report by Fraser River Pile & Dredge Ltd., New Westminster, British Columbia. 9 pp.

National Oceanic and Atmospheric Administration (National Marine Fisheries Service, Northwest Region). Habitat conservation and protected resources divisions. 1999. The Habitat Approach. Implementation of section 7 of the Endangered Species Act for action affecting the habitat of Pacific anadromous salmonids.

Neff, J.M. 1985. Polycyclic aromatic hydrocarbons. Pages 416-454 in G.M. Rand and S.R. Petrocelli. Fundamentals of aquatic toxicology,. Hemisphere Publishing, Washington, D.C.

Newcombe, C. P., and D. D. MacDonald. 1991. Effects of Suspended Sediments on Aquatic Ecosystems. North American Journal of Fisheries Management 11: 72-82.

Nickelson, T.E., J.W. Nicholas, A.M. McGie, R.B. Lindsay, D.L. Bottom, R.J. Kaiser, and S.E. Jacobs. 1992. Status of anadromous salmonids in Oregon coastal basins. Oregon Department of Fish and Wildlife, research development section and ocean salmon management, 83 p. Oregon Department of Fish and Wildlife, P.O. Box 59, Portland.

NOAA Fisheries, 2001. Biological Opinion for the San Francisco-Oakland Bay Bridge East Span Seismic Safety Project. Southwest Region, Santa Rosa, California. Admin. Rec. 151422SWR99SR190.

Noggle, C.C. 1978. Behavioral, physiological and lethal effects of suspended sediment on juvenile salmonids. [Thesis] Seattle: University of Washington.

OCSRI (Oregon Coastal Salmon Restoration Initiative). 1997. State of Oregon, Salem. March 10.

ODAS (Oregon Department of Administrative Services). 1999. Oregon economic and revenue forecast. Vol. XIX. No.2. Office of economic analysis, Salem.

ODEQ (Oregon Department of Environmental Quality) 2002. Oregon Department of Environmental Quality north coast subbasins draft total maximum daily load.

ODEQ 2001. Oregon's final 1998 water quality limited streams - 303(d) list, record ID 2737.

ODFW (Oregon Department of Fish and Wildlife). 2002. Estimated coho spawner abundance. 2001 spawning season.

PFMC (Pacific Fishery Management Council), 1998a. Final Environmental Assessment/Regulatory Review for Amendment 11 to the Pacific Coast Groundfish Fishery Management Plan. October 1998.

PFMC (Pacific Fishery Management Council), 1998b. The Coastal Pelagic Species Fishery Management Plan: Amendment 8. Portland, Oregon.

PFMC (Pacific Fishery Management Council). 1999. Amendment 14 to the Pacific Coast Salmon Plan. Appendix A: Description and Identification of Essential Fish Habitat, Adverse Impacts and Recommended Conservation Measures for Salmon. Portland, Oregon.

PSU (Portland State University). 1999. Nehalem River watershed assessment.

Redding, J. M., C. B. Schreck, and F. H. Everest. 1987. Physiological Effects on Coho Salmon and Steelhead of Exposure to Suspended Solids. Transactions of the American Fisheries Society 116: 737-744.

Reyff, J.A. 2003. Underwater sound levels associated with seismic retrofit construction of the Richmond-San Rafael Bridge. Document in support of Biological Assessment for the Richmond-San Rafael Bridge Seismic Safety Project. January, 31, 2003. 18 pp.

Rodgers, J.D. 2001. Monitoring of the abundance of juvenile salmonids in Oregon coastal streams. Monitoring program report number OPSW-ODFW-2001-1, Oregon Department of Fish and Wildlife, Portland, Oregon.

Rogers, P.H. and M. Cox. 1988. Underwater sound as a biological stimulus. pp. 131-149 *in*: Sensory biology of aquatic animals. Atema, J, R.R. Fay, A.N. Popper and W.N. Tavolga (eds.). Springer-Verlag. New York.

Sand, O., P.S. Enger, H.E. Karlsen, F. Knudsen, T. Kvernstuen. 2000. Avoidance responses to infrasound in downstream migrating European silver eels, *Anguilla anguilla.* Environmental Biology of Fishes, 57:327-336.

Servizi, J. A., and Martens, D. W. 1991. Effects of Temperature, Season, and Fish Size on Acute Lethality of Suspended Sediments to Coho Salmon. Canadian Journal of Fisheries and Aquatic Sciences 49:1389-1395.

Sigler, J. W., T. C. Bjornn, and F. H. Everest. 1984. "Effects of Chronic Turbidity on Density and Growth of Steelheads and Coho Salmon." Transactions of the American Fisheries Society 113:142-150.

Spence, B.C., G.A. Lomnicky, R.M. Hughes, and R.P. Novitzki. 1996. An Ecosystem Approach to Salmonid Conservation. TR-4501-96-6057. ManTech Environmental Research Services Corp., Corvallis, Oregon. 356 p. Available from the National Marine Fisheries Service, Portland, Oregon.

Stadler, J.H. 2002. Personal observation of fish-kill occurring during pile driving activity at the Winslow Ferry Terminal, Winslow, WA. October 7, 2002. Fish Biologist, DOC/NOAA/National Marine Fisheries Service/HCD, Lacey, Washington.

Steelquist, R. 1992. Field guide to the Pacific salmon. Sasquatch Books. Seattle, WA.

Stotz, T. and J. Colby. 2001. January 2001 dive report for Mukilteo wingwall replacement project. Washington State Ferries Memorandum. 5 pp. + appendices.

Weitkamp, L.A., T.C. Wainwright, G.J. Bryant, G.B. Milner, D.J. Teel, R.G. Kope, and R.S. Waples. 1995. Status review of coho salmon from Washington, Oregon, and California. National Marine Fisheries Service, Northwest Fisheries Science Center, Seattle, Washington.

Würsig, B., C.R. Greene, Jr., and T.A. Jefferson. 2000. Development of an air bubble curtain to reduce underwater noise of percussive pile driving. Marine Environmental Research 49:79-93.