UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Northwest Region
7600 Sand Point Way N.E., Bldg. 1
BIN C15700
Seattle, WA 98115-0070

Refer to:
OHB2002-0044-FEC

April 9, 2002

Mr. Robert E. Willis
U.S. Army Corps of Engineers
Chief, Environmental Resources Branch
P.O. Box 2946
Portland, OR 97208-2946

Re: Endangered Species Act Section 7 Formal Consultation and Magnuson-Stevens Act Essential Fish Habitat Consultation for Interstate 84 Riverbank Stabilization Project Along the Columbia River, Multnomah County, Oregon

Dear Mr. Willis:

Enclosed is a biological opinion (Opinion) prepared by the National Marine Fisheries Service (NMFS) pursuant to section 7 of the Endangered Species Act (ESA) on the effects of the proposed Interstate 84 Riverbank Stabilization Project in Multnomah County, Oregon. In this Opinion, NMFS concluded that the proposed actions are not likely to jeopardize the continued existence of ESA-listed Snake River sockeye salmon (*Oncorhynchus nerka*), Snake River fall chinook salmon (*O. tshawytscha*), Snake River spring/summer chinook salmon, Upper Columbia River spring-run chinook salmon, Lower Columbia River chinook salmon, Columbia River chum salmon (*O. keta*), Snake River steelhead (*O. mykiss*), Upper Columbia River steelhead, Middle Columbia River steelhead, and Lower Columbia River steelhead, or destroy or adversely modify designated critical habitats. As required by section 7 of the ESA, NMFS included reasonable and prudent measures with non-discretionary terms and conditions that NMFS believes are necessary to minimize the impact of incidental take associated with this action.

This Opinion 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 at 50 CFR Part 600.

If you have any questions regarding this consultation, please contact Art Martin of my staff in the Oregon Habitat Branch at 503.231.6848.

Sincerely,

for Michael R Course

D. Robert Lohn
Regional Administrator

cc: Rose Owens, ODOT
Greg Robart, ODFW
Diana Hwang, USFWS
Steve Helm, COE

Endangered Species Act - Section 7 Consultation
&
Magnuson-Stevens Act Essential Fish Habitat Consultation

BIOLOGICAL OPINION

Interstate 84 Riverbank Stabilization Project along the Columbia River, Multnomah County, Oregon

Agency: Army Corps of Engineers, Portland District

Consultation Conducted By: National Marine Fisheries Service, Northwest Region

Date Issued: April 9, 2002

Issued by: for Michael R Crouse

D. Robert Lohn
Regional Administrator

Refer to: OHB2002-0044-FEC

TABLE OF CONTENTS

1. ENDANGERED SPECIES ACT

1.1 Background

On Februaray 12, 2002, the National Marine Fisheries Service (NMFS) received a letter from the U.S. Army Corps of Engineers (COE) requesting formal consultation on the Interstate 84 Riverbank Stabilization Project along the Columbia River. The proposed action is the bank stabilization of Interstate 84 before the in-water work window of November 1 to February 28. In the February 12, 2002 letter and the accompanying biological assessment (BA), the COE determined that the following 10 listed evolutionarily significant units (ESUs) of Columbia Basin salmonids may occur within the project area, and that the proposed projects are "likely to adversely affect" (LAA) these species or their designated critical habitats: Snake River sockeye salmon (*Oncorhynchus nerka*), Snake River spring/summer chinook salmon (*O. tshawytscha*), Snake River fall-run chinook salmon (*O. tshawytscha*), Lower Columbia River steelhead (*O. mykiss*), Upper Columbia River steelhead (*O. mykiss*), Snake River steelhead (*O. mykiss*), Middle Columbia River steelhead (*O. mykiss*), Columbia River chum salmon (*O. keta*), Lower Columbia River chinook salmon (*O. tshawytscha*), and Upper Columbia River spring run chinook salmon (*O. tshawytscha*). References and dates for the listing status, critical habitat designations and ESA section 4(d) take prohibitions of these 10 species are provided in Table 1.

The objective of this consultation is to determine whether the proposed action is likely to jeopardize the continued existence of the 10 listed ESUs of Columbia Basin salmonids described above, or destroy or adversely modify their critical habitats.

1.2 Proposed Actions

The proposed action is the construction of 597 m of riprap along the bank of the Columbia River at five locations between milepost 22.5 and 23.7 on the shoulder of Interstate 84. Fill and excavation for the proposed action will total 26,000 cubic m and 2,760 cubic m, respectively. Fill and excavation below the 2-year flood elevation will total 7,800 cubic m and 850 cubic m, respectively. At all five locations, a one lane temporary access road exists or will be constructed to provide construction access to the project sites. Existing riprap and river bed materials will be removed by backhoe, bulldozer or similar equipment to excavate a toe trench. Excavated material will be stockpiled at the toe of slope for reincorporation in the final embankment. An irregular riprap bank line with be constructed, incorporating bull-noses, and bioengineered features such as 34 large coniferous trees with rootwads attached, willow brush layering, and willow stakes into the new toe of slope. No construction equipment will enter the flowing water and no construction will occur in the water. No construction material will be allowed to enter the water and excavated material will be removed during low water when sediments are exposed. Estimated time to complete this project is 4 months.

Although a bioengineered embankment was considered during development of the proposed action, site specific constraints such as extreme weather conditions, fluctuation of river level,

Table 1. References for additional background on listing status, biological information, and critical habitat elements for the listed and proposed species considered in this biological opinion.

Species	Listing Status	Critical Habitat	Protective Regulations	Biological Information, Historical Population Trends
Columbia River chum salmon	March 25, 1999; 64 FR 14508, Threatened	February 16, 2000; 65 FR 7764	July 10, 2000; 65 FR 42422	Johnson *et al.* 1997; Salo 1991
Lower Columbia River steelhead	March 19, 1998; 63 FR 13347, Threatened	February 16, 2000; 65 FR 7764	July 10, 2000; 65 FR 42422	Busby *et al.* 1995; 1996
Middle Columbia River steelhead	March 25, 1999; 64 FR 14517, Threatened	February 16, 2000; 65 FR 7764	July 10, 2000; 65 FR 42422	Busby *et al.* 1995; 1996
Upper Columbia River steelhead	August 18, 1997; 62 FR 43937, Endangered	February 16, 2000; 65 FR 7764	July 10, 2000; 65 FR 42422	Busby *et al.* 1995; 1996
Snake River Basin steelhead	August 18, 1997; 62 FR 43937, Threatened	February 16, 2000; 65 FR 7764	July 10, 2000; 65 FR 42422	Busby *et al.* 1995; 1996
Snake River sockeye salmon	November 20, 1991; 56 FR 58619, Endangered	December 28, 1993; 58 FR 68543	November 20, 1991; 56 FR 58619	Waples *et al.* 1991a; Burgner 1991
Lower Columbia River chinook salmon	March 24, 1999; 64 FR 14308, Threatened	February 16, 2000; 65 FR 7764	July 10, 2000; 65 FR 42422	Myers *et al.*1998; Healey 1991
Upper Columbia River spring-run chinook salmon	March 24, 1999; 64 FR 14308, Endangered	February 16, 2000; 65 FR 7764	July 10, 2000; 65 FR 42422	Myers *et al.*1998; Healey 1991
Snake River spring/summer-run chinook salmon	April 22, 1992; 57 FR 14653, Threatened	December 28, 1993; 58 FR 68543	April 22, 1992; 57 FR 14653	Matthews and Waples 1991; Healey 1991
Snake River fall-run chinook salmon	April 22, 1992; 57 FR 14653, Threatened	December 28, 1993; 58 FR 68543	April 22, 1992; 57 FR 14653	Waples *et al.* 1991b; Healey 1991

slope steepness, river velocities, wind, and barge wave energy limit the effectiveness of traditional bioengineered solutions. To minimize potential adverse effects and maximize potential beneficial effects to designated critical habitats, bioengineering features were incorporated into the hardened embankment design as described above. An estimated 18,000 willow cuttings will be planted as a result of the willow brush layering and willow stakes.

The project BA includes a set of best management practices (BMPs) designed to minimize adverse effects on steelhead, salmon and their habitats. These BMPs are described on page 11 of the BA. Specific BMPs for in-water work, bank work, erosion control, hazardous materials, and site-specific conservation measures are included. The NMFS regard these BMPs as integral components of the project and considers them to be part of the proposed action.

Direct and indirect effects to listed species will occur at the project site and may extend upstream or downstream based on the potential for sediment and pollutant discharge, and the extent of riparian habitat modifications. Indirect effects to listed species may occur throughout the watershed where actions described in this Opinion lead to additional activities or affect ecological functions contributing to stream degradation. As such, the action area for the proposed activities include the immediate river bed and banks where the proposed action will occur, and those areas upstream and downstream that may reasonably be affected, temporarily or in the long term. For the purposes of this Opinion, the action area is defined as the streambed and streambank of Columbia River extending upstream and downstream one mile below the project disturbance limits. Other areas of the Columbia River are not expected to be directly affected. There may be temporary indirect effects (sedimentation and construction contaminants) to the Columbia River caused by the in-water work and general riparian and bank disturbance within the project area.

1.3 Biological Information and Critical Habitat

Based on typical juvenile out-migration timing for steelhead and chinook (DeHart 2001 and Dawley et al. 1986) at Bonneville Dam (RM 146) and at Jones Beach (RM47), the NMFS expects that some juvenile salmonids may be present in the project area (RM 127-128) during the proposed construction period. The proposed action would occur within designated critical habitats for listed species.

The action area is defined by NMFS regulations (50 CFR 402) as "all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action." The action area includes designated critical habitats affected by the proposed actions within the Columbia River (RM 127-128). The action area for the proposed projects includes the actual river bank/highway embankment prism and the area affected by a potential sediment plume, approximately 300 feet downstream. The Columbia River at the project sites serve as a migration area for all 10 ESUs under consideration in this Opinion. It may also serve as a feeding and rearing area for juvenile chum and sub-yearling chinook salmon. Essential features of the area for the species are: (1) Substrate, (2) water quality, (3) water quantity, (4) water temperature, (5) water velocity, (6) cover/shelter, (7) food (juvenile only), (8) riparian vegetation, (9) space, and (10) safe passage conditions (50 CFR 226).

The essential feature the proposed project may affect is disturbance of river substrate resulting from the fill and excavation activities.

1.4 Evaluating Proposed Actions

The standards for determining jeopardy are set forth in section 7(a)(2) of the ESA as defined by 50 CFR Part 402 (the consultation regulations). NMFS must determine whether the action is likely to jeopardize the listed species and/or whether the action is likely to destroy or adversely modify designated critical habitats. This analysis involves the initial steps of (1) defining the biological requirements and current status of the listed species, and (2) evaluating the relevance of the environmental baseline to the species' current status.

Subsequently, NMFS evaluates whether the action is likely to jeopardize the listed species by determining if the species can be expected to survive with an adequate potential for recovery. In making this determination, NMFS must consider the estimated level of mortality attributable to: (1) Collective effects of the proposed or continuing action, (2) the environmental baseline, and (3) any cumulative effects. If NMFS finds that the action is likely to jeopardize the listed species, NMFS must identify reasonable and prudent alternatives for the action.

Furthermore, NMFS evaluates whether the action, directly or indirectly, is likely to destroy or adversely modify the listed species' designated critical habitat. NMFS must determine whether habitat modifications appreciably diminish the value of critical habitat for both survival and recovery of the listed species. NMFS identifies those effects of the action that impair the function of any essential element of critical habitat. If NMFS concludes that the action will destroy or adversely modify critical habitat, it must identify any reasonable and prudent measures available.

For the proposed action, a jeopardy analysis by NMFS considers direct or indirect mortality of fish attributable to the action. A critical habitat analysis by NMFS considers the extent to which the proposed actions impair the function of essential elements necessary for migration, spawning, and rearing salmon under the existing environmental baseline.

1.4.1 Biological Requirements

The first step in the methods NMFS uses for applying the ESA section 7(a)(2) to listed salmonids is to define the species' biological requirements that are most relevant to each consultation. The NMFS also considers the current status of the listed species taking into account population size, trends, distribution and genetic diversity. To assess the current status of the listed species, NMFS 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 relevant biological requirements are those necessary for the listed species to survive and recover to a naturally reproducing population level at which 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 this consultation, the biological requirements are improved habitat characteristics that function to support successful rearing and migration. The current status of the listed species, based upon their risk of extinction, has not significantly improved since the species were listed.

1.4.2 Environmental Baseline

The most recent evaluation of the environmental baseline for the Columbia River is part of the NMFS's Opinion for the Federal Columbia River Power System (FCRPS) issued in December 2000. This Opinion assessed the entire Columbia River system below Chief Joseph Dam and downstream to the farthest point (the Columbia River estuary and nearshore ocean environment) at which listed salmonids are influenced. For a detailed evaluation of the environmental baseline of the Columbia River basin please refer to the FCRPS Opinion (NMFS 2000).

The quality and quantity of freshwater habitats in much of the Columbia River basin have declined dramatically in the last 150 years. Forestry, farming, grazing, road construction, hydrosystem development, mining, and urbanization have radically changed the historical habitat conditions of the basin.

Water quality in streams throughout the Columbia River basin has been degraded by human activities such as dams and diversion structures, water withdrawals, farming and grazing, road construction, timber harvest activities, mining activities, and urbanization. Sediment and contaminants from the tributaries settle in mainstem reaches and the estuary and contribute to poor water quality. Temperature alterations affect salmonid metabolism, growth rate, spawning success, and disease resistance, as well as the timing of adult migrations, fry emergence, and smoltification. Many factors can cause high stream temperatures, but they are primarily related to land-use practices rather than point-source discharges. Loss of wetlands and increases in groundwater withdrawals have contributed to lower base-stream flows, which in turn contribute to temperature increases. Channel widening and land uses that create shallower streams also cause temperature increases.

Pollutants also degrade water quality. Salmon require clean gravel for successful spawning, egg incubation, and emergence of fry. Fine sediments clog the spaces between gravel and restrict the flow of oxygen-rich water to the incubating eggs. Excess nutrients, low concentrations of dissolved oxygen, heavy metals, and changes in pH also directly affect the water quality for salmon and steelhead.

Water quantity problems are also a significant cause of habitat degradation and reduced fish production. Withdrawing water for irrigation, urban, and other uses can increase temperatures, smolt travel time, and sedimentation. Return water from irrigated fields can introduce nutrients and pesticides into streams and rivers. On a larger landscape scale, human activities have affected the timing and amount of peak water runoff from rain and snowmelt. Many riparian areas, flood plains, and wetlands that once stored water during periods of high runoff have been developed. Urbanization paves over or compacts soil and alters the volume and timing of runoff reaching rivers and streams.

The Columbia River estuary also has been changed by human activities. Historically, the

downstream half of the estuary was a dynamic environment with multiple channels, extensive wetlands, sandbars, and shallow areas. The mouth of the Columbia River was about four miles wide. Today, navigation channels have been dredged, deepened and maintained, jetties and pile-dike fields have been constructed to stabilize and concentrate flow in navigation channels, marsh and riparian habitats have been filled and diked, and causeways have been constructed across waterways. These actions have decreased the width of the mouth of the Columbia River to 2 miles and increased the depth of the Columbia River channel at the bar from less than 20 to more than 55 feet.

In the action area for the proposed project, near River Miles 127-128, the environmental baseline has been further degraded by human activity. This area consists of constructed highway embankments in various states of failure along the Oregon shore. The riparian area in this reach of the Columbia River contains little cover and vegetation. The development of this area contributes to the degraded conditions of the Columbia River including reduced water quality, increased water temperature, altered timing and quantity of runoff, and decreased riparian cover and habitat refugia.

1.5 Analysis of Effects

1.5.1 Effects of Proposed Actions

Creeks and rivers are dynamic systems that naturally alter their courses in response to many physical processes. Roadways and other structures constructed along waterways are subject to flooding and undercutting as a result of these natural changes in the stream course. Structural hardening of embankments is the traditional means of protecting these structures along waterways.

Hardened embankments simplify stream channels, alter hydraulic processes, and prevent natural channel adjustments (Spence *et al*. 1996). Moreover, embankment hardening may shift the erosion point either upstream or downstream of the project site and contribute to stream velocity acceleration. As amplified erosive forces attack different locations and landowners respond with more bank hardening, the river eventually attains a continuous fixed alignment lacking habitat complexity (USACE 1977).

Fish habitats are enhanced by the diversity of habitats at the land-water interface and adjacent bank (USACE 1977). Streamside vegetation provides shade that reduces water temperature. Overhanging branches provide cover from predators. Insects and other invertebrates that fall from overhanging branches may be preyed upon by fish, or provide food sources for other prey organisms. Immersed vegetation, logs, and root wads provide points of attachment for aquatic prey organisms, create shelter from swift currents during high flow events, retain bed load materials, create pools, and reduce flow velocity.

The most desirable method of bank protection is revegetation. However, revegetation alone can seldom stabilize banks steeper than 3:1 (horizontal:vertical) or areas of high velocity and wave action (USACE 1977). Although they are biologically less desirable, fixed structures provide the most reliable means of bank stability. The use of structural measures should be a last resort.

Combining structural measures such as sloped riprap or mechanically stabilized earth walls, vegetation and large woody material (LWM) is preferable to a structural solution without vegetation (USACE 1977).

Sedimentation. Potential impacts to listed salmonids from the proposed action include both direct and indirect effects. Potential direct effects include mortality from exposure to suspended sediments (turbidity) and contaminants resulting for construction. Potential indirect effects include behavioral changes resulting from elevated turbidity level (Sigler *et al.* 1984, Berg and Northcote 1985, Whitman et al. 1982, Gregory 1988), during river bank habitat alterations.

Suspended sediment and turbidity influences on fish reported in the literature range from beneficial to detrimental. Elevated total suspended solids (TSS) conditions have been reported to enhance cover conditions, reduce piscivorous fish/bird predation rates, and improve survival. Elevated TSS conditions have also been reported to cause physiological stress, reduce growth, and adversely affect survival. Of key importance in considering the detrimental effects of TSS on fish are the frequency and the duration of the exposure, not just the TSS concentration.

Behavioral avoidance of turbid waters may be one of the most important effects of suspended sediments (DeVore *et al.* 1980, Birtwell *et al.* 1984, Scannell 1988). Salmonids have been observed to move laterally and downstream to avoid turbid plumes (McLeay *et al.* 1984, 1987, Sigler *et al.* 1984, Lloyd 1987, Scannell 1988, Servizi and Martens 1991). Juvenile salmonids tend to avoid streams that are chronically turbid, such as glacial streams or those disturbed by human activities, unless the fish need to traverse these streams along migration routes (Lloyd *et al.* 1987). In addition, a potentially positive reported effect is providing refuge and cover from predation (Gregory and Levings 1988).

Fish that remain in turbid, or elevated TSS, waters experience a reduction in predation from piscivorous fish and birds (Gregory and Levings 1998). In systems with intense predation pressure, this provides a beneficial trade off (e.g., enhanced survival) to the cost of potential physical effects (e.g., reduced growth). Turbidity levels of about 23 Nephalometric Turbidity Units (NTU) have been found to minimize bird and fish predation risks (Gregory 1993). Exposure duration is a critical determinant of the occurrence and importance of physical or behavioral effects (Newcombe and MacDonald 1991). Salmonids have evolved in systems that periodically experience short-term pulses (days to weeks) of high suspended sediment loads, often associated with flood events, and are adapted to such high pulse exposures. Adult and larger juvenile salmonids may be little affected by the high concentrations of suspended sediments that occur during storm and snowmelt runoff episodes (Bjorn and Reiser 1991). However, research shows that chronic exposure can cause physiological stress responses that can increase maintenance energy and reduce feeding and growth (Redding et al. 1987, Lloyd 1987, Servizi and Martens 1991).

Turbidity, at moderate levels, has the potential to adversely affect primary and secondary productivity, and at high levels, has the potential to injure and kill adult and juvenile fish, and may also interfere with feeding (Spence *et al.* 1996). Newly emerged salmonid fry may be vulnerable to even moderate amounts of turbidity (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 also have the potential to adversely affect primary and secondary productivity (Spence *et al.* 1996), and to reduce incubation success (Bell 1991) and cover for juvenile salmonids (Bjornn and Reiser 1991). Because the potential for turbidity should be localized and brief, the probability of direct mortality is negligable.

Chemical Contamination. As with all construction activities, accidental release of fuel, oil, and other contaminants may occur. Operation of the back-hoes, excavators, and other equipment requires the use of fuel, lubricants, etc., which, if spilled into the channel of a water body or into the adjacent riparian zone, can injure or kill aquatic organisms. Petroleum-based contaminants (such as fuel, oil, and some hydraulic fluids) contain poly-cyclic aromatic hydrocarbons (PAHs), which can be acutely toxic to salmonids at high levels of exposure and can also cause chronic lethal and acute and chronic sublethal effects to aquatic organisms (Neff 1985). Similarly, exposure to herbicides can have lethal and sublethal effects on salmonids, aquatic invertebrates, aquatic vegetation, and target and non target riparian vegetation (Spence *et al.* 1996).

Construction related effects necessary to complete the proposed action will be minimized by completing the in-water work during low flow periods. No construction or construction equipment will enter the flowing water as a result of the proposed action.

Vegetation Removal. The construction of access roads and embankment construction will result in some native and non-native riparian vegetation removal. Minor amounts of riparian vegetation will be lost because of this project, since little currently exists in the project area. Extensive willow plantings will help to offset the loss of any functional benefits associated with necessary vegetation removal. Temporary increases in water temperature may result as a result of vegetation removal.

Space. The proposed action will result in the net loss of 7,800 cubic m of space below the 2-year flood elevation. However, the finished embankment will result in a net increase of 197 m in total length of shoreline. Habitat complexity and quality will improve as a result of incorporation of bull-noses, large coniferous trees with rootwads attached and extensive willow plantings along the finished embankment. The increase in shoreline length, habitat complexity and quality is expected to result in a long-term beneficial affect on anadromous salmonid migration and rearing habitat at the project sites.

1.5.2 Effects on Critical Habitat

NMFS designates critical habitat based on physical and biological features that are essential to the listed species. Essential features for designated critical habitat include substrate, water quality, water quantity, water temperature, food, riparian vegetation, access, water velocity, space and safe passage. Effects on critical habitat from the proposed action are included in the effects description above.

1.5.3 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." Future Federal actions, including the ongoing operation of hydropower systems, hatcheries, fisheries, and land management activities are being (or have been) reviewed through separate section 7 consultation processes. Therefore, these actions are not considered cumulative to the proposed actions.

The NMFS is not aware of any specific future non-Federal activities within the action area that would cause greater impacts to listed species than presently occurs. However, development of structures and vegetation clearing along the streams is likely to continue. The NMFS assumes that future private and state actions will continue at similar intensities as in recent years**.**

1.6 Conclusion

NMFS has determined, based on the available information, that the proposed actions covered in this Opinion are not likely to jeopardize the continued existence of listed salmonids or adversely modify critical habitats. NMFS used the best available scientific and commercial data to apply its jeopardy analysis, when analyzing the effects of the proposed actions on the biological requirements of the species relative to the environmental baseline, together with cumulative effects. The proposed actions would cause a minor, short-term degradation of anadromous salmonid habitat due to turbidity caused by fill and excavation below the 2-year flood elevation. NMFS does not expect direct mortality to listed salmonids from the proposed action.

2. INCIDENTAL TAKE STATEMENT

Section 4 (d) and Section 9 of the ESA prohibit any taking (harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, collect, or attempt to engage in any such conduct) of listed species without a specific permit or exemption. Harm is further defined to 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 (50 CFR 222.102; October 1, 2000). Harass is defined as actions that create the likelihood of injuring listed species to such an extent as to significantly alter normal behavior patterns which include, but are not limited to, breeding, feeding, and sheltering. Incidental take is take of listed animal species that results from, but is not the purpose of, the Federal agency or the applicant carrying out 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 prohibited taking provided that such taking is in compliance with the terms and conditions of this incidental take statement.

An incidental take statement specifies the impact of any incidental taking of threatened species. It also provides reasonable and prudent measures that are necessary to minimize impacts and sets forth terms and conditions with which the action agency must comply in order to implement the reasonable and prudent measures.

2.1 Amount or Extent of the Take

The NMFS anticipates that the action covered by this Opinion is reasonably certain to result incidental take of listed salmonids because of detrimental effects from increased turbidity levels (non-lethal) and indirect effects from alteration of critical habitat features. Effects of the action covered by this Opinion are largely unquantifiable in the short term, and are not expected to be measurable as long-term adverse effects on habitat or population levels. Therefore, even though NMFS expects some low level incidental take to occur due to the action covered by this Opinion, the best scientific and commercial data available are not sufficient to enable NMFS to estimate a specific amount of incidental take to the species itself. In instances such as these, the NMFS designates the expected level of take as "unquantifiable." Based on the information provided by the COE and other available information, NMFS anticipates that an unquantifiable amount of incidental take could occur as a result of the action covered by this Opinion. The extent of the take is limited to the action area.

2.2 Reasonable and Prudent Measures

The measures described below are non-discretionary. They must be implemented so that they become binding conditions in order for the exemption in section 7(a)(2) to apply. The COE has the continuing duty to regulate the activities covered in this incidental take statement. If the COE fails to adhere to the terms and conditions of the incidental take statement through enforceable terms added to the document authorizing this action, or fails to retain the oversight to ensure compliance with these terms and conditions, the protective coverage of section 7(a)(2) may lapse.

The NMFS believes that the following reasonable and prudent measures are necessary and appropriate to minimize take of the above species. The COE shall:

1. Minimize the likelihood of incidental take from streambank and shoreline protection actions by directing the contractor to use an approach that maximizes ecological functions and the best available bioengineering technology.

2. Minimize the likelihood of incidental take from activities involving temporary access roads, use of heavy equipment, earthwork, site restoration, or that may otherwise involve in-water work or affect fish passage by directing the contractor to avoid or minimize disturbance to riparian and aquatic systems.

3. Minimize the likelihood of incidental take from in-water work activities by ensuring that the in-water work activities (toe trench excavation and scour protection placement) are isolated from flowing water.

4. Complete a comprehensive monitoring and reporting program to ensure implementation of these conservation measures are effective in minimizing the likelihood of take from permitted activities.

2.3 Terms and Conditions

To be exempt from the prohibitions of section 9 of the ESA, the COE 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 (streambank protection), the COE shall ensure that:
    a. The use of rock and riprap is minimized.
        i. Rock will be individually placed in a way that produces an irregularly contoured face to provide velocity disruption. No end dumping will be allowed.
    b. Any instream large wood or riparian vegetation that is moved or altered during construction will stay on site or be replaced with a functional equivalent.
    c. The bankline will be revegetated using natural vegetation.

2. To implement Reasonable and Prudent Measure #2 (construction), the COE shall ensure that:
    a. Project design. Alteration or disturbance of the stream banks and existing riparian vegetation will be minimized.
    b. In-water work. All work within the active channel will be completed within the low flow period, no construction equipment will enter the flowing water, and no construction will occur in the water.
    c. Pollution and erosion control plan. A Pollution and Erosion Control Plan (PECP) will be developed for the project to prevent point-source pollution related to construction operations. The PECP will contain the pertinent elements listed below and meet requirements of all applicable laws and regulations:
        i. Methods that will be used to prevent erosion and sedimentation associated with access roads, construction sites, equipment and material storage sites, fueling operations and staging areas.
        ii. A description of the hazardous products or materials that will be used, including inventory, storage, handling, and monitoring.
        iii. A spill containment and control plan with notification procedures, specific clean up and disposal instructions for different products, quick response containment and clean up measures that will be available on site, proposed methods for disposal of spilled materials, and employee training for spill containment.
        iv. Measures that will be taken to prevent construction debris from falling into any aquatic habitat. Any material that falls into a stream during construction operations will be removed in a manner that has a minimum impact on the streambed and water quality.
    d. Pre-construction activities. Prior to significant alteration of the action area, the following actions will be accomplished:
        i. Boundaries of the clearing limits associated with site access and construction are flagged to prevent ground disturbance of critical riparian vegetation, wetlands and other sensitive sites beyond the flagged boundary.

ii. A supply of erosion control materials (e.g., silt fence and straw bales) is on hand to respond to sediment emergencies. Sterile straw or hay bales will be used when available to prevent introduction of weeds.

iii. All temporary erosion controls (e.g., straw bales, silt fences) are in place and appropriately installed downslope of project activities within the riparian area. Effective erosion control measures will be in place at all times during the contract, and will remain and be maintained until such time that permanent erosion control measures are effective.

e. Earthwork. Earthwork, including excavation, filling and compacting, is completed in the following manner:

i. Boulders, rock, woody materials and other natural construction materials used for the project must be obtained from outside of the riparian area.

ii. Material removed during excavation will only be placed in locations where it cannot enter streams or other water bodies.

iii. All exposed or disturbed areas will be stabilized to prevent erosion.

(1) Areas of bare soil within 150 feet of waterways, wetlands or other sensitive areas will be stabilized by native seeding,[1] mulching, and placement of erosion control blankets and mats, if applicable, quickly as reasonable after exposure, but within 7 days of exposure.

(2) All other areas will be stabilized as quickly as reasonable, but within 14 days of exposure.

(3) Seeding outside of the growing season will not be considered adequate for permanent stabilization.

f. Heavy Equipment. Heavy equipment use will be fueled, maintained and stored as follows:

i. Vehicle staging, maintenance, refueling, and fuel storage areas will be a minimum of 150 feet horizontal distance from any stream.

ii. All vehicles operated within 150 feet of any stream or water body will be inspected daily for fluid leaks before leaving the vehicle staging area. Any leaks detected will be repaired before the vehicle resumes operation.

iii. When not in use, vehicles will be stored in the vehicle staging area.

g. Site restoration. Site restoration and clean-up, including protection of bare earth by seeding, planting, mulching and fertilizing, will be done in the following manner:

i. Disturbed areas will be planted with native vegetation specific to the project vicinity or the region of the state where the project is located, and will comprise a diverse assemblage of woody and herbaceous species.

ii. No herbicide application will occur as part of this permitted action. Mechanical removal of undesired vegetation and root nodes is permitted.

iii. No surface application of fertilizer will be used within 50 feet of any stream channel as part of this permitted action.

---

[1] By Executive Order 13112 (February 3, 1999), Federal agencies are not authorized to permit, fund or carry out actions that are likely to cause, or promote, the introduction or spread of invasive species. Therefore, only native vegetation that is indigenous to the project vicinity, or the region of the state where the project is located, shall be used.

iv. Plantings will achieve an 80 percent survival success after 3 years within the natural vegetation zone at the project site.
(1) If success standard has not been achieved after 3 years, the applicant will submit an alternative plan to NMFS. The alternative plan will address temporal loss of function.
(2) Plant establishment monitoring will continue and plans will be submitted to the NMFS until site restoration success has been achieved.

3. To implement Reasonable and Prudent Measure #3 (in-water work area activities) the COE shall ensure that the in-water work activities (toe trench excavation and scour protection placement) are isolated from flowing water.

4. To implement Reasonable and Prudent Measure #4 (monitoring and reporting), the COE shall ensure that:
a. Within 120 days of completing the project, the COE shall ensure submittal of a monitoring report to NMFS describing the COE's success meeting their permit conditions. This report will consist of the following information:
i. Project identification.
(1) Project name.
(2) starting and ending dates of work completed for this project.
(3) the COE contact person.
ii. Isolation of in-water work area. All projects involving isolation of in-water work areas must include a report of any seine and release activity including:
(1) The name and address of the supervisory fish biologist,
(2) methods used to isolate the work area and minimize disturbances to fish species,
(3) stream conditions prior to and following placement and removal of barriers,
(4) the means of fish removal,
(5) the number of fish removed by species,
(6) the location and condition of all fish released, and
(7) any incidence of observed injury or mortality.
iii. Pollution and erosion control. A summary of all pollution and erosion control inspection reports, including descriptions of any failures experienced with erosion control measures, efforts made to correct them and a description of any accidental spills of hazardous materials.
iv. Site restoration. Documentation of the following conditions:
(1) Finished grade slopes and elevations.
(2) Log and rock structure elevations, orientation, and anchoring, if any.
(3) Planting composition and density.
(4) A plan to inspect and, if necessary, replace failed plantings and structures for a period of 5 years, including the compensatory mitigation site.

v. A narrative assessment of the effects of the project and compensatory mitigation on natural stream function.

vi. Photographic documentation of environmental conditions at the project site before, during and after project completion.

(1) Photographs will include general project location views and close-ups showing details of the project area and project, including pre- and post-construction.

(2) Each photograph will be labeled with the date, time, photo point, project name, the name of the photographer, and a comment describing the photograph's subject.

(3) Relevant environmental conditions include characteristics of channels, streambanks, riparian vegetation, flows, water quality, and other visually discernable environmental conditions at the project area, and upstream and downstream of the project.

b. Submit monitoring reports to:

National Marine Fisheries Service
Oregon Habitat Branch, Habitat Conservation Division
Attn: OHB2002-0044
525 NE Oregon Street, Suite 500
Portland, Oregon 97232-2778

c. If a dead, injured, or sick endangered or threatened species specimen is located, initial notification must be made to the National Marine Fishery Service Law Enforcement Office, located at Vancouver Field Office, 600 Maritime, Suite 130, Vancouver, Washington 98661; at (360) 418-4246. Care will 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 unnecessarily disturbed.

3. MAGNUSON-STEVENS ACT

3.1 Background

The objective of the essential fish habitat (EFH) consultation is to determine whether the proposed actions 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 actions.

3.2 Magnuson-Stevens Fishery Conservation and Management Act

The Magnuson-Stevens Fishery Conservation and Management Act (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 NMFS on activities that may adversely affect EFH.

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 (50CFR600.110).

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

- Federal agencies must consult with NMFS on all actions, or proposed actions, authorized, funded, or undertaken by the agency, that may adversely affect EFH.
- NMFS 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 NMFS provide a detailed response in writing to NMFS 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 NMFS, 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 NMFS is required by Federal agencies undertaking, permitting or funding activities that may adversely affect EFH, regardless of its location.

3.3 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 (370.4 km)(PFMC 1998a, 1998b). Freshwater EFH for Pacific salmon includes all those streams, lakes, ponds, wetlands, and other water bodies currently, or historically accessible to salmon in Washington, Oregon, Idaho, and California, except areas upstream of certain impassable man-made barriers (as identified by the PFMC), and longstanding, naturally-impassable barriers (i.e., 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 (370.4 km) 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 NMFS 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 actions is based on this information.

3.4 Proposed Actions

The proposed actions are detailed above in section 1.2. The action area includes designated critical habitat affected by the proposed action within the Columbia River. This area has been designated as EFH for various life stages of chinook and coho salmon and starry flounder (*Platyichthys stellatus*).

3.5 Effects of Proposed Action

As described in detail in section 1.5 of this document, the proposed activities may result in short-term adverse effects to water quality (sediment and chemical contamination). Long-term beneficial effects are likely from greater cross-sectional channel area and improved hydraulic conditions under the new structure.

Effect #1: Sedimentation - Excavation and fill of the stream bank in the wetted channel during installation of the scour protection will result in short-term releases of sediment. An increase in turbidity can impact fish and filter-feeding macroinvertebrates downstream of the work site.

Effect #2: Chemical Contamination - As with all construction activities, accidental release of fuel, oil, and other contaminants may occur.

Effect #3: Vegetation Removal - Minor amounts of riparian vegetation will be removed and extensive willow plantings will more than offset any short-term adverse effects to habitat.

Effect #4: Space - Incorporation of bull-noses, large coniferous trees with rootwads attached, and extensive willow plantings will result in long-term beneficial affects to rearing and migration habitat.

3.6 Conclusion

NMFS believes that the proposed actions may adversely affect the EFH for Pacific salmon species and starry flounder (*Platyichthys stellatus*).

3.7 EFH Conservation Recommendations

Pursuant to section 305(b)(4)(A) of the Magnuson-Stevens Act, NMFS 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 and all of the Reasonable and Prudent Measures and the Terms and Conditions contained in Sections 2.2 and 2.3 are applicable to EFH. Therefore, NMFS incorporates each of those measures here as EFH conservation recommendations.

3.8 Statutory Response Requirement

Please note that the Magnuson-Stevens Act (section 305(b)) and 50 CFR 600.920(j) requires the Federal agency to provide a written response to NMFS 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 NMFS, the agency must explain its reasons for not following the recommendation.

3.9 Consultation Renewal

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

4. LITERATURE CITED

Bell, M.C. 1991. Fisheries handbook of Engineering requirements and biological criteria. Fish Passage Development and Evaluation Program. U.S. Army Corps of Engineers. North Pacific Division.

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.

Birtwell, I. K., G. F. Hartman, B. Anderson, D. J. McLeay, and J. G. Malick. 1984. A Brief Investigation of Arctic Grayling (*Thymallus arcticus*) and Aquatic Invertebrates in the Minto Creek Drainage, Mayo, Yukon Territory: An Area Subjected to Placer Mining. Canadian Technical Report of Fisheries and Aquatic Sciences 1287.

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.

Dawley, E. M., R. D. Ledgerwood, T. H. Blahm, C. W. Sims, J. T. Durkin, R. A. Kirn, A. E. Rankis, G. E. Moran, and F. J. Ossiander. 1986. Migrational characteristics, biological observations, and relative survival of juvenile salmonids entering the Columbia River estuary, 1966-1983. Final Report of National Marine Fisheries Service, Northwest Fisheries Science Center, Seattle, Washington, to Bonneville Power Administration, Portland, Oregon.

DeHart, M. 2001. Fish Passage Center of the Columbia Basin Fish & Wildlife Authority 2000 Annual Report (Draft). March. 108 pp. plus Appendices.

DeVore, P. W., L. T. Brooke, and W. A. Swenson. 1980. The effects of red clay turbidity and sedimentation on aquatic life in the Nemadji River System. Impact of nonpoint pollution control on western Lake Superior. S. C. Andrews, R. G. Christensen, and C. D. Wilson. Washington, D.C., U.S. Environmental Protection Agency. EPA Report 905/9-79-002-B.

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.

Gregory, R.S. 1993. Effect of turbidity on the predator avoidance behavior of juvenile chinook salmon (*Oncorhynchus tshawytcha*). Canadian J. Fish. Aquatic Sciences 50:241-246.

Gregory, R. S. 1988. Effects of Turbidity on benthic foraging and predation risk in juvenile chinook salmon. Pages 64-73 *In:* C. A. Simenstad (ed.). Effects of dredging on anadromous Pacific coast fishes. Washington Sea Grant Program. Washington State University. Seattle, Washington.

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.

McLeay, D. J., G. L. Ennis, I. K. Birtwell, and G. F. Hartman. 1984. Effects on arctic grayling (*Thymallus arcticus*) of prolonged exposure to Yukon placer mining sediment: A laboratory study. Canadian Technical Report of Fisheries and Aquatic Sciences 1241.

McLeay, D. J., I. K. Birtwell, G. F. Hartman, and G. L. Ennis. 1987. Responses of arctic grayling (*Thymallus arcticus*) to acute and prolonged exposure to Yukon placer mining sediment. Canadian Journal of Fisheries and Aquatic Sciences 44: 658-673.

Neff, J.M. 1985. Polycyclic aromatic hydrocarbons. *In*: Fundamentals of aquatic toxicology, G.M. Rand and S.R. Petrocelli, pp. 416-454. 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.

NMFS (National Marine Fisheries Service). 2000. Biological Opinion: Reinitiation of Consultation on Operation of the Federal Columbia River Power System, Including the Juvenile Fish Transportation Program, and 19 Bureau of Reclamation Projects in the Columbia Basin. Web site: http://www.nwr.noaa.gov/1hydrop/hydroweb/docs/Final/2000Biop.html. December 21, 2000.

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.

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.

Scannell, P.O. 1988. Effects of elevated sediment levels from placer mining on survival and behavior of immature arctic grayling. Alaska Cooperative Fishery Unit, University of Alaska. Unit Contribution 27.

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. 1984.

Spence, B. C., G. A. Lomnicky, R. M. Hughes, and R. P. Novitzki. 1996. An ecosystem approach to salmonid conservation. ManTech Environmental Research Services, Inc., Corvallis, Oregon, to National Marine Fisheries Service, Habitat Conservation Division, Portland, Oregon (Project TR-4501-96-6057).

USACE (United States Army Corps of Engineers). 1977. Nehalem wetlands review: A comprehensive assessment of the Nehalem Bay and River (Oregon). U.S. Army Engineer District, Portland, Oregon. [Page count unknown].

Whitman, R.P., T.P. Quinn and E.L. Brannon. 1982. Influence of suspended volcanic ash on homing behavior of adult chinook salmon. Trans. Am. Fish. Soc. 113:142-150.