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:
2003/00787

January 23, 2004

Mr. Lawrence C. Evans
U.S. Army Corps of Engineers
Attn: Mary Headley
Portland District, CENWP-CO-GP
P.O. Box 2946
Portland, OR 97208-2946

Re: Endangered Species Act Section 7 Formal Consultation and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Consultation for the Hayden Island Condos and Marina, Hayden Island, Columbia River, Multnomah County, Oregon (Corps No. 200300374)

Dear Mr. Evans:

Enclosed is a biological opinion (Opinion) prepared by NOAA's National Marine Fisheries Service (NOAA Fisheries) pursuant to section 7 of the Endangered Species Act (ESA) for the issuance of a permit under section 10 of the Rivers and Harbors Act to authorize construction of the Hayden Island Condos project on Hayden Island, Columbia River, Multnomah County, Oregon. The Corps of Engineers (COE) requested formal consultation on this action, and determined that the action may adversely affect Snake River sockeye salmon (*Oncorhynchus nerka*), Snake River fall-run chinook salmon (*O. tshawytscha*), Snake River spring/summer-run chinook salmon, Upper Columbia River spring-run chinook salmon, Lower Columbia River chinook salmon, Upper Willamette River chinook salmon, Columbia River chum salmon (*O. keta*), Snake River steelhead (*O. mykiss*), Upper Columbia River steelhead, Middle Columbia River steelhead, Upper Willamette River steelhead, and Lower Columbia River steelhead, or destroy or adversely modify designated critical habitat(s). NOAA Fisheries concludes in this Opinion that the proposed action is not likely to jeopardize the continued existence of the above-listed species or destroy or adversely modify designated critical habitat.

Pursuant to section 7 of the ESA, NOAA Fisheries has included reasonable and prudent measures with non-discretionary terms and conditions that NOAA Fisheries believes are necessary and appropriate to minimize the potential for incidental take associated with this project.

This document also serves as consultation on essential fish habitat (EFH) pursuant to section 305(b) of the Magnuson-Stevens Fishery Conservation and Management Act (MSA) and its implementing regulations (50 CFR Part 600). NOAA Fisheries concludes that the proposed action will adversely affect designated EFH for coho salmon and chinook salmon (*O. tshawytscha*) and starry flounder (*Platyichthys stellatus*). As required by section 305(b)(4)(A) of the MSA, included are conservation recommendations that NOAA Fisheries believes will avoid, minimize, mitigate, or otherwise offset adverse effects on EFH resulting from the proposed action. As described in the enclosed consultation, 305(b)(4)(B) of the MSA requires that a Federal action agency must provide a detailed response in writing within 30 days after receiving an EFH conservation recommendation.

Questions regarding this letter should be directed to Christy Fellas of my staff in the Willamette Basin Habitat Branch in the Oregon State Habitat Office at 503.231.2307.

Sincerely,

for Michael R Crouse

D. Robert Lohn
Regional Administrator

cc: John van Staveren, Pacific Habitat Services

Endangered Species Act - Section 7 Consultation
Biological Opinion

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

Hayden Island Condos and Marina,
Hayden Island, Columbia River,
Multnomah County, Oregon
(Corps No. 200300374)

Agency:	U.S. Army Corps of Engineers
Consultation Conducted By:	NOAA's National Marine Fisheries Service, Northwest Region
Date Issued:	January 23, 2004
Issued by:	For Michael R Crouse D. Robert Lohn Regional Administrator
Refer to:	**2003/00787**

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1. INTRODUCTION

1.1 Background

On June 19, 2003, NOAA's National Marine Fisheries Service (NOAA Fisheries) received a letter from the U.S. Army Corps of Engineers (COE) requesting formal consultation pursuant to the Endangered Species Act (ESA) for the issuance of a permit under section 10 of the Rivers and Harbors Act to Mr. Steve Morrison, Hayden Island Condos LLC, to allow condos and a new marina to be constructed on Hayden Island at river mile 106.5, Columbia River, Multnomah County, Oregon. The COE determined the proposed action was likely to adversely affect: Snake River (SR) sockeye salmon (*Oncorhynchus nerka*), SR fall chinook salmon (*O. tshawytscha*), SR spring/summer chinook salmon, Upper Columbia River (UCR) spring-run chinook salmon, Lower Columbia River (LCR) chinook salmon, Upper Willamette River (UWR) chinook salmon, Columbia River (CR) chum salmon (*O. keta*), SR steelhead (*O. mykiss*), UCR steelhead, Middle Columbia River (MCR) steelhead, UWR steelhead, and LCR steelhead, and designated critical habitat for SR sockeye, spring/summer chinook, or fall chinook salmon.

1.2 Proposed Action

The COE proposes to issue a permit enabling Hayden Island Condos LLC to construct a 112-slip marina in conjunction with a 112-unit residential condominium project, Waterside Condominiums. The site is zoned Commercial General with airport noise overlay (CGX) with R1 allowance which allows for the development of 233 residential units at 85% site coverage. The developer proposes to reduce the site coverage to 37%, leaving 63% as open space. Parking for the development will be subsurface and stormwater will be filtered on site before discharging to the City of Portland's storm system.

The proposed marina will extend 300 feet into the river from the 0-foot, 0-inch river elevation, Columbia River Datum (CRD) and 365 feet from the 8-foot, 0-inch CRD elevation. The marina will be connected to the residential development via a 100-foot long, 7-foot wide aluminum ramp extending from the top of bank to the floating concrete dock. The docks will be 4, 6, 8, and 12 feet in width, with the widest dock used on the exterior, upstream, and riverward sides of the marina to provide wave attenuation. No other wave attenuating structures are proposed. The marina will be 588 feet wide and will have approximately 60 steel pilings. The steel pipe pilings will range in size from 14 to 24 inches in diameter, with the larger diameter piles on the outer dock. Deck grating will be incorporated into the docks to allow light to penetrate below the marina. The grating will be spaced at 20-foot increments on all the dock sections and will be 24 inches by the width of the dock in that location. The grating will allow between 35 and 50% light penetration, depending on the type selected. The actual location and spacing will be determined in the final engineering drawings. There will be no covered structures or slips and no refueling or maintenance buildings.

The construction of the marina will require the installation of approximately 60, 14 to 24-inch diameter hollow steel piles into the river to a minimum penetration of 30 feet. Installation of the piles will impact an area below the ordinary high water elevation of the Columbia River; an area under the jurisdiction of the COE. The construction of the marina access ramp and the condominiums will not impact wetlands or other areas regulated by the Oregon Division of State Lands (DSL) or the COE.

To avoid the possibility of the marina floats “grounding out”, the most shoreward catwalk will be at approximately –8 feet CRD. It is predicted that at the lowest water flows in the Columbia River, water depths beneath the dock will be a minimum of 10 feet.[1] This is based on the lowest daily minimum stage (-0.8 feet CRD) at the I-5 bridge for the period from August 1994 to May 2002.

The condominium development will be between 35 to 50 feet from the top of bank, at a minimum, and a paved pedestrian path will be between the condos and the top of bank. The public path must also serve as an emergency access route, as per City of Portland requirements. The area extending 25 feet from top of bank is within the City of Portland’s Environmental Zone (E-Zone). As such, local regulations regulate this area and all plantings and construction must meet the City requirements. Vehicular access to the site will be from North Hayden Island Drive and parking will be underground. Access to the marina will be pedestrian traffic and only accessible to condo residents. Stormwater will be filtered through a biofiltration system on site before being conveyed to City storm drains. Given the sandy soil in the site, it is anticipated that nearly 100% of the stormwater will infiltrate before reaching the storm system.

The construction of the marina will take place during the Columbia River in-water work period between November 1st and February 28th. The piles will be installed via a barge using a vibratory hammer. The piles will be vibrated into the sediment to a minimum of 30 feet. The top of the pilings will be at 32 feet CRD. Caps will be placed over the exposed tops of the pilings to prevent birds from getting trapped and to discourage roosting. The docks will be fabricated off-site, barged to the site, and assembled and bolted to the pilings using small hand tools. There is no anticipated welding. It will take about one week to place the piles with a vibratory hammer and approximately 30 days to complete the dock structure, including the 100 foot ramp from the shore to the dock.

Best management practices will include sediment and pollution control efforts to minimize the impacts of the project on the fish and other wildlife in the Columbia River. This will be accomplished via the installation of erosion control devices including silt fencing around the staging area, and/or other approved erosion control methods. In addition, the following methods will be used to control the degradation of water quality:

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[1] Voicemail from John van Staveren, Pacific Habitat Services, Inc. (November 26, 2003) (answering request to locate dock structure in deeper water).

- Fueling would occur in a designated staging location well away from the Columbia River with approval by the agencies. A spill containment kit will be readily available should the need arise.

- To prevent the possibility of fuel or oil reaching the river, hazardous substances, chemicals, fuels, and lubricating oils will not be stored within 100 feet of the top of bank.

- Petroleum products, chemicals, or other deleterious materials will not be allowed to enter the river.

- Waste materials and spoils not utilized in the project will be removed from the site and disposed of in an appropriate upland location.

- All equipment will carry a spill containment cleanup kit on board.

- All contractor employees and subcontractors will be required to receive training in procedures to prevent erosion and spills.

- All erosion/sediment control devices shall be inspected weekly, at a minimum during construction to ensure that they are working adequately.

- Erosion control materials (*i.e.* silt fence, straw bales, biobags, aggregate) in excess of those installed shall be available on site for immediate use during emergency erosion control needs.

- Containment measures adequate to prevent chemical spill materials from entering any waterway shall be implemented. Waterway shall be defined as that area below the mean high-high water elevation or 10-year flood elevation, whichever is greater.

- An oil-absorbing, floating boom shall be available with the barge during in-water phases of construction.

- Vehicles operated within 150 feet of the waterway shall be free of fluid leaks. Daily examination of vehicles for fluid leaks is required during periods operated within or above the waterway.

- No pollutants of any kind (sewage, waste spoils, petroleum products, silt, welding slag and grindings) shall come in contact with the waterbody or wetlands nor their substrate below the mean high-high water elevation or 10-year flood elevation, whichever is greater.

- Vehicle maintenance, refueling of vehicles and storage of fuel shall be done at least 100 feet from the waterway.

- Temporary erosion and sediment controls will be used on all exposed slopes during any hiatus in work exceeding seven days.

- Exposed soil surfaces will be permanently stabilized at finished grade with native grass seeding and mulch.

A certified arborist conducted a review of the trees on the river bank. The twenty cottonwood trees range in size from 5 to 60 inches diameter at breast height and from 20 to 85 feet in height. According to the arborist, few of the trees are in good health, with at least 12 having wood-decaying cankers, and 14 having weak crotches or undermined root systems. All of these symptoms lead to an increased likelihood of breakage or uprooting during strong winds. The applicant therefore proposes to remove the cottonwood trees for safety reasons and replant the bank with other native species including: Red alder, Columbia River willow, mock orange, nootka rose, snowberry and thimbleberry.

To compensate for the tree removal, a bank restoration plan has been prepared using a variety of native trees and shrubs suitable for the site. Plantings beyond the top of bank will be prepared by the project's landscape architect and in accordance with the City's E-Zone requirements.

1.3 Action Area

The action area is defined by NOAA Fisheries 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 is the Columbia River including the streambed, streambank, water column and adjacent riparian zone at river mile 106.5 and 500 feet upstream and 500 feet downstream of the construction area.

2. ENDANGERED SPECIES ACT

2.1 Biological Opinion

2.1.1 Biological Information

Species' information references, listing and critical habitat designation dates and take prohibitions are listed in Table 1. The objective of this biological opinion (Opinion) is to determine whether the proposed action is likely to jeopardize the continued existence of the ESA-listed species for these species or destroy or adversely modify designated critical habitat. This consultation is conducted pursuant to section 7(a)(2) of the ESA and its implementing regulations, 50 CFR 402.

Essential habitat features for salmonids are: Substrate, water quality, water quantity, water temperature, water velocity, cover/shelter, food (juvenile only), riparian vegetation, space, and safe passage conditions. The proposed action may affect the essential habitat features of water quality, cover/shelter, riparian vegetation and space. The Columbia River within the action area serves as a rearing and migration area for listed salmonids.

2.1.2 Evaluating Proposed Action

The standards for determining jeopardy are set forth in section 7(a)(2) of the ESA as defined by 50 CFR Part 402. NOAA Fisheries must determine whether the action is likely to jeopardize the listed species and/or whether the action is likely to destroy or adversely modify critical habitat. 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, NOAA Fisheries 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, NOAA Fisheries 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 NOAA Fisheries finds that the action is likely to jeopardize the listed species, NOAA Fisheries must identify reasonable and prudent alternatives for the action.

NOAA Fisheries also evaluates whether the action, directly or indirectly, is likely to destroy or adversely modify the listed species' critical habitat. NOAA Fisheries must determine whether habitat modifications appreciably diminish the value of critical habitat for both survival and recovery of the listed species. NOAA Fisheries identifies those effects of the action that impair the function of any essential element of critical habitat. NOAA Fisheries then considers whether such impairment appreciably diminishes the habitat's value for the species' survival and recovery. If NOAA Fisheries concludes that the action will adversely modify critical habitat, it must identify any reasonable and prudent alternatives available.

For the proposed action, NOAA Fisheries' jeopardy analysis considers direct or indirect mortality of fish attributable to the action. NOAA Fisheries' analysis considers the extent to which the proposed action impairs the function of essential elements necessary for migration, spawning, and rearing of listed species under the existing environmental baseline.

2.1.3 Biological Requirements

The first step in the methods NOAA Fisheries 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. NOAA Fisheries 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, 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 relevant biological requirements are those necessary for the listed species to survive and recover to a naturally-reproducing population level, 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 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.

2.1.4 Environmental Baseline

The most recent evaluation of the environmental baseline for the Columbia River is part of the NOAA Fisheries's Biological Opinion for the Bonneville Power Administration's Habitat Improvement Program, issued in August 2003 (refer to: 2003/00750). The following is a summary for the portion of the Columbia River that is relevant to this consultation.

The quality and quantity of fresh water habitat in much of the Columbia River basin have declined dramatically in the last 150 years. Forestry, farming, grazing, road construction, hydropower system development, mining, and development have radically changed the historical habitat conditions of the basin. More than 2,500 streams, river segments, and lakes in the Northwest do not meet Federally-approved, state, and/or Tribal water quality standards and are now listed as water-quality-limited under section 303(d) of the Clean Water Act. Tributary water quality problems contribute to poor water quality when sediment and contaminants from the tributaries settle in mainstem reaches and the estuary. Most of the waterbodies in Oregon on the 303(d) list do not meet water quality standards for temperature. High water temperatures adversely affect salmonid metabolism, growth rate, 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. Some common actions that cause high stream temperatures are the removal of trees or shrubs that directly shade streams, water withdrawals for irrigation or other purposes, and warm irrigation return flows. Loss of wetlands and increases in groundwater withdrawals contribute to lower base-stream flows that, in turn, contribute to temperature increases. Activities that create shallower streams also cause temperature increases.

Many waterways in the Columbia River basin fail to meet Clean Water Act (CWA) and Safe Drinking Water Act (SDWA) water quality standards due to the presence of pesticides, heavy metals, dioxins and other pollutants. These pollutants originate from both point (industrial and municipal waste) and nonpoint (agriculture, forestry, urban activities, *etc.*) sources. The types and amounts of compounds found in runoff are often correlated with land use patterns. Fertilizers and pesticides are found frequently in agricultural and urban settings, and nutrients are found in areas with human and animal waste. People contribute to chemical pollution in the basin, but natural and seasonal factors also influence pollution levels in various ways. Nutrient and pesticide concentrations vary considerably from season to season, as well as among regions with different geographic and hydrological conditions. Natural features (such as geology and soils) and land-management practices, such as stormwater drains, tile drainage and irrigation, can influence the movement of chemicals over both land and water. Salmon and steelhead require clean water and gravel for successful spawning, egg incubation, and fry emergence. Fine sediments clog the spaces between gravel and restrict the flow of oxygen-rich water to the incubating eggs. Pollutants, excess nutrients, low levels 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. Millions of acres in the Columbia River basin are irrigated. Although some of the water withdrawn from streams eventually returns as agricultural runoff or groundwater recharge, crops consume a large proportion of it. Withdrawals affect seasonal flow patterns by removing water from streams in the summer (mostly May through September) and restoring it to surface streams and groundwater in ways that are difficult to measure. Withdrawing water for irrigation, urban consumption, and other uses increases temperatures, smolt travel time, and sedimentation. Return water from irrigated fields can introduce nutrients and pesticides into streams and rivers. Deficiencies in water quantity have been a problem in the major production subbasins for some ESUs that have seen major agricultural development over the last century. Water withdrawals (primarily for irrigation) have lowered summer flows in nearly every stream in the basin and thereby profoundly decreased the amount and quality of rearing habitat. In fact, in 1993, fish and wildlife agency, Tribal, and conservation group experts estimated that 80% of 153 Oregon tributaries had low-flow problems, two-thirds of which was caused (at least in part) by irrigation withdrawals (OWRD 1993). The Northwest Power Planning Council (NWPPC 1992) found similar problems in many Idaho, Oregon, and Washington tributaries.

Blockages that stop downstream and upstream fish movement exist at many dams and barriers, whether they are for agricultural, hydropower, municipal/industrial, or flood control purposes. Culverts that are not designed for fish passage also block upstream migration. Being diverted into unscreened or inadequately screened water conveyances or turbines sometimes kills migrating fish. While many fish-passage improvements have been made in recent years, manmade structures continue to block migrations or kill fish throughout the basin.

On the landscape scale, human activities have affected the timing and amount of peak water runoff from rain and snowmelt. Forest and range management practices have changed vegetation types and density that, in turn, affect runoff timing and duration. Many riparian areas, floodplains, and wetlands that once stored water during periods of high runoff have been destroyed by development that paves over or compacts soil; thus increasing runoff and altering natural hydrograph patterns.

Land ownership has also played its part in the region's habitat and land-use changes. Federal lands, which compose 50% of the basin, are generally forested and situated in upstream portions of the watersheds. While there is substantial habitat degradation across all land ownerships, in general, habitat in many headwater stream sections is in better condition than in the largely non-federal lower portions of tributaries (Doppelt *et al.* 1993, Frissell 1993, Henjum *et al.* 1994, Quigley and Arbelbide 1997). In the past, valley bottoms were among the most productive fish habitats in the basin (Stanford and Ward 1992, Spence *et al.* 1996, ISG 1996). Today, agricultural and urban land development and water withdrawals have significantly altered the habitat for fish and wildlife in these valley bottoms. Streams in these areas typically have high water temperatures, sedimentation problems, low flows, simplified stream channels, and reduced riparian vegetation.

At the same time some habitats were being destroyed by water withdrawals in the Columbia basin, water impoundments in other areas dramatically reduced habitat by inundating large amounts of spawning and rearing habitat and reducing migration corridors, for the most part, to a single channel. Floodplains have been reduced in size, off-channel habitat features have been lost or disconnected from the main channel, and the amount of large woody debris (large snags/log structures) in rivers has been reduced. Most of the remaining habitats are affected by flow fluctuations associated with reservoir management.

More than 50% of the original marshes and spruce swamps in the estuary have been converted to industrial, transportation, recreational, agricultural, or urban uses. More than 3,000 acres of intertidal marsh and spruce swamps have been converted by human use since 1948 (LCREP 1999). Many wetlands along the shore in the upper reaches of the estuary have been converted to industrial and agricultural lands after levees and dikes were constructed. Furthermore, water storage and release patterns from reservoirs upstream of the estuary have changed the seasonal pattern and volume of discharge. The peaks of spring/summer floods have been reduced and the amount of water discharged during winter has increased.

The existing project area is made of dredge spoils. The nearshore habitat in the Columbia River at this site is primarily sand and gravels. Very little vegetation and large wood material exists in the project area. The toe of the slope is covered with small to medium sized rocks and a few shrubs and cottonwood trees are interspersed along the shoreline. The shoreline drops off into water at a steady gradient of 8%, reaching a level of -24 feet CRD at the riverward edge of the proposed marina.

2.1.5 Analysis of Effects

2.1.5.1 Direct Effects of the Proposed Action

<u>Turbidity from Construction</u>
The effects of suspended sediment and turbidity on fish, as reported in the literature, range from beneficial to detrimental. Elevated total suspended solids (TSS) conditions have been reported to enhance cover conditions, reduce piscivorus 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 (Sigler *et al.* 1984, Lloyd 1987, Scannell 1988, Servizi and Martens 1991). Juvenile salmonids 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 1987). Turbidity resulting from the proposed project will be confined to pile driving. The extent and duration of turbidity will be limited in space and time.

Pile Driving

Pile driving often generates intense sound pressure waves that can injure or kill fish (Reyff 2003, Abbott and Bing-Sawyer 2002, Caltrans 2001, Longmuir and Lively 2001, Stotz and Colby 2001). 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 all influence the sounds produced during pile driving. Sound pressure is positively correlated with the size of the pile because more energy is required to drive larger piles. Wood and concrete piles produce lower sound pressures than hollow steel piles of a similar size, and may be less harmful to fishes. 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). Impact hammers produce intense, sharp spikes of sound that can easily reach levels that harm fishes, and the larger hammers produce more intense sounds. Vibratory hammers, on the other hand, produce sounds of lower intensity, with a rapid repetition rate.

Sound pressure levels (SPLs) greater than 150 decibels (dB) root mean square (RMS) produced when using an impact hammer to drive a pile have been shown to affect fish behavior and cause physical harm when peak SPLs exceed 180 dB (re: 1 microPascal). Surrounding the pile with a bubble curtain can attenuate the peak SPLs by approximately 20 dB and is equivalent to a 90% reduction in sound energy. However, a bubble curtain may not bring the peak and RMS SPLs below the established thresholds, injuring or killing fish. Without a bubble curtain, SPLs from driving 12-inch diameter steel pilings, measured at 10 m, will be approximately 205 dB_{peak} (Pentec 2003) and 185 dB_{rms}. With a bubble curtain, SPLs are approximately 185 dB_{peak} and 165 dBrms. Using the spherical spreading model to calculate attenuation of the pressure wave ($TL = 50*\log(R1/R2)$), physical injury to sensitive species and life-history stages may occur up to 18 m from the pile driver, and behavioral effects up to 56m. Studies on pile driving and underwater explosions suggest that, besides attenuating peak pressure, bubble curtains also reduce the impulse energy and, therefore, the potential for injury (Keevin 1998). Because sound pressure attenuates more rapidly in shallow water (Rogers and Cox 1988), it may have fewer deleterious effects there.

Fish respond differently to sounds produced by impact hammers than they do to sounds produced by vibratory hammers. Fish consistently avoid sounds like those of a vibratory hammer (Enger *et al.* 1993; Dolat 1997; Knudsen *et al.* 1997; Sand *et al.* 2000) and appear not to habituate to these sounds, even after repeated exposure (Dolat, 1997; Knudsen *et al.* 1997). On the other hand, fish may respond to the first few strikes of an impact hammer with a 'startle' response, but then the startle response wanes and some fish remain within the potentially-harmful area (Dolat 1997). Compared to impact hammers, vibratory hammers make sounds that have a longer duration (minutes vs. milliseconds) and have more energy in the lower frequencies (15-26 Hz vs. 100-800 Hz) (Würsig, *et al.* 2000; Carlson *et al.* 2001; Nedwell and Edwards 2002).

Piles are proposed to be driven with a vibratory hammer. However, a sound attenuation device should be used when driving piles if piles are proofed or driven with an impact hammer to further minimize impacts to listed salmonids during construction.

<u>Over-water and In-water Structures</u>
The proposed project includes a total of 60 pilings, ranging from 14" - 24" diameter, and approximately 36,000 ft^2 of slips and walkways in the marina. The slips and walkways will be alternating concrete floats and grating to allow light penetration.

Predator species such as northern pikeminnow (*Ptychocheilus oregonensis*), and introduced predators such as largemouth bass (*Micropterus salmoides*), smallmouth bass (*M. dolomieu*), black crappie (*Pomoxis nigromaculatus*) white crappie (*P. annularis*) and, potentially, walleye (*Stizostedion vitreum*) (Ward *et al.* 1994, Poe *et al*. 1991, Beamesderfer and Rieman 1991, Rieman and Beamesderfer 1991, Petersen *et al.* 1990, Pflug and Pauley 1984, and Collis *et al.* 1995) may utilize habitat created by over-water structures (Ward and Nigro 1992, Pflug and Pauley 1984) such as piers, float houses, floats and docks (Phillips 1990). However, the relationship between the extent of new structure and increased predation on salmonids in the lower Columbia River resulting from over-water structures is not well known.

Major habitat types utilized by largemouth bass include vegetated areas, open water and areas with cover such as docks and submerged trees (Mesing and Wicker 1986). During the summer, bass prefer pilings, rock formations, areas beneath moored boats, and alongside docks. Colle *et al.* (1989) found that, in lakes lacking vegetation, largemouth bass distinctly preferred habitat associated with piers, a situation analogous to the Columbia River. Marinas also provide wintering habitat for largemouth bass out of mainstem current velocities (Raibley *et al.* 1997). Bevelhimer (1996), in studies on smallmouth bass, indicates that ambush cover and low light intensities create a predation advantage for predators and can also increase foraging efficiency. Wanjala *et al.* (1986) found that adult largemouth bass in a lake were generally found near submerged structures suitable for ambush feeding.

Piscivorous fish use four major predatory strategies. They are: (1) Run down prey; (2) ambush prey; (3) habituate prey to a non-aggressive illusion; or (4) stalk prey (Hobson 1979). Ambush predation is probably the most common strategy; predators lie in wait, then dart out at the prey in an explosive rush (Gerking 1994). Predators may use sheltered areas that provide slack water to ambush prey fish in faster currents (Bell 1991).

Light plays an important role in defense from predation. Prey species are better able to see predators under high light intensity, thus providing the prey species with an advantage (Hobson

1979, Helfman 1981). Petersen and Gadomski (1994) found that predator success was higher at lower light intensities. Prey fish lose their ability to school at low light intensities, making them vulnerable to predation (Petersen and Gadomski 1994). Howick and O'Brien (1983) found that in high light intensities prey species (bluegill) can locate largemouth bass before they are seen by the bass. However, in low light intensities, the bass can locate the prey before they are seen. Walters *et al.* (1991) indicate that high light intensities may result in increased use of shade-producing structures. Helfman (1981) found that shade, in conjunction with water clarity, sunlight and vision, is a factor in attraction of temperate lake fishes to overhead structure.

An effect of over-water structures is the creation of a light/dark interface that allows ambush predators to remain in a darkened area (barely visible to prey) and watch for prey to swim by against a bright background (high visibility). Prey species moving around the structure are unable to see predators in the dark area under the structure and are more susceptible to predation. The incorporation of grating into all of the docks allows for more light penetration and diffuses the light/dark interface. This will minimize the susceptibility of juvenile salmonids to piscivorous predation resulting from this project.

In addition to piscivorous predation, the tops of pilings also provide perching platforms for avian predators such as double-crested cormorants (*Phalacrocorax auritis*), from which they can launch feeding forays or dry plumage. Their high energy demands associated with flying and swimming create a need for voracious predation on live prey (Ainley 1984). Cormorants are underwater pursuit swimmers (Harrison 1983) that typically feed on mid-water schooling fish (Ainley 1984), but they are known to be highly opportunistic feeders (Derby and Lovvorn 1997; Blackwell *et al.* 1997; Duffy 1995. Double-crested cormorants are known to fish cooperatively in shallow water areas, herding fish before them (Ainley 1984). Krohn *et al.* (1995) indicate that cormorants can reduce fish populations in forage areas, thus possibly affecting adult returns as a result of smolt consumption. Because their plumage becomes wet when diving, cormorants spend considerable time drying out feathers (Harrison 1983) on pilings and other structures near feeding grounds (Harrison 1984). Placement of piles to support the dock structures will potentially provide for some usage by cormorants. Placement of anti-perching devices on the top of the pilings would preclude their use by any potential avian predators.

The proposed project has incorporated anti-perching devices on the tops of pilings. More extensive grating incorporated into the floats to allow light penetration would reduce the likelihood of predatory fishes using ambush strategies.

<u>Stormwater Management</u>

This project will add approximately 37% of new impervious surface to the project site by building residential condominiums and therefore increasing stromwater runoff. The project includes a biofiltration system on site as a conservation measure before water is conveyed to City storm drains. The effects of stormwater include changes in hydrologic processes, increasing the magnitude, frequency and duration of peak discharges and reducing summer base flows (Booth 1991). These changes occur because of a loss of forest cover, and an increase in the impervious surface, and a replacement of the natural drainage system with an artificial network of storm pipes, drainage ditches and roads (Lucchetti and Fuerstenberg 1993, Booth and Jackson 1997). Roads provide a direct drainage pathway for runoff into the stream system and storm sewer outfalls. Reductions in the natural drainage network and increases in artificial drainage systems shrink the lag time between a rainfall event and the point of peak discharge of stormwater into a stream (Booth and Jackson 1997). This reduction often equates to heightened stormwater peak discharges which cause streambed and streambank scour, mobilize and remove large wood, and extend durations of channel forming flows. This change to the natural hydrology of the stream can have adverse effects on all life stages of salmonids, however, rearing juveniles are particularly vulnerable to being swept downstream during high flows and flows of extended durations.

The increased impervious cover of urbanized watersheds also alters the pathway of water to streams. As functional vegetation is removed, evapotranspiration (evaporation of water from plant surfaces and transpiration of water from the soil by plants) can be decreased by 50% or more, resulting in increased runoff volume. Infiltration is reduced as soils are stripped of vegetation, compacted and/or paved, and impervious cover increases. This decrease in infiltration often results in a decrease of stream base flows, adversely affecting salmonids who utilize streams during the summer.

Imperviousness is a very useful indicator with which to measure effects of land development on aquatic systems. Total impervious area is a physically defined unit which is the sum of roads, parking lots, sidewalks, rooftops, and other impermeable surfaces of the lowland streams landscape. Several studies have provided significant scientific evidence that relates imperviousness to specific changes in hydrology, habitat structure, water quality and biodiversity of aquatic systems. The body of research, conducted in many geographic areas, concentrating on many different variables, and employing widely different methods, has yielded similar conclusions: significant stream degradation can occur at relatively low levels of imperviousness (Paul and Meyer 2001). The hydrology of urban streams changes as sites are cleared and natural vegetation is replaced by impervious cover. One of the consequences is that more of a stream's annual flow is delivered as stormwater runoff rather than baseflow. Depending on the degree of a subwatershed's impervious cover, the annual volume of stormwater runoff can increase by up to 16 times that for natural areas (Schueler 1994). Increased stream flows can have significant effects on channel morphology. In addition, since impervious cover prevents rainfall from infiltrating into the soil, less flow is available to recharge ground water. Therefore, during extended periods without rainfall, baseflow levels are often reduced in urban streams.

Water Quality

No fuel delivery systems or sewage pumping stations are proposed as part of the project. The proposed action might affect listed salmonids if fuel and sewage spills entering the water from either line ruptures or poor handling during vessel fueling or sewage pumping. NOAA Fisheries believes that there is a low likelihood of a rupture occurring. However, a rupture would result in substantial impacts to both food sources (invertebrates) and the fish themselves (Taylor *et al.* 1995). The water soluble fraction, or components, of fuels may be toxic to fish (Taylor *et al.*

1995). There are lethal, sublethal and delayed effects from exposure and young organisms are especially vulnerable (Taylor *et al.* 1995). Short term effects of oil spills typically involve substantial fish mortality and significant invertebrate population decreases (Taylor *et al.* 1995). For example, operator error caused a 500 gallon gasoline spill in Bear Creek, Oregon in 1976, which killed 1,000 trout and steelhead and affected 2 miles of the creek (Taylor *et al.* 1995). Impacts to aquatic organisms are usually short-lived in fast flowing, riverine environments (Taylor *et al.* 1995). Spills into quiescent areas may persist for longer periods. Oil spill clean up is complex and can be hampered by unpreparedness (Bell 1991). Timeliness is an important factor in the control of spills (Bell 1991).

Boating Activities

Adding residential docks and especially marinas to the action area is likely to increase boating activity in their immediate vicinity, particularly beside floats. Specifically, docks serve as mooring and staging platforms for recreational boating activities. There are several impacts boating activity may have on listed salmonids and aquatic habitat. Directly, engine noise, prop movement, and the physical presence of a boat hull can disrupt or displace nearby fishes (Mueller 1980, Warrington 1999a).

Boat traffic at this marina is also likely to cause increased turbidity in shallow waters and aquatic pollution (through exhaust, fuel spills, or release of petroleum lubricants) (see Warrington 1999b). Nordstrom (1989) indicates that boat wakes may also play a significant role in creating erosion in narrow creeks entering an estuary (areas that are extensively used by rearing juvenile salmonids). These boating impacts indirectly affect listed fish in a number of ways. Turbidity may injure or stress affected fishes. Despite a general lack of data specifically for salmonids, pollution from boats may cause short-term injury, physiological stress, decreased reproductive success, cancer, or death for fishes in general. Further, pollution may also impact fishes by impacts to potential prey species or aquatic vegetation.

Riparian Vegetation

The proposed project includes removal of 20, 5- to 60-inch diameter cottonwood trees. The site will be planted with a variety of native trees and shrubs including: Snowberry, Nootka rose, Columbia River willow, Red alder. Species will be planted on the bank and between the top of existing rock and the top of bank. A total of 470 trees and shrubs will be planted.

To the extent that vegetation is providing habitat function, such as delivery of large wood, particulate organic matter, or shade to a riparian area and stream, root strength for slope and bank stability, and/or sediment filtering and nutrient absorption from runoff, removal of that vegetation for construction will reduce or eliminate those habitat values (Darnell 1976, Spence *et al.* 1996). Denuded areas lose organic matter and dissolved minerals such as nitrates and phosphates. Microclimate can become drier and warmer with corresponding increases in wind speed, and soil and water temperature. Water tables and spring flow can be reduced. Loose soil can temporarily accumulate in the construction area. In dry weather, this soil can be dispersed as dust. In wet weather, loose soil is transported to streams by erosion and runoff, particularly in steep areas. Erosion and runoff increase the supply of soil to lowland drainage areas and eventually to aquatic habitats where they increase water turbidity and sedimentation. This combination of erosion and mineral loss can reduce soil quality and site fertility in upland and riparian areas.

To compensate for the loss of the more mature cottonwood trees removed, the replacement plantings have a wide range in size so the larger saplings can provide some leaf litter and root strength while the other trees and shrubs are growing.

2.1.5.2 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." 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 action.

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. Between 1990 and 2000, the population of Multnomah County increased by 13.1%.[2] 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.

2.1.5.3 Effects to Critical Habitat

NOAA Fisheries designates critical habitat based on physical and biological features that are essential to the listed species. Essential elements for designated critical habitat include: Substrate, water quality, water quantity, water temperature, food, riparian vegetation, access, water velocity, space and safe passage.

Critical habitat is currently designated in the project area for Snake River stocks only. Critical habitat might be affected by turbidity from construction and pile driving and placement of in-water and over-water structures. Effects to critical habitat are included in the effects description expressed above in section 2.1.5.1, and are expected to be minor in scale.

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[2] U.S. Census Bureau, State and County Quickfacts, Multnomah County, Oregon. Available at http://quickfacts.census.gov/qfd/states/41/41051.html

2.1.6 Conclusion

NOAA Fisheries has determined that, based on the available information, the proposed action is not likely to jeopardize the continued existence of listed species nor result in the destruction or adverse modification of critical habitat. NOAA Fisheries used the best available scientific and commercial data to analyze the effects of the proposed action on the biological requirements of the species relative to the environmental baseline, together with cumulative effects. NOAA Fisheries believes that the proposed action will cause a minor, short-term degradation of anadromous salmonid habitat due to increases in turbidity from pile driving and construction.

These conclusions are based on the following considerations: (1) Construction will take place in the recommended in-water work window of November 1 to February 28; (2) any increases in sedimentation and turbidity and sound pressure effects in the project area will be short-term and minor in scale; (3) best management practices will be followed for all construction activities; and (4) the proposed action is not likely to impair properly functioning habitat, or retard the long-term progress of impaired habitat toward proper functioning condition essential to the long-term survival and recovery at the population or ESU scale.

2.1.7 Reinitiation of Consultation

Consultation must be reinitiated if: (1) The amount or extent of taking specified in the incidental take statement is exceeded, or is expected to be exceeded; (2) new information reveals effects of the action may affect listed species in a way not previously considered; (3) the action is modified in a way that causes an effect on listed species that was 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 the Take

Twelve ESUs of salmon and steelhead use the action area for rearing holding and migration in juvenile and adult life histories. They are likely to be present in the action area while the effects of this action are manifest. Since listed species will be exposed to these effects, incidental take is reasonable certain to occur. Incidental take will most likely occur in the form of "harm" or habitat modification that interferes with normal behavior patterns. Despite the use of the best available information, estimating the number of fish that might be injured or killed by habitat modifying activities is difficult, if not impossible. In such circumstances, the anticipated amount of take is characterized as "unquantifiable."

For those consultations for which take is unquantifiable, NOAA Fisheries estimates the extent of take anticipated in relation to the anticipated extent of habitat modification. The extent of incidental take from increased predation opportunity and decreased forage, related installation of new in-and over-water structures, is that which would accrue from the addition of 36,000 ft^2 of over-water structure. The extent of incidental take from pile driving is that which would accrue from driving 60 piles over the area within an 1800 foot radius of pile location.

The action area is the Columbia River including the streambed, streambank, water column and adjacent riparian zone at River Mile 106.5, and 500 feet upstream and 500 feet downstream of the construction area.

2.2.2 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.

NOAA Fisheries believes that the following reasonable and prudent measures are necessary and appropriate to avoid or minimize take of listed salmonid species resulting from the action covered by this Opinion.

The COE shall include measures in the subject permit that will:

1. Avoid or minimize incidental take from general construction by applying permit conditions that avoid or minimize adverse effects to riparian and aquatic systems.

2. Avoid or minimize incidental take from over-water and in-water structures by applying permit conditions or project specifications that avoid or minimize adverse effects to riparian and aquatic systems.

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

2.2.3 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 (general conditions for construction, operation and maintenance), the COE shall ensure that:

    a. Timing of in-water work. Work below the bankfull elevation[3] will be completed during the preferred in-water work period of November 1 to February 28, unless otherwise approved in writing by NOAA Fisheries.
    b. Cessation of work. Cease project operations under high flow conditions that may result in inundation of the project area, except for efforts to avoid or minimize resource damage.
    c. Pollution and Erosion Control Plan. Prepare and carry out a pollution and erosion control plan to prevent pollution caused by surveying or construction operations. The plan must be available for inspection on request by COE or NOAA Fisheries.
        i. Plan Contents. The pollution and erosion control plan will contain the pertinent elements listed below, and meet requirements of all applicable laws and regulations.
            (1) The name and address of the party(s) responsible for accomplishment of the pollution and erosion control plan.
            (2) Practices to prevent erosion and sedimentation associated with access roads, stream crossings, drilling sites, construction sites, borrow pit operations, haul roads, equipment and material storage sites, fueling operations, staging areas, and roads being decommissioned.
            (3) Practices to confine, remove and dispose of excess concrete, cement, grout, and other mortars or bonding agents, including measures for washout facilities.
            (4) A description of any regulated or hazardous products or materials that will be used for the project, including procedures for inventory, storage, handling, and monitoring.
            (5) A spill containment and control plan with notification procedures, specific cleanup and disposal instructions for different products,

[3] 'Bankfull elevation' means the bank height inundated by a 1.5 to 2-year average recurrence interval and may be estimated by morphological features such average bank height, scour lines and vegetation limits.

quick response containment and cleanup measures that will be available on the site, proposed methods for disposal of spilled materials, and employee training for spill containment.

(6) 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.

ii. Inspection of erosion controls. During construction, monitor instream turbidity and inspect all erosion controls daily during the rainy season and weekly during the dry season, or more often as necessary, to ensure the erosion controls are working adequately.[4]

(1) If monitoring or inspection shows that the erosion controls are ineffective, mobilize work crews immediately to make repairs, install replacements, or install additional controls as necessary.

(2) Remove sediment from erosion controls once it has reached 1/3 of the exposed height of the control.

d. Construction discharge water. Treat all discharge water created by construction (*e.g.*, concrete washout, pumping for work area isolation, vehicle wash water, drilling fluids) as follows:

i. Water quality. Design, build and maintain facilities to collect and treat all construction discharge water, including any contaminated water produced by drilling, using the best available technology applicable to site conditions. Provide treatment to remove debris, nutrients, sediment, petroleum hydrocarbons, metals and other pollutants likely to be present.

ii. Discharge velocity. If construction discharge water is released using an outfall or diffuser port, velocities may not exceed 4 feet per second, and the maximum size of any aperture may not exceed one inch.

iii. Pollutants. Do not allow pollutants including green concrete, contaminated water, silt, welding slag, sandblasting abrasive, or grout cured less than 24 hours to contact any wetland or the two-year floodplain.

iv. Drilling discharge. All drilling equipment, drill recovery and recycling pits, and any waste or spoil produced, will be completely isolated to prevent drilling fluids or other wastes from entering the stream.

(1) All drilling fluids and waste will be completely recovered then recycled or disposed to prevent entry into flowing water.

(2) Drilling fluids will be recycled using a tank instead of drill recovery/recycling pits, whenever feasible.

(3) When drilling is completed, attempts will be made to remove the remaining drilling fluid from the sleeve (*e.g.*, by pumping) to reduce turbidity when the sleeve is removed.

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[4] 'Working adequately' means that project activities do not increase ambient stream turbidity by more than 10% above background 100 feet below the discharge, when measured relative to a control point immediately upstream of the turbidity causing activity.

e. Piling installation. Install temporary and permanent pilings as follows.

i. Minimize the number and diameter of pilings, as appropriate, without reducing structural integrity.

ii. Repairs, upgrades, and replacement of existing pilings consistent with these terms and conditions are allowed.

iii. In addition to repairs, upgrades, and replacements of existing pilings, up to five single pilings or one dolphin consisting of three to five pilings may be added to an existing facility per in-water construction period.

iv. Drive each piling as follows to minimize the use of force and resulting sound pressure.

(1) Hollow steel pilings greater than 24 inches in diameter, and H-piles larger than designation HP24, are not authorized under this Opinion.

(2) When impact drivers will be used to install a pile, use the smallest driver and the minimum force necessary to complete the job. Use a drop hammer or a hydraulic impact hammer, whenever feasible and set the drop height to the minimum necessary to drive the piling.

(3) When using an impact hammer to drive or proof steel piles, one of the following sound attenuation devices will be used to reduce sound pressure levels by 20 decibels.

(a) Place a block of wood or other sound dampening material between the hammer and the piling being driven.

(b) If currents are 1.7 miles per hour or less, surround the piling being driven by an unconfined bubble curtain that will distribute small air bubbles around 100% of the piling perimeter for the full depth of the water column.[5]

(c) If currents greater than 1.7 miles per hour, surround the piling being driven by a confined bubble curtain (*e.g.*, a bubble ring surrounded by a fabric or metal sleeve) that will distribute air bubbles around 100% of the piling perimeter for the full depth of the water column.

(d) Other sound attenuation devices as approved, in writing, by NOAA Fisheries.

f. Preconstruction activity. Complete the following actions before significant[6] alteration of the project area.

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[5] For guidance on how to deploy an effective, economical bubble curtain, see, Longmuir, C. and T. Lively, *Bubble Curtain Systems for Use During Marine Pile Driving*, Fraser River Pile and Dredge LTD, 1830 River Drive, New Westminster, British Columbia, V3M 2A8, Canada. Recommended components include a high volume air compressor that can supply more than 100 pounds per square inch at 150 cubic feet per minute to a distribution manifold with 1/16 inch diameter air release holes spaced every 3/4 inch along its length. An additional distribution manifold is needed for each 35 feet of water depth.

[6] 'Significant' means an effect can be meaningfully measured, detected or evaluated.

i. Marking. Flag the boundaries of clearing limits associated with site access and construction to prevent ground disturbance of critical riparian vegetation, wetlands and other sensitive sites beyond the flagged boundary.

ii. Emergency erosion controls. Ensure that the following materials for emergency erosion control are onsite.

(1) A supply of sediment control materials (*e.g.*, silt fence, straw bales[7]).

(2) An oil-absorbing, floating boom whenever surface water is present.

iii. Temporary erosion controls. All temporary erosion controls will be in-place and appropriately installed downslope of project activity within the riparian area until site restoration is complete.

g. Heavy Equipment. Restrict use of heavy equipment as follows:

i. Choice of equipment. When heavy equipment will be used, the equipment selected will have the least adverse effects on the environment (*e.g.*, minimally-sized, low ground pressure equipment).

ii. Vehicle and material staging. Store construction materials, and fuel, operate, maintain and store vehicles as follows.

(1) To reduce the staging area and potential for contamination, ensure that only enough supplies and equipment to complete a specific job will be stored on-site.

(2) Complete vehicle staging, cleaning, maintenance, refueling, and fuel storage in a vehicle staging area placed 150 feet or more from any stream, waterbody or wetland, unless otherwise approved in writing by NOAA Fisheries.

(3) Inspect all vehicles operated within 150 feet of any stream, waterbody or wetland daily for fluid leaks before leaving the vehicle staging area. Repair any leaks detected in the vehicle staging area before the vehicle resumes operation. Document inspections in a record that is available for review on request by Corps or NOAA Fisheries.

(4) Before operations begin and as often as necessary during operation, steam clean all equipment that will be used below bankfull elevation until all visible external oil, grease, mud, and other visible contaminates are removed.

(5) Diaper all stationary power equipment (*e.g.*, generators, cranes, stationary drilling equipment) operated within 150 feet of any stream, waterbody or wetland to prevent leaks, unless suitable containment is provided to prevent potential spills from entering any stream or waterbody.

[7] When available, certified weed-free straw or hay bales will be used to prevent introduction of noxious weeds.

h. Site preparation. Conserve native materials for site restoration.
   i. If possible, leave native materials where they are found.
   ii. If materials are moved, damaged or destroyed, replace them with a functional equivalent during site restoration.
   iii. Stockpile any large wood[8], native vegetation, weed-free topsoil, and native channel material displaced by construction for use during site restoration.

i. Earthwork. Complete earthwork (including drilling, excavation, dredging, filling and compacting) as quickly as possible.
   i. Site stabilization. Stabilize all disturbed areas, including obliteration of temporary roads, following any break in work unless construction will resume within four days.
   ii. Source of materials. Obtain boulders, rock, woody materials and other natural construction materials used for the project outside the riparian area.

j. Stormwater management. All stormwater shall be filtered on-site and then directed in the City drain system. No stormwater shall runoff into the Columbia River from any upland portions of the project.

k. Site restoration. Prepare and carry out a site restoration plan as necessary to ensure that all streambanks, soils and vegetation disturbed by the project are cleaned up and restored as follows. Make the written plan available for inspection on request by the COE or NOAA Fisheries.
   i. General considerations.
      (1) Restoration goal. The goal of site restoration is renewal of habitat access, water quality, production of habitat elements (*e.g.*, large woody debris), channel conditions, flows, watershed conditions and other ecosystem processes that form and maintain productive fish habitats.
      (2) Streambank shaping. Restore damaged streambanks to a natural slope, pattern and profile suitable for establishment of permanent woody vegetation, unless precluded by pre-project conditions (*e.g.*, a natural rock wall).
      (3) Revegetation. Replant each area requiring revegetation before the first April 15 following construction. Use a diverse assemblage of species native to the project area or region, including grasses, forbs, shrubs and trees. Noxious or invasive species may not be used.
         (a) Red alders seedlings shall be the following sizes in height:

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[8] For purposes of this Opinion only, 'large wood' means a tree, log, or rootwad big enough to dissipate stream energy associated with high flows, capture bedload, stabilize streambanks, influence channel characteristics, and otherwise support aquatic habitat function, given the slope and bankfull channel width of the stream in which the wood occurs. See, Oregon Department of Forestry and Oregon Department of Fish and Wildlife, *A Guide to Placing Large Wood in Streams*, May 1995 (www.odf.state.or.us/FP/RefLibrary/LargeWoodPlacemntGuide5-95.doc).

(i) Ten, at least 18 to 24 inches in height
(ii) Twenty, at least 2 to 3 feet in height
(iii) Ten, at least 4 feet or more in height

(4) Pesticides. Take of ESA-listed species caused by any aspect of pesticide use is not included in the exemption to the ESA take prohibitions provided by this incidental take statement. Pesticide use must be evaluated in an individual consultation, although mechanical or other methods may be used to control weeds and unwanted vegetation.

(5) Fertilizer. Do not apply surface fertilizer within 50 feet of any stream channel.

ii. Plan contents. Include each of the following elements.

(1) Responsible party. The name and address of the party(s) responsible for meeting each component of the site restoration requirements, including providing and managing any financial assurances and monitoring necessary to ensure restoration success.

(2) Baseline information. This information may be obtained from existing sources (*e.g.*, land use plans, watershed analyses, subbasin plans), where available.

(a) A functional assessment of adverse effects, *i.e.*, the location, extent and function of the riparian and aquatic resources that will be adversely affected by construction and operation of the project.

(b) The location and extent of resources surrounding the restoration site, including historic and existing conditions.

(3) Goals and objectives. Restoration goals and objectives that describe the extent of site restoration necessary to offset adverse effects of the project, by aquatic resource type.

(4) Performance standards. Use these standards to help design the plan and to assess whether the restoration goal is met. While no single criterion is sufficient to measure success, the intent is that these features should be present within reasonable limits of natural and management variation.

(a) Bare soil spaces are small and well dispersed.

(b) Soil movement, such as active rills or gullies and soil deposition around plants or in small basins, is absent or slight and local.

(c) If areas with past erosion are present, they are completely stabilized and healed.

(d) Plant litter is well distributed and effective in protecting the soil with few or no litter dams present.

(e) Native woody and herbaceous vegetation, and germination microsites, are present and well distributed across the site.

(f) Vegetation structure is resulting in rooting throughout the available soil profile.

(g) Plants have normal, vigorous growth form, and a high probability of remaining vigorous, healthy and dominant over undesired competing vegetation.

(h) High impact conditions confined to small areas necessary access or other special management situations.

(i) Streambanks have less than 5% exposed soils with margins anchored by deeply rooted vegetation or coarse-grained alluvial debris.

(j) Few upland plants are in valley bottom locations, and a continuous corridor of shrubs and trees provide shade for the entire streambank.

(5) Work plan. Develop a work plan with sufficient detail to include a description of the following elements, as applicable.

(a) Boundaries for the restoration area.

(b) Restoration methods, timing, and sequence.

(c) Water supply source, if necessary.

(d) Woody native vegetation appropriate to the restoration site[9]. This must be a diverse assemblage of species that are native to the project area or region, including grasses, forbs, shrubs and trees. This may include allowances for natural regeneration from an existing seed bank or planting.

(e) A plan to control exotic invasive vegetation.

(f) Elevation(s) and slope(s) of the restoration area to ensure they conform with required elevation and hydrologic requirements of target plant species.

(g) Geomorphology and habitat features of stream or other open water.

(h) Site management and maintenance requirements.

(6) Five-year monitoring and maintenance plan.

(a) A schedule to visit the restoration site annually for five years or longer as necessary to confirm that the performance standards are achieved. Despite the initial five-year planning period, site visits and monitoring will continue from year-to-year until the Corps certifies that site restoration performance standards have been met.

(b) During each visit, inspect for and correct any factors that may prevent attainment of performance standards (*e.g.*, low plant survival, invasive species, wildlife damage, drought).

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[9] Use references sites to select vegetation for the mitigation site whenever feasible. Historic reconstruction, vegetation models, or other ecologically-based methods may also be used as appropriate.

(c) Keep a written record to document the date of each visit, site conditions and any corrective actions taken.

2. To implement reasonable and prudent measure #2 (over-water and in-water structures), the COE shall ensure that:

a. General. The following general conditions apply to over-water and in-water structures.

i. Docks, piers, walkways or other over-water facilities. For structures more than 6 feet wide in flows less than 0.7 fps, or located less than 50 feet offshore and in less than 20 feet of water, **one** of the following designs will be followed:

(1) Floats shall be no longer than 4 feet and shall incorporate 18 to 24 inches of grating between them.

(2) Floats of any length shall incorporate two rows of 1-foot diameter tubes on 2-foot centers.

(3) Another design for structures wider than 6 feet, approved in writing by NOAA Fisheries.

ii. Piscivorus bird deterrence. Fit all pilings, mooring buoys, and navigational aids (*e.g.*, channel markers) with devices to prevent perching by piscivorus birds.

iii. Removal of large wood debris obstructions. When floating or submerged large wood debris must be moved to allow the reasonable use of an over-water or in-water facility, ensure that the wood is returned to the water downstream where it will continue to provide aquatic habitat function.

iv. Flotation.

(1) Permanently encapsulate all synthetic flotation material to prevent breakup into small pieces and dispersal in water.

(2) Install mooring buoys as necessary to ensure that moored boats do not ground out or prop wash the bottom.

v. Spill containment. Minimize potential adverse effects on listed species caused by accidental spills of fuel or sewage from vessels and stations.

(1) Sufficient supplies are maintained on site to prevent a fuel leak from spreading to the Columbia River and adequate equipment necessary to deploy them.

(2) Signage detailing emergency actions in the event of a gasoline of sewage spill shall be installed. Training in emergency procedures shall be provided to all employees of the facility within one week of their starting date.

(3) Sewage pumping facilities shall be installed with automatic shut off valves.

(4) A spill response plan shall be developed and implemented before installation of sewage pumping facilities.

vi. Educational Signs. Because the best way to minimize adverse effects caused by boating is to educate the public about pollution and its prevention, post the following information on a permanent sign that will be maintained at the facility.

(1) A description of the ESA-listed salmonids which are or may be present in the project area.

(2) Notice that the adults and juveniles of these species, and their habitats, are to be protected so that they can successfully migrate, spawn, rear, and complete other behaviors necessary for their recovery.

(3) Lack of necessary habitat conditions may result in a variety of adverse effects including direct mortality, migration delay, reduced spawning, loss of food sources, reduced growth, reduced populations and decreased productivity.

(4) Therefore, all users of the facility are encouraged or required to:

(a) Follow procedures and rules governing use of sewage pump-out facilities.

(b) Minimize the fuel and oil released into surface waters during fueling, and from bilges and gas tanks.

(c) Avoid cleaning boat hulls in the water to prevent the release of cleaner, paint and solvent.

(d) Practice sound fish cleaning and waste management, including proper disposal of fish waste.

(e) Dispose of all solid and liquid waste produced while boating in a proper facility away from surface waters.

3. To implement reasonable and prudent measure #3 (monitoring), the Corps shall:

a. Implementation monitoring. Ensure that each applicant submits a monitoring report to the Corps within 120 days of project completion describing the applicant's success meeting his or her permit conditions. Each project level monitoring report will include the following information:

i. Project identification

(1) Applicant name, permit number, and project name.

(2) Project location, including any compensatory mitigation site(s), by 5^{th} field HUC and by latitude and longitude as determined from the appropriate USGS seven-minute quadrangle map.

(3) Corps contact person.

(4) Starting and ending dates for work completed.

ii. Photo documentation. Photos of habitat conditions at the project and any compensation site(s), before, during, and after project completion.[10]

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

(2) Label each photo with date, time, project name, photographer's name, and a comment about the subject.

iii. Other data. Additional project-specific data, as appropriate for individual projects.

(1) Pollution control. A summary of pollution and erosion control inspections, including any erosion control failure, contaminant release, and correction effort.

(2) Pilings.

(a) Number and type of pilings removed, including the number of pilings (if any) that broke during removal.

(b) Number, type, and diameter of any pilings installed (*e.g.*, untreated wood, treated wood, hollow steel).

(c) Description of how pilings were installed and any sound attenuation measures used.

(3) Site preparation.

(a) Total cleared area – riparian and upland.

(b) Total new impervious area.

(4) Streambank protection.

(a) Type and amount of materials used.

(b) Project size – one bank or two, width and linear feet.

(5) Water dependent structures and related features.

(a) Area of new over-water structure.

(b) Streambank distance to nearest existing water dependent structure -- upstream and down.

(6) Minor discharge and excavation/dredging.

(a) Volume of dredged material.

(b) Water depth before dredging and within one week of completion.

(c) Verification of upland dredge disposal.

(7) Site restoration. Photo or other documentation that site restoration performance standards were met.

(8) Long-term habitat loss. The same elements apply as for monitoring site restoration.

iv. Site restoration or compensatory mitigation monitoring. In addition to the 120-day implementation report, each applicant will submit an annual report by December 31 that includes the written record documenting the

[10] Relevant habitat conditions may include characteristics of channels, eroding and stable streambanks in the project area, riparian vegetation, water quality, flows at base, bankfull and over-bankfull stages, and other visually discernable environmental conditions at the project area, and upstream and downstream of the project.

date of each visit to a restoration site or mitigation site, and the site conditions and any corrective action taken during that visit. Reporting will continue from year to year until the Corps certifies that site restoration or compensatory mitigation performance standards have been met.

b. NOTICE. If a sick, injured or dead specimen of a threatened or endangered species is found, the finder must notify the Vancouver Field Office of NOAA Fisheries Law Enforcement at 360.418.4246. The finder must take care in handling of sick or injured specimens to ensure effective treatment, and in handling dead specimens to preserve biological material in the best possible condition for later analysis of cause of death. The finder also has the responsibility to carry out instructions provided by Law Enforcement to ensure that evidence intrinsic to the specimen is not disturbed unnecessarily.

3. MAGNUSON-STEVENS ACT

3.1 Background

The Magnuson-Stevens Fishery Conservation and Management Act (MSA), as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-267), established procedures designed to identify, conserve, and enhance essential fish habitat (EFH) for those species regulated under a Federal fisheries management plan. Pursuant to the MSA:

- 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)).

- NOAA Fisheries must provide conservation recommendations for any Federal or state action that would adversely affect EFH (§305(b)(4)(A)).

- Federal agencies must provide a detailed response in writing to NOAA Fisheries within 30 days after receiving EFH conservation recommendations. The response must 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 NOAA Fisheries EFH conservation recommendations, the Federal agency must explain its reasons for not following the recommendations (§305(b)(4)(B)).

EFH means those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity (MSA §3). For the purpose of interpreting this definition of EFH: "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; "spawning, breeding, feeding, or growth to maturity" covers a species' full life cycle (50 CFR 600.10), and "adverse effect" means any impact which reduces quality and/or quantity of EFH, and may include direct (*e.g.*, contamination or physical disruption), indirect (*e.g.*, loss of prey or reduction in species fecundity), site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions (50 CFR 600.810).

EFH consultation with NOAA Fisheries is required regarding any Federal agency action that may adversely affect EFH, including actions that occur outside EFH, such as certain upstream and upslope activities.

The objectives of this EFH consultation are to determine whether the proposed action would adversely affect designated EFH and to recommend conservation measures to avoid, minimize, or otherwise offset potential adverse effects to EFH.

3.2 Identification of EFH

Pursuant to the MSA, the Pacific Fisheries Management Council (PFMC) has designated EFH for federally-managed fisheries within the waters of Washington, Oregon, and California. 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 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 1999), 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 (PFMC 1999).

Detailed descriptions and identifications of EFH are contained in the fishery management plans for groundfish (PFMC 1998a), coastal pelagic species (PFMC 1998b), and Pacific salmon (PFMC 1999). Casillas *et al*. (1998) provides additional detail on the groundfish EFH habitat complexes. Assessment of the potential adverse effects to these species' EFH from the proposed action is based, in part, on these descriptions and on information provided by the COE.

3.3 Proposed Actions

The proposed action and action area are detailed above in sections 1.2 and 2.1.1 of this Opinion. The action area includes habitats that have been designated as EFH for various life-history stages of starry flounder *(Platichthys stellatus)* and chinook and coho salmon.

3.4 Effects of Proposed Action

As described in detail in section 2.1.5 of this document, the proposed action will result in short-term adverse effects to a variety of habitat parameters. These adverse effects are: Decreased water quality (turbidity) and riparian vegetation. Long-term adverse effects may result from over and in-water structures. The enhancement of a fringe marsh area and planting riparian plants will have long-term beneficial effects on salmonids.

3.5 Conclusion

NOAA Fisheries concludes that the proposed action will adversely affect the EFH for starry flounder and chinook and coho salmon.

3.6 EFH Conservation Recommendations

Pursuant to section 305(b)(4)(A) of the MSA, NOAA Fisheries is required to provide EFH conservation recommendations to Federal agencies regarding actions which may adversely affect EFH. While NOAA Fisheries understands that the conservation measures described in the BA will be implemented by the COE it does not believe that these measures are sufficient to address the adverse impacts to EFH described above. However, the terms and conditions outlined in section 2.2.3 are generally applicable to designated EFH for the species designated in section 3.3, and address these adverse effects. Consequently, NOAA Fisheries incorporates them here as EFH conservation measures.

3.7 Statutory Response Requirement

Pursuant to the MSA (§305(b)(4)(B)) and 50 CFR 600.920(j), Federal agencies are required to provide a detailed written response to NOAA Fisheries' EFH conservation recommendations within 30 days of receipt of these recommendations. The response must include a description of measures proposed to avoid, mitigate, or offset the adverse impacts of the activity on EFH. In the case of a response that is inconsistent with the EFH conservation recommendations, the response must explain the reasons for not following the recommendations, including the scientific justification for any disagreements over the anticipated effects of the proposed action and the measures needed to avoid, minimize, mitigate, or offset such effects.

3.8 Supplemental Consultation

The COE must reinitiate EFH consultation with NOAA Fisheries if the proposed action is substantially revised in a manner that may adversely affect EFH, or if new information becomes available that affects the basis for NOAA Fisheries' EFH conservation recommendations (50 CFR 600.920(k)).

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Table 1. References for Additional Background on Listing Status, Biological Information, Protective Regulations, and Critical Habitat Elements for the ESA-Listed Species Considered in this Consultation.

Species ESU	Status	Critical Habitat[11]	Protective Regulations	Biological Information, Historical Population Trends
Chinook salmon (*O. Tshawytscha*)				
Snake River fall-run	T 4/22/92; 57 FR 14653[12]	12/28/93; 58 FR 68543	7/10/00; 65 FR 42422	Waples *et al*. 1991b; Healey 1991
Snake River spring/summer-run	T 4/22/92; 57 FR 14653[2]	10/25/99; 64 FR 57399[13]	7/10/00; 65 FR 42422	Matthews and Waples 1991; Healey 1991
Lower Columbia River	T 3/24/99; 64 FR 14308		7/10/00; 65 FR 42422	Myers *et al.*1998; Healey 1991
Upper Willamette River	T 3/24/99; 64 FR 14308		7/10/00; 65 FR 42422	Myers *et al.*1998; Healey 1991
Upper Columbia River spring-run	E 3/27/99; 64 FR 14308		7/10/00; 65 FR 42422	Myers *et al.*1998; Healey 1991
Chum salmon (*O. keta*)				
Columbia River	T 3/25/99; 64 FR 14508		7/10/00; 65 FR 42422	Johnson *et al*. 1997; Salo 1991
Sockeye salmon (*O. nerka*)				
Snake River	E 11/20/91; 56 FR 58619	12/28/93; 58 FR 68543	11/20/91; 56 FR 58619	Waples *et al*. 1991a; Burgner 1991
Steelhead (*O. mykiss*)				
Lower Columbia River	T 3/19/98; 63 FR 13347		7/10/00; 65 FR 42422	Busby *et al*. 1995; 1996
Middle Columbia River	T 3/25/99; 64 FR 14517		7/10/00; 65 FR 42422	Busby *et al*. 1995; 1996
Upper Columbia River	E 8/18/97; 62 FR 43937		7/10/00; 65 FR 42422	Busby *et al*. 1995; 1996
Upper Willamette River	T 3/25/99; 64 FR 14517		7/10/00; 65 FR 42422	Busby *et al*. 1995; 1996
Snake River Basin	T 8/18/97; 62 FR 43937		7/10/00; 65 FR 42422	Busby *et al*. 1995; 1996

[11] Critical habitat designations (excluding Snake River chinook and sockeye salmon) were vacated and remanded on May 7, 2002, by a Federal Court.

[12] Also see 6/3/92; 57 FR 23458, correcting the original listing decision by refining ESU ranges.

[13] This corrects the original designation of 12/28/93 (58 FR 68543) by excluding areas above Napias Creek Falls, a naturally impassable barrier.