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:
OHB2001-0016-PEC June 14, 2002

Mr. Lawrence Evans
U.S. Army Corps of Engineers, Portland District
ATTN: Ms. Judy Linton
P.O. Box 2946
Portland, Oregon 97208-2946

Mr. Thomas Mueller
U.S. Army Corps of Engineers, Seattle District
P.O. Box 3755
Seattle, Washington 98124-2255

Re: Programmatic Biological Opinion and Magnuson-Stevens Act Essential Fish Habitat Consultation for Standard Local Operating Procedures for Endangered Species (SLOPES) for Certain Activities Requiring Department of Army Permits in Oregon and the North Shore of the Columbia River

Dear Mr. Evans and Mueller:

Enclosed is the National Marine Fisheries Service's (NMFS) programmatic biological opinion (Opinion) concluding formal Endangered Species Act consultation on standard local operating procedures (SLOPES) for certain activities requiring Department of Army permits in Oregon and the north shore of the Columbia River, as described in the U.S. Army Corps of Engineer's biological assessments dated March 16, 2000 and March 25, 2002 (the BA), and the reinitiation letter dated April 12, 2002. This Opinion considers Southern Oregon/Northern California Coasts coho salmon (*Oncorhynchus kisutch*), Oregon Coast coho salmon (*O. kisutch*), Snake River Fall-run chinook salmon (*O. tshawytscha*), Snake River spring/summer-run chinook salmon (*O. tshawytscha*), Lower Columbia River chinook salmon (*O. tshawytscha*), Upper Willamette River chinook salmon (*O. tshawytscha*), Upper Columbia River spring-run chinook salmon (*O. tshawytscha*), Columbia River chum salmon (*O. keta*), Snake River sockeye salmon (*O. nerka*), Upper Columbia River steelhead (*O. mykiss*), Snake River Basin steelhead (*O. mykiss*), Lower Columbia River steelhead (*O. mykiss*), Upper Willamette River steelhead (*O. mykiss*), and Middle Columbia River steelhead (*O. mykiss*).

The enclosed Opinion contains an analysis of the effects of the proposed action on designated critical habitat. Shortly before the issuance of this Opinion, however, a Federal court vacated the rule designating critical habitat for some of the ESUs considered in the Opinion. The analysis and conclusions regarding critical habitat remain informative for our application of the jeopardy standard, even though they no longer have independent legal significance. Also, if critical habitat is redesignated before this action is fully implemented, the analysis will be relevant when determining whether a reinitiation of consultation will be necessary at that time. For these reasons and the need for timely issuance of this Opinion, our critical habitat analysis has not been removed from this Opinion.

NMFS has determined that the proposed action is not likely to jeopardize the continued existence of the listed species described above, or destroy or adversely modify designated critical habitat. An Incidental Take Statement provides non-discretionary terms and conditions to minimize the potential for incidental take of listed species.

This document also serves as consultation on essential fish habitat for coho and chinook salmon, groundfish and coastal pelagic species under the Magnuson-Stevens Act and its implementing regulations (50 C.F.R. Part 600).

We appreciate the considerable effort and cooperation provided by your staff in completing this consultation. If you have any questions regarding this Opinion, please contact Marc Liverman at 503/231-2336 or Ben Meyer at 503/230-5425, in the Oregon State Branch Office, or Rachel Friedman at 360/753-4063, of my staff, in the Washington State Branch Office.

Sincerely,

For Michael R Crouse

D. Robert Lohn
Regional Administrator
National Marine Fisheries Services

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

Programmatic
Biological Opinion

Standard Local Operating Procedures for Endangered Species (SLOPES)
for Certain Activities Requiring Department of the Army Permits
in Oregon and the North Shore of the Columbia River

Agency: Army Corps of Engineers, Portland and Seattle Districts

Consultation
Conducted By: National Marine Fisheries Service,
Northwest Region

Date Issued: June 14, 2002

Issued by: for Michael R Crouse
D. Robert Lohn
Regional Administrator

Refer to: **OHB2001-0016-PEC**

TABLE OF CONTENTS

LIST OF TABLES

1. INTRODUCTION

The U.S. Army Corps of Engineers (Corps) proposes to amend standard local operating procedures for endangered species (SLOPES) that guide the administration of activities regulated under Section 10 of the Rivers and Harbors Act of 1899 and Section 404 of the Clean Water Act. Use of the amended SLOPES will assure compliance with the requirements of the Endangered Species Act (ESA) and Magnuson-Stevens Fishery Conservation Act (MSA), and allow more efficient handling of many minor permit requests. The action area for this consultation is the area within the Portland District of the Corps that is also within the range of ESA-listed salmon and steelhead, their designated critical habitats, and essential fish habitat (EFH) designated under the MSA. It also includes the north shore of the mainstem Columbia River, Columbia River sloughs, and adjacent wetlands downstream of McNary Dam within the Seattle District of the Corps. Tributaries to the north shore of the Columbia River, the Columbia River above McNary Dam, and all other areas of the Seattle District are excluded from this action area.

1.1 Background and Consultation History

Structures or work outside the limits defined for navigable waters of the United States require a Section 10 permit if the structure or work affects the course, location, or condition of the water body. The law applies to any dredging or disposal of dredged material, excavation, filling, rechannelization, or any other modification of a navigable water of the United States, and applies to all structures, from the smallest floating dock to the largest commercial undertaking. It further includes, without limitation, any wharf, dolphin, weir, boom, breakwater, jetty, groin, bank protection, mooring structures (such as pilings), aerial or subaqueous power transmission lines, intake or outfall pipes, permanently moored floating vessel, tunnel, artificial canal boat ramp, aids to navigation, and any other permanent or semi-permanent obstacle or obstruction.

Section 404 of the Clean Water Act requires authorization from the Secretary of the Army, acting through the Corps, for the discharge of dredged or fill material into all waters of the U.S., including wetlands, both adjacent and isolated. Discharges of fill material generally include, without limitation: Placement of fill that is necessary for the construction of any structure, or impoundment requiring rock, sand, dirt, or other material for its construction; site-development fills for recreational, industrial, commercial, residential, and other uses; causeways or road fills; dams and dikes; artificial islands; property protection or reclamation devices such as riprap, groins, sea walls, breakwaters, and revetments; beach nourishment; levees; fill for intake and outfall pipes and subaqueous utility lines; fill associated with the creation of ponds; and other work involving the discharge of fill or dredged material. A Corps permit is required whether the work is permanent or temporary. Examples of temporary discharges included dewatering of dredged material before final disposal, and temporary fills for access roadways, cofferdams, storage and work areas.

The Portland District of the Corps issues on average between 600 and 800 permits for these types of activities each year. Nearly all anadromous fish-bearing streams within this area are occupied by ESA-listed species and designated as EFH. The requirements for ESA and EFH consultation on these permits has resulted in a substantial workload for both the Corps and the National Marine Fisheries Service (NMFS) without any additional benefits to the species. Many of these activities are minor in nature and consultation results in similar requirements for project approval. The Portland District uses SLOPES described in the Programmatic Biological Opinion on 15 Categories of Activities Requiring Department of the Army Permits (the 15C Opinion) issued by NMFS in March 2001 to guide its review of individual permit requests under Section 10 of the Rivers and Harbors Act and Section 404 of the Clean Water Act. Proposed actions that are found to be within the range of effects considered in the 15C Opinion are issued a permit with conditions. The Portland District issued 139 permits with SLOPES described in the 15C Opinion during their first nine months of use. Other applications were submitted to NMFS for individual ESA and EFH consultation pursuant to requirements of the 15C Opinion.

Since March 21, 2001, Corps regulatory personnel and NMFS biologists have had many telephone conversations, email exchanges, meetings and site visits to clarify the scope and application of the 15C Opinion. Most of these contacts helped to resolve issues related to the scope and timing of specific projects. Others were part of an early general review of SLOPES and addressed programmatic ways to further reduce or remove adverse effects to listed species, their critical habitats, and designated EFH while making the regulatory consultation process more efficient.

On July 17, 2001, the Corps requested programmatic consultation for marina and boat dock projects within Oregon that require Department of the Army permits.[1] In its request, the Corps said that it typically reviews from 25 to 50 applications for marinas and boat docks each year. Each application requires formal consultation and the volume of permit requests created delays without commensurate benefits for species. Programmatic consultation on marinas and boat docks was initiated (OSB2001-0157-FEC), but later was consolidated into this Opinion.

Between July and November 2001, NMFS also participated in a series of meetings to discuss the State of Oregon's application to assume part of the Corps's regulatory authority through a statewide programmatic general permit (SPGP). Those discussions with the Corps, the U.S. Fish and Wildlife Service, and representatives of many Oregon state agencies suggested further changes to the 15C Opinion intended to adjust permit conditions for better resource protection and to allow for more efficient handling of a larger number of similar types of projects. This would further expedite the permitting process for activities that would normally be allowed to go forward with specified conditions.

On November 19, 2001, the Corps requested NMFS support for extending the geographic scope of the 15C Opinion to include the north shore of the Columbia River.[2] This initiated a new phase of consultation based on an unprecedented effort to blend administrative approaches of different state offices of NMFS and different District Offices of the Corps. During the next five months, the Corps and NMFS explored ways to better define and modify the scope of actions to make their programmatic effects more predictable and manageable. These discussions were tracked through many iterations of draft conservation measures designed to reduce or remove adverse

[1] Letter from Lawrence C. Evans, Corps, to Michael R. Crouse, NMFS (July 17, 2001) (requesting programmatic consultation on marina and boat dock projects within Oregon).

[2] Letter from Lawrence C. Evans, U.S. Army Corps of Engineers, to Michael Crouse, National Marine Fisheries Service (November 19, 2001) (requesting support for expansion of 15 Categories Opinion to north shore of Columbia River).

effects and, whenever possible, design actions that are beneficial to species and their critical habitats or EFH.

The Corps's willingness to engage in this type of process was the key to the success of this consultation. By the time the Seattle District of the Corps requested formal consultation and the Portland District requested reinitiation, both had already reached an agreement with NMFS to adopt the conservation measures identified during informal consultation as their proposed action. This allowed NMFS to produce this biological opinion (Opinion) in which all of the conservation measures offered by the Corps as part of the proposed action flow nearly seamlessly into the final terms and conditions of the Incidental Take Statement, which accompanies this Opinion.

On March 25, 2002, NMFS received a request for formal consultation and a biological assessment (BA) from the Seattle District transmitting the information necessary to include the north shore of the Columbia River in the 15C consultation.[3] On April 15, 2002, NMFS received a report from the Portland District describing monitoring results for projects completed under the 15C Opinion to date. In that letter, the Portland District also asked that NMFS reinitiate consultation based on proposed modifications to the scope of the action and new, proposed conservation measures.

The attached Opinion contains an analysis of the effects of the proposed action on designated critical habitat. Shortly before the issuance of this Opinion, however, a Federal court vacated the rule designating critical habitat for the ESUs considered in this Opinion. The analysis and conclusions regarding critical habitat remain informative for our application of the jeopardy standard, even though they no longer have independent legal significance. Also, if critical habitat is redesignated before this action is fully implemented, the analysis will be relevant when determining whether a reinitiation of consultation will be necessary at that time. For these reasons and the need for timely issuance of this Opinion, our critical habitat analysis has not been removed from this Opinion.

1.2 Description of the Proposed Action

The Corps proposes to amend SLOPES used by permit reviewers to standardize permit evaluations and conditions attached to permits. The proposed SLOPES amendments were developed jointly by the Corps and NMFS as conservation measures, and are adopted as terms and conditions of the Incidental Take Statement that accompanies this programmatic opinion. The process of developing conservation measures narrowed the scope of proposed actions to include only those whose effects are considered minor, repetitive and predictable. Proposed actions that may have unpredictable or site-specific effects are required to complete an individual consultation and are not covered under this Opinion.

1.2.1 Standard Local Operating Procedures for Endangered Species

[3] Letter from Ralph H. Graves, U.S. Army Corps of Engineers, to Steve Landino, National Marine Fisheries Service (March 25, 2002) (requesting programmatic consultation for activities in the Lower Columbia River).

Under the proposed SLOPES, a Corps permit evaluator will individually review each application for a Department of the Army permit to decide whether a listed species or a designated critical habitat is reasonably certain to occur within the action area of the proposed project. If not, the permit evaluator will complete his or her review of the application without further reference to SLOPES. However, if a listed species or designated critical habitat is within the proposed action area, the permit evaluator then asks whether (1) the proposed project is in a category covered by this Opinion, and (2) all direct and indirect effects of the proposed action on the species or critical habitat and its interrelated and interdependent activities are within the range of effects considered in this Opinion. If the answer to either question is no, the permit evaluator will refer the application for an individual consultation. If the answer to both questions is yes and the Corps decides to issue a permit for the project, the permit evaluator will ensure that the permit will include a statement directing the disposition of injured or dead specimens of threatened or endangered species and other enforceable conditions as follows:

- Each permittee will provide a monitoring report to the Corps within 120 days of project completion describing the permittee's success meeting the permit conditions. Monitoring information will identify the project, provide a narrative assessment and photo documentation of the project's effects on natural stream function.[4] Project-specific data is required for projects involving capture and release of listed fish and certain other activities.
- Landowners will allow reasonable access[5] to sites for long-term monitoring of permit conditions and their effectiveness for avoiding and minimizing take.

The Corps will give NMFS an annual summary of permiting activity by December 31 of each year. The Corps will also gather any other data or analyses it deems necessary or helpful to complete an assessment of habitat trends in stream and riparian conditions because of Corps permitted actions. By March 31 each year, the Corps will meet with NMFS to discuss any action necessary to make the program more effective.

Formal consultation on the categories of action authorized by this Opinion will be reinitiated by the Corps within three years of the date of issuance. Moreover, failure to provide specified monitoring information by the required date will be considered a modification of the action that will cause the incidental take statement to expire.

1.2.2 Construction

Each of the proposed actions (except possibly minor discharge and excavation, maintenance dredging, and return water from upland disposal sites) is likely to involve one or more of the following construction activities:

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[4] 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.

[5] "Reasonable access" means with prior notice to the permittee, the Corps and NMFS may at reasonable times and in a safe manner enter and inspect authorized projects to insure compliance with the reasonable and prudent measures, terms and conditions, in this Opinion.

P Onsite activities before site alteration – surveying, minor vegetation clearing, placement of stakes and flagging guides, minor movements of machines and personnel over action area.
P Construction of access roads – depending on the scope of the action, construction or reconstruction of access roads may entail subgrade stabilization, base course construction, aggregate production, and extension of other activities listed below.
P Establishment of construction staging area – when actions require heavy equipment, that equipment must be delivered to the site, fueled, maintained and stored in temporary facilities when not in use.
P Materials storage – soil, rocks or other materials that must be hauled to, and stored at, the action site.
P Site preparation – removal of surface vegetation and major root systems that may be disposed of by natural decomposition or burning, or reserved for use in restoration activities. Construction can also involve the discharge of water for actions such as concrete washout, pumping for work area isolation, and washing vehicles.
P Earthwork – use of heavy machinery to move natural soils from one location to another by excavating, filling, and, usually, compacting.
P Site restoration and cleanup – protection of bare earth by seeding, planting, mulching, and fertilizing.

Beyond conservation measures (that will be included by the Corps as enforceable conditions of any permit issued by the Corps under this Opinion) for each specific type of activity, the Corps has proposed the following general conservation measures for all construction activities:

<u>Onsite activities before site alteration</u>

P Boundaries of clearing limits associated with site access and construction will be marked to minimize disturbance of riparian vegetation, wetlands and other sensitive sites.
P A pollution and erosion control plan will be prepared and carried out to prevent pollution and erosion related to construction operations. The plan will address access roads, stream crossings, construction sites, borrow pit operations, haul roads, equipment and materials storage sites, fueling operations, staging areas, cement, mortars and bonding agents, hazardous materials, spill containment and notification, construction debris, and inspection and replacement of erosion controls.
P A supply of emergency erosion control materials will be on hand, and temporary erosion controls will be installed and maintained in place until site restoration is complete.

<u>Construction of access roads</u>

P Existing roadways or travel paths must be used whenever possible.
P The number of temporary access roads will be minimized and roads will be designed to avoid adverse effects.
P No temporary stream crossing may be built at known or suspected spawning areas, or within 300 upstream of such areas if spawning may be affected.
P Access ways may not be built mid-slope or on slopes greater than 30 percent.
P Crossing designs must provide for foreseeable risks such as flooding and associated bedload and debris to prevent a stream diversion if the crossing fails.
P Vehicles and machinery must cross riparian areas and streams at right angles whenever possible.

- All temporary access roads will be obliterated when the project is completed, the soil must be stabilized and the site must be revegetated.
- Temporary roads in wet or flooded areas must be abandoned and restored by the end of the in-water work period.

Establishment of construction staging area
- Heavy equipment will be limited to that with the least adverse effects on the environment, e.g., minimally sized, rubber tired.
- Vehicle staging, cleaning, maintenance, refueling, and fuel storage will be 150-feet or more from any stream, water body or wetland.
- All vehicles operated with 150-feet of any water body must be inspected daily for leaks and, if necessary, repaired before leaving the staging area.
- All equipment operated instream must be cleaned to remove all external grease, dirt, and mud before operations below the bankfull elevation.
- Stationary power equipment operated within 150-feet of any stream or wetland will be diapered to prevent leaks, unless otherwise approved by NMFS.

Materials storage
- Boulders, rock, large wood[6] and any other natural construction materials will be obtained outside the riparian buffer area.[7]
- No treated wood[8] will be used for any structure that may contact flowing water or that will be placed over water, except pilings installed following NMFS' guidelines.
- Treated wood debris and treated wood removed as part of a project will be handled and disposed of as appropriate for this type of hazardous material.

Site preparation
- Any large wood, native vegetation, weed-free topsoil, and native channel material displaced by construction must be stockpiled for use during site restoration.
- Any water intakes used for the project will have a fish screen installed, operated and maintained according to NMFS' fish screen criteria.

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[6] For purposes of this Opinion only, "large wood" means a tree, log, or rootwad large 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 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).

[7] For purposes of this Opinion only, "riparian buffer area" means land: (1)Within 150-feet of any natural water occupied by listed salmonids during any part of the year or designated as critical habitat; (2) within 100-feet of any natural water within 1/4 mile upstream of areas occupied by listed salmonids or designated as critical habitat and that is physically connected by an above-ground channel system such that water, sediment, or woody material delivered to such waters will eventually be delivered to water occupied by listed salmon or designated as critical habitat; and (3) within 50-feet of any natural water upstream of areas occupied by listed salmonids or designated as critical habitat and that is physically connected by an above-ground channel system such that water, sediment, or woody material delivered to such waters will eventually be delivered to water occupied by listed salmon or designated as critical habitat. "Natural water" means all perennial or seasonal waters except water conveyance systems that are artificially constructed and actively maintained for irrigation.

[8] "Treated wood" means lumber, pilings, and other wood products preserved with alkaline copper quaternary (ACQ), ammoniacal copper arsenate (ACA), ammoniacal copper zinc arsenate (ACZA), copper naphthenate, chromated copper arsenate (CCA), pentachlorophenol, or creosote.

- P Construction discharge water will be treated for water quality and discharge velocity, and released away from spawning areas and submerged marine vegetation.

Earthwork

- P Earthwork will be completed as quickly as possible.
- P Fish passage will be provided for any adult or juvenile salmonid species present in the project area during construction, and after construction for the life of the project.
- P Work within the active channel will be completed during preferred in-water work windows, unless otherwise approved in writing by NMFS.
- P If listed fish are present, or the work area is within 300-feet of a spawning area, the in-water work area will be isolated.
- P Any listed fish that may be trapped within the isolated work area will be captured and released using appropriate methods, including supervision by an fishery biologist experienced with work area isolation and competent to ensure the safe handling of all ESA-listed fish.
- P Any new surfaces or land use conversions that delay entry of water into the soil must control the quantity and quality of the resulting stormwater runoff for the life of the project.

Site restoration and cleanup

- P The site will be stabilized during any significant break in work.
- P Project operations will cease under high flow conditions that may inundate the project area, except as necessary to avoid or minimize resource damage.
- P When construction is finished, all streambanks, soils and vegetation will be cleaned up and restored as necessary to renew ecosystem processes that form and maintain productive fish habitats.
- P No pesticide application is allowed.
- P Fencing must be installed as necessary to prevent access to revegetated sites by livestock or unauthorized persons.
- P An unavoidable long-term adverse effect, such as a new impervious surface or dredging in water closer than 50-feet from shore or less than 20-feet deep, must be offset by an action like planting additional riparian trees and shrubs or restoration of nearshore habitats.

This concludes the discussion of the effects of general construction actions. The following discussion describes the additional effects that may be associated with each different type of proposed project.

1.2.3 Site Preparation for Construction of Buildings and Related Features

Site preparation for construction of buildings and related features includes action necessary for construction of any type of dwelling, fills for driveways, parking areas, garages, storage and utility buildings or other structures. Besides conservation measures for construction, above, the Corps will not authorize this activity within the riparian buffer area.

1.2.4 Streambank Protection

Streambank protection is placement of material along or beside banks to prevent erosion, either by lining the bank with a hard surface, by altering the face of the bank using bioengineering methods, or by creating structures in the water to divert the current or to reduce the effects of wave action. The Corps will not authorize the following types of streambank protection under this Opinion: (1) Structures built entirely or primarily of rock, concrete, steel or similar materials intended to prevent bank failure at design flows above bankfull elevation, such as revetments, bulkheads, groins, buried groins, and rock toes[9]; (2) structures intended to redirect instream flow other than a barb[10] as described below; and (3) weirs or other structures that span the streambed.

Besides general conservation measures (permit conditions) for construction activities, described above, the Corps has proposed the following conservation measures for all streambank protection activities:

- All actions intended for streambank protection will be designed to provide the greatest degree of natural stream and floodplain function achievable through the application of an ecological approach to bank and channel protection.
- Streambank protection treatments will be selected from options identified using screening matrices described in WDFW et al. 2000.[11] The applicant will include a copy of the completed screening matrices as part of the permit application.
- Large wood will be included as an integral part of all streambank protection treatments.
- Use of rock, stone and similar materials will be avoided or minimized, but is authorized for the following uses: (1) As ballast to anchor or stabilize large wood; (2) to fill certain scour holes; (3) to construct a footing, facing, headwall or other protection for certain types of existing structures; and (4) to construct a barb as follows.
- When flow must be redirected away from the bank to control erosion, one or more barbs may be constructed. The dimensions of the rock portion of each barb must be designed in proportion to bankfull elevation and channel width, the maximum barb length must not exceed 1/4 of the bankfull channel width. and all rock must be individually placed without end dumping. When used in a series, the barb farthest upstream will be placed within 150-feet or 2.5 bankfull channel widths, whichever is less, from the barb farthest downstream. Each barb will incorporate large wood and woody riparian planting as part of the project.

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[9] "Revetment" means a facing of stone, concrete, logs, or other materials built to armor a scarp, embankment, or shore structure against erosion by wave action or currents. "Bulkhead" means a structure or partition to retain or prevent sliding of the land or to protect the upland against damage by wave action or currents. "Groin" means a high elevation projection from a bank, usually perpendicular to the bank and sometimes buried in the bank where it will be exposed by subsequent erosion, to trap sediment and control streambank erosion. "Rock toe" means rock installed parallel to stream flow, from the toe of the bank up to the bankfull elevation.

[10] "Barb" means a low elevation projection from a bank, angled upstream to redirect flow away from the bank and control flow alignment and streambank erosion.

[11] Washington Department of Fish and Wildlife, Washington Department of Transportation, Washington Department of Ecology, and the U.S. Army Corps of Engineers, *Integrated Streambank Protection Guidelines*, various pagination (Draft) (October 30, 2000) (guidance on ecological approach to management of eroding streambanks) (http://www.wa.gov/wdfw/hab/ahg/ispgdoc.htm). Chapter 5, pages 5-4 through 5-7, describes the process of selecting bank protection methods using screening matrices based on the mechanism of bank failure, reach conditions, and habitat impacts; pages 5-7 through 5-19 provide additional information to support the choice of techniques.

1.2.5 Stream and Wetland Restoration

For purposes of this consultation, stream and wetland restoration consists of these four actions: (1) Removal of certain impediments to fish passage (e.g., trash, artificial debris, sediment); (2) removal of water control structures (e.g., levees, dikes, berms, weirs); (3) setback of levees, dikes and berms; and (4) reshaping of streambanks as necessary to reestablish vegetation. Besides conservation measures for construction, above, the Corps proposes that all stream wetland restoration actions will include adequate precautions to prevent post construction stranding of juvenile or adult fish.

1.2.6 Water Control Structures

Water control structures are dikes, levees, tide gates, pump stations, and related features. For purposes of this consultation, the proposed action is repair of existing structures consistent with general conservation measures for construction, above. New tide gates are also authorized, but to the extent that they are necessary to provide or improve fish passage. Tide gates must be designed to have a maximum average velocity that does not exceed 2-feet per second.

1.2.7 Road Construction, Repairs and Improvements

For purposes of this consultation, road construction, repairs and improvements consist of repairs, upgrades, and replacement of existing roads, bridges and culverts, and installation of new roads, bridges and culverts as described below. Road upgrades include actions such as widening shoulders, rebuilding or restoring surfaces, installing passing lanes, installing turn refuges, and installing guardrails or barriers. The Corps will not authorize the following types of activity under this Opinion: (1) A new, permanent road inside the riparian buffer area that is not a bridge approach; (2) a new bridge pier or abutment below the bankfull elevation; (3) a new bridge approach within the Federal Emergency Management Agency (FEMA) designated floodway that will require embankment fills that significantly impair floodplain function; (4) a baffled culvert or fishway.

Besides general conservation measures for construction and streambank protection, above, the Corps has proposed the following conservation measures for all road construction, repair and improvement activities:

- Permanent stream crossings will be designed in the following priority: [12]
    - Nothing – road realignment to avoid crossing the stream
    - Bridge – spanning the stream to allow for long-term dynamic channel stability
    - Streambed simulation – bottomless arch, embedded culvert, or ford

[12] For a discussion of crossing design types, see, National Marine Fisheries Service, Southwest Region, *Guidelines for Salmonid Passage at Stream Crossings* (September 2001) (http://swr.nmfs.noaa.gov/hcd/NMFSSCG.PDF) and Washington Department of Fish and Wildlife, *Fish Passage Design at Road Culverts: A Design Manual for Fish Passage at Road Crossings* (March 3, 1999) (http://www.wa.gov/wdfw/hab/engineer/cm/toc.htm).

- No-slope design culvert[13] – sometimes called hydraulic design, here limited to 0% slopes
- If the crossing will occur near an active spawning area, only full span bridges or streambed simulation may be used.
- Fill width must be limited to the minimum necessary to complete the crossing, and must not reduce existing stream width.
- In new culverts, the maximum average water velocity[14] shall not exceed 1 foot per second to provide for juvenile migration.
- Culverts must be cleaned by working from the top of the bank, unless culvert access using work area isolation would result in less habitat take, to remove only the minimum amount of wood, sediment and other natural debris necessary to maintain culvert function without disturbing spawning gravel.
- All large wood recovered during cleaning must be placed downstream.
- All routine work must be done in the dry, using work area isolation if necessary.
- Road maintenance must comply with ODOT (1999) practices or the most current version of the Regional Road Maintenance Endangered Species Act Program Guidelines.[15]

1.2.8 Utility Lines

For purposes of this consultation, utility line activities consist of repairs and replacements as described below. Utility lines consist of pipes, pipelines, cables, and wire used to convey liquids or energy, or to communicate. The Corps will not authorize the following types of utility lines under this Opinion: (1) Construction or upgrade of a gas, sewer or water line to support a new or expanded service area for which effects, including indirect effects from interrelated or interdependent activities, have not been analyzed in this Opinion; (2) New utilities that transit the bed of an estuary or saltwater area that is less than -10.0-feet deep (mean lower low water).

Besides general conservation measures for construction and streambank protection, above, the Corps has proposed the following conservation measures for all utility line repair and replacement activities:

- Utility stream crossings will be perpendicular to the watercourse, or nearly so, and designed in the following priority:
  - Aerial lines, including lines hung from existing bridges.
  - Directional drilling, boring and jacking.
  - Dry trenching or plowing.

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[13] "No-slope design culvert" means a culvert that is sufficiently large and installed flat to allow the natural movement of bedload to form a stable bed inside the culvert.

[14] "Maximum average water velocity" means the average of water velocity within the barrel of the culvert calculated using the 10 percent annual exceedance of the daily average flow.

[15] Oregon Department of Transportation, *Routine Road Maintenance: Water Quality and Habitat Guide, Best Management Practices*, 21 pp. + appendices (July 1999) (providing guidance on routine road maintenance activity only) (http://www.odot.state.or.us/eshtm/images/4dman.pdf) or, see, National Marine Fisheries Service, Regional Road Maintenance Endangered Species Act Program Guidelines (March 2002) (http://www.metrokc.gov/roadcon/bmp/pdfguide.htm)

- P If directional drilling, boring or jacking is used, the following will apply.
  - P The drill, bore or jack hole must span the channel migration zone[16] and any associated wetland.
  - P Pits and any associated waste must be completely isolated from surface waters.
  - P If drilling fluid or waste is visible in the water, all drilling activity must cease pending written approval from NMFS to resume drilling.
- P If trenching or plowing are used, the following will apply.
  - P Trenching or plowing must occur in the dry.
  - P Trenches must be backfilled below the ordinary high water line with native material, then capped with clean gravel suitable for fish use in the project area, unless otherwise approved in writing by NMFS.
  - P Large wood displaced by trenching or plowing must be returned to its original position, wherever feasible.
- P Utility lines must not cause lateral migration, head cutting, general scour, or debris loading.

1.2.9 Recreational Boating Facilities

Activities whose primary purpose is to support recreational boating are grouped for convenience into this category: Construction of boat ramps; installation and repair of navigational aids (e.g., permanent and temporary mooring buoys and channel markers); maintenance of existing structures and marinas; installation of small temporary floats (e.g., buoys, markers, small floating docks, and similar structures placed for recreational use during specific events); structures in fleeting and anchorage areas for storage of vessels where such areas have been established for that purpose by the U.S. Coast Guard; and fish and wildlife harvest, attraction devices and activities, limited here to the use of floats to mark traps for shrimp and crab harvest.

The Corps will not authorize the following types of recreational boating facilities under this Opinion: (1) New marinas, floating storage units, boat houses, or houseboats; (2) new boat ramps, docks, piers, or other over-water facilities in (a) an estuary or other saltwater area;[17] (b) an exposed area requiring a breakwater, jetty or groin; (c) less than 0.5 miles downstream of the mouth of a tributary; (d) a shallow water area requiring significant excavation; or, (e) a deposition area likely to need routine maintenance dredging (e.g., alcoves, backwater sloughs, side channels, other shallow-water areas); (6) docks, piers, or other over-water facilities wider than 6-feet, unless current velocity is greater than 0.7-feet per second during the low flow period (April 1 through August 31), or the structure is more than 50-feet from the shoreline and in water more than 20-feet deep (7) buoys or floats in inactive anchorage and fleeting areas; (8) related

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[16] "Channel migration zone" means the area defined by the lateral extent of likely movement along a stream reach as shown by evidence of active stream channel movement over the past 100 years, e.g., alluvial fans or floodplains formed where the channel gradient decreases, the valley abruptly widens, or at the confluence of larger streams.

[17] "Estuary or other saltwater area" means an area with maximum saltwater intrusion of more than 0.5 parts per thousand measured at depth. For purposes of this Opinion only, the estuary or saltwater area of the Columbia River will be defined as downstream of the boundary between Wahkiakum and Cowlitz Counties in Washington State, and the boundary between Clatsop and Columbia Counties in Oregon State.

facilities that are not water dependent (e.g., parking lots, picnic areas, trails, toilets) inside the riparian buffer area; or (8) asphalt boat ramps.

Besides general conservation measures (permit conditions) for construction activities, described above, the Corps has proposed the following conservation measures for all recreational boating facilities:

- Modifications of existing marinas are made within the existing footprint of the moorage, or in water more than 50-feet from the shoreline and more than 20-feet deep.
- All synthetic flotation material must be permanently encapsulated to prevent breakup into small pieces and dispersal in water.
- Mooring buoys, small temporary floats, and fish and wildlife harvesting devices (e.g., crab and shrimp traps) must be installed as follows.
    - More than 300-feet from submerged marine vegetation
    - More than 50-feet from the shoreline
    - In water more than 20-feet deep
    - Mooring buoys must also be installed as necessary to ensure that moored boats do not ground out or props wash the bottom.
    - Small temporary floats must also be installed less than 7 days before a scheduled event, removed five days after a scheduled event is concluded, and not left in longer than 21 days.
- Pilings must be installed as follows.
    - The number and diameter of pilings must be minimized, as appropriate, without reducing structural integrity.
    - No more than five single piles or one dolphin consisting of three to five piles may be replaced or added to an existing structure or marina per in-water construction period.
- All pilings, mooring buoys, and navigational aids (e.g., channel markers) must be fitted with devices to prevent perching by piscivorus birds.

1.2.10 Minor Discharge and Excavation

For purposes of this consultation, minor discharges and excavations means small structural fills, minor excavations or dredging necessary for maintenance and minor repairs of previously authorized structures such as culverts and outfalls. The Corps has proposed to use general conservation measures for construction activities, described above, as the conservation measures for minor discharge and excavation activities.

1.2.11 Maintenance Dredging

For purposes of this Opinion, maintenance dredging means removal of sediments necessary to maintain existing marinas, port terminals, and industrial docks and wharfs. The Corps will not authorize the following types of activities under this Opinion: (1) Use of the economic loading method for hopper dredging; (2) dredging in the following locations (a) salmonid spawning habitats in tributaries or upstream; (b) Columbia River, above Bonneville Dam, in the following areas: backwater sloughs, silted-in lateral channels, alcoves, side channels, or other shallow-water areas less than 20-feet deep; and (3) flow lane disposal of dredge spoils.

Besides general conservation measures (permit conditions) for construction activities, described above, the Corps has proposed the following conservation measures for all maintenance dredging:

- Sediment quality will be evaluated before dredging begins using the most recent version of NMFS' approved criteria for evaluation of contaminated sediments.[18] Only sediments approved for in-water disposal by those criteria will be authorized for maintenance dredging.
- Dredges will be operated as follows.
    - A hydraulic dredge intake must be kept at or just below the surface of the material being removed, but may be raised for brief periods of purging or flushing.
    - Clamshell dredges must use a finishing type bucket with flaps, whenever feasible.
    - Dredge spoil will be placed in an approved upland area where it cannot reenter the water body and that is large enough to allow settling.

1.2.12 Return Water From Upland Disposal Sites

This activity includes return water from upland, contained dredged material disposal sites that are administratively defined as a discharge of dredged material [33 CFR 323.2(d)] although the disposal itself occurs on the upland and thus does not require a Section 404 permit. Water being discharged must not exceed 4-feet per second at the outfall or diffuser port, or other wise significantly impairs spawning, rearing, migration, feeding or other essential behaviors.

2. ENDANGERED SPECIES ACT

The Endangered Species Act (ESA) (16 U.S.C. 1531-1544), amended in 1988, establishes a national program for the conservation of threatened and endangered species of fish, wildlife, and plants and the habitat on which they depend. Section 7(a)(2) of the ESA requires Federal agencies to consult with USFWS and NMFS, as appropriate, to ensure that their actions are not likely to jeopardize the continued existence of endangered or threatened species or to adversely modify or destroy their designated critical habitats. This biological opinion is the product of an interagency consultation pursuant to Section 7(a)(2) of the ESA and implementing regulations found at 50 Code of Federal Regulations (C.F.R.) Part 402.

2.1 Biological Opinion

The objective of the ESA portion of this programmatic consultation is to determine whether adoption of the proposed amendments to SLOPES guiding the administration of 15 categories of activities regulated under Section 10 of the Rivers and Harbors Act of 1899 and Section 404 of the Clean Water Act, and the proposed expansion of the action area, are likely to jeopardize the continued existence of ESA-listed species or cause the destruction or adverse modification of

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[18] See, U.S. Army Corps of Engineers, U.S. Environmental Protection Agency, Oregon Department of Environmental Quality, Washington Department of Ecology, and Washington Department of Natural Resources, *Dredged Material Evaluation Framework: Lower Columbia River Management Area* (November 1998) (providing a consistent set of procedures to determine sediment quality for dredging activity) (http://www.nwp.usace.army.mil/ec/h/hr/Final/).

their designated critical habitat. BAs provided by the Corps with requests for consultation, described below, included the finding that actions permitted using the proposed SLOPES are "likely to adversely affect" the following 14 ESUs[19] listed under the ESA.

- Southern Oregon/Northern California Coasts (SONC) coho salmon (*Oncorhynchus kisutch*)
- Oregon Coast (OC) coho salmon (*O. kisutch*)
- Snake River (SR) Fall-run chinook salmon (*O. tshawytscha*)
- SR spring/summer-run chinook salmon (*O. tshawytscha*)
- Lower Columbia River (LCR) chinook salmon (*O. tshawytscha*)
- Upper Willamette River (UWR) chinook salmon (*O. tshawytscha*)
- Upper Columbia River (UCR) spring-run chinook salmon (*O. tshawytscha*)
- CR chum salmon (*O. keta*)
- SR sockeye salmon (*O. nerka*)
- UCR steelhead (*O. mykiss*)
- SR Basin steelhead (*O. mykiss*)
- LCR steelhead (*O. mykiss*)
- UWR steelhead (*O. mykiss*)
- Middle Columbia River (MCR) steelhead (*O. mykiss*)

2.1.1 Biological Information and Critical Habitat

The listing status and history for species addressed in this Opinion are summarized in Table 1. Designated critical habitat for each of the 14 listed ESUs considered in this Opinion occurs within the proposed action area. Essential elements of critical habitat for salmonids 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 C.F.R. 226). Based on migratory and other life history timing, it is likely that adult and juvenile life stages of these 14 listed ESUs would be present in the action area when activities authorized by the proposed SLOPES would be carried out. Actions authorized by the proposed SLOPES may affect all of these essential habitat features, although the effects of each individual action will vary in timing, duration, and intensity.

[19] "ESU" means a population or group of populations that is considered distinct (and hence a "species") for purposes of conservation under the ESA. To qualify as an ESU, a population must (1) be reproductively isolated from other conspecific populations, and (2) represent an important component in the evolutionary legacy of the biological species (Waples 1991a).

Table 1. References for Additional Background on Listing Status/Critical Habitat/Protective Regulations/and Biological Information for the Listed Species Addressed in this Opinion.

Species	Listing Status	Critical habitat	Protective Regulations	Biological Information/ Population Trends
SONC coho salmon	Threatened 02/18/97 62 FR 33038	05/05/99 64 FR 24049	07/18/1997 62 FR 38479	Weitkamp et al. 1995; NMFS 1997a; Sandercock 1991; Nickelson et al. 1992
OC coho salmon	Threatened 08/10/98 63 FR 42587	02/16/00 65 FR 7764	07/10/00 65 FR 42423	Weitkamp et al. 1995; Nickelson et al. 1992; NMFS 1997b; Sandercock 1991
SR fall-run chinook salmon	Threatened 04/22/92 57 FR 14653	12/28/93 58 FR 68543	07/22/1992 57 FR 14653	Waples et al. 1991c; Healey 1991; ODFW and WDFW 1998
SR spring/summer-run chinook salmon	Threatened 04/22/92 57 FR 14653	12/28/93 58 FR 68543 and 10/25/19 64 FR 57399	04/22/1992 57 FR 14653	Matthews and Waples 1991; Healey 1991; ODFW and WDFW 1998
LCR chinook salmon	Threatened 03/24/99 64 FR 14308	02/16/00 65 FR 7764	07/10/00 65 FR 42423	Myers et al.1998; Healey 1991; ODFW and WDFW 1998
UWR chinook salmon	Threatened 03/24/99 64 FR 14308	02/16/00 65 FR 7764	07/10/00 65 FR 42423	Myers et al.1998; Healey 1991; ODFW and WDFW 1998
UCR spring-run chinook salmon	Endangered 03/24/99 64 FR 14308	02/16/00 65 FR 7764	ESA prohibition on take applies	Myers et al.1998; Healey 1991; ODFW and WDFW 1998
CR chum salmon	Threatened 03/25/99 64 FR 14508	02/16/00 65 FR 7764	07/10/00 65 FR 42423	Johnson et al.1997; Salo 1991; ODFW and WDFW 1998
SR sockeye salmon	11/20/91 56 FR 58619 Endangered	12/28/93 58 FR 68543	ESA prohibition on take applies	Waples et al. 1991b; Burgner 1991; ODFW and WDFW 1998
UCR steelhead	08/18/97 62 FR 43937 Endangered	02/16/00 65 FR 7764	ESA prohibition on take applies	Busby et al. 1995; Busby et al. 1996; ODFW and WDFW 1998
SR Basin steelhead	08/18/97 62 FR 43937 Threatened	02/16/00 65 FR 7764	07/10/00 65 FR 42423	Busby et al. 1995; Busby et al. 1996; ODFW and WDFW 1998
LCR steelhead	03/19/98 63 FR 13347 Threatened	02/16/00 65 FR 7764	07/10/00 65 FR 42423	Busby et al. 1995; Busby et al. 1996; ODFW and WDFW 1998
UWR steelhead	03/25/99 64 FR 14517 Threatened	02/16/00 65 FR 7764	07/10/00 65 FR 42423	Busby et al. 1995; Busby et al. 1996; ODFW and WDFW 1998
MCR steelhead	03/25/99 64 FR 14517 Threatened	02/16/00 65 FR 7764	07/10/00 65 FR 42422	Busby et al. 1995; Busby et al. 1996; ODFW and WDFW 1998

2.1.2 Evaluating the Proposed Action

The standards for determining jeopardy are set forth in Section 7(a)(2) of the ESA as defined by 50 C.F.R. 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 critical habitat. This analysis involves the initial steps of: (1) Defining the biological requirements 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. This evaluation must take into account measures for survival and recovery specific to the listed species' life stages that occur beyond the action area. If NMFS finds that the action is likely to jeopardize, NMFS must identify reasonable and prudent alternatives for the action.

NMFS also evaluates whether the action, directly or indirectly, is likely to destroy or adversely modify the listed species' 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. NMFS then considers whether such impairment appreciably diminishes the habitat's value for the species' survival and recovery. If NMFS concludes that the action will adversely modify critical habitat, it must identify any reasonable and prudent alternatives available.

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

2.1.3 Biological Requirements

Actions permitted using the proposed SLOPES would occur within designated critical habitat for the 14 listed ESUs considered in this Opinion. Essential elements of critical habitat for the listed ESUs are described section 2.1.1, above. Actions permitted using the proposed SLOPES may affect each of these essential elements, although the combination of essential elements affected would vary by the specific action.

Additional background on listing status, biological information, and critical habitat elements for these 14 listed ESUs are described below. Information presented here for Columbia Basin ESUs is adapted from Appendix A to the paper "A Standardized Quantitative Analysis of the Risks Faced by Salmonids in the Columbia River Basin" (McClure et al. 2000a). Further details regarding the life histories, factors for decline, and current range wide status of these species are found in NMFS (2000).

SONC coho salmon. In the 1940s, estimated abundance of SONC coho salmon ranged from 150,000 to 400,000 naturally spawning fish. Today, coho populations in this ESU are very depressed and number approximately 10,000 naturally produced adults. Although the Oregon portion of the SONC coho ESU has declined drastically, the Rogue River Basin increased substantially from 1974-1997. The bulk of current coho salmon production in this ESU consists of stocks from the Rogue River, Klamath River, Trinity River, and Eel River in Oregon. In Oregon south of Cape Blanco, all but one coho salmon stock is considered to be at "high risk of extinction". South of Cape Blanco, all Oregon coho salmon stocks are considered "depressed".

In contrast to the life history patterns of other anadromous salmonids, coho salmon exhibit a relatively simple three-year life cycle. Most SONC coho salmon enter rivers between September and February and spawn from November to January (occasionally into early spring). In migration is influenced by river flow, especially for many small California stream systems that have sandbars at their mouths for much of the year except winter. Although coho salmon have been captured several thousand kilometers away from their natal stream, this species usually remains closer to its river of origin than chinook salmon. Coho typically spend two growing seasons in the ocean before returning to spawn as three year-olds; precocious males ("jacks") may return after only six months at sea.

Threats to naturally-reproducing SONC coho salmon throughout its range are numerous and varied. Habitat factors include: Channel morphology changes, substrate changes, loss of in stream roughness, loss of estuarine habitat, loss of wetlands, loss/degradation of riparian areas, declines in water quality (e.g., elevated water temperatures, reduced dissolved oxygen, altered biological communities, toxics, elevated pH, and altered stream fertility), altered stream flows, fish passage impediments, elimination of habitat, and direct take. The major activities responsible for the decline of coho salmon in Oregon are logging, road building, grazing and mining activities, urbanization, stream channelization, dams, wetland loss, beaver trapping, water withdrawals, and unscreened diversions for irrigation.

Other factors contributing to the decline of SONC coho include overutilization for commercial recreational, scientific, or education purposes. Harvest management practiced by the tribes is conservative and has resulted in limited impact on the coho stock in the Klamath and Trinity Rivers; over fishing in non-tribal fisheries is believed to have been a significant factor in the decline of coho salmon. Marked hatchery coho are allowed to be harvested in the Rogue River. All other recreational coho salmon fisheries in the Oregon portion of this ESU are closed. Collection for scientific research and educational programs is believed to have had little or no impact on coho populations in the ESU. Relative to other effects, disease and predation are not believed to be major factors contributing to the overall decline of coho salmon in this ESU. However, disease and predation may have substantial impacts in local areas.

OC coho salmon. Within the OC coho salmon ESU, hatchery populations from the north Oregon coast form a distinctive subgroup. Adult run- and spawn-timing are similar to those along the Washington coast and in the Columbia River, but less variable. While marine conditions off the Oregon and Washington coasts are similar, the Columbia River has greater influence north of its mouth, and the continental shelf becomes broader off the Washington coast. Upwelling off the Oregon coast is much more variable and generally weaker than areas south of Cape Blanco.

Estimated escapement of coho salmon in coastal Oregon was about 1.4 million fish in the early 1900s, with harvest of nearly 400,000 fish. Abundance of wild Oregon coast coho salmon declined during the period from about 1965 to 1975 and has fluctuated at a low level since that time. Production potential (based on stock-recruit models) shows a reduction of nearly 50 percent in habitat capacity. Recent spawning escapement estimates indicate an average spawning escapement of less than 30,000 adults. Current abundance of coho on the Oregon coast may be less than five percent of that in the early part of this century. The Oregon coast coho salmon ESU is not at immediate danger of extinction but may become endangered in the future if present trends continue. For more information on OC coho salmon life history and factors contributing to the decline of the ESU, see, SONC coho salmon, above.

SR Fall-run chinook Salmon. The Snake Basin drains an area of approximately 280,000 km^2 and incorporates a range of vegetative life zones, climatic regions, and geological formations, including the deepest canyon (Hells Canyon) in North America. The ESU includes the mainstem river and all tributaries, from their confluence with the Columbia River to the Hells Canyon Dam complex. Because genetic analyses indicate that fall-run chinook salmon in the Snake River are distinct from the spring/summer-run in the Snake River Basin (Waples et al. 1991), SR fall-run chinook salmon are considered separately from the other two forms. They are also considered separately from those assigned to the UCR summer- and fall-run ESU because of considerable differences in habitat characteristics and adult ocean distribution and less definitive, but still significant, genetic differences. There is, however, some concern that recent introgression from Columbia River hatchery strays is causing the Snake River population to lose the qualities that made it distinct for ESA purposes.

SR fall-run chinook salmon remained stable at high levels of abundance through the first part of the twentieth century, but then declined substantially. Although the historical abundance of fall-run chinook salmon in the Snake River is difficult to estimate, adult returns appear to have declined by three orders of magnitude since the 1940s, and perhaps by another order of magnitude from pristine levels. Irving and Bjornn (1981) estimated that the mean number of fall-run chinook salmon returning to the Snake River declined from 72,000 during the period 1938 to 1949 to 29,000 during the 1950s. Further declines occurred upon completion of the Hells Canyon Dam complex, which blocked access to primary production areas in the late 1950s (see below).

Fall-run chinook salmon in this ESU are ocean-type. Adults return to the Snake River at ages 2 through 5, with age 4 most common at spawning (Chapman et al. 1991). Spawning, which takes place in late fall, occurs in the mainstem and in the lower parts of major tributaries (NWPPC 1989; Bugert et al. 1990). Juvenile fall-run chinook salmon move seaward slowly as subyearlings, typically within several weeks of emergence (Chapman et al. 1991). Based on modeling by the Chinook Technical Committee, the Pacific Salmon Commission estimates that a significant proportion of the SR fall-run chinook (about 36 percent) are taken in Alaska and Canada, indicating a far-ranging ocean distribution. In recent years, only 19 percent were caught off Washington, Oregon, and California, with the balance (45 percent) taken in the Columbia River (Simmons 2000).

With hydrosystem development, the most productive areas of the Snake River Basin are now inaccessible or inundated. The upper reaches of the mainstem Snake River were the primary areas used by fall-run chinook salmon, with only limited spawning activity reported downstream from river kilometer (Rkm) 439. The construction of Brownlee Dam (1958; Rkm 459), Oxbow Dam (1961; Rkm 439), and Hells Canyon Dam (1967; Rkm 397) eliminated the primary production areas of SR fall-run chinook salmon. There are now 12 dams on the mainstem Snake River, and they have substantially reduced the distribution and abundance of fall-run chinook salmon (Irving and Bjornn 1981).

The Snake River has contained hatchery-reared fall-run chinook salmon since 1981 (Busack 1991). The hatchery contribution to Snake River escapement has been estimated at greater than 47 percent (Myers et al. 1998). Artificial propagation is recent, so cumulative genetic changes associated with it may be limited. Wild fish are incorporated into the brood stock each year, which should reduce divergence from the wild population. Release of subyearling fish may also help minimize the differences in mortality patterns between hatchery and wild populations that can lead to genetic change (Waples 1999). (See NMFS [1999a] for further discussion of the SR fall-run chinook salmon supplementation program.)

Some SR fall-run chinook historically migrated over 1,500 km from the ocean. Although the Snake River population is now restricted to habitat in the lower river, genes associated with the lengthier migration may still reside in the population. Because longer freshwater migrations in chinook salmon tend to be associated with more-extensive oceanic migrations (Healey 1983), maintaining populations occupying habitat that is well inland may be important in continuing diversity in the marine ecosystem as well.

For the SR fall-run chinook salmon ESU as a whole, NMFS estimates that the median population growth rate (lambda) over the base period[20] ranges from 0.94 to 0.86, decreasing as the effectiveness of hatchery fish spawning in the wild increases compared to that of fish of wild origin (Tables B-2a and B-2b in McClure et al. 2000b).

SR spring/summer-run chinook salmon. The location, geology, and climate of the Snake River region create a unique aquatic ecosystem for chinook salmon. Spring-run and/or summer-run chinook salmon are found in several subbasins of the Snake River (CBFWA 1990). Of these, the Grande Ronde and Salmon Rivers are large, complex systems composed of several smaller tributaries that are further composed of many small streams. In contrast, the Tucannon and Imnaha Rivers are small systems with most salmon production in the main river. In addition to these major subbasins, three small streams (Asotin, Granite, and Sheep Creeks) that enter the Snake River between Lower Granite and Hells Canyon Dams provide small spawning and rearing areas (CBFWA 1990). Although there are some indications that multiple ESUs may exist within the Snake River Basin, the available data do not clearly demonstrate their existence or define their boundaries. Because of compelling genetic and life-history evidence that fall-run

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[20] Estimates of median population growth rate, risk of extinction, and the likelihood of meeting recovery goals presented here and below are based on population trends observed during a base period beginning in 1980. Population trends are projected under the assumption that all conditions will stay the same into the future. For further information, see, NMFS (2000a).

chinook salmon are distinct from other chinook salmon in the Snake River, however, they are considered a separate ESU.

Historically, spring and/or summer-run chinook salmon spawned in virtually all accessible and suitable habitat in the Snake River system (Evermann 1895; Fulton 1968). During the late 1800s, the Snake River produced a substantial fraction of all Columbia Basin spring and summer chinook salmon, with total production probably exceeding 1.5 million in some years. By the mid-1900s, the abundance of adult spring and summer chinook salmon had greatly declined. Fulton (1968) estimated that an average of 125,000 adults per year entered the Snake River tributaries from 1950 through 1960. As evidenced by adult counts at dams, however, spring and summer chinook salmon have declined considerably since the 1960s.

In the Snake River, spring and summer chinook share key life history traits. Both are stream-type fish, with juveniles that migrate swiftly to sea as yearling smolts. Depending primarily on location within the basin (and not on run type), adults tend to return after either 2 or 3 years in the ocean. Both spawn and rear in small, high-elevation streams (Chapman et al. 1991), although where the two forms coexist, spring-run chinook spawn earlier and at higher elevations than summer-run chinook.

Even before mainstem dams were built, habitat was lost or severely damaged in small tributaries by construction and operation of irrigation dams and diversions, inundation of spawning areas by impoundments, and siltation and pollution from sewage, farming, logging, and mining (Fulton 1968). Recently, the construction of hydroelectric and water storage dams without adequate provision for adult and juvenile passage in the upper Snake River has kept fish from all spawning areas upstream of Hells Canyon Dam.

There is a long history of human efforts to enhance production of chinook salmon in the Snake River Basin through supplementation and stock transfers. The evidence is mixed as to whether these efforts have altered the genetic makeup of indigenous populations. Straying rates appear to be very low.

For the SR spring/summer-run chinook salmon ESU as a whole, NMFS estimates that the median population growth rate (lambda) over the base period 1 ranges from 0.96 to 0.80, decreasing as the effectiveness of hatchery fish spawning in the wild increases compared to the effectiveness of fish of wild origin (Tables B-2a and B-2b in McClure et al. 2000b).

LCR chinook salmon. The lower Columbia River is characterized by numerous short- and medium-length rivers that drain the coast ranges and the west slope of the Cascade Mountains. The LCR chinook salmon ESU includes all native populations from the mouth of the Columbia River to the crest of the Cascade Range, excluding populations above Willamette Falls. The former location of Celilo Falls (inundated by The Dalles reservoir in 1960) is the eastern boundary for this ESU. Stream-type, spring-run chinook salmon found in the Klickitat River or the introduced Carson spring-run chinook salmon strain are not included in this ESU. Spring-run chinook salmon in the Sandy River have been influenced by spring-run chinook salmon introduced from the Willamette River ESU. However, analyses suggest that considerable genetic resources still reside in the existing population (Myers et al. 1998). Recent escapements above

Marmot Dam on the Sandy River average 2,800 and have been increasing (ODFW 1998a). Tule fall chinook from the LCR chinook salmon ESU were observed spawning in the Ives Island area during October 1999. The Hardy/Hamilton Creeks/Ives Island complex is located along the Washington shoreline approximately 2 miles below Bonneville Dam.

Historical records of chinook salmon abundance are sparse, but cannery records suggest a peak run of 4.6 million fish in 1883. Although fall-run chinook salmon are still present throughout much of their historical range, most of the fish spawning today are first-generation hatchery strays. Furthermore, spring-run populations have been severely depleted throughout the ESU and extirpated from several rivers.

Most fall-run fish in the LCR chinook salmon ESU emigrate to the marine environment as subyearlings (Reimers and Loeffel 1967, Howell et al. 1985, WDF et al. 1993). Returning adults that emigrated as yearling smolts may have originated from the extensive hatchery programs in the ESU. It is also possible that modifications in the river environment have altered the duration of freshwater residence. Coded-wire tag (CWT) recoveries of LCR chinook salmon ESU fish suggest a northerly migration route, but (based on CWT recoveries) the fish contribute more to fisheries off British Columbia and Washington than to the Alaskan fishery. Tule fall chinook salmon return at adult ages 3 and 4; “bright” fall chinook return at ages 4 and 5, with significant numbers returning at age 6. Tule and bright chinook salmon are distinct in their spawn timing.

As in other ESUs, chinook salmon have been affected by the alteration of freshwater habitat (Bottom et al. 1984, WDF et al. 1993, Kostow 1995). Timber harvesting and associated road building peaked in the 1930s, but effects from the timber industry remain (Kostow 1995). Agriculture is widespread in this ESU and has affected riparian vegetation and stream hydrology. The ESU is also highly affected by urbanization, including river diking and channelization, wetland draining and filling, and pollution (Kostow 1995).

The LCR chinook salmon ESU has been subject to intensive hatchery influence. Hatchery programs to enhance chinook salmon fisheries in the lower Columbia River began in the 1870s, releasing billions of fish over time. That equals the total hatchery releases for all other chinook ESUs combined (Myers et al. 1998). Although most of the stocks have come from inside the ESU, more than 200 million fish from outside the ESU have been released since 1930 (Myers et al. 1998).

For the LCR chinook salmon ESU as a whole, NMFS estimates that the median population growth rate (lambda) over the base period ranges from 0.98 to 0.88, decreasing as the effectiveness of hatchery fish spawning in the wild increases compared to that of fish of wild origin (Tables B-2a and B-2b in McClure et al. 2000b).

<u>UWR chinook salmon</u>. The UWR chinook salmon ESU includes native spring-run populations above Willamette Falls and in the Clackamas River. In the past, it included sizable numbers of spawning salmon in the Santiam River, the middle fork of the Willamette River, and the McKenzie River, as well as smaller numbers in the Molalla River, Calapooia River, and Albiqua Creek. Although the total number of fish returning to the Willamette has been relatively high (24,000), about 4,000 fish now spawn naturally in the ESU, two-thirds of which originate in

hatcheries. The McKenzie River supports the only remaining naturally reproducing population in the ESU (ODFW 1998a).

There are no direct estimates of the size of the chinook salmon runs in the Willamette Basin before the 1940s. McKernan and Mattson (1950) present anecdotal information that the Native American fishery at the Willamette Falls may have yielded 2,000,000 lb (908,000 kg) of salmon (454,000 fish, each weighing 20 lb [9.08 kg]). Based on egg collections at salmon hatcheries, Mattson (1948) estimates that the spring chinook salmon run in the 1920s may have been 5 times the run size of 55,000 fish in 1947, or 275,000 fish. Much of the early information on salmon runs in the upper Willamette River Basin comes from operation reports of state and Federal hatcheries.

Fish in this ESU are distinct from those of adjacent ESUs in life history and marine distribution. The life history of chinook salmon in the Upper Willamette River ESU includes traits from both ocean- and stream-type development strategies. CWT recoveries indicate that the fish travel to the marine waters off British Columbia and Alaska. More Willamette fish are, however, recovered in Alaskan waters than fish from the Lower Columbia River ESU. UWR chinook salmon mature in their fourth or fifth years. Historically, 5-year-old fish dominated the spawning migration runs; recently, however, most fish have matured at age 4. The timing of the spawning migration is limited by Willamette Falls. High flows in the spring allow access to the upper Willamette basin, whereas low flows in the summer and autumn prevent later-migrating fish from ascending the falls. The low flows may serve as an isolating mechanism, separating this ESU from others nearby.

Human activities have had vast effects on the salmonid populations in the Willamette River drainage. First, the Willamette River, once a highly braided river system, has been dramatically simplified through channelization, dredging, and other activities that have reduced rearing habitat (i.e., stream shoreline) by as much as 75 percent. In addition, the construction of 37 dams in the basin has blocked access to over 700 km of stream and river spawning habitat. The dams also alter the temperature regime of the Willamette and its tributaries, affecting the timing of development of naturally-spawned eggs and fry. Water quality is also affected by development and other economic activities. Agricultural and urban land uses on the valley floor, as well as timber harvesting in the Cascade and Coast ranges, contribute to increased erosion and sediment load in Willamette River Basin streams and rivers. Finally, since at least the 1920s, the lower Willamette River has suffered municipal and industrial pollution.

Hatchery production in the basin began in the late nineteenth century. Eggs were transported throughout the basin, resulting in current populations that are relatively homogeneous genetically (although still distinct from those of surrounding ESUs). Hatchery production continues in the Willamette River, with an average of 8.4 million smolts and fingerlings released each year into the main river or its tributaries between 1975 and 1994. Hatcheries are currently responsible for most production (90 percent of escapement) in the basin. The Clackamas River currently accounts for about 20 percent of the production potential in the Willamette Basin, originating from one hatchery plus natural production areas that are primarily located above the North Fork Dam. The interim escapement goal for the area above North Fork Dam is 2,900 fish (ODFW 1998b). However, the system is so heavily influenced by hatchery production that it is difficult to distinguish spawners of natural stock from hatchery origin fish. Approximately 1,000 to 1,500 adults have been counted at the North Fork Dam in recent years.

Harvest on this ESU is high, both in the ocean and in river. The total in river harvest below the falls from 1991 through 1995 averaged 33 percent and was much higher before then. Ocean harvest was estimated as 16 percent for 1982 through 1989. ODFW (1998a) indicates that total (marine and freshwater) harvest rates on UWR spring-run stocks were reduced considerably for the 1991 through 1993 brood years, to an average of 21 percent.

For the UWR chinook salmon ESU as a whole, NMFS estimates that the median population growth rate (lambda) over the base period ranges from 1.01 to 0.63, decreasing as the effectiveness of hatchery fish spawning in the wild increases compared to that of fish of wild origin (Tables B-2a and B-2b in McClure et al. 2000b).

<u>UCR spring-run chinook salmon</u>. This ESU includes spring-run chinook populations found in Columbia River tributaries between Rock Island and Chief Joseph Dams, notably the Wenatchee, Entiat, and Methow River Basins. The populations are genetically and ecologically separate from the summer- and fall-run populations in the lower parts of many of the same river systems (Myers et al. 1998). Although fish in this ESU are genetically similar to spring chinook in adjacent ESUs (i.e., mid-Columbia and Snake), they are distinguished by ecological differences in spawning and rearing habitat preferences. For example, spring-run chinook in upper Columbia River tributaries spawn at lower elevations (500 to 1,000 m) than in the Snake and John Day River systems.

The upper Columbia River populations were intermixed during the Grand Coulee Fish Maintenance Project (1939 through 1943), resulting in loss of genetic diversity between populations in the ESU. Homogenization remains an important feature of the ESU. Fish abundance has trended downward both recently and over the long term. At least six former populations from this ESU are now extinct, and nearly all extant populations have fewer than 100 wild spawners.

UCR spring-run chinook are considered stream-type fish, with smolts migrating as yearlings. Most stream-type fish mature at 4 years of age. Few CWTs are recovered in ocean fisheries, suggesting that the fish move quickly out of the north central Pacific and do not migrate along the coast.

Spawning and rearing habitat in the Columbia River and its tributaries upstream of the Yakima River includes dry areas where conditions are less conducive to steelhead survival than in many other parts of the Columbia Basin (Mullan et al. 1992). Salmon in this ESU must pass up to nine Federal and private dams, and Chief Joseph Dam prevents access to historical spawning grounds farther upstream. Degradation of remaining spawning and rearing habitat continues to be a major concern associated with urbanization, irrigation projects, and livestock grazing along riparian corridors. Overall harvest rates are low for this ESU, currently less than 10 percent (ODFW and WDFW 1995).

Spring-run chinook salmon from the Carson National Fish Hatchery (a large composite, non-native stock) were introduced into, and have been released from, local hatcheries (Leavenworth, Entiat, and Winthrop National Fish Hatcheries [NFH]). Little evidence suggests that these hatchery fish stray into wild areas or hybridize with naturally-spawning populations. In addition to these national production hatcheries, two supplementation hatcheries are operated by the WDFW in this ESU. The Methow Fish Hatchery Complex (operations began in 1992) and the Rock Island Fish Hatchery Complex (operations began in 1989) were both designed to implement supplementation programs for naturally spawning populations on the Methow and Wenatchee Rivers, respectively (Chapman et al. 1995).

For the UCR spring-run chinook salmon ESU as a whole, NMFS estimates that the median population growth rate (lambda) over the base period ranges from 0.85 to 0.83, decreasing as the effectiveness of hatchery fish spawning in the wild increases compared to that of fish of wild origin (Tables B-2a and B-2b in McClure et al. 2000b). NMFS used population risk assessments for UCR spring-run chinook salmon and steelhead ESUs from the draft quantitative analysis report (QAR) (Cooney 2000). Risk assessments described in that report were based on Monte Carlo simulations with simple spawner/spawner models that incorporate estimated smolt carrying capacity. Population dynamics were simulated for three separate spawning populations in the UCR spring-run chinook salmon ESU, the Wenatchee, Entiat, and Methow populations. The QAR assessments showed extinction risks for UCR spring chinook salmon of 50 percent for the Methow, 98 percent for the Wenatchee, and 99 percent for the Entiat spawning populations. These estimates are based on the assumption that the median return rate for the 1980 brood year to the 1994 brood year series will continue into the future.

<u>CR chum salmon</u>. Chum salmon of the Columbia River ESU spawn in tributaries and in mainstem areas below Bonneville Dam. Most fish spawn on the Washington side of the Columbia River (Johnson et al. 1997). Previously, chum salmon were reported in almost every river in the lower Columbia River Basin, but most runs disappeared by the 1950s (Rich 1942, Marr 1943, Fulton 1970). Currently, WDFW regularly monitors only a few natural populations in the basin, one in Grays River, two in small streams near Bonneville Dam, and the mainstem area next to one of the latter two streams. Recently spawning has occurred in the mainstem Columbia River at two spots near Vancouver, Washington and in Duncan Creek below Bonneville Dam.

Chum salmon enter the Columbia River from mid-October through early December and spawn from early November to late December. Recent genetic analysis of fish from Hardy and Hamilton Creeks and from the Grays River indicate that these fish are genetically distinct from other chum salmon populations in Washington. Genetic variability within and between populations in several geographic areas is similar, and populations in Washington show levels of genetic subdivision typical of those seen between summer- and fall-run populations in other areas and typical of populations within run types (Salo 1991, WDF et al. 1993, Phelps et al. 1994, and Johnson et al. 1997).

Historically, the CR chum salmon ESU supported a large commercial fishery, landing more than 500,000 fish per year. Commercial catches declined beginning in the mid-1950s. There are now no recreational or directed commercial fisheries for chum salmon in the Columbia River, although chum salmon are taken incidentally in the gill-net fisheries for coho and chinook salmon, and some tributaries have a minor recreational harvest (WDF et al. 1993).

Hatchery fish have had little influence on the wild component of the CR chum salmon ESU. NMFS estimates an median population growth rate (lambda) over the base period, for the ESU as a whole, of 1.04 (Tables B-2a and B-2b in McClure et al. 2000b). Because census data are peak counts (and because the precision of those counts decreases markedly during the spawning season as water levels and turbidity rise), NMFS is unable to estimate the risk of absolute extinction for this ESU.

SR sockeye salmon. The only remaining anadromous sockeye in the Snake River system are found in Redfish Lake, on the Salmon River. The nonanadromous form (kokanee), found in Redfish Lake and elsewhere in the Snake River Basin, is included in the ESU. Snake River sockeye were historically abundant in several lake systems of Idaho and Oregon. However, all populations have been extirpated in the past century, except fish returning to Redfish Lake.

In general, juvenile sockeye salmon rear in the lake environment for 1, 2, or 3 years before migrating to sea. Adults typically return to the natal lake system to spawn after spending 1, 2, 3, or 4 years in the ocean (Gustafson et al. 1997).

In 1910, impassable Sunbeam Dam was constructed 20 miles downstream of Redfish Lake. Although several fish ladders and a diversion tunnel were installed during subsequent decades, it is unclear whether enough fish passed above the dam to sustain the run. The dam was partly removed in 1934, after which Redfish Lake runs partially rebounded. Evidence is mixed as to whether the restored runs constitute anadromous forms that managed to persist during the dam years, nonanadromous forms that became migratory, or fish that strayed in from outside the ESU.

NMFS proposed an interim recovery level of 2,000 adult Snake River sockeye salmon in Redfish Lake and two other lakes in the Snake Basin (Table 1.3-1 in NMFS 1995). Low numbers of adult SR sockeye salmon preclude a QAR-type quantitative analysis of the status of this ESU. Because only 16 wild and 264 hatchery-produced adult sockeye returned to the Stanley River Basin between 1990 and 2000, however, NMFS considers the status of this ESU to be dire under any criteria. Clearly the risk of extinction is very high.

UCR steelhead. The UCR steelhead ESU occupies the Columbia Basin upstream of the Yakima River. Rivers in the area primarily drain the east slope of the northern Cascade Mountains and include the Wenatchee, Entiat, Methow, and Okanogan River basins. The climate of the area reaches temperature and precipitation extremes; most precipitation falls as mountain snow (Mullan et al. 1992b). The river valleys are deeply dissected and maintain low gradients, except for the extreme headwaters (Franklin and Dyrness 1973).

Estimates of historical (pre-1960s) abundance specific to this ESU are available from fish counts at dams. Counts at Rock Island Dam from 1933 to 1959 averaged 2,600 to 3,700, suggesting a prefishery run size exceeding 5,000 adults for tributaries above Rock Island Dam (Chapman et al. 1994). Runs may, however, already have been depressed by lower Columbia River fisheries.

As in other inland ESUs (the Snake and mid-Columbia Basins), steelhead in the Upper Columbia River ESU remain in freshwater up to a year before spawning. Smolt age is dominated by 2-year-olds. Based on limited data, steelhead from the Wenatchee and Entiat rivers return to freshwater after 1 year in salt water, whereas Methow River steelhead are primarily age-2-ocean (Howell et al. 1985). Life history characteristics for UCR steelhead are similar to those of other inland steelhead ESUs; however, some of the oldest smolt ages for steelhead, up to 7 years, are reported from this ESU. The relationship between anadromous and nonanadromous forms in the geographic area is unclear.

The Chief Joseph and Grand Coulee Dam construction caused blockages of substantial habitat, as did that of smaller dams on tributary rivers. Habitat issues for this ESU relate mostly to irrigation diversions and hydroelectric dams, as well as to degraded riparian and instream habitat from urbanization and livestock grazing.

Hatchery fish are widespread and escape to spawn naturally throughout the region. Spawning escapement is dominated by hatchery-produced fish.

For the UCR steelhead ESU as a whole, NMFS estimates that the median population growth rate (lambda) over the base period ranges from 0.94 to 0.66, decreasing as the effectiveness of hatchery fish spawning in the wild increases compared to that of fish of wild origin (Tables B-2a and B-2b in McClure et al. 2000b). Because of data limitations, the QAR steelhead assessments in Cooney (2000) were limited to two aggregate spawning groups—the Wenatchee/Entiat composite and the above-Wells populations. Wild production of steelhead above Wells Dam was assumed to be limited to the Methow system. Assuming a relative effectiveness of hatchery spawners of 1.0, the risk of absolute extinction within 100 years for UCR steelhead is 100 percent. The QAR also assumed hatchery effectiveness values of 0.25 and 0.75. A hatchery effectiveness of 0.25 resulted in projected risks of extinction of 35 percent for the Wenatchee/Entiat and 28 percent for the Methow populations. At a hatchery effectiveness of 0.75, risks of 100 percent were projected for both populations.

<u>SR Basin steelhead</u>. Steelhead spawning habitat in the Snake River is distinctive in having large areas of open, low-relief streams at high elevations. In many Snake River tributaries, spawning occurs at a higher elevation (up to 2,000 m) than for steelhead in any other geographic region. SR Basin steelhead also migrate farther from the ocean (up to 1,500 km) than most.

No estimates of historical (pre-1960s) abundance specific to this ESU are available.

Fish in this ESU are summer-run steelhead. They enter freshwater from June to October and spawn during the following March to May. Two groups are identified, based on migration timing, ocean-age, and adult size. A-run steelhead, thought to be predominately age-1-ocean, enter freshwater during June through August. B-run steelhead, thought to be age-2-ocean, enter freshwater during August through October. B-run steelhead typically are three to four inches longer at the same age. Both groups usually smolt as 2- or 3-year-olds (Whitt 1954, Hassemer 1992). All steelhead are iteroparous, capable of spawning more than once before death.

Hydrosystem projects create substantial habitat blockages in this ESU; the major ones are the Hells Canyon Dam complex (mainstem Snake River) and Dworshak Dam (North Fork Clearwater River). Minor blockages are common throughout the region. Steelhead spawning areas have been degraded by overgrazing, as well as by historical gold dredging and sedimentation due to poor land management. Habitat in the Snake River Basin is warmer and drier and often more eroded than elsewhere in the Columbia Basin or in coastal areas.

Hatchery fish are widespread and stray to spawn naturally throughout the region. In the 1990s, an average of 86 percent of adult steelhead passing Lower Granite Dam were of hatchery origin. Hatchery contribution to naturally spawning populations varies, however, across the region. Hatchery fish dominate some stocks, but do not contribute to others.

For the SR Basin steelhead ESU as a whole, NMFS estimates that the median population growth rate (lambda) over the base period ranges from 0.91 to 0.70, decreasing as the effectiveness of hatchery fish spawning in the wild increases compared to that of fish of wild origin (Tables B-2a and B-2b in McClure et al. 2000b).

LCR steelhead. The Lower Columbia River ESU encompasses all steelhead runs in tributaries between the Cowlitz and Wind Rivers on the Washington side of the Columbia River, and the Willamette and Hood Rivers on the Oregon side. The populations of steelhead that make up the Lower Columbia River ESU are distinguished from adjacent populations by genetic and habitat characteristics. The ESU consists of summer and winter coastal steelhead runs in the tributaries of the Columbia River as it cuts through the Cascades. These populations are genetically distinct from inland populations (east of the Cascades), as well as from steelhead populations in the upper Willamette River Basin and coastal runs north and south of the Columbia River mouth. Not included in the ESU are runs in the Willamette River above Willamette Falls (Upper Willamette River ESU), runs in the Little and Big White Salmon rivers (Middle Columbia River ESU) and runs based on four imported hatchery stocks: early-spawning winter Chambers Creek/lower Columbia River mix, summer Skamania Hatchery stock, winter Eagle Creek NFH stock, and winter Clackamas River ODFW stock (63 FR 13351 and 13352). This area has at least 36 distinct runs (Busby et al. 1996), 20 of which were identified in the initial listing petition. In addition, numerous small tributaries have historical reports of fish, but no current abundance data. The major runs in the ESU, for which there are estimates of run size, are the Cowlitz River winter runs, Toutle River winter runs, Kalama River winter and summer runs, Lewis River winter and summer runs, Washougal River winter and summer runs, Wind River summer runs, Clackamas River winter and summer runs, Sandy River winter and summer runs, and Hood River winter and summer runs.

For the larger runs, current counts have been in the range of one to 2,000 fish (Cowlitz, Kalama, and Sandy Rivers); historical counts, however, put these runs at more than 20,000 fish. In general, all runs in the ESU have declined over the past 20 years, with sharp declines in the last 5 years.

Steelhead in this ESU are thought to use estuarine habitats extensively during out migration, smoltification, and spawning migrations. The lower reaches of the Columbia River are highly modified by urbanization and dredging for navigation. The upland areas covered by this ESU are extensively logged, affecting water quality in the smaller streams used primarily by summer runs. In addition, all major tributaries used by LCR steelhead have some form of hydraulic barrier that impedes fish passage. Barriers range from impassible structures in the Sandy Basin that block access to extensive, historically occupied, steelhead habitat, to passable but disruptive projects on the Cowlitz and Lewis Rivers. The Biological Review Team (BRT 1997) viewed the overall effect of hydrosystem activities on this ESU as an important determinant of extinction risk.

Many populations of steelhead in the Lower Columbia River ESU are dominated by hatchery escapement. Roughly 500,000 hatchery-raised steelhead are released into drainages within this ESU each year. As a result, first-generation hatchery fish are thought to make up 50 percent to 80 percent of the fish counted on natural spawning grounds. The effect of hatchery fish is not uniform, however. Several runs are mostly hatchery strays (e.g., the winter run in the Cowlitz River [92 percent] and the Kalama River [77 percent] and the summer run in the North Fork Washougal River [50 percent]), whereas others are almost free of hatchery influence (the summer run in the mainstem Washougal River [0 percent] and the winter runs in the North Fork Toutle and Wind Rivers [0 percent to 1 percent]).

Escapement estimates for the steelhead fishery in the Lower Columbia River ESU are based on in river and estuary sport-fishing reports; there is a limited ocean fishery on this ESU. Harvest rates range from 20 percent to 50 percent on the total run, but for hatchery-wild differentiated stocks, harvest rates on wild fish have dropped to 0 percent to 4 percent in recent years (punch card data from WDFW through 1994).

For the LCR steelhead ESU as a whole, NMFS estimates that the median population growth rate (lambda) over the base period ranges from 0.98 to 0.78, decreasing as the effectiveness of hatchery fish spawning in the wild increases compared to that of fish of wild origin (Tables B-2a and B-2b in McClure et al. 2000b).

UWR steelhead. The UWR steelhead ESU occupies the Willamette River and tributaries upstream of Willamette Falls, extending to and including the Calapooia River. These major river basins containing spawning and rearing habitat comprise more than 12,000 km^2 in Oregon. Rivers that contain naturally spawning winter-run steelhead include the Tualatin, Molalla, Santiam, Calapooia, Yamhill, Rickreall, Luckiamute, and Mary's, although the origin and distribution of steelhead in a number of these basins is being debated. Early migrating winter and summer steelhead have been introduced into the upper Willamette Basin, but those components are not part of the ESU. Native winter steelhead within this ESU have been declining since 1971 and have exhibited large fluctuations in abundance.

In general, native steelhead of the upper Willamette Basin are late-migrating winter steelhead, entering freshwater primarily in March and April. This atypical run timing appears to be an adaptation for ascending Willamette Falls, which functions as an isolating mechanism for UWR steelhead. Reproductive isolation resulting from the falls may explain the genetic distinction between steelhead from the upper Willamette Basin and those in the lower river. UWR late-migrating steelhead are ocean-maturing fish. Most return at age 4, with a small proportion returning as 5-year-olds (Busby et al. 1996).

Willamette Falls (Rkm 77) is a known migration barrier. Winter steelhead and spring chinook salmon historically occurred above the falls, whereas summer steelhead, fall chinook, and coho salmon did not. Detroit and Big Cliff Dams cut off 540 km of spawning and rearing habitat in the North Santiam River. In general, habitat in this ESU has become substantially simplified since the 1800s by removal of large woody debris to increase the river's navigability.

The main hatchery production of native (late-run) winter steelhead occurs in the North Fork Santiam River, where estimates of hatchery proportion in natural spawning areas range from 14 percent to 54 percent (Busby et al. 1996). More recent estimates of the percentage of naturally spawning fish attributable to hatcheries in the late 1990s are 24 percent in the Molalla, 17 percent in the North Santiam, 5 percent to 12 percent in the South Santiam, and less than 5 percent in the Calapooia (Chilcote 1997).

For the UWR steelhead ESU as a whole, NMFS estimates that the median population growth rate (lambda) over the base period ranges from 0.94 to 0.87, decreasing as the effectiveness of hatchery fish spawning in the wild increases compared to that of fish of wild origin (Tables B-2a and B-2b in McClure et al. 2000b).

<u>MCR steelhead</u>. The MCR steelhead ESU occupies the Columbia River Basin from above the Wind River in Washington and the Hood River in Oregon and continues upstream to include the Yakima River, Washington. The region includes some of the driest areas of the Pacific Northwest, generally receiving less than 16 inches of precipitation annually (Jackson 1993). Summer steelhead are widespread throughout the ESU; winter steelhead occur in Mosier, Chenowith, Mill, and Fifteenmile creeks, Oregon, and in the Klickitat and White Salmon Rivers, Washington. The John Day River probably represents the largest native, natural spawning stock of steelhead in the region.

Estimates of historical (pre-1960s) abundance specific to this ESU are available for the Yakima River, which has an estimated run size of 100,000 (WDF et al. 1993). Assuming comparable run sizes for other drainage areas in this ESU, the total historical run size may have exceeded 300,000 steelhead.

Most fish in this ESU smolt at 2 years and spend 1 to 2 years in salt water before reentering freshwater, where they may remain up to a year before spawning (Howell et al. 1985, BPA 1992). All steelhead upstream of The Dalles Dam are summer-run (Schreck et al. 1986, Reisenbichler et al. 1992, Chapman et al. 1994). The Klickitat River, however, produces both summer and winter steelhead, and age-2-ocean steelhead dominate the summer steelhead, whereas most other rivers in the region produce about equal numbers of both age-1- and 2-ocean fish. A nonanadromous form co-occurs with the anadromous form in this ESU; information suggests that the two forms may not be isolated reproductively, except where barriers are involved.

The only substantial habitat blockage now present in this ESU is at Pelton Dam on the Deschutes River, but minor blockages occur throughout the region. Water withdrawals and overgrazing have seriously reduced summer flows in the principal summer steelhead spawning and rearing tributaries of the Deschutes River. This is significant because high summer and low winter temperatures are limiting factors for salmonids in many streams in this region (Bottom et al. 1984).

Continued increases in the proportion of stray steelhead in the Deschutes Basin is a major concern. The ODFW and the Confederated Tribes of the Warm Springs Reservation of Oregon (CTWSRO) estimate that 60 percent to 80 percent of the naturally spawning population consists of strays, which greatly outnumber naturally produced fish. Although the reproductive success of stray fish has not been evaluated, their numbers are so high that major genetic and ecological effects on natural populations are possible (Busby et al. 1999). The negative effects of any interbreeding between stray and native steelhead will be exacerbated if the stray steelhead originated in geographically distant river basins, especially if the river basins are in different ESUs. The populations of steelhead in the Deschutes Basin include steelhead native to the Deschutes River, hatchery steelhead from the Round Butte Hatchery on the Deschutes River, wild steelhead strays from other rivers in the Columbia Basin, and hatchery steelhead strays from other Columbia Basin streams

Regarding the latter, CTWSRO reports preliminary findings from a tagging study by T. Bjornn and M. Jepson (University of Idaho) and NMFS suggesting that a large fraction of the steelhead passing through Columbia River dams (e.g., John Day and Lower Granite dams) have entered the Deschutes River and then returned to the mainstem Columbia River. A key unresolved question about the large number of strays in the Deschutes basin is how many stray fish remain in the basin and spawn naturally.

For the MCR steelhead ESU as a whole, NMFS estimates that the median population growth rate (lambda) over the base period10 ranges from 0.88 to 0.75, decreasing as the effectiveness of hatchery fish spawning in the wild increases compared to that of fish of wild origin (Tables B-2a and B-2b in McClure et al. 2000b).

2.1.4 Environmental Baseline

Regulations implementing section 7 of the Act (50 C.F.R. 402.02) define the environmental baseline as the past and present impacts of all Federal, State, or private actions and other human activities in the action area. The environmental baseline also includes the anticipated impacts of all proposed Federal projects in the action area that have undergone section 7 consultation, and the impacts of State and private actions that are contemporaneous with the consultation in progress. The action area is defined in 50 C.F.R. 402.02 to mean "all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action."

For the purposes of this consultation, the action area includes all waters within the Portland District's regulatory jurisdiction for activities described in this consultation throughout the State of Oregon and within the range of listed salmon and steelhead. In addition, the action area includes all waters along the north shore of the Columbia River from McNary Dam to the river mouth within the Portland and Seattle District's regulatory jurisdiction for activities described in this consultation within the State of Washington. The action area in the State of Oregon may also extend upstream or downstream, based on the potential of the permitted activities to impair fish passage, riparian succession, the hydrologic cycle, the erosion, transportation and deposition of sediments, and other ecological processes related to the formation and maintenance of salmon habitats. Indirect effects may occur throughout the watershed where other activities depend on actions described in this Opinion for their justification or usefulness.

State of Oregon. The analysis presented in this section is based primarily on the *Oregon State of the Environment Report 2000*, published by the Oregon Progress Board in September 2000 (Risser 2000) and the Programmatic Biological Evaluation produced for this Consultation (USACE 2002). The *Report* provides a comprehensive review of Oregon's environmental baseline in terms of all of its interrelated parts and natural processes. It was developed using a combination of analyses of existing data and best professional scientific judgment. Aquatic ecosystems, marine ecosystems, estuarine ecosystems, freshwater wetlands, and riparian ecosystems were among the resources considered. A set of indicators of ecosystem health was proposed for each resource system and as benchmarks for the State’s use in evaluating past decisions and for planning future policies to improve Oregon’s environment and economy. The *Report* also included findings regarding the environmental health of Oregon’s eight ecoregions and conclusions about future resource management needs. Highlights of the *Report* follow.

Oregon’s currently available water supplies are fully or often over allocated during low flow months of summer and fall. In the Columbia Plateau ecoregion, less that 20 percent of instream water rights can expect to receive their full allocation nine months of the year. In the Willamette Valley and Cascades ecoregions, more than 80 percent of the instream water rights can expect to receive their full allocation in the winter, but only about 25 percent in the early fall. Increased demand for water is linked to the projected 34 percent increase in human population over the next 25 years in the state. Depletion and storage of natural flows have altered natural hydrological cycles in basins occupied by listed ESUs. This may cause juvenile salmon mortality through migration delay resulting from insufficient flows or habitat blockages; loss of sufficient habitat due to dewatering and blockage; stranding of fish resulting from rapid flow fluctuations; entrainment of juveniles into poorly screened or unscreened diversions; and increased juvenile mortality resulting from increased water temperatures (Spence et al. 1996). Reduced flows also negatively affected fish habitats due to increased deposition of fine sediments in spawning gravels, decreased recruitment of new spawning gravels, and encroachment of riparian and exotic vegetation into spawning and rearing areas. Further, some climate models predict 10 to 25 percent reductions in late spring-summer-early fall runoff amounts in the coming decades.

Water quality in Oregon was categorized using the Oregon Water Quality Index (OWQI). The OWQI is a large, consistent and reliable data set that covers the state. It is based on a combination of measurements of temperature, dissolved oxygen, biochemical oxygen demand, pH, ammonia and nitrate nitrogen, total phosphorus, total solids and fecal coliform. Because water quality is influenced by streamflow, water quality indices are measured during high and low flow periods. Two key water quality factors affecting salmon are water temperature and fine sediment. Summer temperatures above 16^{o}C puts fish at greater risk through effects that range from the individual organism to the aquatic community level. These effects impair salmon productivity from the reach to the stream network scale by reducing the area of usable habitat and reducing the diversity of coldwater fish assemblages. The loss of vegetative shading is the predominant cause of elevated summer water temperature. Smaller streams with naturally lower temperatures that are critical to maintaining downstream water temperatures are most vulnerable to this effect. The same factors that elevate summer water temperature can decreases winter water temperatures and put salmon at additional risk. Widespread channel widening and reduced base flows further exacerbate seasonal water temperature extremes.

Sedimentation from logging, mining, urban development, and agriculture are a primary cause of salmon habitat degradation. In general, effects of sedimentation on salmons are well documented and include clogging and abrasion of gills and other respiratory surfaces; adhering to the chorion of eggs; providing conditions conducive to entry and persistence of disease-related organisms; inducing behavioral modifications; entombing different life stages; altering water chemistry by the absorption of chemicals; affecting useable habitat by scouring and filling pools and riffles and changing bedload composition; reducing photosynthetic growth and primary production; and affecting intergravel permeability and dissolved oxygen levels (Spence et al. 1996).

Generally, water quality in Oregon is poor for salmon during low flow periods, except in mountainous areas. Instances of excellent or good water quality occur most often in the forested uplands. Poor or very poor water quality occurs most often in the non forested lowlands where land has been converted to agricultural and urban uses. Most ecoregions include some rivers and streams with excellent water quality and other with very poor water quality. Only the Cascades ecoregion has excellent water quality overall as shown by average OWQI measurements. The Willamette Valley, Columbia Plateau, Northern Basin and Range and southern end of the Eastern Cascade Slope ecoregions have poor water quality indices. The effects of pesticides and fertilizers, especially nitrates, on water supplies and aquatic habitats are a significant concern. Almost all categories of water pollution are growing, as are hazardous waste emissions, air pollution, toxic releases, and waste generation.

Depending on the species, salmon spend from a few days to one or two years in an estuary before migrating out to the ocean. Natural variability and extremes in temperature, salinity, tides and river flow make estuarine ecosystems and organisms relatively resilient to disturbance. However, alterations such as filling, dredging, the introduction of nonnative species, and excessive waste disposal have changed Oregon's estuaries, reducing their natural resiliency and functional capacity. The most significant historical changes in Oregon's estuaries are the diking, draining and filling of wetlands and the stabilization, dredging and maintenance of navigation channels. Between 1870 and 1970, approximately 50,000 acres or 68 percent of the original tidal wetland areas in Oregon estuaries were lost. Despite these significant historical wetland conversions and continuing degradation by pollutants, nuisance species, and navigational improvement, much of the original habitat that existed in the mid-1800s is still relatively intact and under protection of local zoning plans. Hundreds of acres of former estuarine marshes are now being restored.

Nonnative species now comprise a significant portion of Oregon's estuarine flora and fauna. Some, such as the European green crab, pose serious threats to native estuarine communities necessary to support healthy salmon populations. Consumptive use of fresh water in the upper watersheds has reduced freshwater inflow to estuaries by as much as 60 to 80 percent, thus reducing the natural dilution and flushing of pollutants. Other significant concerns include excessive sediment and runoff pollution from local and watershed source, and pressures associated with population and tourism growth.

Oregon contains approximately 114,500 miles of rivers and streams. No statewide measurements exist of the area of riparian vegetation, although some estimates have been made for more localized regions. Using the conservative estimate of a 100-yard riparian corridor on each side of the stream, the total area of riparian habitats for flowing water in Oregon may be 22,900 square miles. That is equal to approximately 15 percent of the total area of the state. With the exception of fall chinook, which generally spawn and rear in the mainstem, salmon and steelhead spawning and rearing habitat is found in tributaries where riparian areas are a major habitat component. Healthy riparian areas retain the structure and function of natural landscapes as they were before the intensive land use and land conversion that has occurred over the last 150 to 200 years. However, land use activities have reduced the numbers of large trees, the amount of closed-canopy forests, and the proportion of older forests in riparian areas. In western Oregon, riparian plan communities have been altered along almost all streams and rivers.

In the western Cascades, Willamette Valley, Coast Range, and Klamath Mountains, riparian areas on privately-owned land are dominated by younger forests because of timber harvest, whereas riparian areas on public lands have more mature conifers. Old coniferous forests now comprise approximately 20 percent of the riparian forests in the Cascades, but only 3 percent in the Coast Range. Older forests historically occurred along most of the McKenzie River, but now account for less than 15 percent of its riparian forests. Along the mainstem of the upper Willamette River, channel complexity has been reduced by 80 percent and the total area of riparian forest has been reduced by more than 80 percent since the 1850s. Downstream portions of the Willamette River have experienced little channel change, but more than 80 percent of the historical riparian forest has been lost.

Beginning in the early 1800s, riparian areas in eastern and southern Oregon were extensively changed by trapping beaver, logging, mining, livestock grazing, agricultural activities, and associated water diversion projects. Very little of the once extensive riparian vegetation remains to maintain water quality and provide habitats for threatened salmon. Dams have affected flow, sediment, and gravel patterns, which in turn have diminished regeneration and natural succession of riparian vegetation along downstream rivers. Introduced plant species pose a risk to some riparian habitat by dominating local habitats and reducing the diversity of native species. Improper grazing in riparian areas is another significant threat.

Sixty-three species or recognized subspecies of native freshwater fish occur in Oregon. Currently, 14 of those species or subspecies are listed under the ESA as threatened or endangered. An additional 15 species are considered potentially at-risk and are listed as candidate species. Thus, 45 percent of Oregon's freshwater fish species have declined and are at some risk of extinction. Among the 50 states, Oregon ranks fifth for the greatest number of listed fish species. In response to concern about the health of salmon populations, commercial and sport harvests have been sharply curtailed, and fishing for coastal coho salmon was eliminated entirely from 1994 to 1998.

Occurrence of tumors, lesions, and deformities in fish is a direct measure of fish health. Systematic data regarding this problem are not available statewide. In the Willamette River, skeletal deformities comprised less than 5 percent of the sampled population upstream from Corvallis, 20 percent between Corvallis and Newberg, and 56 percent of the sampled population in the Newberg pool.

More than 32 species of freshwater fish have been introduced into Oregon, and are now self-sustaining, making up approximately one-third of Oregon's freshwater fish fauna. Introduced species are frequently predators on native species, compete for food resources, and alter freshwater habitats. In 1998, introduced species were found to comprise 5 percent of the number of species found in the upper Willamette River, but accounted for 60 percent of the observed species in the lower river near Portland.

In summary, the *Report* makes it clear that environmental baseline conditions are most critical in lowlands of major river basins, where most Oregonians live and work. Flow conditions and water quality are poor and riparian structure and function has been significantly degraded from historical conditions. These and other problems reflect the aggregate effects of many small, diffuse, individual decisions and actions.

The March 21, 2001 Biological Opinion required the Corps to provide an annual monitoring report. The report is intended to be a summary of project data and a description of program participation; the quality of supporting analyses, monitoring information, and compensatory mitigation provided by permittees; trends in the environmental baseline; and recommendations to improve the effectiveness of the program. In its annual monitoring report for 2001[21], the Corps identified a total of 139 permits within the proposed action area for activities that were within the range of actions covered under the 15C Opinion (Table 2).[22]

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[21] Letter from Lawrence C. Evans, Corps, to Michael Crouse, NMFS (April 12, 2002) (transmitting annual monitoring report for permits issued under the March 21, 2001 biological opinion in 2001).

[22] Permit activity on the north shore of the Columbia River was not included in this total because this was not part of the action area for the 15C Opinion in 2001. Nonetheless, information on individual consultations from the north shore is shown in Table 2 as an indication of permit activity that may be captured by this Opinion in the future.

Table 2. Number of Corps Permits Issued in 2001 Within the Action Area by Activity Type for Activities Covered by the 15c Opinion.

ACTIVITY	OREGON	NORTH SHORE COLUMBIA RIVER
Site Preparation for Construction of Buildings	0	0
Streambank Protection	19	0
Stream and Wetland Restoration	0	not available
Water Control Structures	4	0
Road Construction, Repairs and Improvements	47	0
Utility Lines	18	0
Recreational Boating Facilities	24	0
Minor Discharge and Excavation	18	4
Maintenance Dredging	9	0
Return Water from Upland Disposal Sites	0	0

Of the projects permitted under the Opinion, seven monitoring reports were provided to the Corps by the permittees. As a result, the Corps is not certain how many projects authorized by the Opinion were completed in 2001. The Corps is working to tighten its tracking system for 2002 so that it will have a better idea how many authorized projects are completed. Monitoring reports that were received contained an adequate level of narrative detail to describe the effects on aquatic habitats. The level of photo documentation was cited as especially good and, with the project narratives, provided a reasonable basis for evaluating project effects. Nonetheless, the low level of monitoring response was inadequate to identify or evaluate trends in the baseline because of permitted activities in 2001.

If the 2001 permits are arranged by geographic areas corresponding to tentatively identified recovery planning domains and the currently listed ESUs they contain,[23] 64 percent were in the Willamette/Lower Columbia area, 14 percent were within the Interior Columbia, 9 percent were on the Oregon Coast (Columbia River to Cape Blanco), and 12 percent were within the Southern Oregon/Northern California Coasts area (Cape Blanco to California) (Table 3). Most projects were authorized for the Willamette Valley. This pattern reflects the higher level of economic activity that takes place in the Willamette/ Lower Columbia coastal geographic areas compared with the part of the much larger Interior Columbia area that is included in the action area, and that is home for the most endangered ESUs (i.e., UCR chinook, UCR steelhead and SR sockeye). If this trend continues, comparatively few actions will be authorized under this Opinion in the Interior Columbia geographic area where those actions might affect endangered ESUs.

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[23] See, NMFS, Northwest Salmon Recovery Planning, at http://research.nwfsc.noaa.gov/cbd/trt/index.html.

Table 3. Number of Corps Permits Issued in 2001 Within the Action Area by Geographic Area for Activities Covered by the 15c Opinion.

GEOGRAPHIC AREA	ESUs AFFECTED	PERMITS ISSUED
Willamette/Lower Columbia	LCR chinook, UWR chinook, CR chum, LCR steelhead, UWR steelhead	89
Interior Columbia	SR fall-run chinook, SR spring/ summer-run chinook, UCR spring-run chinook, SR sockeye, UCR steelhead, SR Basin steelhead, MCR steelhead	20
Oregon Coast	OC coho	13
Southern Oregon/ Northern California Coasts	SONC coho	17

State of Washington. For the purposes of programmatic consultations, Seattle District Corps has separated Washington State into five geographic regions: Coastal Washington Watersheds; Puget Sound, Hood Canal, Strait of Juan de Fuca, and Strait of Georgia Watersheds; Lower Columbia River Watersheds: Middle and Upper Columbia River Watersheds; and, Snake River Watersheds. This programmatic consultation applies only to the mainstem Columbia River from McNary Dam to the river mouth. This area encompasses the Lower Columbia River Region 3 (Clark, Cowlitz, Lewis, Pacific, Skamania and Wahkiakum Counties), and the southern portion of the Middle Columbia River Region 4 (Klickitat and Benton Counties).

In Region 3, the majority of the upper watersheds have experienced some levels of timber harvesting with most of the timber production focused in Wahkiakum County, the eastern portions Lewis, Cowlitz, and Clark Counties, and Skamania County. Water-body impairments are often associated with areas where the timber has been over harvested. Some watersheds, such as the Upper Grays River in Wahkiakum County, which have experienced expansive timber harvest and increased flows due to lack of runoff retention have flooding problems throughout the basin. Flooding can cause streambank erosion, deposition of fines, shallowing of streambeds and subsequent temperature warming downstream.

Many of the waterbodies exceed Washington State Water Quality Standards for temperature, sedimentation, and dissolved oxygen (WDOE 2000). A limiting factors analysis has identified problems of excessive fine sediments, lack of large woody debris in streams and in large woody debris recruitment areas, and elevated summer water temperatures. These factors are associated with high forest road densities, removal of riparian habitat, and road construction in riparian areas.

Significant agricultural production occurs throughout the Lower and Middle Columbia River watersheds. Conversion of habitat to agricultural lands has resulted in loss of riparian habitat, unstable stream banks due to poor cattle exclusion devices, excessive chemical levels in the water associated with pesticides and herbicides, high water temperatures, low dissolved oxygen levels and high levels of fecal coliform (WDOE 2000). Many streams exceed appropriate width/depth ratios, resulting in high temperatures, sheet flow at high waters, and inadequate velocity levels at low flows. Agricultural production has also increased disturbance related to invasive plant species. Within the watersheds, several waterbodies have issues with fish passage either due to road crossing or small dams constructed for irrigation of agricultural lands.

Several hydropower projects including the Bonneville Dam on the mainstem Columbia River have caused adverse effects directly to listed species and to habitat along the Lower Columbia River. The series of dams along the Columbia River have blocked an estimated 12 million cubic yards of debris and sediment that would otherwise naturally flow down the Columbia, replenishing the shorelines along the Washington and Oregon Coasts.

Industrial harbor and port development have been significant within the Lower Columbia River watersheds, and along the mainstem Columbia River. One hundred miles of river channel within the mainstem Columbia River, it's estuary – Baker Bay, and Oregon's Willamette River have been dredged as a navigation channel by the Corps since 1878. Originally dredged to a depth of 20-feet minimum in 1878, the federal navigation channel of the lower Columbia River is now maintained at a depth of 40-feet and a width of 600-feet. The average amount dredged each year is 5.5 million cubic yards of material (NMFS 2002b). The lower Columbia River supports five ports on the Washington State side: Kalama, Longview, Skamania County, Woodland and Vancouver. These ports primarily focus on the transport of timber and agricultural commodities. In addition to loss of riparian habitat, and disruption of benthic habitat due to dredging, several sediment chemical exceedances, such as arsenic, and PAHs, have been identified in Lower Columbia River watersheds in the vicinity of the ports and associated industrial activities

The most extensive urban development in the Lower Columbia River watershed occurs in the Vancouver/Camas area. Outside of this major urban area, the majority of residential development relies on septic systems. Common water contaminants associated with urban development and residential septic systems include excessive water temperatures, lowered dissolved oxygen levels, fecal coliform, and chemicals associated with pesticides and urban runoff.

Lower Columbia River watersheds have also been significantly altered by sand and gravel mining activities both in the past and at present. Many streams and rivers have excessive sediment levels and unstable riparian areas due to in-stream mining or upland mining with poor sediment and erosion control measures.

NMFS concludes that not all of the biological requirements of the species within the action area are being met under current conditions, based on the best available information on the status of the affected species; information regarding population status, trends, and genetics; and the environmental baseline conditions within the action area. Significant improvement in habitat conditions over those currently available under the environmental baseline is needed to meet the biological requirements for survival and recovery of these species.

2.1.3 Effects of the Proposed Action

NMFS' ESA regulations define "effects of the action" as "the direct and indirect effects of an action on the species or critical habitat with the effects of other activities that are interrelated or interdependent with that action, that will be added to the environmental baseline." Direct effects are immediate effects of the project on the species or its habitat, and indirect effects are those caused by the proposed action and are later in time, but are still reasonably certain to occur (50 C.F.R. 402.02).

Direct effects result from the agency action and can include effects of interrelated and interdependent actions. Future Federal actions that are not a direct effect of the action under consideration (and not included in the environmental baseline or treated as indirect effects) are not evaluated. Indirect effects are caused by the proposed action, are later in time, and are reasonably certain to occur (50 C.F.R. 402.02). Indirect effects can occur outside of the area directly affected by the action. Indirect effects can include the effects of other Federal actions that have not undergone section 7 consultation, but will result from the action under consultation. These actions must be reasonably certain to occur, or be a logical extension of the proposed action.

General Construction. Most of the proposed actions require some degree of construction in and beside streams or other water bodies. The direct physical and chemical effects of the construction associated with the proposed actions begin with surveying, minor vegetation clearing, placement of stakes and flagging guides, and minor movements of machines and personnel over the action area. Subsequent construction of access roads, construction staging areas, and materials storage areas may affect more of the project area and clear vegetation that will allow rainfall to strike the bare land surface. Additional clearing and digging for site preparation and earthwork may remove more vegetation and topsoil, expose deeper soil layers, extend operations into the active channel, and reshape banks as necessary for successful revegetation. Different structures, each with a different set of effects that will be analyzed in subsequent sections, may be added to upland, riparian, in-water, or over-water locations. The final stage of general construction is site restoration and consists of actions necessary to restore ecological recovery mechanisms such as soil stability, energy and nutrient distribution, and vegetation succession.

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 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. Concurrent in-water work can compact or dislodge channel sediments, thus increasing turbidity and allowing currents to transport sediment downstream where it is eventually redeposited. Continued operations when the construction site is inundated can significantly increase the likelihood of severe erosion and contamination. The proposed action will avoid or minimize these effects with the following conservation measures:

- # Boundaries of clearing limits associated with site access and construction will be marked to avoid or minimize disturbance of riparian vegetation, wetlands and other sensitive sites.
- # A pollution and erosion control plan will be prepared and carried out to prevent pollution and erosion related to construction operations. Erosion control elements of the plan will address materials storage sites, access roads, stream crossings, construction sites, borrow pit operations, haul roads, and inspection and replacement of erosion controls.
- # A supply of emergency erosion control materials will be on hand, and temporary erosion controls will be installed and maintained in place until site restoration is complete.
- # Existing roadways or travel paths will be used whenever possible.
- # The number of temporary access roads will be minimized and roads will be designed to avoid adverse effects.
- # Access ways may not be built mid-slope or on slopes greater than 30 percent.
- # Stream crossings will provide for foreseeable risks such as flooding and associated bedload and debris to prevent a stream diversion if the crossing fails.
- # Vehicles and machinery will cross riparian areas and streams at right angles whenever possible.
- # Earthwork will be completed as quickly as possible.
- # The site will be stabilized during any significant break in work.
- # If listed fish are present, or the work area is within 300-feet of a spawning area, any in-water work area will be isolated from flowing waters.
- # Project operations will cease under high flow conditions that may inundate the project area, except as necessary to avoid or minimize resource damage.

Use of heavy equipment during construction creates the opportunity for accidental spills of fuel, lubricants, hydraulic fluid and similar contaminants into the riparian zone or water where they can injure or kill aquatic organisms. Discharge of construction water used for vehicle washing, concrete washout, pumping for work area isolation, and other purposes can carry sediments and a variety of contaminants to the riparian area and stream. Similarly, use of treated wood in or over flowing water to build any type of structure at the construction site can introduce toxic compounds directly into the stream during cutting or abrasion, or by leaching (Poston, 2001). Pile driving for in-water structures can cause temporary, intense underwater sound events that may affect behavior of salmon up to 600-meters away (Feist et al. 1996, Carlson et al. 2001, Carrasquero 2001). Besides the conservation measures listed above, the Corps has proposed the following conservation measures to further minimize or avoid these effects:

- # Pollution control elements of the pollution and erosion control plan will address equipment and materials storage sites, fueling operations, staging areas, cement, mortars and bonding agents, hazardous materials, spill containment and notification, and construction debris management.
- # Vehicle staging, cleaning, maintenance, refueling, and fuel storage will be 150-feet or more from any stream, water body or wetland.
- # All vehicles operated with 150-feet of any water body will be inspected daily for leaks and, if necessary, repaired before leaving the staging area.

Stationary power equipment operated within 150-feet of any stream or wetland will be diapered to prevent leaks, unless otherwise approved by NMFS.
All equipment operated instream will be cleaned to remove all external grease, dirt, and mud before operations below the bankfull elevation.
Project operations will cease under high flow conditions that may inundate the project area, except as necessary to avoid or minimize resource damage.
Construction discharge water will be treated for water quality and discharge velocity, and released away from spawning areas and submerged marine vegetation.
Treated wood debris and treated wood removed as part of a project will be handled and disposed of as appropriate for this type of hazardous material.
No new treated wood will be used for any structure that may contact flowing water or that will be placed over water, except pilings installed following NMFS' guidelines.
The number and diameter of pilings will be minimized, as appropriate, without reducing structural integrity.
No more than five single piles or one dolphin consisting of three to five piles may be replaced or added to an existing structure or marina per in-water construction period.

Heavy equipment can cause soil compaction, thus reducing soil permeability and infiltration. Construction of pavement and other permanent soil coverings to build water-dependent structures (e.g., bridges, boat ramps), roads linking those structures to the transportation system, and road upgrades can also reduce site permeability and infiltration. Permeability and infiltration are inversely related to the rate and volume of runoff. During and after wet weather, increased runoff can suspend and transport more sediment to receiving waters. This increases turbidity and stream fertility. Increased runoff also increases the frequency and duration of high stream flows and wetland inundation in construction areas. Higher stream flows increase stream energy that can scour stream bottoms and transport greater sediment loads farther downstream that would otherwise occur. Sediments in the water column reduce light penetration, increase water temperature, and modify water chemistry. Once deposited, sediments can alter the distribution and abundance of important instream habitats, such as pool and riffle areas. During dry weather, the physical effects of increased runoff appear as reduced ground water storage, lowered stream flows, and lowered wetland water levels. The effects of reduced soil permeability and infiltration are most significant in upland areas where runoff processes and the overall storm hydrograph are controlled mainly by groundwater recharge and subsurface flows. These effects are less significant in riparian areas, where saturated soils and high water tables are more common and runoff processes are dominated by direct precipitation and Horton overland flow (Dunn and Leopold 1978). Besides conservation measures listed above, the effects of heavy equipment operation will be further minimized or avoiding by the following conservation measures:
Heavy equipment will be limited to that with the least adverse effects on the environment (e.g., minimally sized, rubber tired).
New impervious surface for a water-dependent structure will be offset by an action like planting additional riparian trees and shrubs or restoration of near shore habitats.

The direct physical and chemical effects of post-construction site restoration included as part of the proposed actions are essentially the reverse of the construction activities that go before it. Bare earth is protected by seeding, planting woody shrubs and trees, and mulching. This immediately dissipates erosive energy associated with precipitation and increases soil infiltration.

It also accelerates vegetative succession necessary to restore the delivery of large wood to the riparian area and stream, root strength necessary for slope and bank stability, leaf and other particulate organic matter input, sediment filtering and nutrient absorption from runoff, and shade. Microclimate will become cooler and more moist, and wind speed will decrease. In addition to conservation measures listed above, the Corps has proposed the following conservation measures to further minimize or avoid the adverse effects of site restoration, and to maximize the beneficial environmental effects:

- All temporary access roads will be obliterated when the project is completed, the soil will be stabilized and the site will be revegetated.
- Temporary roads in wet or flooded areas will be abandoned and restored by the end of the in-water work period.
- Any large wood, native vegetation, weed-free topsoil, and native channel material displaced by construction will be stockpiled for use during site restoration.
- When construction is finished, all streambanks, soils and vegetation will be cleaned up and restored as necessary to renew ecosystem processes that form and maintain productive fish habitats.
- No pesticide application will be allowed.
- Fencing will be installed as necessary to prevent access to revegetated sites by livestock or unauthorized persons.
- An unavoidable adverse effect, such as construction of a new impervious surface for a water-dependent structure, will be offset by an action like planting additional riparian trees and shrubs or restoration of nearshore habitats.

The direct biological effects of construction included as part of the proposed action are primarily the result of physical and chemical changes in the environment caused by that construction. These effects are complex and vary in magnitude and severity between the individual organism, population, ESU and community scales.

The most lethal biological effects of the proposed actions on individual listed salmon and steelhead will likely be caused by the isolation of in-water areas. Although work area isolation is itself a conservation measure intended to reduce the adverse effects of erosion and runoff on the population, any individual fish present in the work isolation area will be captured and released. Capturing and handling fish causes them stress though they typically recover fairly rapidly from the process and therefore the overall effects of the procedure are generally short-lived (NMFS 2002a). The primary contributing factors to stress and death from handling are differences in water temperatures (between the river and wherever the fish are held), dissolved oxygen conditions, the amount of time that fish are held out of the water, and physical trauma. Stress on salmonids increases rapidly from handling if the water temperature exceeds 18°C or dissolved oxygen is below saturation. Fish that are transferred to holding tanks can experience trauma if care is not taken in the transfer process, and fish can experience stress and injury from overcrowding in traps, if the traps are not emptied on a regular basis. Debris buildup at traps can also kill or injure fish if the traps are not monitored and cleared on a regular basis. These biological effects will be minimized or avoiding by the following conservation measures:

- Work within the active channel will be completed during preferred in-water work windows, when listed fish are least likely to be present in the action area, unless otherwise approved in writing by NMFS.

Fish passage will be provided for any adult or juvenile salmonid species that may be present in the project area during construction, and after construction for the life of the project.
If listed fish are present, or the work area is within 300-feet of a spawning area, the in-water work area will be isolated.
Any water intakes used for the project – including pumps used to dewater the work isolation area – will have a fish screen installed, operated and maintained according to NMFS' fish screen criteria.
Any listed fish that may be trapped within the isolated work area will be captured and released using methods approved by NMFS, including supervision by a fishery biologist experienced with work area isolation and competent to ensure the safe handling of all ESA-listed fish.

Construction actions may also have direct biological effects on individual salmon and steelhead by altering development, bioenergetics, growth, and behavior. Actions that increase flows can disturb gravel in salmon or steelhead redds and can also agitate or dislodge developing young and cause their damage or loss. Similarly, actions that reduce subsurface or surface flows, reduce shade, deposit silt in streams, or otherwise reduce the velocity, temperature, or oxygen concentration of surface water as it cycles through a redd can adversely affect the survival, timing, and size of emerging fry (Warren 1971). Coho salmon that survive the redd but emerge later and smaller than other fry also appear to be weaker, less dominant, and less capable of maintaining their position in the environment (Mason and Chapman 1965). Once adult salmon or steelhead arrive at a spawning area, their successful reproduction is dependent on the same environmental conditions that affect survival of embryos in the redd.

Many environmental conditions can cause incremental differences in feeding, growth, movements, and survival of salmon and steelhead during the juvenile life stage. Construction actions that reduce the input of particulate organic matter to streams, add fine sediment to channels, or disturb shallow-water habitats, can adversely affect the ability of salmon and steelhead to obtain food necessary for growth and maintenance. Salmon and steelhead are generally able to avoid the adverse conditions created by construction if those conditions are limited to areas that are small or local compared to the total habitat area, and if the system can recover before the next disturbance. This means juvenile and adult salmon and steelhead will, to the maximum extent possible, readily move out of a construction area to obtain a more favorable position within their range of tolerance along a complex gradient of temperature, turbidity, flow, noise, contaminants, and other environmental features. The degree and effectiveness of the avoidance response varies with life stage, season and the frequency and duration of exposure to the unfavorable condition, and the ability of the individual to balance other behavioral needs for feeding, growth, migration, and territory. Chronic or unavoidable exposure heightens physiological stress thus increasing maintenance energy demands (Redding et al. 1987, Servizi and Martens 1991). This reduces the feeding and growth rates of juveniles and can interfere with juvenile migration, growth to maturity in estuaries, and adult migration. However, with due diligence for the full range of conservation measures outlined above, the threat is negligible that the environmental changes caused by events at any single construction site associated with the proposed action, or even any likely combination of such construction sites in proximity, could cause chronic or unavoidable exposure over a large habitat area sufficient to cause more than transitory direct affects to individual salmon or steelhead.

At the population level, the effects of the environment are understood to be the integrated response of individual organisms to environmental change. Thus, instantaneous measures of population characteristics, such as population abundance, population spatial structure and population diversity, are the sum of individual characteristics within a particular area, while measures of population change, such as population growth rate, are measured as the productivity of individuals over the entire life cycle (McElhany et al. 2000). Lethal take associated with work area isolation, if any, is expected to amount to no more than a few individual juveniles (see, Table 4). That is too few to influence population abundance. Similarly, small to intermediate reductions in juvenile population density in the action areas caused by individuals moving out of the construction area to avoid short-term physical and chemical effects of the proposed construction are expected to be transitory and are not expected alter juvenile survival rates. Because adult salmon and steelhead are larger and more mobile than juveniles, it is unlikely that any will be killed during work area isolation although adults may move laterally or stop briefly during migration to avoid noise or other construction disturbances (Feist et al. 1996, Gregory 1988, Servizi and Martens 1991, Sigler 1988). However, with due diligence for the full range of conservation measures outlined above, it is unlikely that physical and chemical changes caused by construction events at any single construction site associated with the proposed action, or even any likely combination of such construction sites in proximity, will cause delays severe enough to reduce spawning success and alter population growth rate, or cause straying that might alter the spatial structure or genetic diversity of populations. Thus, it is unlikely that the direct biological effects of construction associated with the proposed action will affect the characteristics of salmon or steelhead populations.

At the ESU level, direct biological effects are synonymous with those at the population level or, more likely, are the integrated demographic response of one or more subpopulations (McElhany et al. 2000). As described above, it is unlikely that the direct biological effects of construction associated with the proposed action will affect the characteristics of salmon or steelhead populations, therefore it is also unlikely that salmon or steelhead will be affected at the ESU level.

Indirect effects that are reasonably certain to occur after the proposed construction is complete include human activity and ecological recovery in the construction area. The human activity will vary with the type and purpose of the structure or activity completed, and will be discussed below in sections analyzing specific types of actions. "Ecological recovery" means the establishment or restoration of environmental conditions necessary for proper functioning condition in the construction area. Many proposed actions are likely to occur in areas where productive habitat functions and recovery mechanisms were absent or degraded before construction took place. These sites are only likely to achieve proper functioning condition if the preconstruction environment retains the ecological potential to function properly[24] (e.g., residual productivity of

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[24] "Properly functioning," "properly functioning condition," and "properly functioning habitat condition" refers to the habitat component of a species' biological requirements and means the sustained presence of natural habitat-forming processes in a watershed necessary for the long-term survival of the species through the full range of

riparian soils, channel conditions with balanced scour and fill processes). The prospect for ecological recovery will be further limited by ecological and social factors at the watershed and landscape scales, or site capacity. For example, ecological recovery of a project site surrounded by intensive land use and severe upstream disturbance is likely to be less stable and less resilient than the recovery of a site surrounded by wildlands where the headwaters are protected. To some extent, control of undesirable vegetation, limiting anthropogenic disturbance, and other proposed conservation measures described above will help to compensate for low residual ecological potential and accelerate recovery. However, they are unlikely to fully overcome severe site constraints imposed by low site capacity.

The time necessary for recovery of functional habitat attributes will vary by attribute. Recovery mechanisms such as soil stability, sediment filtering and nutrient absorption, and vegetation succession may recover quickly (months, years) after completion of the proposed action. Recovery of functions related to large wood and microclimate may require decades or longer. Functions related to shading of the riparian area and stream, root strength for bank stabilization, and organic matter input may require intermediate lengths of time. Thus, ecological recovery that includes all important functional habitat attributes, within the limits of site potential and capability, may require many decades although substantial or full recovery of most attributes is likely to occur much sooner. This is well within the 100-year time frame used to evaluate the role of local environmental variation in the long-term survival of salmon and steelhead populations (McElhaney et al. 2000). Habitat areas associated with new pavement and other new permanent soil cover, if any, will not be part of this recovery trajectory. However, other riparian and in-water areas will be selected for concurrent habitat improvement using quantitative criteria developed for each project as necessary to offset any permanent habitat loss caused by construction.

The indirect biological effects of construction can be understood as the integrated response of individuals and populations of many, interrelated species at the community level. All populations are dependent on the physical and chemical conditions and resources at their locations, and together with these conditions and resources form ecosystems. A persistent change in the environmental conditions or resources of an ecosystem can lead to a change in the abundance of many, if not all, populations in the ecosystem and lead to development of a new community. Differences in riparian and instream habitat quality, including water chemistry, can alter trophic and competitive relationships in ways that support or weaken the populations of salmon and steelhead in relation to other more pollution tolerant species (Wentz et al. 1998; Williamson et al. 1998). However, with due diligence for the full range of proposed conservation outlined above, it is unlikely that physical and chemical changes due to construction activities associated with the proposed action will cause a persistent change in the conditions or resources available relative to the total habitat area. Thus, it is unlikely that the indirect biological effects of construction associated with the proposed action will affect the characteristics of individuals and populations at the biological community level.

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environmental variation. See, NMFS, 1999b The Habitat Approach: Implementation of Section 7 of the Endangered Species Act for Actions Affecting the Habitat of Pacific Anadromous Salmonids. Northwest Region Habitat Conservation and Protected Resources Divisions, Portland, Oregon. 12 p. (August 26, 1999)

Site Preparation for Construction of Buildings and Related Features. The proposed action includes site preparation for construction of buildings and related features outside of the riparian buffer area. Most direct and indirect effects of this type of site preparation are the same as those for general construction discussed above, and these site preparation actions will follow the conservation measures for general construction as applicable. However, the effects of this type of site preparation are likely to be less intense than those discussed above because all actions will occur outside of the riparian buffer area. An additional indirect effect of this activity, which includes site preparation for commercial buildings, houses, and parking lots, can be intentional or opportunistic human access to riparian or instream areas. Once in the riparian zone or instream area, people may walk or hike, thus trampling soils and channel materials, and disturbing vegetation in ways that can increase runoff and reduce plant growth. They may also start fires, dump trash, or otherwise adversely alter environmental conditions. However, with due diligence for the full range of conservation measures outlined above, including the requirement that fencing will be installed as necessary to prevent access to revegetated sites by livestock or unauthorized persons, it is unlikely that environmental changes caused by these indirect effects at any single construction site associated with the proposed action, or that any likely combination such construction sites in proximity, could cause chronic trampling or vegetation removal over a large habitat area sufficient to cause more than transitory indirect affects to salmon or steelhead.

Streambank Protection. The primary proposed streambank protection action is the use of large wood and vegetation to increase bank strength and resistance to erosion in an ecological approach to engineering streambank protection (Mitsch 1996; WDFW et al. 2000). Construction of "hard" scour protection for specific public infrastructure and construction of barbs to redirect flow are also proposed. The proposed actions explicitly do not include any other type of structure built entirely of rock, concrete, steel or similar materials, other streamflow control structures, or any type of channel-spanning structure. Except as noted below, most direct and indirect effects of proposed streambank protection actions are the same as those for general construction discussed above, and streambank protection restoration actions will follow the conservation measures for general construction as applicable. The primary means of streambank protection proposed is the use of large wood and vegetation to increase resistance to bank erosion (bioengineering). This approach protects banks by using natural materials to increase erosion resistance and bank roughness to disrupt stream energy. Roots and other small and large pieces of vegetation are used to collect and bind bank sediments. This helps to avoid or minimize loss of riparian function associated with more traditional approaches to streambank protection that rely primarily on rock, cement, steel and other hard materials. Bioengineered bank treatments develop root systems that are flexible and regenerative, and respond more favorably to hydraulic disturbance than conventional hard alternatives. Besides conservation measures listed above, the effects of streambank protection will be further minimized or avoiding by the following conservation measures:

- All streambank protection actions will provide the greatest degree of natural stream and floodplain function achievable through application of an integrated, ecological approach by requiring the selection of protection measures to be constrained by an analysis of the mechanisms and causes of streambank failure, reach conditions, and habitat impacts.
- Large wood will be included as an integral component of all streambank protection treatments. The wood will be intact, hard, and undecayed to partly decaying with untrimmed root wads to provide functional refugia habitat for fish.

The proposed use of "hard" scour protection is limited to construction of a footing, facing, headwall, or other structure necessary to prevent scouring or downcutting of an existing culvert, utility line, or bridge support. Direct and indirect effects of these scour protection actions are similar to the effects of general construction discussed above, including production of new impervious surface, and will follow the conservation measures for general construction as applicable. Besides conservation measures listed above, the effects of scour protection will be further minimized or avoided by the following conservation measure:

Fill of scour holes will be limited to that necessary to protect the integrity of the project and will not extend above the channel bed to avoid or minimize any effects on flow and channel forming processes.

Proposed streambank protection actions also include construction of a barb to redirect low flows believed to be causing certain kinds of bank erosion. A barb is a low elevation projection from a bank that is built primarily of stone and angled upstream to redirect flow away from the bank and control flow alignment. Most direct and indirect effects of constructing a barb are similar to those of general construction described above, and barb construction actions will follow the conservation measures for general construction as applicable. The direct effects of a barb also include redirection of instream flow away from the bank and toward the thalweg. This is believed to improve bank stability along smoothed channel or bends, especially when used in combination with bioengineering techniques (WDFW et al. 2000). This combination is most effective for reducing bank erosion along the outer edge of the channel migration zone in reaches where sedimentation and flows remain relatively constant over time. Barbs are designed to be overtopped by channel forming flows. This ensures that any direct effect they may have on channel forming processes or floodplain connectivity are avoided or minimized. Besides conservation measures listed above, the direct effects of barbs will be further minimized or avoiding by the following conservation measures:

Woody riparian planting will be included as part of every streambank protection action.
No part of the barb structure may exceed bank full elevation, including all rock buried in the bank key.
The trench excavated for the bank key above bankfull elevation will be filled with soil and topped with native vegetation.
The barb itself will incorporate large wood.
Maximum barb length will not exceed 1/4 of the bankfull channel width.
Rock will be individually placed without end dumping.
If two or more barbs are built in a series, the barb farthest upstream will be placed within 150-feet or 2.5 bankfull channel widths, whichever is less, from the barb farthest downstream.

The indirect environmental effects of proposed bioengineered bank treatments are similar to those discussed above for general construction, particularly those related to ecological recovery. The indirect effects of scour protection for public infrastructures are similar, with the area occupied by the hard structure itself being analogous to an area of new impervious surface. However, this effect will be offset with the requirement of offset with additional planting of riparian trees and shrubs or restoration of nearshore habitats. The indirect effects of construction of a barb are also similar, but can also include the beneficial effects due to development of scour holes, deepened pools, and other low energy habitats useful as juvenile rearing areas down-gradient of the barb (USEPA 1998, Piper et al. 2001, cf., Rosgen, undated, describing hydrological problems caused by improperly designed barbs and other flow controls).

Stream and Wetland Restoration. The proposed stream and wetland restoration actions are limited to removal of trash, other artificial debris, sediment bars or terraces that block fish passage; removal of water control structures; and setback of levees, dikes and berms; and reshaping of streambanks as necessary to reestablish vegetation. Most direct and indirect effects of stream and wetland restoration actions are the same as those for general construction discussed above, and stream and wetland restoration actions will follow the conservation measures for general construction as applicable. Further direct physical and chemical effects of trash and debris removal can include resuspension and deposition of sediment and contaminants contained in or buried under the trash and debris. Land uses practices such as agriculture and urban development have contributed increased sediment in streams. Sometimes this sediment can accumulate at the stream mouth, forming a bar or terrace. The bar or terrace can spread the streamflow into finely braided or sheet flow patterns, forming temporal or complete passage barriers to fish. While removal of sediment bars that block fish passage would normally be beneficial to anadromous fish in the long-term, excessive amounts of removal may lead to ancillary effects to stream bed and banks that impair habitat formation and stream processes. Additional analysis of the project to evaluate these impacts are necessary. Therefore, limits on the amount and location of sediment bar and terrace removal are required.

Additional direct physical and chemical effects of removing water control structures and setting back levees, dikes and berms include an increase in effective floodplain and wetland area by restoration of seasonal flow. Additional biological effects of removing fish passage obstructions and removing or setting back water control structures can include an increase in the total habitat area available, and fish stranding. In addition to conservation measures listed above, the Corps has proposed the following conservation measure to further minimize or avoid these effects:

- Removal of sediment bars or terraces to improve fish passage is limited to areas within 50-feet of the mouth of a tributary, and to 25-cubic yards or less of sediment.
- Adequate precautions will be taken to prevent post-construction stranding of juvenile or adult fish.

Most indirect effects of removing water control structures and setting back levees, dikes and berms are similar to those discussed above for general construction. However, these actions can also alter environmental conditions in the project area such that it is converted from an upland biological community and ecosystem to a riparian, wetland or aquatic community and ecosystem. Many complex changes in soil, vegetation and hydrological conditions accompany this conversion and are beneficial for the restoration of proper functioning habitat conditions for salmon and steelhead (NRC 1992, Williams et al. 1996).

Water Control Structures. The proposed water control actions are limited to repair of existing water control structures, including tide gates, and improvements to those structures as necessary to provide or improve fish passage. Because these preexisting structures have independent utility apart from fish passage, the only effects of the proposed actions are those related to repairs and modifications necessary for for fish passage. Therefore, most direct and indirect effects of these actions are similar to the effects of general construction discussed above, and will follow the conservation measures for general construction as applicable. Additional biological effects of providing or improving removing fish passage are an increase in the total available habitat area. In addition to conservation measures listed above, the Corps has proposed the following conservation measure to ensure juvenile fish passage through tide gates:

The maximum average water velocity through the tide gate will not exceed 2-feet per second.

<u>Road Construction, Repairs and Improvements</u>. The proposed action for road construction, repairs and improvements does not include construction of a new road within the riparian buffer area, a new bridge pier or abutment below the bankfull elevation, a new bridge approach within the Federal Emergency Management Agency (FEMA) designated floodway that will require embankment fills that significantly impair floodplain function, or a baffled culvert or fishway. Most direct and indirect effects of the proposed road construction, repairs and improvements are the same as those for general construction discussed above, and these road actions will follow the conservation measures for general construction as applicable. However, the adverse effects of roads can be more severe and more intense than those of general construction because roads, bridges and their associated drainage systems, and traffic accidents, can cause accelerated runoff of sediment and contaminated water. Additional biological effects can include accelerating the introduction of alien plant and animal species that can make ecological recovery more uncertain (Gucinski et al. 2001). Besides general conservation measures for general construction, above, the Corps has proposed the following conservation measures for all road construction, repair and improvement actions:

Permanent stream crossings will be designed in the following priority: Road realignments to avoid crossing the stream, streambed simulation, no-slope design culverts. If the crossing will occur near an active spawning area, only full span bridges or streambed simulation may be used.
Fill width will be limited to the minimum necessary to complete the crossing, and will not reduce existing stream width.
Maximum average water velocity in new culverts will not exceed 1-foot per second to provide for upstream passage of juvenile salmonids.
Suitable grade controls will be included to prevent culvert failure caused by changes in stream elevation.
Culverts will be cleaned by working from the top of the bank, unless culvert access using work area isolation would result in less habitat take. Cleaning will only remove the minimum amount of wood, sediment and other natural debris necessary to maintain culvert function without disturbing spawning gravel. All large wood recovered during cleaning will be placed downstream. All routine work will be done in the dry, using work area isolation if necessary.
Road maintenance will comply with ODOT (1999) practices or the most current version of the Regional Road Maintenance Endangered Species Act Program Guidelines.

<u>Utility Lines</u>. Proposed utility line action consists of stream crossings for pipes, pipelines, cables, and wires. Most direct and indirect effects of utility line actions are similar to the effects of general construction discussed above, and will follow the conservation measures for general construction as applicable. Additional direct effects can include the production of spoils,

contaminated lubricants, and other drilling waste produced by boring that can kill or injure fish if introduced into the water. Besides general conservation measures for construction, above, the Corps has proposed the following conservation measures for all utility line activities:

- Utility stream crossings will be perpendicular to the watercourse, or nearly so, and designed in the following priority: Aerial lines, including lines hung from existing bridges; directional drilling, boring and jacking; dry trenching or plowing.
- If directional drilling, boring or jacking is used, the drill, bore or jack hole will span the channel migration zone and any associated wetland, and pits and any associated waste will be completely isolated from surface waters. If drilling fluid or waste is visible in the water, all drilling activity will cease pending written approval from NMFS to resume drilling.
- If trenching or plowing are used, they will be completed in the dry. Trenches will be backfilled below the ordinary high water line with native material, then capped with clean gravel suitable for fish use in the project area, unless otherwise approved in writing by NMFS.
- Large wood displaced by trenching or plowing will be returned to its original position, wherever feasible.
- Utility lines will not cause lateral migration, head cutting, general scour, or debris loading.

Construction of new utility lines has the potential to enable other interrelated activities, such as commercial and residential development, which may affect individuals of the ESA-listed species or their designated critical habitat through a variety of pathways (e.g., alteration of floodplains, alteration of the volume or timing of water introduction into streams, water withdrawals). In the context of this programmatic consultation, it is not possible for NMFS to anticipate all the possible circumstances where the Corps permitting of new utility line crossings might lead to such indirect effects, nor is NMFS able to analyze the general effects of possible interrelated and interdependent activities. Accordingly, new utility line crossings that entail indirect effects to ESA-listed species or their designated critical habitats are not covered by this Opinion, and require individual consultation.

Recreational Boating Facilities. Recreational boating requires construction and maintenance of a variety of types and sizes of structures. Some are water dependent, and will be placed in riparian, nearshore and overwater areas. Others are "related facilities" (e.g., parking lots, picnic areas) that are not water dependent. For purposes of this consultation, actions proposed to support recreational boating facilities are construction of boat ramps, maintenance, repair and relocation of structures within an existing marina, structures in fleeting and anchorage areas, installation of small temporary floats, and repair of navigational aids.

These proposed actions have significant limitations: (1) No new marinas, floating storage units, boat houses, houseboats; (2) no new boat ramps, docks, piers, or other overwater facilities in an estuary or other saltwater areas, an exposed area requiring a breakwater, an area within 0.5 miles downstream of the mouth of a tributary, a shallow water area requiring significant excavation, or a deposition area likely to need routine maintenance dredging; (3) no new overwater facilities wider than 6-feet unless current velocity is greater than 0.7-feet per second during the low flow period or the structure is more than 50-feet from the shoreline and in water more than 20-feet deep; (4) modifications of existing marinas are made within the existing footprint of the moorage, or in water more than 50-feet from the shoreline and more than 20-feet deep; and (5) all related facilities, such as parking lots and picnic areas, will be outside the riparian buffer area. In addition, all conservation measures for general construction apply as appropriate.

Many direct and indirect effects of recreational boating activities are similar to those of general construction described above. Among those are construction of new impervious surfaces for a boat ramp or other water-dependent structure that will be offset by an action like planting additional riparian trees and shrubs or restoration of nearshore habitats. Other direct physical and chemical effects are unique to overwater structures. These are disruption of nearshore habitat, shading and ambient light changes, water flow pattern and energy disruption (Carrasquero 2001), although these effects have been avoided or minimized by conservation measures described above. Over-water structures can alter predator prey relationships by improving predator success (Hobson 1979, Bell 1991, Metcalfe et al. 1997), although the environmental conditions created by over-water structures that can increase predation on salmon can be avoided or minimized using project design criteria that reduce shaded area and avoid placement in shallow water and other low velocity locations (Carrasquero 2001).

The obvious indirect effect of recreational boating facilities is boating. Boating can result in discharges of many pollutants from boats and related facilities, and physical disruption to wetland, riparian and benthic communities and ecosystems through the actions of a boat hull, propeller, anchor, or wakes (USEPA 1993, Carrasquero 2001). These effects, too, have been avoided or minimized, to the extent possible using boating facility design criteria, by conservation measures described above. The intensity and magnitude of the remaining effects depend on the knowledge and discretion of boat operators as they pursue their boating activity. More subtle indirect effects are caused by the environmental changes caused by deployment of small floats, disintegration of floatation material, and use of boat structures as perches for piscivorous birds. Beyond conservation measures listed above, the effects of recreational boating facilities will be further minimized or avoided by the following conservation measures:

- Buoys or floats are prohibited in inactive anchorage and fleeting areas.
- All synthetic flotation material will be permanently encapsulated to prevent the breakup into small pieces and dispersal in water.
- Mooring buoys, small temporary floats, and floats for crab and shrimp traps will be installed more than 300-feet from submerged marine vegetation, more than 50-feet from the shoreline, in water more than 20-feet deep, and otherwise as necessary to ensure that moored boats do not ground out or propeller wash the bottom.
- Small temporary floats will also be installed less than 7-days before a scheduled event, removed five days after a scheduled event is concluded, and not left in longer than 21-days total.
- All pilings, mooring buoys, and navigational aids (e.g., channel markers) will be fitted with devices to prevent perching by piscivorus birds.

<u>Minor Discharge and Excavation</u>. Minor discharge and excavation refers to maintenance and repairs of previously authorized structures, such as a wastewater outfall. The direct and indirect effects of these actions are the same as those for general construction discussed above, and these actions will follow the conservation measures for general construction as applicable. However,

because these actions are limited in so limited in scope and typically involve very small areas, the direct and indirect effects of these actions on riparian and instream areas are likely to be less intense and severe than those caused by general construction.

Maintenance Dredging. The proposed maintenance dredging is to remove sediments necessary to maintain existing marinas, port terminals, and industrial docks and wharfs with the following restrictions: (1) The economic loading method for hopper dredging will not be used; (2) no dredging will take place in salmonid spawning habitats in tributaries or upstream or in the Columbia River above Bonneville Dam in backwater sloughs, silted-in lateral channels, alcoves, side channels, or other shallow-water areas less than 20-feet deep; and (3) flow lane spoil disposal will not be used.

The direct physical and chemical effects of dredging and spoil disposal activities can include modification of bottom topography and water circulation patterns, increased turbidity, a shift to coarser substrate within the dredged area, bottom siltation outside the dredged area with fine sediments, and return water from upland spoil disposal areas (Darnell 1976, NMFS 2002). Modification of bottom topography and water circulation patterns are proportional to the dredged area in relation to the channel area. These effects are likely to be negligible for locations large enough to support the types of facilities affected by the proposed action. The effects of increased turbidity and bottom siltation have been discussed above. In areas of coarse sand, like the lower Columbia River, the turbidity generated from the dredging process is likely to be very small and confined to the immediate dredging area. Similarly, the requirement that sediments be tested and approved for in-water disposal before dredging takes place will ensure that any opportunity for resuspension of contaminants as a result of maintenance dredging or return water from upland spoil disposal areas will be avoided or minimized. The effects of return flows from upland disposal areas are analyzed below. The direct biological effects of maintenance dredging can include entrainment of salmon and steelhead during dredging. However, no juvenile salmon or steelhead have been entrained during monitoring of normal dredging operations in the Columbia River (Larson and Moehl 1990). The indirect biological effect of dredging can be disruption of benthic prey populations used by juvenile salmon and steelhead if repeated maintenance dredging in the same location exceeds the recovery rate of benthic food organisms or causes a permanent shift in substrate texture or other channel conditions either in the dredged area or downstream. Significant uncertainties regarding the nutritional state of migrating juvenile salmon and steelhead in relation to stability and productivity of freshwater foodwebs (Williams et al. 1966) and the small size of affected areas in relation to the available habitat area complicate evaluation of this effect. Nonetheless, the Corps has proposed to offset the possibility that maintenance dredging can delay or prevent recovery of benthic prey populations with additional plantings of riparian trees and shrubs or restoration of nearshore habitats.

Beyond conservation measures listed above, the effects of maintenance dredging will be further minimized or avoided by the following conservation measures:

- Sediment quality will be evaluated before dredging begins using the most recent version of NMFS' approved criteria for evaluation of contaminated sediments; only sediments approved for in-water disposal by those criteria will be authorized for maintenance dredging.

A hydraulic dredge intake must be kept at or just below the surface of the material being removed, but may be raised for brief periods of purging or flushing.
Clamshell dredges must use a finishing type bucket with flaps, whenever feasible
Dredge spoil will be placed in an approved upland area where it cannot reenter the water body and that is large enough to allow settling.

Return Water From Upland Disposal Sites. This proposed activity includes return water from upland, contained dredged material disposal sites discharged at 4-feet per second, or less, measured at the outfall or diffuser port. The direct physical and chemical effects of this activity are limited to small changes in the location and timing of flow. These changes are a function of the volume of interstitial water contained in the dredged material, the distance between the dredge site and the outfall or diffuser port, and the time necessary for water in the spoils to reach the outfall or diffuser port.

Synthesis. The scope of activity allowed under each type of proposed action is narrowly proscribed, and is further limited by conservation measures tailored to avoid direct and indirect adverse effects of those actions on properly functioning habitat conditions. Due diligence for the scope of actions allowed and conservation measures required will probably limit direct lethal effects on listed fish to a few deaths associated with isolation of in-water work areas, an action necessary to avoid greater environmental harm. All other direct adverse effects will likely be transitory and within the ability of both juveniles and adults to avoid by bypassing or temporarily leaving the proposed action area. Such behavioral avoidance will probably be the only significant biological response of salmon and steelhead to the proposed actions. This is because action areas are likely to be widely distributed and small compared with the total habitat area; the intensity and severity of environmental effects within the action areas have been comprehensively minimized; and proper functioning habitat conditions are likely to recover within the action areas inside the time span used to evaluate local environmental variation in the long-term survival of salmon and steelhead populations. Completion of proposed restoration activities at a degraded site that retains the capability for proper functioning at the site, watershed and landscape scale, will likely result in an increase in the total area of properly functioning habitats available.

2.1.4 Cumulative Effects

Cumulative effects are defined in 50 C.F.R. 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." Other activities within the watershed have the potential to impact fish and habitat within the action area. 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.

Non-Federal activities within the action area are expected to increase with a projected 34 percent increase in human population over the next 25 years in Oregon (Oregon Department of Administrative Services 1999). Thus, NMFS assumes that future private and State actions will continue within the action area, but at increasingly higher levels as population density climbs.

2.1.5 Conclusion

After reviewing the best available scientific and commercial information available regarding the current status of the 14 ESUs considered in this consultation, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is NMFS' opinion that the action, as proposed, is not likely to jeopardize the continued existence of these species, and is not likely to destroy or adversely modify designated critical habitat.

Our conclusions are based on the following considerations: (1) SLOPES requires individual review of each project to ensure whether the proposed action will be covered by this Opinion, and that each applicable conservation measure (reiterated in this opinion as reasonable and prudent measures and terms and conditions) is included as an enforceable condition of the permit document; (2) taken together, the conservation measures applied to each project will ensure that any short-term effects to water quality, habitat access, habitat elements, channel conditions and dynamics, flows, and watershed conditions will be brief, minor, and timed to occur at times that are least sensitive for the species' life-cycle; (3) the underlying requirement of an ecological design approach that protects and stimulates natural habitat forming processes is expected to result in authorization of many projects that will have beneficial long-term effects; and (4) the individual and combined effects of all actions permitted in this way are not expected to impair currently properly functioning habitats, appreciably reduce the functioning of already impaired habitats, or retard the long-term progress of impaired habitats toward proper functioning condition essential to the long-term survival and recovery at the population or ESU scale.

2.1.6 Conservation Recommendations

Section 7 (a)(1) of the ESA directs Federal agencies to use their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of threatened and endangered species. Conservation recommendations are discretionary measures suggested to minimize or avoid adverse effects of a proposed action on listed species, to minimize or avoid adverse modification of critical habitats, or to develop additional information. NMFS believes the following conservation recommendations are consistent with these obligations, and therefore should be carried out by the Corps. This information will help to reduce uncertainty about the effects of past and ongoing human and natural factors leading to the status of listed salmon and steelhead, their habitats, and the aquatic ecosystem within the action area.

1. To the greatest extent possible, the Corps should develop a database that consists of all existing permits that have resulted in projects in these 10 categories. The database should be compatible with monitoring information that will be produced to meet the requirements of this Opinion. NMFS is particularly interested in an accounting of those projects with identified monitoring elements. There is a need to understand how the implementation of the 10 categories of actions and any associated avoidance, minimization and compensation measures are impacting the listed salmon and steelhead. In addition, there is a need to be able to visually track the variety of activities on a watershed or sub-basin scale.

2. In addition to application of their permit tracking database, the Corps should also develop another database, compatible with monitoring data that will be collected under this Opinion consisting of all permits the Corps has issued, and will issue in the future, for categories of activities that are not included in this consultation. The tracking database should alert permit managers to the timing requirements for receipt of monitoring data.

3. The Corps should also develop a Geographic Information System (GIS) to locationally track project implementation. The development of the data-layers should be done in coordination with NMFS, and the resultant reports provided to NMFS on an annual basis.

In order for NMFS to be kept informed of actions minimizing or avoiding adverse effects, or those that benefit listed salmon and steelhead or their habitats, NMFS requests notification of the achievement of any conservation recommendations when the Corps submits its annual report describing achievements of the permitting process for the fifteen categories of activities during the previous year.

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; the action is modified in a way that causes an effect on listed species that was not previously considered; or (3) a new species is listed or critical habitat is designated that may be affected by the action (50 C.F.R. 402.16).

If the Corps fails to provide specified monitoring information by the required date, NMFS will consider that a modification of the action that causes an effect on listed species not previously considered and causes the Incidental Take Statement of the Opinion to expire. Consultation also must be reinitiated 3 years after the date this Opinion is signed. To reinitiate consultation, contact the Habitat Conservation Division (Oregon State Office) of NMFS.

2.2 Incidental Take Statement

Section 9 and rules promulgated under section 4(d) 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 that results in death or injury to listed species by significantly impairing behavioral patterns such as breeding, feeding, and sheltering. Harass is defined as actions that create the likelihood of injuring listed species by annoying it 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 complicance with the terms and conditions of this incidental take statement.

An incidental take statement specifies the impact of any incidental taking of endangered or 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.

2.2.1 Amount or Extent of the Take

NMFS anticipates that the proposed actions considered in this Opinion are reasonably likely to take some of the 14 ESA-listed species through habitat-related effects. Further, NMFS expects those actions that require isolation of the in-water work area to result in an additional amount of nonlethal and lethal take.

Take associated with the habitat-related effects of actions such as these are largely unquantifiable and are not expected to be measurable as long-term effects on populations. Therefore, although NMFS expects the habitat-related effects of these actions to cause some low level incidental take, the best scientific and commercial data available are not sufficient to enable NMFS to estimate a specific amount of incidental take because of those habitat-related effects. In instances such as these, NMFS designates the expected level of take as "unquantifiable."

NMFS estimated the amount of take associated with those projects requiring isolation of the in-water work area using the following assumptions: (1) The geographic distribution of actions covered by this Opinion in 2002 will be similar to the distribution observed in 2001; (2) the number of actions is likely to increase by approximately 50 percent next year, from 139 actions to 210; (3) approximately 10 percent of those actions will require isolation of the in-water work area; (4) each project requiring in-water work area isolation is likely to capture fewer than 100 juvenile salmonids; (5) of the ESA-listed fish to be captured and handled in this way, 98 percent or more are expected to survive with no long-term effects and 1-2 percent are expected to be injured or killed, including delayed mortality because of injury. Nonetheless, the more conservative estimate of 5 percent lethal take will be used here to allow for variations in experience and work conditions.

An estimate of listed fish to non-listed fish in the Columbia Basin was obtained using NMFS' data estimation of percentages of listed spring/summer and fall chinook, sockeye salmon and steelhead smolts arriving at various locations in the Columbia River Basin in 1999[25], then increased several fold to provide a conservative estimate of take due to projects requiring isolation of the in-water work area in 2002 (Table 4). The estimate for take of ESA-listed fish in the two Oregon Coast geographic areas was calculated in a similar way using ODFW preliminary estimates of coho spawner abundance for 2001.[26] Hatchery data for chum are from the Fish

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[25] Memorandum from Michael H. Schiewe, Northwest Fisheries Science Center, to Kevin Collins, NMFS (March 3, 1999) (estimation of percentages of listed spring/summer and fall chinook, sockeye salmon and steelhead smolts arriving at various locations in the Columbia River Basin in 1999).

[26] Oregon Department of Fish and Wildlife, Preliminary estimated coho spawner abundance -- 2001 spawning season (March 1, 2002).

Passage Center, Portland, Oregon. Because many ESUs that these actions may affect are similar in appearance, assigning this take to groups below the species level is impossible.

Table 4. Estimate of Nonlethal and Lethal Take Associated with Proposed Projects Requiring Isolation of an In-water Work Area.

Geographic Area Species	Life Stage	Total Catch	Nonlethal Take ESA-Listed Fish	Lethal Take ESA-Listed Fish
Willamette/Lower Columbia				
sockeye	juvenile	24	<1	<0.1
chinook salmon	juvenile	906	82	4
chum salmon	juvenile	31	31	2
steelhead	juvenile	382	69	3
Interior Columbia				
sockeye salmon	juvenile	5	<1	<0.01
chinook salmon	juvenile	198	18	<1
steelhead	juvenile	7	7	<1
Oregon Coast				
coho salmon	juvenile	189	174	9
S. Oregon/N. California Coasts				
coho salmon	juvenile	252	233	12

NMFS will update this estimate of incidental take before March 31 each year after reviewing information from the preceding year describing isolation of in-water work area operations. Even if monitoring proves the 5 percent mortality rate is accurate, isolation of in-water work area activities will not affect ESA-listed species at the population level. Capture and release of adult fish is not expected to occur as part of the proposed isolation of in-water work areas. Thus, NMFS does not anticipate that any adult fish will be taken.

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 Corps has the continuing duty to regulate the activities covered in this incidental take statement. If the Corps fails to require the applicants to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, or fails to retain the oversight to ensure compliance with these terms and conditions, the protective coverage of section 7(o)(2) may lapse. The NMFS believes that activities carried out in a manner consistent with these reasonable and prudent measures, except those otherwise identified as exclusions, will not necessitate further site-specific consultation. Activities which do not comply with all relevant reasonable and prudent measures will require individual consultation.

The NMFS believes that the following reasonable and prudent measures are necessary and appropriate to avoid or minimize the amount or extent of take of listed fish resulting from implementation of this Opinion. These reasonable and prudent measures would also avoid or minimize adverse effects to designated critical habitat.

The Corps shall:

1. Minimize incidental take from administration of the regulatory program for Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act of 1899 by ensuring effective administration of standard local operating procedures for endangered species (SLOPES).

2. Minimize incidental take from general construction by excluding unauthorized permit actions and applying permit conditions that avoid or minimize adverse effects to riparian and aquatic systems.

3. Minimize incidental take from site preparation for construction of buildings and related features by excluding unauthorized permit actions and applying permit conditions that avoid or minimize adverse effects to riparian and aquatic systems.

4. Minimize incidental take from streambank protection by excluding unauthorized activities and applying permit conditions that provide the greatest degree of natural floodplain and stream functions achievable through the use of an integrated, ecological approach.

5. Minimize incidental take from stream and wetland restoration by excluding unauthorized permit actions and applying permit conditions that avoid or minimize adverse effects to riparian and aquatic systems.

6. Minimize incidental take from repairs to water control structures by excluding unauthorized permit actions and applying permit conditions that avoid or minimize adverse effects to riparian and aquatic systems.

7. Minimize incidental take from road construction, repairs and improvements by excluding unauthorized permit actions and applying permit conditions that avoid or minimize adverse effects to riparian and aquatic systems.

8. Minimize incidental take from utility lines by excluding unauthorized permit actions and applying permit conditions that avoid or minimize adverse effects to riparian and aquatic systems.

9. Minimize incidental take from recreational boating facilities by excluding unauthorized permit actions and applying permit conditions that avoid or minimize adverse effects to riparian and aquatic systems.

10. Minimize incidental take from minor discharge and excavation by excluding unauthorized permit actions and applying permit conditions that avoid or minimize adverse effects to riparian and aquatic systems.

11. Minimize incidental take by from maintenance dredging excluding unauthorized permit actions and applying permit conditions that avoid or minimize adverse effects to riparian and aquatic systems.

12. Minimize incidental take by from return water from upland disposal sites by excluding unauthorized permit actions and applying permit conditions that avoid or minimize adverse effects to riparian and aquatic systems.

13. Ensure completion of a comprehensive monitoring and reporting program to confirm this Opinion is meeting its objective of minimizing take from permitted activities.

2.2.3 Terms and Conditions

To be exempt from the prohibitions of section 9 of the ESA, the Corps must comply with the following terms and conditions, which implement the reasonable and prudent measures described above. These terms and conditions are non-discretionary and, in relevant part, apply equally to proposed actions in all categories of activity.

1. To implement Reasonable and Prudent Measure #1 (standard local operating procedures for endangered species; SLOPES), the Corps shall:
    a. Individual project review. Individually review each project to ensure that all direct and indirect adverse effects to listed salmon and their habitats are within the range of effects considered in this Opinion, and that each applicable term and condition from this Opinion is included as an enforceable term of the permit document.
    b. Full implementation required. Departure from full implementation of the terms and conditions of the following incidental take statement will result in the lapse of the protective coverage of section 7(o)(2) regarding "take" of listed species and may lead NMFS to a different conclusion as to the effects of the continuing action, including findings that specific projects will jeopardize listed species.
    c. Confirmation of fish presence. Contact a fish biologist from the NMFS, ODFW or WDFW, as appropriate for the action area, if necessary to confirm that a project is within the present or historic range of a listed species or a designated critical habitat.
    d. Project access. Require landowners to provide reasonable access[27] to projects permitted under this Opinion for monitoring the use and effectiveness permit conditions.
    e. Salvage notice. Include the following notice with each permit issued.

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[27] "Reasonable access" means with prior notice to the permittee, the Corps and NMFS may at reasonable times and in a safe manner, enter and inspect permitted projects to insure compliance with the reasonable and prudent measures, terms and conditions, in this Opinion.

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 NMFS 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.

f. Reinitiation. Reinitiate formal consultation on this Opinion within three years of the date of issuance. This term and condition is in addition to reinitiation requirements described in section 2.1.6 above.

g. Failure to provide timely monitoring causes Incidental Take Statement to expire. If the Corps fails to provide specified monitoring information by the required date, NMFS will consider that a modification of the action that causes an effect on listed species not previously considered and causes the Incidental Take Statement of the Opinion to expire.

h. Reinitiation contact. To reinitiate consultation, contact the Habitat Conservation Division (Oregon State Office) of NMFS.

2. To implement Reasonable and Prudent Measure #2 (general conditions for construction, operation and maintenance), the Corps shall ensure that:

   a. Timing of in-water work. Work within the active channel will be completed during the ODFW (2000) or the Corps Seattle District (2000) preferred in-water work period[28], as appropriate for the project area, unless otherwise approved in writing by NMFS.

   b. Cessation of work. Project operations will cease under high flow conditions that may result in inundation of the project area, except for efforts to avoid or minimize resource damage.

   c. Fish screens. All water intakes used for a project, including pumps used to isolate an in-water work area, will have a fish screen installed, operated and maintained according to NMFS' fish screen criteria.[29]

   d. Fish passage. Passage will be provided for any adult or juvenile salmonid species present in the project area during construction, and after construction for the life

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[28] Oregon Department of Fish and Wildlife, *Guidelines for Timing of In-Water Work to Protect Fish and Wildlife Resources*, 12 pp (June 2000) (identifying work periods with the least impact on fish) (http://www.dfw.state.or.us/ODFWhtml/InfoCntrHbt/0600_inwtrguide.pdf); U.S. Army Corps of Engineers, Seattle District, Approved Work Windows for Fish Protection (Version: 13 October 2000) (http://www.nws.usace.army.mil/reg/Programmatic_Consultations/TimCond/WorkWinI.pdf)

[29] National Marine Fisheries Service, *Juvenile Fish Screen Criteria* (revised February 16, 1995) and *Addendum: Juvenile Fish Screen Criteria for Pump Intakes* (May 9, 1996) (guidelines and criteria for migrant fish passage facilities, and new pump intakes and existing inadequate pump intake screens) (http://www.nwr.noaa.gov/1hydrop/hydroweb/ferc.htm).

of the project. Upstream passage is not required during construction if it did not previously exist.

e. Pollution and Erosion Control Plan. A Pollution and Erosion Control Plan will be prepared and carried out to prevent pollution related to construction operations. The plan must be available for inspection on request by Corps or NMFS.

   i. Plan Contents. The Pollution and Erosion Control Plan must contain the pertinent elements listed below, and meet requirements of all applicable laws and regulations.

      (1) Practices to prevent erosion and sedimentation associated with access roads, stream crossings, construction sites, borrow pit operations, haul roads, equipment and material storage sites, fueling operations and staging areas.

      (2) Practices to confine, remove and dispose of excess concrete, cement and other mortars or bonding agents, including measures for washout facilities.

      (3) A description of any hazardous products or materials that will be used for the project, including procedures for inventory, storage, handling, and monitoring.

      (4) 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 the site, proposed methods for disposal of spilled materials, and employee training for spill containment.

      (5) Practices to prevent construction debris from dropping into any stream or water body, 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, all erosion controls must be inspected daily during the rainy season and weekly during the dry season to ensure they are working adequately.[30]

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

      (2) Sediment must be removed from erosion controls once it has reached 1/3 of the exposed height of the control.

f. Construction discharge water. All discharge water created by construction (e.g., concrete washout, pumping for work area isolation, vehicle wash water) will be treated as follows.

   i. Water quality. Facilities must be designed, built and maintained to collect and treat all construction discharge water using the best available technology applicable to site conditions. The treatment must remove debris, nutrients, sediment, petroleum hydrocarbons, metals and other pollutants likely to be present.

[30] "Working adequately" means no turbidity plumes are evident during any part of the year.

ii. Discharge velocity. If construction discharge water is released using an outfall or diffuser port, velocities must not exceed 4-feet per second.

iii. Spawning areas, marine submerged vegetation. No construction discharge water may be released within 300-feet upstream of active spawning areas or areas with marine submerged vegetation.

g. Treated wood. Projects using treated wood[31] for any structure that may contact flowing water or that will be placed over water are not authorized, except for pilings installed following NMFS' guidelines.[32] Projects that require removal of treated wood will use the following precautions.

i. Treated wood debris. Care must be taken to ensure that no treated wood debris falls into the water. If treated wood debris does fall into the water, it must be removed immediately.

ii. Removal of treated pilings. If treated wood pilings will be removed, the following conditions apply.

(1) Pilings must be dislodged with a vibratory hammer.

(2) Once loose, the pilings must be placed onto the construction barge or other appropriate dry storage location, and not left in the water or piled onto the stream bank.

(3) If pilings break during removal, the stump must be removed by breaking or cutting 3-feet below the sediment surface, then covered with a substrate appropriate for the site.

iii. Disposal of treated wood debris. All treated wood removed during a project must be disposed of at a facility approved for hazardous materials of this classification.

h. Preconstruction activity. Before significant[33] alteration of the project area, the following actions must be completed.

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[34]).

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[31] "Treated wood" means lumber, pilings, and other wood products preserved with alkaline copper quaternary (ACQ), ammoniacal copper arsenate (ACA), ammoniacal copper zinc arsenate (ACZA), copper naphthenate, chromated copper arsenate (CCA), pentachlorophenol, or creosote.

[32] Letter from Steve Morris, National Marine Fisheries Service, to W.B. Paynter, Portland District, U.S. Army Corps of Engineers (December 9, 1998) (transmitting a document titled *Position Document for the Use of Treated Wood in Areas within Oregon Occupied by Endangered Species Act Proposed and Listed Anadromous Fish Species, National Marine Fisheries Service, December 1998*).

[33] "Significant" means an effect can be meaningfully measured, detected or evaluated.

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

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

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

i. Temporary access roads.

i. Existing ways. Existing roadways or travel paths must be used whenever possible, unless construction of a new way would result in less habitat take.

ii. Steep slopes. Temporary roads built mid-slope or on slopes steeper than 30 percent are not authorized.

iii. Minimizing soil disturbance and compaction. When a new temporary road is necessary within 150-feet[35] of a stream, water body or wetland, soil disturbance and compaction must be minimized by clearing vegetation to ground level and placing clean gravel over geotextile fabric, unless otherwise approved in writing by NMFS.

iv. Temporary stream crossings.

(1) The number of temporary stream crossings must be minimized.

(2) Temporary road crossings must be designed as follows.

(a) A survey must identify and map any potential spawning habitat within 300-feet downstream of a proposed crossing.

(b) No stream crossing may occur at known or suspected spawning areas, or within 300-feet upstream of such areas if spawning areas may be affected.

(c) The crossing design must provide for foreseeable risks (e.g., flooding and associated bedload and debris) to prevent the diversion of streamflow out of the channel and down the road if the crossing fails.

(d) Vehicles and machinery must cross riparian areas and streams at right angles to the main channel wherever possible.

v. Obliteration. When the project is completed, all temporary access roads must be obliterated, the soil must be stabilized, and the site must be revegetated. Temporary roads in wet or flooded areas must be abandoned and restored as necessary by the end of the in-water work period.

j. Heavy Equipment. Use of heavy equipment will be restricted as follows.

i. Choice of equipment. When heavy equipment must be used, the equipment selected must have the least adverse effects on the environment (e.g., minimally sized, rubber tired).

ii. Vehicle staging. Vehicles must be fueled, operated, maintained and stored as follows.

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[35] Distances from a stream or water body are measured horizontally from, and perpendicular to, the bankfull elevation, the edge of the channel migration zone, or the edge of any associated wetland, whichever is greater. "Channel migration zone" means the area defined by the lateral extent of likely movement along a stream reach as shown by evidence of active stream channel movement over the past 100 years, e.g., alluvial fans or floodplains formed where the channel gradient decreases, the valley abruptly widens, or at the confluence of larger streams.

(1) Vehicle staging, cleaning, maintenance, refueling, and fuel storage must take place in a vehicle staging area placed 150-feet or more from any stream, water body or wetland.

(2) All vehicles operated within 150-feet of any stream, water body or wetland must be inspected daily for fluid leaks before leaving the vehicle staging area. Any leaks detected must be repaired in the vehicle staging area before the vehicle resumes operation. Inspections must be documented in a record that is available for review on request by Corps or NMFS.

(3) All equipment operated instream must be cleaned before beginning operations below the bankfull elevation to remove all external oil, grease, dirt, and mud.

iii. Stationary power equipment. Stationary power equipment (e.g., generators, cranes) operated within 150-feet of any stream, water body or wetland must be diapered to prevent leaks, unless otherwise approved in writing by NMFS.

k. Site preparation. Native materials will be conserved for site restoration.

i. If possible, native materials must be left where they are found.

ii. Materials that are moved, damaged or destroyed must be replaced with a functional equivalent during site restoration.

iii. Any large wood[36], native vegetation, weed-free topsoil, and native channel material displaced by construction must be stockpiled for use during site restoration.

l. Isolation of in-water work area. If adult or juvenile fish are reasonably certain to be present, the work area will be well isolated from the active flowing stream using inflatable bags, sandbags, sheet pilings, or similar materials. The work area will also be isolated if in-water work may occur within 300-feet upstream of spawning habitats.

m. Capture and release. Before and intermittently during pumping to isolate an in-water work area, an attempt must be made to capture and release fish from the isolated area using trapping, seining, electrofishing, or other methods as are prudent to minimize risk of injury.

i. A fishery biologist experienced with work area isolation and competent to ensure the safe handling of all ESA-listed fish must conduct or supervise the entire capture and release operation.

ii. If electrofishing equipment is used to capture fish, the capture team must comply with NMFS' electrofishing guidelines.[37]

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[36] 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 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).

[37] National Marine Fisheries Service, *Backpack Electrofishing Guidelines* (December 1998) (http://www.nwr.noaa.gov/1salmon/salmesa/pubs/electrog.pdf).

iii. The capture team must handle ESA-listed fish with extreme care, keeping fish in water to the maximum extent possible during seining and transfer procedures to prevent the added stress of out-of-water handling.

iv. Captured fish must be released as near as possible to capture sites.

v. ESA-listed fish may not be transferred to anyone except NMFS personnel, unless otherwise approved in writing by NMFS.

vi. Other Federal, state, and local permits necessary to conduct the capture and release activity must be obtained.

vii. NMFS or its designated representative must be allowed to accompany the capture team during the capture and release activity, and must be allowed to inspect the team's capture and release records and facilities.

n. <u>Earthwork</u>. Earthwork (including drilling, excavation, dredging, filling and compacting) will be completed as quickly as possible.

i. <u>Site stabilization</u>. All disturbed areas must be stabilized, including obliteration of temporary roads, within 12 hours of any break in work unless construction will resume work within 7 days between June 1 and September 30, or within 2 days between October 1 and May 31.

ii. <u>Source of materials</u>. Boulders, rock, woody materials and other natural construction materials used for the project must be obtained outside the riparian area.

o. <u>Construction of new impervious surface/stormwater management</u>. Beyond construction terms and conditions above, any project that will produce new impervious surface or a land cover conversion that slows the entry of water into the soil must also control the quantity and quality of the resulting stormwater runoff for the life of the project.

i. On-site stormwater management.

(1) Stormwater best management practices (BMPs)[38] will be used for stormwater source control and treatment individually or in a series as necessary to minimize, retain, treat, and infiltrate stormwater on-site to the maximum extent feasible without causing flooding or erosion effects. Stormwater BMP installation in the riparian buffer area may be allowed with prior written approval from NMFS. (Actions with no more than a negligible likelihood of adverse effects.)

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[38] For purposes of this Opinion, "stormwater BMP" means a procedure or structure that, when used individually or in series, will avoid or minimize the adverse effects of stormwater on riparian and aquatic habitats. On-site stormwater BMPs include source controls to prevent the production and release of pollutants, and treatments that capture pollutants. A source control can be operational (i.e., managerial) or structural (i.e., a physical or mechanical facility). **Implement appropriate** on-site BMPs such as downspout dispersion, concentrated flow dispersion , sheet flow dispersion, full dispersion , concave vegetated surfaces, multiple small basins, engineered soil/landscape system, infiltration basins, infiltration trenches, bio-filtration swales, basic biofiltration swales, wet biofiltration swales, continuous inflow biofiltration swales, basic filter strips , narrow area filter strips, wetponds, and stormwater treatment wetlands. For a discussion of stormwater BMPs, see, e.g., Washington Department of Ecology, Water Quality Program, Stormwater Management Manual for Western Washington, Publication Numbers 99-11 through 99-15 (August 2001) (http://www.ecy.wa.gov/programs/wq/stormwater/index.html

(2) Permeable pavements[39] must be installed and maintained for load-bearing surfaces, including multiple use trails, wherever soil, slope and traffic conditions allow.

ii. Runoff treatment facilities.[40]

(1) Water quality treatment must be provided to remove debris, nutrients, sediment, petroleum hydrocarbons, metals and other pollutants likely to be present using the best available technology applicable to site conditions.[41]

(2) Treatment facilities and BMPs will not be installed inside the riparian buffer area without prior written approval from NMFS. (Actions with no more than a negligible likelihood of adverse effects.)

(3) Runoff from pollution generating impervious surfaces must be pre-treated[42] to reduce suspended solids before use of infiltration BMPs.

(4) Stormwater treatment facilities and BMPs for each project will include a schedule of operation, inspection and maintenance activities for all structural BMPs and conveyance systems. A log of maintenance activities showing what actions were taken will be kept and made available for inspection on request by the Corps and NMFS. These operations, inspection and maintenance activities must be conducted, as appropriate:

(a) Ensure that the capacity of each facility, structural BMP and conveyance system is not exceeded and that heavy sediment discharges are prevented.

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[39] **Implement appropriate** permeable pavements such as porous asphalt and porous concrete, porous pavers, and permeable interlocking concrete pavement. For a discussion of stormwater BMPs, see, e.g., Washington Department of Ecology, Water Quality Program, Stormwater Management Manual for Western Washington, Publication Numbers 99-11 through 99-15 (August 2001) (http://www.ecy.wa.gov/programs/wq/stormwater/index.html).

[40] **Implement appropriate** water quality treatment facilities such as biofiltration swales, constructed wetlands, detention ponds, or oil/water separators. For a discussion of treatment facilities see, e.g., Washington Department of Ecology, Water Quality Program, Stormwater Management Manual for Western Washington, Publication Numbers 99-11 through 99-15 (August 2001) (http://www.ecy.wa.gov/programs/wq/stormwater/index.html).

[41] In addition to on-site stormwater BMP's, in Washington State, runoff treatment facilities are required if a project has 5,000 or more square feet of effective, pollution-generating impervious surfaces, or 32,670 or more square feet (0.75 acres) of pollution-generating pervious surfaces and a surface discharge. Further, treatment facilities must be sized to meet runoff volume predicted from a 24-hour storm with a 6-month return frequency as predicted by a continuous runoff model. The water quality design flow rate must treat 91 percent of the runoff volume. Also in Washington State, projects that discharge directly into the Columbia River are exempt from flow control requirements, but must meet requirements iii.1-4 above).

[42] **Implement appropriate** pretreatment BMPs such as pre-settling basins.

(b) Inspect and clean each structural BMP and conveyance system as needed. Determine whether improvements in operation and maintenance are needed.

(c) Promptly repair any deterioration threatening the effectiveness of any structural BMP or conveyance system.

(d) If storm drains inlets are used, post warning signs on or next to all storm drain inlets that say, as appropriate for the receiving water, "Dump No Waste - Drains to Ground Water, Streams, or Lakes."

(e) Ensure that all sediments and liquids from catch basins are disposed of only in an approved facility.

iii. Flow Control. When runoff must be discharged directly, or indirectly through a conveyance system, into fresh surface water or a wetland, the following requirements apply.

(1) Natural drainage patterns must be maintained. Discharges from the project site must occur at the natural location, to the maximum feasible extent. Discharge of runoff from the project site must not cause an adverse effect to riparian or aquatic habitats.

(2) The area must be drained by a conveyance system comprised entirely of manufactured elements (e.g., pipes, ditches, outfall protection) that extends to the ordinary high water line of the receiving water.

(3) Any erodible elements of this system must be adequately stabilized to prevent erosion.

(4) Surface water from the area must not be diverted from or increased to an existing wetland, stream or near-shore habitat sufficient to cause a significant adverse effect to wetland hydrology, soils or vegetation.

p. <u>Site restoration</u>. All streambanks, soils and vegetation disturbed by the project are cleaned up and restored as follows.

i. <u>Restoration goal</u>. The goal of site restoration is renewal of habitat access, water quality, production of habitat elements (such as large woody debris), channel conditions, flows, watershed conditions and other ecosystem processes that form and maintain productive fish habitats.

ii. <u>Streambank shaping</u>. Damaged streambanks must be restored to a natural slope, pattern and profile suitable for establishment of permanent woody vegetation.

iii. <u>Revegetation</u>. Areas requiring revegetation must be replanted before the first April 15 following construction with a diverse assemblage of species that are native to the project area or region, including grasses, forbs, shrubs and trees.

iv. <u>Pesticides</u>. No pesticide application is allowed, although mechanical or other methods may be used to control weeds and unwanted vegetation.

v. <u>Fertilizer</u>. No surface application of fertilizer may occur within 50-feet of any stream channel.

vi. Fencing. Fencing must be installed as necessary to prevent access to revegetated sites by livestock or unauthorized persons.

q. Long-term adverse effects. Long-term adverse effects will be avoided or offset after taking all appropriate steps to avoid or minimize short-term adverse effects.

i. Actions of concern. The following actions require compensation for long-term adverse effects.

(1) Construction of new impervious surfaces inside the riparian buffer area.[43]

(2) Maintenance dredging in water closer than 50-feet from shore or in waters less than 20-feet deep.[44]

(3) Other activities that prevent development of properly functioning condition of natural habitat processes.

ii. Design review. The Corps must review and approve designs to avoid or offset long-term adverse effects by applying the following considerations.

(1) Use of an ecosystem approach

(2) Habitat requirements of the affected species

(3) Productive capacity of the proposed construction and compensation site(s)

(4) Timing of the construction and compensation actions

(5) Length of time necessary to achieve full functionality

(6) Likelihood of success

iii. Maintenance dredging goal. The goal of compensation for maintenance dredging is to offset loss of benthic food resources and must consist of riparian plantings of trees and woody shrubs or restoration of nearshore habitats whenever feasible.

iv. Project evaluation. The Corps must evaluate compensation project success using quantitative criteria established for the project.

v. Terms and conditions. Action to minimize long-term adverse effects that requires a Corps permit must also meet all applicable terms and conditions for this Opinion, or complete a separate consultation.

3. To implement Reasonable and Prudent Measure #3 (site preparation for construction of buildings and related features), the Corps shall ensure that site preparation for construction of a new building or related structure is not authorized inside the riparian buffer area.

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43 For purposes of this Opinion only, "riparian buffer area" means land: (1)Within 150-feet of any natural water occupied by listed salmonids during any part of the year or designated as critical habitat; (2) within 100-feet of any natural water within 1/4 mile upstream of areas occupied by listed salmonids or designated as critical habitat and that is physically connected by an above-ground channel system such that water, sediment, or woody material delivered to such waters will eventually be delivered to water occupied by listed salmon or designated as critical habitat; and (3) within 50-feet of any natural water upstream of areas occupied by listed salmonids or designated as critical habitat and that is physically connected by an above-ground channel system such that water, sediment, or woody material delivered to such waters will eventually be delivered to water occupied by listed salmon or designated as critical habitat. "Natural water" means all perennial or seasonal waters except water conveyance systems that are artificially constructed and actively maintained for irrigation.

44 Depth in tidal waters is measured from mean lower low water (MLLW).

4. To implement Reasonable and Prudent Measure #4 (streambank protection), the Corps shall ensure that:
   a. Exclusions. The following types of streambank protection actions are not authorized.
      i. Structures built entirely of rock, concrete, steel or similar materials (e.g., revetments, bulkheads, groins, buried groins, rock toes[45]).
      ii. Structures other than barbs, as defined in these terms and conditions, that are intended to redirect instream flow.
      iii. Weirs or other channel-spanning structures.
   b. Conservation goal. All actions intended for streambank protection will also provide the greatest degree of natural stream and floodplain function achievable through application of an integrated, ecological approach.
   c. Supporting analysis. Streambank protection treatments must be selected from options identified using the three treatment screening matrices described in WDFW et al. (2000).[46] A copy of the completed screening matrices must be included as part of the permit application.
   d. Bioengineering Practices. Large wood will be included as an integral component of all streambank protection treatments. Avoid or minimize the use of rock, stone and similar materials.
      i. Large wood must be intact, hard, and undecayed to partly decaying with untrimmed root wads to provide functional refugia habitat for fish. Use of decayed or fragmented wood found laying on the ground or partially sunken in the ground is not acceptable.
      ii. Rock may be used for the following purposes and structures. The rock must be class 350 metric or larger, wherever feasible, but may not constrict the channel migration zone or impair natural stream flows into or out of secondary channels or riparian wetlands.
         (1) As ballast to anchor or stabilize large woody debris components of a structural or biotechnical bank treatment.
         (2) To fill scour holes, as necessary to protect the integrity of the project, if the rock is limited to the depth of the scour hole and does not extend above the channel bed.

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[45] "Revetment" means a facing of stone, concrete, logs, or other materials built to armor a scarp, embankment, or shore structure against erosion by wave action or currents. "Bulkhead" means a structure or partition to retain or prevent sliding of the land or to protect the upland against damage by wave action or currents. "Groin" means a high elevation projection from a bank, usually perpendicular to the bank and sometimes buried in the bank where it will be exposed by subsequent erosion, to trap sediment and control streambank erosion. "Rock toe" means rock installed parallel to stream flow, from the toe of the bank up to the bankfull elevation.

[46] Washington Department of Fish and Wildlife, Washington Department of Transportation, Washington Department of Ecology, and the U.S. Army Corps of Engineers, *Integrated Streambank Protection Guidelines*, various pagination (Draft) (October 30, 2000) (guidance on ecological approach to management of eroding streambanks) (http://www.wa.gov/wdfw/hab/ahg/ispgdoc.htm). Chapter 5, pages 5-4 through 5-7, describes the process of selecting bank protection methods using screening matrices based on the mechanism of bank failure, reach conditions, and habitat impacts; pages 5-7 through 5-19 provide additional information to support the choice of techniques.

(3) To construct a footing, facing, headwall, or other protection necessary to prevent scouring or downcutting of an existing flow control structure (e.g., a culvert, water intake), utility line, or bridge support.

(4) To construct a barb as follows.

e. Barb design. A barb will be constructed as follows, unless otherwise approved in writing by NMFS.

i. No part of the barb structure may exceed bank full elevation, including all rock buried in the bank key.

ii. The barb must incorporate large wood.

iii. The trench excavated for the bank key above bankfull elevation must be filled with soil and topped with native vegetation.

iv. Maximum barb length must not exceed 1/4 of the bankfull channel width.

v. Rock must be individually placed without end dumping.

vi. If two or more barbs are built in a series, the barb farthest upstream must be placed within 150-feet or 2.5 bankfull channel widths, whichever is less, from the barb farthest downstream.

vii. Woody riparian planting must be included as a project component.

5. To implement Reasonable and Prudent Measure #5 (stream and wetland restoration), the Corps shall ensure that stream or wetland restoration projects[47] that will alter streambank or channel conditions are not authorized, except as follows.

a. Remove trash and other artificial debris dams that block fish passage.

b. Remove sediment bars or terraces that block fish passage within 50-feet of a tributary mouth. No more than 25-cubic yards of sediment may be removed from within 25-feet of the mouth of the stream. Streambed grading could occur within 50-feet of the mouth of a stream.

c. Remove levees, dikes, berms, weirs or other water control structures.

d. Set back levees, dikes and berms.

e. Reshape streambanks as necessary to reestablish vegetation.

f. Adequate precautions must be taken to prevent post-construction stranding of juvenile or adult fish.

6. To implement Reasonable and Prudent Measure #6 (water control structures), the Corps shall:

a. Exclusions. New or upgraded water control structures are not authorized, except as necessary to improve fish passage.

b. Water control structure repairs. Repair of existing water control structures consistent with these terms and conditions are allowed.

c. Tide gate repairs, upgrades, and replacements. Tide gates will be designed to allow passage for adult and juvenile salmon and steelhead through 90% of the tidal cycle during migration periods, unless otherwise approved in writing by NMFS.

[47] "Restoration project" means a habitat restoration activity whose primary purpose is to restore natural aquatic or riparian habitat process or conditions, which would not be undertake but for its restoration purpose.

7. To implement Reasonable and Prudent Measure #7 (road construction, repairs and improvements), the Corps shall ensure that:
   a. Exclusions. The following types of projects are not authorized by this Opinion:
      i. A new, permanent road inside the riparian buffer area that is not a bridge approach.
      ii. A new bridge pier or abutment below the bankfull elevation
      iii. A new bridge approach within the Federal Emergency Management Agency (FEMA) designated floodway which will require embankment fills that significantly impair floodplain function.
      iv. A baffled culvert or fishway.
   b. Bridge repairs, upgrades and replacement. Repairs, upgrades, and replacement of existing bridges consistent with these term and conditions are allowed.
   c. Permanent stream crossings. Permanent stream crossings will be built as follows.
      i. Design.
         (1) Crossing types.[48] Design road crossings in the following priority.
            (a) Nothing – road realignment to avoid crossing the stream.
            (b) Bridge – spanning the stream to allow for long-term dynamic channel stability.
            (c) Streambed simulation – bottomless arch, embedded culvert, or ford.
            (d) No-slope design culvert[49] – sometimes referred to as hydraulic design, here limited to 0% slopes.
         (2) If the crossing will occur near an active spawning area, only full span bridges or streambed simulation may be used.
         (3) Fill width must be limited to the minimum necessary to complete the crossing, and must not reduce existing stream width.
      ii. New culverts.
         (1) To provide for upstream passage of juvenile salmonids, the maximum average water velocity[50] shall not exceed 1 foot per second.
         (2) Suitable grade controls must be included to prevent culvert failure caused by changes in stream elevation.
      iii. Culvert maintenance. Culverts must be cleaned by working from the top of the bank, unless culvert access using work area isolation would result in less habitat take, to remove only the minimum amount of wood, sediment

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[48] For a discussion of crossing design types, see, National Marine Fisheries Service, Southwest Region, *Guidelines for Salmonid Passage at Stream Crossings* (September 2001) (http://swr.nmfs.noaa.gov/hcd/NMFSSCG.PDF) and Washington Department fo Fish and Wildlife, *Fish Passage Design at Road Culverts: A Design Manual for Fish Passage at Road Crossings* (March 3, 1999) (http://www.wa.gov/wdfw/hab/engineer/cm/toc.htm).

[49] "No-slope design culvert" means a culvert that is sufficiently large and installed flat to allow the natural movement of bedload to form a stable bed inside the culvert.

[50] "Maximum average water velocity" means the average of water velocity within the barrel of the culvert calculated using the 10 percent annual exceedance of the daily average flow.

and other natural debris necessary to maintain culvert function without disturbing spawning gravel.

(1) All large wood recovered during cleaning must be placed downstream.

(2) All routine work must be done in the dry, using work area isolation if necessary.

d. Road maintenance. Road maintenance must comply with ODOT (1999) practices or the most current version of the Regional Road Maintenance Endangered Species Act Program Guidelines.[51]

8. To implement Reasonable and Prudent Measure #8 (utility lines), the Corps shall ensure that:

a. Exclusion. The following types of utility lines are not authorized.

i. Construction or upgrading of a gas, sewer or water line to support a new or expanded service area for which effects, including indirect effects from interrelated or interdependent activities, have not been analyzed in this Opinion.

ii. New utilities that transit the bed of an estuary or saltwater area that is less than -10.0-feet deep (mean lower low water).

b. Repairs, upgrades, and replacements. Repairs, upgrades, and replacements of existing utility lines consistent with these terms and conditions are allowed.

c. Utility stream crossings. Utility stream crossings are built as follows.

i. Alignments must be perpendicular to the watercourse, or nearly so.

ii. Design utility line crossings in the following priority.

(1) Aerial lines, including lines hung from existing bridges

(2) Directional drilling, boring and jacking

(3) Dry trenching or plowing

d. Directional drilling. If directional drilling, boring or jacking is used, the following will apply.

i. The drill, bore or jack hole must span the channel migration zone and any associated wetland.

ii. Bore and jack pits, directional drill recovery/recycling pits, and any associated waste or spoils must be completely isolated from surface waters. All drilling fluids and waste must be recovered and recycled or disposed to prevent entry into flowing water.

iii. If a drill hole breaks and drilling fluid or waste is visible in the water, all drilling activity must cease pending written approval from NMFS to resume drilling.

e. Trenching. If trenching or plowing are used, the following will apply.

i. Any trenching or plowing must occur in the dry.

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[51] Oregon Department of Transportation, *Routine Road Maintenance: Water Quality and Habitat Guide, Best Management Practices*, 21 pp. + appendices (July 1999) (providing guidance on routine road maintenance activity only) (http://www.odot.state.or.us/eshtm/images/4dman.pdf) or, see, Regional Road Maintenance Endangered Species Act Program Guidelines (March 2002) (http://www.metrokc.gov/roadcon/bmp/pdfguide.htm)

ii. Trenches must be backfilled below the ordinary high water line with native material, then capped with clean gravel suitable for fish use in the project area, unless otherwise approved in writing by NMFS.

iii. Large wood displaced by trenching or plowing must be returned to its original position, wherever feasible.

f. Erosion. Utility lines must be prevented from causing lateral migration, head cutting, general scour, or debris loading.

g. Pits and spoils. All pits and other excavations associated with installation must be placed where they will not cause damage to the streambed or stream banks, and prevent wastewater or spoil material from entering the water.

9. To implement Reasonable and Prudent Measure #9 (recreational boating facilities), the Corps shall ensure that:

a. Exclusions. The following types of recreational boating facilities are not authorized.

i. New marinas, floating storage units, boat houses, or houseboats

ii. New boat ramps, docks, piers, or other overwater facilities in the following areas

(1) An estuary or other saltwater area[52]

(2) An exposed area requiring a breakwater, jetty or groin

(3) Less than 0.5 miles downstream of the mouth of a tributary

(4) A shallow water area requiring significant excavation

(5) A deposition area likely to need routine maintenance dredging (e.g., alcoves, backwater sloughs, side channels, other shallow-water areas)

iii. Docks, piers, or other over-water facilities wider than 6-feet, unless current velocity is greater than 0.7-feet per second during the low flow period (April 1 through August 31), or the structure is more than 50-feet from the shoreline and in water more than 20-feet deep.

iv. Buoys or floats in inactive anchorage and fleeting areas.

v. Related facilities that are not water dependent (e.g., parking lots, picnic areas, trails, toilets) inside the riparian buffer area.

vi. Asphalt boat ramps.

b. Repairs, upgrades and replacement. Repairs, upgrades, and replacement of existing recreational boating facilities consistent with these term and conditions are allowed.

c. Modification of marinas. Modifications of existing marinas are made within the existing footprint of the moorage, or in water more than 50-feet from the shoreline and more than 20-feet deep.

d. General. The following general conditions, as applicable, are added to permits for recreational boating facilities.

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[52] "Estuary or other saltwater area" means an area with maximum saltwater intrusion of more than 0.5 parts per thousand measured at depth. For purposes of this Opinion only, the estuary or saltwater area of the Columbia River will be defined as downstream of the boundary between Wahkiakum and Cowlitz Counties in Washington State, and the boundary between Clatsop and Columbia Counties in Oregon State.

i. Flotation.
   (1) All synthetic flotation material must be permanently encapsulated to prevent breakup into small pieces and dispersal in water.
   (2) Mooring buoys, small temporary floats, and fish and wildlife harvesting devices (e.g., crab and shrimp traps) must be installed as follows.
      (a) More than 300-feet from submerged marine vegetation
      (b) More than 50-feet from the shoreline
      (c) In water more than 20-feet deep
   (3) Mooring buoys must also be installed as necessary to ensure that moored boats do not ground out or prop wash the bottom.
   (4) Small temporary floats must also be installed less than 7 days before a scheduled event, removed five days after a scheduled event is concluded, and not left in longer than 21 days total.

ii. Pilings. Pilings must be installed as follows.
   (1) The number and diameter of pilings must be minimized, as appropriate, without reducing structural integrity.
   (2) No more than five single piles or one dolphin consisting of three to five piles may be replaced or added to an existing structure or marina per in-water construction period.

iii. Piscivorus bird deterrence. All pilings, mooring buoys, and navigational aids (e.g., channel markers) must be fitted with devices to prevent perching by piscivorus birds.

10. To implement Reasonable and Prudent Measure #10 (other minor discharges and excavations), the Corps shall ensure that the only minor discharge or excavation[53] projects authorized are for minor repair of a previously existing project.

11. To implement Reasonable and Prudent Measure #11 (maintenance dredging), the Corps shall ensure that:
   a. Exclusions. Maintenance dredging using the economic loading method for hopper dredging or in the following places are not authorized.
      i. Salmonid spawning habitat in tributaries or upstream
      ii. Columbia River, above Bonneville Dam, in the following areas: backwater sloughs, silted-in lateral channels, alcoves, side channels, or other shallow-water areas less than 20-feet deep
   b. Dredge Material Evaluation Framework. Sediment quality will be evaluated before dredging begins using the most recent version of NMFS' approved criteria

[53] "Minor discharges and excavations" means small structural fills, minor excavations or dredging for maintenance and minor repairs of previously authorized structures such as culverts and outfalls.

for evaluation of contaminated sediments.[54] Only sediments approved for in-water disposal by those criteria will be authorized for maintenance dredging.

c. Dredge operation. Dredges will be operated as follows.
   i. A hydraulic dredge intake must be kept at or just below the surface of the material being removed, but may be raised for brief periods of purging or flushing.
   ii. Clamshell dredges must use a finishing type bucket with flaps, whenever feasible.

d. Spoil disposal. Dredge spoil will be placed in an approved upland area where it cannot reenter the water body and that is large enough to allow settling. In-water disposal is not authorized.

12. To implement Reasonable and Prudent Measure #12 (return water from upland disposal sites), the Corps shall ensure that return flows do not exceed 4-feet per second at either the outfall or diffuser port, or otherwise alter stream flows in a way that significantly impairs spawning, rearing, migration, feeding or other essential behaviors.

13. To implement Reasonable and Prudent Measure #13 (monitoring), the Corps shall:
   a. Meet with NMFS within 60-days of signing this biological opinion and develop a collaborative monitoring strategy. If the strategy cannot be developed within 60-days, the following terms and conditions will apply, including timelines.
   b. Implementation monitoring. Ensure that each permittee submits a monitoring report to the Corps within 120 days of project completion describing the permittee's success meeting his or her permit conditions. Each project level monitoring report will include the following information.
      i. Project identification
         (1) Permittee name, permit number, and project name.
         (2) Category of activity
         (3) Project location, including any compensatory mitigation site(s), by 5th field HUC and by latitude and longitude as determined from the appropriate USGS 7-minute quadrangle map
         (4) Corps contact person.
         (5) Starting and ending dates for work completed
      ii. Narrative assessment. A narrative assessment of the project's effects on natural stream function.
      iii. Photo documentation. Photo of habitat conditions at the project and any compensation site(s), before, during, and after project completion.[55]

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[54] See, U.S. Army Corps of Engineers, U.S. Environmental Protection Agency, Oregon Department of Environmental Quality, Washington Department of Ecology, and Washington Department of Natural Resources, *Dredged Material Evaluation Framework: Lower Columbia River Management Area* (November 1998) (providing a consistent set of procedures to determine sediment quality for dredging activity) (http://www.nwp.usace.army.mil/ec/h/hr/Final/).

[55] 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.

(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.

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

(1) Work cessation. Dates work cessation was required due to high flows.
(2) Fish screen. Compliance with NMFS' fish screen criteria.
(3) A summary of pollution and erosion control inspections, including any erosion control failure, hazardous material spill, and correction effort.
(4) Site preparation.
  (a) Total cleared area – riparian and upland.
  (b) Total new impervious area.
(5) Isolation of in-water work area, capture and release.
  (a) Supervisory fish biologist – name and address.
  (b) Methods of work area isolation and take minimization.
  (c) Stream conditions before, during and within one week after completion of work area isolation.
  (d) Means of fish capture.
  (e) Number of fish captured by species.
  (f) Location and condition of all fish released.
  (g) Any incidence of observed injury or mortality.
(6) Streambank protection.
  (a) Completed screening matrices used to select treatments.
  (b) Type and amount of materials used.
  (c) Project size – one bank or two, width and linear feet.
(7) 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.
(8) Minor discharge and excavation/maintenance dredging.
  (a) Volume of dredged material.
  (b) Water depth before dredging and within one week of completion.
  (c) Verification of upland dredge disposal.
(9) Site restoration.
  (a) Finished grade slopes and elevations.
  (b) Log and rock structure elevations, orientation, and anchoring (if any).
  (c) Planting composition and density.
  (d) A five-year plan to:
    (i) Inspect and, if necessary, replace failed plantings to achieve 100 percent survival at the end of the first year, and 80 percent survival or 80 percent coverage

after five years (including both plantings and natural recruitment).

(ii) Control invasive non-native vegetation.

(iii) Protect plantings from wildlife damage and other harm.

(iv) Provide the Corps annual progress reports.

(10) Long-term habitat loss. This will consist of the same elements as monitoring for site restoration.

c. Effectiveness monitoring. Gather any other data or analyses the Corps deems necessary or helpful to complete an assessment of habitat trends in stream and riparian conditions as a result of Corps permitted actions. The Corps may use existing monitoring efforts for this purpose if those efforts can provide information specific to the objective of identifying habitat trends.

d. Annual monitoring report. Provide NMFS with an annual monitoring report by January 31 of each year that describes the Corps's efforts carrying out this Opinion. The report will summarize project level monitoring information by activity and by 5^{th} field HUC, with special attention to site restoration, streambank protection and compensatory mitigation. The report will also provide an overall assessment of program activity and cumulative effects. A copy of the annual report will be submitted to both the Oregon and Washington Offices of NMFS.

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e. Annual coordination. Meet with NMFS by March 31 each year to discuss the annual monitoring report and any action necessary to make the program more effective.

3. MAGNUSON-STEVENS FISHERY CONSERVATION AND MANAGEMENT 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 NMFS on all actions, or proposed actions, authorized, funded, or undertaken by the agency, that may adversely affect EFH (§305(b)(2)).
- NMFS 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 NMFS 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 NMFS 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 C.F.R. 600.10). 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 C.F.R. 600.810).

EFH consultation with NMFS 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 water bodies currently, or historically accessible to salmon in Washington, Oregon, Idaho, and California, except areas upstream of certain impassable artificial 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 Corps.

3.3 Proposed Actions

The proposed action and action area are detailed above in Section 1 of this Opinion. The action area includes habitats that have been designated as EFH for various life-history stages of groundfish, coastal pelagic species, and Pacific salmon (Table 4).

3.4 Effects of Proposed Action

As described in detail in Section 2.1.3.1 of this Opinion, the proposed action may result in short- and long-term adverse effects to a variety of habitat parameters. These adverse effects are:

1. Loss of riparian function
2. Increases in turbidity pursuant to the construction activities
3. Modification of water levels, flow regimes and impacts on fish passage
4. Long-term adverse effects in tidal marsh and estuarine habitats
5. Introduction of pollutants into waterbodies
6. Modification of stream morphology

3.5 Conclusion

NMFS concludes that the proposed action would adversely affect the EFH for the groundfish, coastal pelagic, and Pacific salmon species listed in Table 1.

3.6 EFH Conservation Recommendations

Pursuant to Section 305(b)(4)(A) of the MSA, NMFS is required to provide EFH conservation recommendations to Federal agencies regarding actions which may adversely affect EFH the Terms and Conditions outlined in Section 2.2.3 are generally applicable to designated EFH for the species in Table 1, and address these adverse effects. Consequently, NMFS recommends that they be adopted as EFH conservation measures.

3.7 Statutory Response Requirement

Pursuant to the MSA (§305(b)(4)(B)) and 50 C.F.R. 600.920(j), Federal agencies are required to provide a detailed written response to NMFS' 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 Corps must reinitiate EFH consultation with NMFS 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 NMFS' EFH conservation recommendations (50 C.F.R. 600.920(k)).

Table 5. Species with Designated EFH Affected by this Consultation.

GROUND FISH SPECIES	Blue rockfish (*S. mystinus*)	Rougheye rockfish (*S. aleutianus*)	Flathead sole (*Hippoglossoides elassodon*)
Leopard shark (*Triakis semifasciata*)	Bocaccio (*S. paucispinis*)	Sharpchin rockfish (*S. zacentrus*)	Pacific sanddab (*Citharichthys sordidus*)
Soupfin shark (*Galeorhinus zyopterus*)	Brown rockfish (*S. auriculatus*)	Shortbelly rockfish (*S. jordani*)	Petrale sole (*Eopsetta jordani*)
Spiny dogfish (*Squalus acanthias*)	Canary rockfish (*S. pinniger*)	Shortraker rockfish (*S. borealis*)	Rex sole (*Glyptocephalus zachirus*)
Big skate (*Raja binoculata*)	Chilipepper (*S. goodei*)	Silvergray rockfish (*S. brevispinus*)	Rock sole (*Lepidopsetta bilineata*)
California skate (*R. inornata*)	China rockfish (*S. nebulosus*)	Speckled rockfish (*S. ovalis*)	Sand sole (*Psettichthys melanostictus*)
Longnose skate (*R. rhina*)	Copper rockfish (*S. caurinus*)	Splitnose rockfish (*S. diploproa*)	Starry flounder (*Platyichthys stellatus*)
Ratfish (*Hydrolagus colliei*)	Darkblotched rockfish (*S. crameri*)	Stripetail rockfish (*S. saxicola*)	
Pacific rattail (*Coryphaenoides acrolepsis*)	Grass rockfish (*S. rastrelliger*)	Tiger rockfish (*S. nigrocinctus*)	**COASTAL PELAGIC SPECIES**
Lingcod (*Ophiodon elongatus*)	Greenspotted rockfish (*S. chlorostictus*)	Vermillion rockfish (*S. miniatus*)	Northern anchovy (*Engraulis mordax*)
Cabezon (*Scorpaenichthys marmoratus*)	Greenstriped rockfish (*S. elongatus*)	Widow Rockfish (*S. entomelas*)	Pacific sardine (*Sardinops sagax*)
Kelp greenling (*Hexagrammos decagrammus*)	Longspine thornyhead (*Sebastolobus altivelis*)	Yelloweye rockfish (*S. ruberrimus*)	Pacific mackerel (*Scomber japonicus*)
Pacific cod (*Gadus macrocephalus*)	Shortspine thornyhead (*Sebastolobus alascanus*)	Yellowmouth rockfish (*S. reedi*)	Jack mackerel (*Trachurus symmetricus*)
Pacific whiting (Hake) (*Merluccius productus*)	Pacific Ocean perch (*S. alutus*)	Yellowtail rockfish (*S. flavidus*)	Market squid (*Loligo opalescens*)
Sablefish (*Anoplopoma fimbria*)	Quillback rockfish (*S. maliger*)	Arrowtooth flounder (*Atheresthes stomias*)	
Aurora rockfish (*Sebastes aurora*)	Redbanded rockfish (*S. babcocki*)	Butter sole (*Isopsetta isolepsis*)	**SALMON**
Bank Rockfish (*S. rufus*)	Redstripe rockfish (*S. proriger*)	Curlfin sole (*Pleuronichthys decurrens*)	Coho salmon (*O. kisutch*)
Black rockfish (*S. melanops*)	Rosethorn rockfish (*S . helvomaculatus*)	Dover sole (*Microstomus pacificus*)	Chinook salmon (*O. tshawytscha*)
Blackgill rockfish (*S. melanostomus*)	Rosy rockfish (*S. rosaceus*)	English sole (*Parophrys vetulus*)	

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