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

Refer to:
2001/01188

January 27, 2003

Mr. Lawrence C. Evans
Chief, Regulatory Branch
Department of the Army
Portland District, Corps of Engineers
Post Office Box 2946
Portland, OR 97208-2946

Re: Endangered Species Act Section 7 Formal Consultation and Magnuson-Stevens Act Essential Fish Habitat Consultation for the Potlatch Corporation Dredging Project, Columbia River at River Mile 271, Morrow County, Oregon (Corps No. 1995-00132).

Dear Mr. Evans:

Enclosed is a biological opinion (Opinion) prepared by the National Marine Fisheries Service (NOAA Fisheries) pursuant to section 7 of the Endangered Species Act (ESA) for the Potlatch Corporation's (Potlatch) Columbia River Maintenance Dredging Project on river mile (RM) 271, of the Columbia River in Morrow County, Oregon. NOAA Fisheries concludes in this Opinion that the proposed action is not likely to jeopardize the continued existence of the ESA-listed Snake River (SR) fall-run chinook salmon (*Oncorhynchus tshawytscha*), SR spring/summer-run chinook salmon, Upper Columbia River (UCR) spring-run chinook salmon, SR sockeye salmon (*O. nerka*), Middle Columbia River (MCR) steelhead (*O. mykiss*), UCR steelhead, and SR steelhead, or destroy or adversely modify SR fall-run chinook, SR spring/summer-run chinook, and SR sockeye salmon designated critical habitat. Pursuant to section 7 of the ESA, NOAA Fisheries has included reasonable and prudent measures with non-discretionary terms and conditions that NOAA Fisheries believes are necessary and appropriate to minimize the potential for incidental take associated with this project.

In addition, this document also serves as consultation on essential fish habitat (EFH) for chinook salmon pursuant to the Magnuson-Stevens Fishery Conservation and Management Act and its implementing regulation (50 CFR Part 600) (MSA).

Questions regarding this letter should be directed to Doug Baus, of my staff in the Oregon Habitat Branch at 541.975.1835, ext. 224.

Sincerely,

For Michael R Crouse

D. Robert Lohn
Regional Administrator

cc: Mary Headley, Corps
Greg White, CH2M Hill
Michelle Eames, USFWS
Tim Bailey, ODFW

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

BIOLOGICAL OPINION

Potlatch Corporation
Columbia River Maintenance Dredging Operation
Columbia River at River Mile 271
Morrow County, Oregon

Agency: U.S. Army Corps of Engineers, Portland District

Consultation Conducted By: NOAA Fisheries, Northwest Region

Date Issued: January 27, 2003

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

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TABLE OF CONTENTS

1. ENDANGERED SPECIES ACT

1.1 Background

On December 11, 2001, the National Marine Fisheries Service (NOAA Fisheries) received a letter from the U.S. Army Corps of Engineers (Corps) requesting informal consultation regarding the potential effects of the Potlatch Maintenance Dredging Operation on chinook salmon (*Oncorhynchus tshawytscha*), sockeye salmon (*O. nerka*), and steelhead (*O. mykiss*). The Corps determined the proposed project “may affect” but was “not likely to adversely affect” (NLAA) the above Endangered Species Act (ESA)-listed species. The proposed project is located on River Mile (RM) 271 of the Columbia River, in Morrow County, Oregon.

Based upon the information received from the Corps, NOAA Fisheries could not concur with a NLAA determination for the maintenance dredging operation. On June 14, 2002, NOAA Fisheries issued to the Corps the Standard Local Operating Procedures for Endangered Species biological opinion (SLOPES Opinion) that addressed routine Corps actions that are “likely to adversely affect” (LAA) ESA-listed anadromous fish species (NMFS 2002). One of the actions addressed in the SLOPES Opinion was maintenance dredging (section 1.2.11), and one of the criteria required to meet the SLOPES Opinion is that maintenance dredging needed to occur in waters greater than 20 feet in depth. The proposed Potlatch annual maintenance dredging operation does not meet the criteria in the SLOPES Opinion, because dredging will be occurring in waters less than 20 feet in depth. The Potlatch maintenance dredging operation will occur in shallow water depths from approximately 22 feet in depth and extend up to the shoreline. Adult and juvenile ESA-listed species primarily utilize shallow water habitat as a feeding and migratory corridor, therefore the proposed project is LAA and requires an individual biological opinion (Opinion).

This Opinion is based on the information presented in the Corps permit application, the biological assessment (BA), a meeting with the Corps and permittees, and other communications to obtain information regarding the project. Early discussions with the permittees included the need to upgrade fish screens at the pumping facility to meet NOAA Fisheries’ juvenile fish screen criteria, including options available to comply with prohibitions against take while the screens are being upgraded. This Opinion provides incidental take coverage for the maintenance dredging operation and acknowledges that incidental take is resulting from the operation of the Potlatch pumping facility due to the withdrawals and lack of NOAA Fisheries-approved fish screens. This Opinion requires Potlatch to screen, operate and maintain pump station in accordance with NOAA Fisheries screening criteria, or the protective coverage of section 7(o)(2) may lapse.

The BA indicated the following seven evolutionary significant units (ESU) listed as threatened or endangered may occur in the vicinity of the project: Snake River (SR) fall-run chinook salmon, SR spring/summer-run chinook salmon, Upper Columbia River (UCR) spring-run chinook salmon, SR sockeye salmon, Middle Columbia River (MCR) steelhead, UCR steelhead, and SR steelhead. The objective of this Opinion is to determine whether the annual Potlatch maintenance dredging operation for 2003-2008 is likely to jeopardize the continued existence of these ESA-listed species. This consultation is conducted pursuant to section 7(a)(2) of the ESA and its implementing regulations, 50 CFR 402.

This Opinion contains an analysis of the effects of the proposed action on designated critical habitat. Critical habitat is designated for SR sockeye, SR fall-run chinook, and SR spring/summer-run chinook salmon. Analysis of the effects of the proposed action on critical habitat is for these three species.

1.2 Proposed Action

The purpose of the proposed action is to provide an adequate flow of water for the pumps and to prevent sediment from fouling the pumps. The maintenance dredging operation will remove a maximum of 1,500 cubic yards (yd^3) of silt, sand, and gravel from the project site annually. The action will take place for five years, and will result in a total of 7,500 yd^3 of dredged material. The dredging operation will take place during the Oregon Department of Fish and Wildlife (ODFW) preferred in-water work window (ODFW 2000) for the Columbia River upstream of the John Day River (December 1 - March 31). Dredging operations are planned to start during the ODFW in-water work window in 2003, and annual dredging operations will be covered by this Opinion through the end of the ODFW in-water work window in 2008.

The pump station is co-owned and co-maintained by the Potlatch Corporation and the Columbia Improvement District. The annual dredging operation will remove material that has accumulated around the intake of the Potlatch pump station located at RM 271 on the mainstem of the Columbia River. The project site is located one mile upstream of the city of Boardman, in Morrow County, Oregon (Section 2, Township 4 North, Range 25 East). Annual maintenance dredging will maintain adequate water depth surrounding the intake valves of the station, which houses ten intake pumps that withdraw water for the Potlatch Corporation during the irrigation season. The intake area around the pumps have not been dredged since 1996.

The dredging will consist of removal of sediments from the Columbia River around the pump station platform. The dimension of the dredging prism will be a maximum of 150 feet (parallel to flow) by 90 feet (perpendicular to flow) by 3 feet deep. The prism will start at a water depth of approximately 22 feet and extend to the shoreline. Final maximum water depth after dredging will be approximately 25 feet. The river bottom will be sloped at approximately 3:1 to coincide with the existing slope. The total maximum volume to be dredged is 1,500 yd^3 annually.

Aggregate removal will be accomplished using a barge-mounted clamshell dredge. Using this dredging method, the barge is positioned in specific locations using the contractor's Global Positioning System (GPS) while the clamshell bucket is lowered by crane to pick up sediment material. The bucket would close prior to being lifted from water in order to help prevent sediment material from escaping. The bucket is then hoisted back to the surface, and the retrieved material is placed on a separate loading barge adjacent to the crane. The bucket is capable of holding about 10 yd^3 of material per retrieval.

The material is brought out of the water and deposited over a sluice box that is mounted on the floating dredge barge. The denser particles are trapped in a sluice box and the remainder of the material is discharged into an intake pipe which transports the material to an upland disposal site. Large boulders, stumps, and rootwads too large to enter the intake pipe will be piled on the bank near the dredging site.

The upland disposal sited is located 350 feet from the normal water line, southeast of the pump station platform. Holding cells have been constructed upland using native soils. The gradient from the disposal site to the top of the riverbank is nearly level, and gravity will return the decanted water from the disposal site to the Columbia River. The spoils would be transported to the disposal sites through an 8-inch High Density Polyethylene (HDPE) pipeline into the holding cell, which allows fall-out of by-product silt and sand material. The decanted water would be returned to the Columbia River through an adjustable weir. A silt fence would be installed to ensure sediment is contained and does not reach the Columbia River.

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

1. Sediment quality will be evaluated before dredging begins using the most recent version of NOAA Fisheries-approved criteria for evaluation of contaminated sediments (USACE *et al.* 1998a).

2. Dredge spoil will be placed in an approved upland area where it cannot reenter the water body and the upland area will be large enough to allow settling

The dredging will take place during daylight hours between February 1 and March 31, 2003-2008, during the ODFW in-water work window. A dilution zone of 300 feet around the dredge and 400 feet downstream will be established 48 hours prior to dredging to establish a sediment/turbidity baseline. Turbidity outside of this zone will be continuously monitored before and during the project. Measurements will be compared to background measurements taken on the same day of dredging. The dredge operation will cease if unit readings exceed 10 Nephalometric Turbidity Units (NTUs) above baseline measurements. If readings fall outside of this range, all reasonable methods will be used to reduce impacts. Methods to reduce turbidity outside the dilution zone during dredging may include activating Potlatch pumps and cessation of dredging until turbidity levels fall to within 10 NTUs of background. The increase in turbidity is expected to be short-term and not detectable within 24 hours of completion of the proposed dredging.

The BA states that annual maintenance dredging will include return water from contained, upland dredged material disposal sites, which 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 will not exceed 4 feet per second at the outfall or diffuser port, and will not otherwise significantly impair spawning, rearing, migration, feeding or other essential behaviors of listed species. The ODFW in-water work window is designed to minimize project impacts to spawning salmonid species. Although the operation will be conducted during the ODFW in-water work window, there is the potential for adult salmonids to be located in the action area at this time (ODFW 2002).

1.3 Biological Information and Critical Habitat

The annual dredging operation will occur near RM 271 on the Columbia River. Adult and juvenile SR fall-run chinook salmon, SR spring/summer-run chinook salmon, UCR spring-run chinook salmon, SR sockeye salmon, MCR steelhead, UCR steelhead, and SR steelhead use this area as a migratory corridor and this area is not used for spawning and rearing (CH2M Hill 2001). Approximately 23 miles upstream of the project is the ODFW Three Mile Dam Trapping Facility. Throughout the ODFW in-water work window adult MCR steelhead pass through RM 271 and return to the Three Mile Dam Trapping Facility (ODFW 2002). Peak juvenile migration periods are May through June for steelhead, sockeye, and age 1 spring/summer-run chinook. Peak juvenile migration for fall-run chinook is June through July (CH2M Hill 2001).

Biological requirements during life history stages are obtained through access to essential features of critical habitat. Essential features include adequate: (1) Substrate, (2) water quality, (3) water quantity, (4) water temperature, (5) water velocity, (6) cover/shelter, (7) food, (8) riparian vegetation, (9) space, and (10) migration conditions [58 FR 68546 (December 28, 1993) for Snake River salmon].

For purposes of this consultation, the relevant critical habitat types are juvenile migration corridors and adult migration corridors. The essential features of critical habitat for juvenile migration areas include adequate water quality, water quantity, water velocity, cover/shelter, food, riparian vegetation, space, and migration conditions. Essential features of adult migration corridors include all the essential features of critical habitat for migrating juveniles with the exception of adequate food.

The proposed action discussed within this Opinion is within designated critical habitat for SR sockeye, SR fall-run chinook, and SR spring/summer-run chinook salmon (Table 1 listed below). Critical habitat for SR sockeye and SR fall-run chinook salmon was designated on December 28, 1993, (58 FR 68543). Critical habitat for SR spring/summer-run chinook salmon was designated on October 25, 1999, (64 FR 57399).

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

Species ESU	Status	Critical Habitat	Additional Protective Measures
Chinook salmon (*O. Tshawytscha*)			
Snake River Fall-run	T[1] 4/22/92; 57 FR 14653	12/28/93; 58 FR 68543	7/10/00; 65 FR 42422
Snake River Spring/Summer run	T 4/22/92; 57 FR 14653[2]	10/25/99; 64 FR 57399[2]	7/10/00; 65 FR 42422
Upper Columbia River spring-run (WA only)	E[3] 3/27/99; 64 FR 14308	-	-
Sockeye salmon (*O. nerka*)			
Snake River	E 11/20/91; 56 FR 58619	12/28/93; 58 FR 68543	-
Steelhead (*O. mykiss*)			
Middle Columbia River	T 3/25/99; 64 FR 14517	-	7/10/00; 65 FR 42422
Upper Columbia River (WA only)	E 8/18/97; 62 FR 43937	-	-
Snake River Basin	T 8/18/97; 62 FR 43937	-	7/10/00; 65 FR 42422

Critical habitat for SR sockeye, SR fall-run chinook, and SR spring/summer-run chinook salmon encompasses the major Columbia River tributaries known to support these ESUs, including the Salmon, Grande Ronde, and Imnaha Rivers, as well as the mainstem Columbia River and estuary. Critical habitat consists of all waterways below long-standing (more than 100 years duration), naturally-impassable barriers, and therefore includes the Potlatch maintenance dredging project area. The riparian zone adjacent to these waterways is also considered critical habitat. This zone is defined as the area that provides the following functions: Shade, sediment,

[1] "T" denotes the species status is "Threatened."

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

[3] "E" denotes the species status is "Endangered."

nutrient/chemical regulation, stream bank stability, and input of large woody debris/organic matter.

1.4 Evaluating Proposed Action

The standards for determining jeopardy are set forth in section 7(a)(2) of the ESA as defined by 50 CFR Part 402 (the consultation regulations). NOAA Fisheries must determine whether the action is likely to jeopardize the listed species. This analysis involves the initial steps of defining the biological requirements and current status of the listed species, and evaluating the relevance of the environmental baseline to the species' current status. Subsequently, NOAA Fisheries evaluates whether the action is likely to jeopardize the listed species by determining if the species can be expected to survive with an adequate potential for recovery. In making this determination, NOAA Fisheries must consider the estimated level of mortality attributable to: (1) Collective effects of the proposed or continuing action; (2) the environmental baseline; and (3) any cumulative effects. This evaluation must take into account measures for survival and recovery specific to the listed salmonid's life stages that occur beyond the action area. If NOAA Fisheries finds that the action is likely to jeopardize, NOAA Fisheries must identify reasonable and prudent alternatives for the action.

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

For the proposed action, NOAA Fisheries' jeopardy analysis considers direct or indirect mortality of fish attributable to the action. NOAA Fisheries' 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.

1.4.1 Biological Requirements

The first step in the methods NOAA Fisheries uses for applying the ESA to listed species is to define the biological requirements of the species most relevant to each consultation. NOAA Fisheries also considers the current status of the listed species, taking into account population size, trends, distribution and genetic diversity. To assess the current status of the listed species, NOAA Fisheries starts with the determinations made in its decision to list the species for ESA protection and also considers new data available that are relevant to the determination.

The relevant biological requirements are those necessary for the listed species to survive and recover to naturally-reproducing population levels at which time protection under the ESA would become unnecessary. Adequate population levels must safeguard the genetic diversity of the listed stocks, enhance their capacity to adapt to various environmental conditions, and allow them to become self-sustaining in the natural environment. The biological requirements that are relevant to this consultation are: Adequate water quality; food availability, and quality; and substrate composition, that function to support successful migration.

The current status of the affected listed species, based upon their risk of extinction, has not significantly improved since these species were listed and, in some cases, their status may have worsened due to continuing downward trends toward extinction. NOAA Fisheries published the information in this section previously as Appendix A to the paper "A Standardized Quantitative Analysis of the Risks Faced by Salmonids in the Columbia River Basin" (McClure *et al.* 2000a). Additional details regarding the life histories, factors for decline, and current range wide status of these species are found in NMFS 2000.

NOAA Fisheries has adopted the species-level biological requirements as its jeopardy standard for the seven listed species being considered in this Opinion. The current status of these species, based on their risk of extinction, shows that their biological requirements are not being met. NOAA Fisheries is not aware of any new data that would indicate otherwise. Nor is NOAA Fisheries aware of any new data that would indicate their status has significantly improved since the species were listed. Improvements in survival rates (assessed over the entire life cycle) are necessary to meet species-level biological requirements in the future.

<u>Snake River Fall-run Chinook Salmon</u>.
The Snake River 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. This ESU includes the mainstem river and all its tributaries, from their confluence with the Columbia River to the Hells Canyon 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 in 1938 to 1949 to 29,000 during the 1950s. Further declines occurred upon completion of the Hells Canyon 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%) are harvested in Alaska and Canada, indicating a far-ranging ocean distribution. In recent years, only 19% were caught off Washington, Oregon, and California, with the balance (45%) taken in the Columbia River (Simmons 2000).

With hydro-power system 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 mile (RM) 273. The construction of Brownlee Dam (1958; RM 285), Oxbow Dam (1961; RM 273), and Hells Canyon Dam (1967; RM 247) 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% (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, genetic traits 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, NOAA Fisheries estimates that the median population growth rate (lambda) over the base period[4] 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).

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[4] 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 (2000).

Snake River Spring/Summer-run Chinook Salmon.
The location, geology, and climate of the Snake River region create a unique aquatic ecosystem for chinook salmon. Spring 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 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 River basin spring and summer-run chinook salmon, with total production probably exceeding 1.5 million in some years. By the mid-1900s, the abundance of adult spring and summer-run 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-run chinook salmon have declined considerably since the 1960s (Corps 1989).

In the Snake River, spring and summer-run 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, SR spring-run chinook spawn earlier and at higher elevations than SR 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, NOAA Fisheries 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).

Upper Columbia River Spring-run Chinook Salmon.
This ESU includes spring-run chinook populations found in Columbia River tributaries between the 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-run chinook in adjacent ESUs (*i.e.*, mid-Columbia and Snake Rivers), they are distinguished by ecological differences in spawning and rearing habitat preferences. For example, spring-run chinook in the Upper Columbia River tributaries spawn at lower elevations (1,640 to 3,280 feet) 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 coded-wire tags 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 chinook survival than in many other parts of the Columbia basin (Mullan *et al.* 1992a). 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% (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, NOAA Fisheries 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).

Snake River Sockeye Salmon.
The only remaining 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. SR 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.

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

Middle Columbia River Steelhead.
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 40 cm of precipitation annually (Jackson 1993). Summer-run 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, naturally-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 re-entering freshwater, where they may remain up to a year before spawning (Howell *et al.* 1985). 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-run steelhead, and age-2-ocean steelhead dominate the summer-run 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, and 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-run 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.* 1985).

Continued increases in the proportion of stray steelhead in the Deschutes River basin is a major concern. The ODFW and the Confederated Tribes of the Warm Springs Reservation (CTWSR) of Oregon estimate that 60 to 80% 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 River basin include the following: (1) Steelhead native to the Deschutes River; (2) hatchery steelhead from the Round Butte Hatchery on the Deschutes River; (3) wild steelhead strays from other rivers in the Columbia River basin; and (4) hatchery steelhead strays from other Columbia River basin streams

Regarding the latter, CTWSR reports preliminary findings from a tagging study by T. Bjornn and M. Jepson (University of Idaho) and NOAA Fisheries 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, NOAA Fisheries 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).

Upper Columbia River Steelhead.
This ESU occupies the Columbia River 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 River basins), steelhead in the UCR 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, NOAA Fisheries 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).

<u>Snake River 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 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 75 to 100 mm 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 SR) 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 River basin or in coastal areas.

Hatchery fish are widespread and stray to spawn naturally throughout the region. In the 1990s, an average of 86% 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 steelhead ESU as a whole, NOAA Fisheries 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).

1.4.2 Environmental Baseline

The environmental baseline is an analysis of the effects of past and on-going, human and natural factors leading to the current status of the species or its habitat and ecosystem within the action area. The "action area" is defined as "all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action" (50 CFR 402.02). For this project, NOAA Fisheries defines the action area as the affected substrate, bank, and aquatic areas of the Columbia River, including the dredge prism (designated as 90 feet by 150 feet surrounding the pump station platform to a depth of 3 feet), including a distance not to exceed 400 feet downstream.

In general, the environment for salmonids in the Columbia River basin, including those that migrate past and downstream of the project site, has been dramatically affected by the development and operation of the Federal Columbia River Power System (FCRPS). For more than 100 years, hatcheries in the Pacific Northwest have been used to supplement natural production lost as a result of the FCRPS and other development. As a result, a large portion of various salmon populations in this region are primarily hatchery fish. The traditional response to declining salmon catches was hatchery construction to produce more fish, thus allowing harvest rates to remain high and further exacerbating the effects of over-fishing on the naturally-produced (non-hatchery) runs mixed in the same fisheries.

Forestry, farming, grazing, road construction, land development, hydro-system activity, mining, and urbanization have also radically reduced the quantity and quality of historic habitat conditions in much of the basin. Water quality in the Middle Columbia River is another key factor in the health of Northwest salmonid populations. The Middle Columbia River remains on the latest (1998) 303(d) list for the following parameters: (1) Temperature (summer), and (2) total dissolved gas (year around) from Bonneville Dam to Washington Border (including the area from the John Day Dam to the McNary Dam) (ODEQ 2002).

Changes in salmonid populations are further affected by variation in the freshwater and marine environments. Ocean conditions that are a key factor in the productivity of Northwest salmonid populations appear to have been in a low phase of the cycle for some time, and are likely an important contributor to the decline of many stocks. The survival and recovery of these species will depend on their ability to persist through periods of low natural survival.

1.5 Analysis of Effects

Consistency with Recovery Plan.
Step 5 of this analysis ultimately requires that NOAA Fisheries determine whether the species-level biological requirements can be met considering the significance of the effects of the action under consultation. Recovery planning can provide the best guidance for making this determination. The 1995 FCRPS biological opinion stated:

> Recovery plans for listed salmon call for measures in each life stage that are based upon the best available scientific information concerning the listed species' biological requirements for survival and recovery. As the statutory goal of the recovery plan is for the species' conservation and survival it necessarily must add these life-stage specific measures together to result in the survival of the species, at least, and its recovery and delisting at most. For this reason, the Recovery Plan is the best source for measures and requirements necessary in each life stage to meet the biological requirements of the species across its life cycle (p.14).

Recovery planning will identify the feasible measures that are needed in each stage of the salmonid life cycle for conservation and survival within a reasonable time. Measures are feasible if they are expected both to be implemented and to result in the required biological benefit. A time period for recovery is reasonable depending on the time requirements for implementation of the measures and the confidence in the survival of the species while the plan is implemented. The plan must demonstrate the feasibility of its measures, the reasonableness of its time requirements, and how the elements are likely to achieve the conservation and survival of the listed species based on the best science available.

In 1995, NOAA Fisheries relied on the proposed Snake River salmon recovery plan, issued in draft in March 1995. Since 1995, the number of ESA-listed salmonid species and the need for recovery planning for Columbia basin salmonids has quadrupled. Rather than finalize the 1995 proposed recovery plan, NOAA Fisheries has developed guidelines for basin-level, multispecies recovery planning on which individual, species-specific recovery plans can be founded. "Basin-level" encompasses habitat, harvest, hatcheries, and hydro. This recovery planning analysis is contained in the document entitled "Conservation of Columbia Basin Fish: Final Basinwide Salmon Recovery Strategy" (hereafter, the Basinwide Recovery Strategy [Federal Caucus 2000]). The Basinwide Recovery Strategy replaces the 1995 proposed recovery plan for Snake River stocks until a specific plan for those stocks is developed on the basis of the Basinwide Recovery Strategy. Recovery plans for each individually listed species will provide the particular statutorily required elements of recovery goals, criteria, management actions, and time estimates that are not developed in the Basinwide Recovery Strategy.

Among other things, the Basinwide Recovery Strategy calls for restoration of degraded habitats on a priority basis to produce significant measurable benefits for listed anadromous and resident fish. Immediate and long-term priorities for restoration measures relevant to this consultation include requirements to screen diversions.

Until the species-specific recovery plans are developed, the Basinwide Recovery Strategy provides the best guidance for judging the significance of an individual action relative to the species-level biological requirements. In the absence of completed recovery planning, NOAA Fisheries strives to ascribe the appropriate significance to actions to the extent available information allows. Where information is not available on the recovery needs of the species, either through recovery planning or otherwise, NOAA Fisheries applies a conservative substitute that is likely to exceed what would be expected of an action if information were available.

1.5.1 Effects of Proposed Action

Direct effects are the immediate effects of the project on the species or its habitat. Direct effects result from the agency action, including the effects of interrelated actions and interdependent actions. Potential effects to listed salmonids from the proposed action include both direct and indirect effects. The dredged material will be moved 350 feet from the normal water line of the Columbia River to an upland disposal site, outside of the immediate riparian area. Any adverse effects presumably will be limited to the effects of removing the material and discharging the decanted water back into the Columbia River.

1.5.1.1 Direct Effects

Direct effects of the proposed action include:

1. Increased sedimentation and turbidity
2. Shallow-water effects
3. Direct removal of habitat elements
4. Risk of spills into the Columbia River from equipment
5. Acoustic disturbances to fish
6. Behavioral avoidance of turbid water

<u>Increased Sedimentation and Turbidity.</u>
Sediment and turbidity will increase in the action area during the annual maintenance dredging operation. During dredging operations there will be short-term impacts on water quality and potentially, on fisheries’ resources from increased turbidity and potential redistribution of sediments. Turbidity, at moderate levels, has the potential to reduce primary and secondary productivity, and at high levels, has the potential to injure and kill adult and juvenile fish, and may also interfere with feeding (Spence *et al.* 1996, Bjornn and Reiser 1991). Other behavioral

effects on fish, such as gill flaring and feeding changes, have been observed in response to pulses of suspended sediment (Berg and Northcote 1985). Fine redeposited sediments also have the potential to reduce primary and secondary productivity (Spence *et al.* 1996), and to reduce incubation success and cover for juvenile salmonids (Bjornn and Reiser 1991).

Effects of suspended sediment and turbidity influences on fish ranging from beneficial to detrimental. Reports have cited that elevated Total Suspended Solids (TSS) conditions can enhance cover conditions, reduce piscivorus fish/bird predation rates, and improve survival. Elevated TSS concentration can cause physiological stress and reduce growth; of key importance are the frequency and duration of TSS on fish when considering detrimental effects. Potential behavioral, sub-lethal, and lethal effects from exposure to increased turbidity are documented (Nightingale and Simenstad 2001, Gregory 1988, Servizi 1988, Sigler 1988, Berg and Northcote 1985, Sigler *et al.* 1984), including mortality from predatory species associated with dredged material disposal (Nightingale and Simenstad 2001).

Clamshell dredging has been found to distribute TSS levels throughout the water column, compared to other dredging methods where solids remain in the lower level of the water column (USAE 1988). In areas of coarse sand, NOAA Fisheries expects the amount of turbidity generated from the dredging process to be very small and confined to the action area. Sediment quality will be evaluated before dredging begins using the most recent version of NOAA Fisheries-approved criteria for evaluation of contaminated sediments (USACE 1998). Only sediments approved for in-water disposal by those criteria will be authorized for maintenance dredging.

The BA indicates the size of the proposed action and the monitoring of sediment levels taken by the Corps will limit any turbidity effects to a low level of incidence at the dredge site. The effects on salmonids resulting from maintenance dredging will be minimized because annual maintenance dredging will occur during the ODFW in-water work window (December 1 - March 31). NOAA Fisheries expects juvenile salmonids to avoid turbid water. A relatively low abundance of listed salmonids are expected in the project area during the proposed action and the expanse of the channel at this time. The increase in turbidity is expected to be short term and not detectable within 24 hours of completion of the proposed dredging.

<u>Shallow-water effects.</u>
Annual maintenance dredging is expected to reduce shallow water habitat. Nearshore and shallow water areas less than 20 feet deep are essential for juvenile salmonids and are used predominantly for feeding and as migratory corridors. Juvenile salmon will also use the upper water column across the breadth of the river for migratory purposes. A temporary displacement of individual fish may occur during dredging. It is likely that relocation of individuals would occur easily and would not cause a long-term or adverse impact on these fish.

<u>Direct removal of habitat elements.</u>
Annual maintenance dredging will directly remove habitat elements from the dredging prism. Large or coarse woody debris and other large elements affect various riparian ecological

processes and conditions, including the microbial uptake and transfer of organic matter (Tank and Winterbourn 1996), the species composition and productivity of benthic invertebrates (Benke *et al.* 1985), and the density of fish (Fausch and Northcote 1992, Crispin *et al.* 1993). While fish may not always be associated with large substrate elements, these features may be limited during critical events such as concealment by salmonids during winter (Heggenes *et al.* 1993) or reproduction.

Risk of Spills.
The operation of the clamshell dredge has the potential to introduce contaminates into the Columbia River. Operation of the barge and other dredge equipment (such as the arm which lowers the clamshell bucket into the water) requires the use of fuel, lubricants, *etc.*, which if accidentally spilled into a water body or the adjacent riparian zone could injure or kill aquatic organisms or habitat. Petroleum-based contaminants (such as fuel, oil, and some hydraulic fluids) contain polycyclic aromatic hydrocarbons (PAHs) which can cause acute toxicity to salmonids at high levels of exposure and can also cause chronic lethal as well as acute and chronic sublethal effects to aquatic organisms (Neff 1985).

Acoustic disturbances.
Noise and the presence of the dredge equipment could cause salmon to avoid the project vicinity, thus minimizing accessibility to habitat. The project area is used primarily as migratory habitat and the action area it is not used for spawning.

Behavioral avoidance.
Behavioral avoidance of turbid waters may be one of the most important effects of elevated suspended sediments (Birtwell *et al.* 1984, Scannell 1988). Salmonids have been observed to move laterally and downstream to avoid turbid plumes (McLeay *et al.* 1984, Sigler *et al.* 1984, Lloyd 1987, Scannell 1988, Servizi and Martens 1991). Juvenile salmonids tend to avoid streams that are chronically turbid, such as glacial streams or those disturbed by human activities, except when the fish must traverse these streams along migration routes (Lloyd *et al.* 1987a). In addition, a potential positive effect of turbidity is providing refuge and cover from predation (Gregory and Levings 1998).

1.5.1.2 Indirect Effects

Indirect effects are caused by, or result from, the proposed action, are later in time, and are reasonably certain to occur. Indirect effects may occur outside of the area directly affected by the action. Indirect effects may include other Federal actions that have not undergone section 7 consultation but will result from the action under consideration. These actions must be reasonably certain to occur.

Indirect effects include: (1) Mortality from operating diversion without NOAA Fisheries-approved fish screen; (2) potential short-term change in benthic invertebrate diversity; and (3) physical alteration of the channel resulting in short-term habitat loss.

Mortality resulting from diversions without NOAA Fisheries-approved fish screens.
Pumping facilities that operate without adequate screening are widely known to kill salmon and steelhead. Juveniles may become entrained or attracted to diversion flows where they later die from a variety of causes (*e.g.*, predation, impingement against screens). Adult and juvenile migration may be impaired by water removal structures such as pumping facilities.

Potential change of benthic invertebrate diversity.
Potential loss of benthic food sources resulting from annual maintenance dredging and disposal of dredged material is expected to occur (Nightingale and Simenstad 2001, Morton 1977). The potential loss of benthic invertebrate diversity is expected to be minimal relative to distribution of benthic invertebrate populations in the Columbia River.

Physical alteration of the channel.
Potential long-term impacts associated with physical alteration of the channel include substrate changes and scouring. A redistribution of sand may occur in the project area and immediately downstream, however any scouring associated with this project is not anticipated to degrade downstream areas. There will not be a change in substrate type within or downstream of the dredge area. It is anticipated that the riverbed material will be the same after dredging as before dredging.

1.5.2 Effects on Critical Habitat

The purpose of this part of the effects assessment is to determine whether any of the constituent elements of critical habitat are likely to be adversely modified or destroyed under the proposed action. Critical habitat types in the action area all share the following essential features. No data are available to quantify these effects, although most are likely to be brief, minor, and will occur at times and timed to occur at times that are least sensitive for the species life-cycle. Data are not available to assess whether the long-term effects of frequent dredging just prior to the beginning of the juvenile migration season prevent full recovery of benthic habitats and preferred salmonid food resources, although proposed conservation measures are likely to avoid or offset this possibility.

Water quality:	Turbidity will increase slightly; low concentrations of toxic organic compounds will be released; biological and chemical oxygen demand will increase; light penetration, photosynthetic oxygen production, oxygen concentration, and pH will decrease.
Water quantity:	Not likely to be adversely affected.
Water temperature:	May increase slightly due to turbidity and suspended solids.
Water velocity:	Flows will increase in dredge channel and decrease in shoal areas; flushing and mixing patterns may change while pumping is underway.

Cover/shelter: Low levels of turbidity may provide additional cover from predators, salmonids will avoid areas with high turbidity.

Food: Sedimentation (a condition that is generally more harmful than turbidity) may alter benthic production and shift the composition and abundance of prey sources by reducing the diversity of aquatic insects and other invertebrate prey.

Riparian vegetation: Dredging may change water edge habitat slightly.

Space: Shallow water habitat will be temporarily reduced.

Migration conditions: Environmental cues for migration may be slightly altered.

1.5.3 Cumulative Effects

Cumulative effects are defined in 50 CFR 402.02 as those effects of "future State or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action subject to consultation." Future Federal actions, including the ongoing operation of hydropower systems, hatcheries, fisheries, and land management activities are being (or have been) reviewed through separate section 7 consultation processes. Therefore, these actions are not considered cumulative to the proposed action.

NOAA Fisheries is not aware of any specific future non-federal activities within the action area that would cause greater effects to listed species than presently occur. NOAA Fisheries assumes that future private and state actions will continue at similar intensities as in recent years. As the human population in the state continues to grow, demand for actions similar to the subject project likely will continue to increase as well. Each subsequent action by itself may have only a small incremental effect, but taken together they may have a significant effect that would further degrade the Columbia River's environmental baseline and undermine the improvements in habitat conditions necessary for listed species to survive and recover.

1.6 Conclusion

After reviewing the current status of the listed species, the environmental baseline for the action area, the effects of the proposed dredging and disposal, and cumulative effects, NOAA Fisheries has determined that the Potlatch annual maintenance dredging operation, as proposed, is not likely to jeopardize the continued existence of SR fall-run chinook salmon, SR spring/summer-run chinook salmon, UCR spring-run chinook salmon, SR sockeye salmon, MCR steelhead, UCR steelhead, and SR steelhead, or destroy or adversely modify SR fall-run chinook, SR spring/summer-run chinook, and SR sockeye salmon designated critical habitat. This finding is partially based on the incorporation of best management practices (BMPs) into the proposed project design, but also on the following considerations:

1. All dredging work will occur during the ODFW in-water work window (December 1 through March 31).
2. Fueling of equipment will take place 330 feet from any water body.
3. All water leaving the settling area will pass through filter fabric.
4. A settling basin will be constructed to contain all dredge spoils.
5. Turbidity will be monitored during dredging. If turbidity is 10 NTU's over baseline, work will be halted and additional sediment containment steps will be taken.
6. An oil containment boom will be on board the dredge at all times in addition to oil absorbent material should a spill occur.
7. The proposed disposal site is approximately 350 feet upland from the normal water line.
8. A daily settleable solids test will be conducted on the decanted water prior to returning to the Columbia River.

NOAA Fisheries believes the annual maintenance operation will not jeopardize the continued existence of ESA-listed species. The annual operation will be of short duration, the area of disturbance within the Columbia River is relatively small, and the area is primarily used as a migratory corridor and spawning will not occur in the action area.

1.7 Conservation Recommendation

Section 7 (a)(1) of the ESA directs Federal agencies to use their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of the threatened and endangered species. Conservation recommendations are discretionary measures suggested to minimize or avoid adverse effects of proposed actions on listed species, and to develop additional information.

> To minimize adverse effects to ESA-listed species resulting from the operation of pumping facilities, provide NOAA Fisheries with a list of Corps permitted pump stations since the passage of the Clean Water Act and document which have NOAA Fisheries-approved fish screens.

1.8 Reinitiation of Consultation

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

2. 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 to 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 compliance with the terms and conditions of this incidental take statement.

2.1 Extent of Take

The proposed action covered by this Opinion is reasonably certain to result in incidental take of listed species resulting from annual maintenance dredging. Effects of actions such as these are largely unquantifiable in the short term, but are expected to be largely limited to non-lethal take in the form of behavior modification, substrate modification and injury resulting from the abrasive properties of sediment. The effects of these activities on population levels are also largely unquantifiable and not expected to be measurable in the long term.

Therefore, even though NOAA Fisheries expects some low levels of incidental take to occur due to the action covered by this Opinion, the best scientific and commercial data available are not sufficient to enable NOAA Fisheries to estimate a specific amount of incidental take to the species themselves. In instances such as this, NOAA Fisheries designates the expected level of take in terms of the extent of take allowed. Therefore, NOAA Fisheries limits the extent of incidental take to an area of annual dredging and the aquatic area 400 feet downstream of the Potlatch Pump Stations on RM 271 of the Columbia River. Incidental take occurring beyond these areas is not authorized by this consultation. Take coverage provide in this Opinion expires on March 31, 2008.

2.2 Effect of Take

In the accompanying Opinion, NOAA Fisheries determined that this level of anticipated take is not likely to result in jeopardy to the seven listed species of Columbia basin salmonids considered in this Opinion or result in the destruction or adverse modification of critical habitats.

2.3 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. Activities which do not comply with all relevant reasonable and prudent measures will require individual consultation.

NOAA Fisheries 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 general construction by applying permit conditions that avoid or minimize adverse effects to riparian and aquatic systems.

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

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

4. Complete a monitoring and reporting program to ensure this Opinion is meeting its objective of minimizing the likelihood of take from permitted actions.

2.4 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 (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)[5], unless otherwise approved in writing by NOAA Fisheries.

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[5] 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)

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. Permittee will screen, operate and maintain pump station in accordance with NOAA Fisheries screening criteria. The Permittee may fulfill this requirement by contacting NOAA Fisheries at the address below to request certification for a water diversion screening 4(d) limit.

d. Pollution and Erosion Control Plan. A pollution and erosion control plan will be prepared and carried out to prevent pollution related to dredging operations. The plan must be available for inspection on request by Corps or NOAA Fisheries.
   - i. The pollution and erosion control plan must contain the pertinent elements listed below, and meet requirements of all applicable laws and regulations. Practices to prevent erosion and sedimentation associated with access roads, haul roads, equipment and material storage sites, fueling operations and staging areas.
   - ii. A description of any hazardous products or materials that will be used for the project, including procedures for inventory, storage, handling, and monitoring.
   - iii. A spill containment and control plan with notification procedures, specific clean up and disposal instructions for different products, quick response containment and clean up measures that will be available on the site, proposed methods for disposal of spilled materials, and employee training for spill containment.

e. Discharge water. All discharge water created will be treated as follows:
   - i. Water quality. Facilities must be designed, build and maintained to collect and treat all 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.
   - ii. Discharge velocity. If discharge water is released using an outfall or diffuser port, velocities must not exceed 4 feet per second.

f. 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:
     - (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 NOAA Fisheries.

(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 NOAA Fisheries.

2. To implement reasonable and prudent measure #2 (maintenance dredging), the Corps shall ensure that:

a. Dredge Material Evaluation Framework. Sediment quality will be evaluated before dredging begins using the most recent version of NOAA Fisheries-approved criteria for evaluation of contaminated sediments.[6] Only sediments approved for in-water disposal by those criteria will be authorized for maintenance dredging.

b. Dredge operation. Clamshell dredges must use a finishing type bucket with flaps, whenever feasible.

c. 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.

3. To implement reasonable and prudent measure #3 (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.

4. To implement reasonable and prudent measure #4 (monitoring), the Corps shall:

a. Within 90-days of the signing of this Opinion, the Corps must obtain written confirmation from the Permittee that one of the following conditions has been met:

i. A NOAA Fisheries certified screen inspector has inspected the screen and found that the existing screen meets the appropriate fish screen criteria, or that the existing screen does not meet the appropriate criteria, but compliance certification is likely and imminent.

ii. A NOAA Fisheries certified screen inspector has inspected the screen and found that the existing screen does not meet the appropriate criteria, and

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[6] 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/).

the Permittee has sent NOAA Fisheries a letter requesting a "screening 4(d) limit, or otherwise reached an agreement with NOAA Fisheries regarding a schedule for design and development, interim operations, and a mitigation plan.

b. Failure to provide timely screening certification may trigger reinitiation. If the Permittee fails to provide screening certification by the required date, NOAA Fisheries may consider that a modification of the action that causes an effect on listed species not previously considered and triggers reinitiation of consultation.

c. Implementation monitoring. Ensure that the permittee submits a monitoring report to the Corps within 120 days of annual project completion describing the permittee's success with meeting permit conditions. Each annual 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.[7]
      (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) A summary of pollution and erosion control inspections, including any erosion control failure, hazardous material spill, and correction effort
      (3) 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.

d. Annual monitoring report. Provide NOAA Fisheries 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

[7] 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.

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 NOAA Fisheries.

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

3. MAGNUSON-STEVENS ACT

3.1 Background

The objective of the essential fish habitat (EFH) consultation is to determine whether the proposed action may adversely affect designated EFH for relevant species, and to recommend conservation measures to avoid, minimize, or otherwise offset potential adverse effects to EFH resulting from the proposed action.

3.2 Magnuson-Stevens Fishery Conservation and Management Act

The Magnuson-Stevens Fishery Conservation and Management Act (MSA), as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-267), requires the inclusion of EFH descriptions in Federal fishery management plans. In addition, the MSA requires Federal agencies to consult with NOAA Fisheries on activities that may adversely affect EFH.

EFH means those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity (MSA §3). For the purpose of interpreting the definition of essential fish habitat, “waters” include aquatic areas and their associated physical, chemical, and biological properties that are used by fish, and may also include aquatic areas historically used by fish where appropriate. “Substrate” includes sediment, hard bottom, structures underlying the waters, and associated biological communities. “Necessary” means the habitat required to support a sustainable fishery and the managed species' contribution to a healthy ecosystem, and “spawning, breeding, feeding, or growth to maturity” covers a species' full life cycle (50 CFR 600.110).

Section 305(b) of the MSA [6 USC 1855(b)] requires that:

- Federal agencies must consult with NOAA Fisheries on all actions, or proposed actions, authorized, funded, or undertaken by the agency, that may adversely affect EFH;
- NOAA Fisheries shall provide conservation recommendations for any Federal or state Activity that may adversely affect EFH;
- Federal agencies shall within 30 days after receiving conservation recommendations from NOAA Fisheries provide a detailed response in writing to NOAA Fisheries regarding the conservation recommendations. The response shall include a description of measures proposed by the agency for avoiding, mitigating or offsetting the impact of the activity on EFH. In the case of a response that is inconsistent with the conservation recommendations of NOAA Fisheries, the Federal agency shall explain its reason for not following the recommendations.

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

3.3 Identification of EFH

The Pacific Fisheries Management Council (PFMC) has designated EFH for three species of Pacific salmon: Chinook (*Oncorhynchus tshawytscha*), coho (*O. kisutch*), and Puget Sound pink salmon (*O.gorbuscha*) (PFMC 1999). Freshwater EFH for Pacific salmon includes all those streams, lakes, ponds, wetlands, and other water bodies currently, or historically accessible to salmon in Washington, Oregon, Idaho, and California, except areas upstream of certain impassable man-made barriers (as identified by the PFMC), and longstanding, naturally-impassable barriers (*i.e.*, natural waterfalls in existence for several hundred years). Detailed descriptions and identifications of EFH for salmon are found in Appendix A to Amendment 14 to the *Pacific Coast Salmon Plan* (PFMC 1999). Assessment of potential adverse effects to these species' EFH from the proposed action is based on this information.

3.4 Proposed Action

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 chinook and coho.

3.5 Effects of Proposed Action

As described in detail in section 1.5.1 of this Opinion, the proposed action may result in direct and indirect adverse effects to a variety of habitat parameters. The adverse effects are:

(1) Increased sedimentation and turbidity; (2) shallow-water effects; (3) direct removal of habitat elements; (4) risk of spills into the Columbia River from equipment; (5) acoustic disturbances to fish; (6) behavioral avoidance of turbid water; (7) mortality resulting from diversions without NOAA Fisheries-approved fish screens; (8) removing water from the Columbia River ; (9) potential changing of benthic invertebrate diversity; (10) physical alteration of the channel resulting in and habitat loss.

3.6 Conclusion

NOAA Fisheries believes that the proposed action will adversely affect the EFH for chinook and coho.

3.7 EFH Conservation Recommendations

Pursuant to Section 305(b)(4)(A) of the Magnuson-Stevens Act, NOAA Fisheries is required to provide EFH conservation recommendations for any Federal or state agency action that would adversely affect EFH. In addition to conservation measures proposed for the project by the Corps, all of the reasonable and prudent measures and the terms and conditions contained in section 2.4 of the ESA portion of this Opinion are applicable to salmon EFH. Therefore, NOAA Fisheries incorporates each of those measures here as EFH conservation recommendations.

3.8 Statutory Response Requirement

Please note that the Magnuson-Stevens Act (section 305(b)) and 50 CFR 600.920(j) requires the Corps to provide a written response to NOAA Fisheries' EFH conservation recommendations within 30 days of its receipt of this letter. The response must include a description of measures proposed to avoid, mitigate, or offset the adverse impacts of the activity on EFH. If the response is inconsistent with NOAA Fisheries' conservation recommendations, the Corps shall explain its reasons for not following the recommendations.

3.9 Supplemental Consultation

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

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