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

VIA ELECTRONIC FILING

September 25, 2007

Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street NE
Washington, DC 20426

Re: Endangered Species Act Section 7 Formal Consultation, and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Consultation for the License for Construction, Post-construction Monitoring and Evaluation of a Tailrace Barrier at Packwood Lake Hydroelectric Project (FERC Project No. 2244). Consultation No. 2007/03849

Dear Secretary Bose:

The enclosed document contains a Biological Opinion (Opinion) prepared by the National Marine Fisheries Service (NMFS) pursuant to section 7(a)(2) of the Endangered Species Act (ESA) on Construction, Post-construction Monitoring and Evaluation of a Tailrace Barrier at Packwood Lake Hydroelectric Project (FERC Project No. 2244). In this Opinion, NMFS concluded that the action, as proposed, is not likely to jeopardize the continued existence of Lower Columbia River Chinook salmon, Lower Columbia River Steelhead, or Lower Columbia River coho salmon; or result in the destruction or adverse modification of designated critical habitat for Lower Columbia River Chinook salmon or Lower Columbia River Steelhead.

As required by Section 7 of the ESA, NMFS included an incidental take statement with this Opinion. The incidental take statement describes reasonable and prudent measures NMFS considers necessary or appropriate to minimize incidental take associated with this action. The incidental take statement sets forth nondiscretionary reasonable and prudent measures, and terms and conditions, including reporting requirements. Incidental take from the Proposed Action will then be exempt from the ESA take prohibition.

This document also includes the results of our analysis of the action's likely effects on essential fish habitat (EFH) pursuant to section 305(b) of the Magnuson-Stevens Fishery Conservation and Management Act (MSA), and includes eight conservation recommendations to avoid, minimize, or otherwise offset potential adverse effects on EFH. These Conservation Recommendations are identical to the reasonable and prudent measures and terms and conditions in the Incidental

Take Statement. Section 305(b)(4)(B) of the MSA requires Federal agencies to provide a detailed written response to NMFS within 30 days after receiving these recommendations. If the response is inconsistent with the EFH conservation recommendations, FERC must explain why the recommendations will not be followed, including the justification for any disagreements over the effects of the action and the recommendations. In response to increased oversight of overall EFH program effectiveness by the Office of Management and Budget, NMFS established a quarterly reporting requirement to determine how many conservation recommendations are provided as part of each EFH consultation and how many are adopted by the action agency. Therefore, in your statutory reply to the EFH portion of this consultation, we ask that you clearly identify the number of conservation recommendations accepted.

If you have questions regarding this consultation, please contact Blane Bellerud at (503)231-2238 or Blane.Bellerud@noaa.gov.

Sincerely,

For
D. Robert Lohn
Regional Administrator

Cc: Service List

UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

Energy Northwest	)	**Packwood Lake**
	)	**Hydroelectric Project**
	)	**FERC No. 2244**

CERTIFICATE OF SERVICE

I hereby certify that I have this day served, by electronic mail, a letter to Kimberly D. Bose, Secretary, Federal Energy Regulatory Commission, from the National Marine Fisheries Service regarding ESA Section 7 Formal Consultation, and MSA Essential Fish Habitat Consultation for the License for Construction, Post-construction Monitoring and Evaluation of a Tailrace Barrier at Packwood Lake Hydroelectric Project (FERC No. 2244) and the foregoing document and this Certificate of Service has been served to each person designated on the official service list compiled by the Commission in the above captioned proceeding.

Dated on September 25, 2007

Bethany Downs

Bethany Downs, Secretary
FERC & Water Diversions Branch
Hydropower Division

Endangered Species Act
Section 7(a)(2) Consultation

Biological Opinion

and

Magnuson-Stevens Fishery Conservation and Management Act Consultation

Construction, Post-construction Monitoring and Evaluation of a Tailrace Barrier at Packwood Lake Hydroelectric Project

FERC Project No. 2244
Cowlitz River, HUC 1708000501
Lewis County, Washington

Action Agency:	Federal Energy Regulatory Commission
Consultation Conducted by:	National Marine Fisheries Service Northwest Region Hydropower Division
NMFS Tracking Number:	2007/03849
Date Issued:	September 24, 2007

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TERMS AND ABBREVIATIONS

BA	Biological Assessment
BRT	Biological Review Team
CHART	Critical Habiat Analytical Review Team
DPS	distinct population segment
EFH	essential fish habitat
ESA	Endangered Species Act
FERC	Federal Energy Regulatory Commission
HUC5	Hydrologic Unit Code at the fifth field scale
LCFRB	Lower Columbia Fish Recovery Board
LCR	Lower Columbia River
MSA	Magnuson-Stevens Fishery Conservation and Management Act
msl	mean sea level
NMFS	National Marine Fisheries Service
Opinion	this Biological Opinion
PCE	primary constituent elements
Project	Packwood Lake Hydroelectric Project
Proposed Action	the construction of a tailrace barrier and biological monitoring and evaluation of the tailrace barrier at the Packwood Lake Hydroelectric Project
USFWS	U.S. Fish and Wildlife Service
VSP	viable salmonid population
WDF	Washington Department of Fisheries
WDFW	Washington Department of Fish and Wildlife
WGC	Washington Game Commission
WLCTRT	Willamette/Lower Columbia Technical Recovery Team

1. INTRODUCTION

This Biological Opinion (Opinion) documents an interagency consultation between the Federal Energy Regulatory Commission (FERC) and the National Marine Fisheries Service (NMFS) under Section 7(a)(2) of the Endangered Species Act (ESA) and Section 305(b) of the Magnuson-Stevens Fishery Conservation and Management Act (MSA). NMFS is responsible for administration of the ESA with respect to anadromous salmonids. NMFS is likewise responsible for administration of the MSA and consultations conducted pursuant to the MSA's essential fish habitat (EFH) consultation requirements. Section 7(a)(2) of the ESA requires Federal agencies to ensure their actions avoid jeopardizing the continued existence of listed species or destroying or adversely modifying designated critical habitat. Section 305(b)(2) of the MSA requires Federal agencies to consult with NMFS if their actions may adversely affect EFH.

FERC's proposed action has two components: (1) the construction of a tailrace barrier, and (2) biological monitoring and evaluation of the performance of the tailrace. The Packwood Lake Hydroelectric Project (Project) is owned by Energy Northwest and located on the upper Cowlitz River in Lewis County, Washington. FERC has requested formal consultation with NMFS due to the potential effects on ESA-listed Lower Columbia River (LCR) Chinook salmon, Lower Columbia River coho salmon, and Lower Columbia River steelhead. The purpose of the screen facility is to exclude fish (including listed salmonids) from the Project tailrace and stilling basin. Excluding listed salmonids from the hazards presented by the tailrace and stilling basin reduces risk of delay, injury, or mortality of juvenile and adult salmonids.

The objective of this Opinion is to address the effects of the Proposed Action on LCR Chinook and LCR coho salmon and LCR steelhead, and to determine if this Federal action proposed by FERC will jeopardize the continued existence of these species or adversely modify or destroy designated critical habitat. This Opinion and the incidental take statement provided with this Opinion were prepared by NMFS in accordance with section 7(b) of the ESA and implementing regulations at 50 CFR 402. The analysis in this Opinion is based on a review of the best available scientific and commercial information. In this Opinion, NMFS concludes that Proposed Action is not likely to jeopardize the continued existence of LCR Chinook salmon or to adversely modify or destroy its designated critical habitat.

The term of this Opinion and incidental take statement is through the expiration of the current FERC License on March 1, 2010.

The EFH consultation was prepared in accordance with section 305(b) of the MSA (16 USC 1855(b)) and implementing regulations at 50 CFR 600. The administrative record for this consultation is on file at the Portland, Oregon NMFS office.

1.1 ESA Listings and Consultation History

The Project is located in the upper Cowlitz basin in the town of Packwood. The project tailrace discharges into the Cowlitz River at approximately RM 125. A barrier previously existed at the terminus of the Project's tailrace before being washed out by a flood in the 1970s. The Washington Department of Fish and Wildlife (WDFW) agreed that the barrier did not need to be replaced; however, WDFW reserved the right to require replacement if anadromous fish were reintroduced to the upper Cowlitz Basin (Sandison and Larson 1978 as cited in the BA).

Reintroduction of anadromous salmonids to the upper Cowlitz Basin via trap and haul began in 1994 as part of the relicensing of Tacoma Power's lower Cowlitz River Hydroelectric Projects. Anadromous salmonids that have been transported upstream from the lower Cowlitz River hydroelectric projects have access to the upper Cowlitz River, including Lake Creek and the Project tailrace. Both anadromous and resident fish therefore can reach the stilling basin (pool) below the powerhouse where they can be stranded during shutdowns and outages.

During relicensing of the Project, the issue of fish in the stilling basin and tailrace was raised. A seining was conducted during a project shutdown to assess how many anadromous fish were present. More than 200 juveniles and a few adult salmonids were recovered. NMFS and other stakeholders therefore requested that a barrier be constructed as soon as possible.

Energy Northwest reviewed the options for a temporary tailrace barrier and determined that the options were not viable, either because they did not meet NMFS' barrier exclusion criteria and/or the costs fell within the range expected for a permanent barrier (EES 2007). As a result of the substantial cost and functional design concerns, this temporary facility was not built. Instead Energy Northwest decided to design and build a permanent barrier on an expedited schedule. For the period prior to installation of the barrier, Energy Northwest has agreed to conduct fish rescue operations in the Project stilling basin and tailrace. This effort will continue until the barrier is constructed and operational.

Energy Northwest and their design contractor, HDR/Fish Pro, consulted with the natural resource agencies on the design for the barrier and preliminary design options were presented to the Project's Water Quality and Aquatic Resources Committee on September 19, 2006. The preliminary design was provided to agencies, tribes, and other stakeholders on October 30, 2006.

The engineering studies were reviewed by stakeholders and NMFS' fish passage engineers. Energy Northwest submitted the final design to FERC with a request for a license amendment. FERC's proposed action to amend the license as described in the BA (EES 2007) is the subject of this consultation. The Biological Assessment (BA) and request for consultation were received by NMFS on May 31, 2007.

1.2 Application of ESA Section 7(a)(2) Standards - Analytical Approach

This section reviews the approach used in this Opinion in order to apply the standards for determining jeopardy and destruction or adverse modification of critical habitat as set forth in Section 7(a)(2) of the ESA and by 50 CFR §402.02 (the consultation regulations). Additional guidance for this analysis is provided by the Endangered Species Consultation Handbook, March 1998, issued jointly by NMFS and the U. S. Fish and Wildlife Service (USFWS) (USFWS and NMFS 1998). In conducting analyses of actions under Section 7 of the ESA, NMFS takes the following steps, as directed by the consultation regulations:

- Identifies the action area based on the action agency's description of the proposed action, and describes the proposed action (Section 2).

- Evaluates the current range-wide status of salmon and steelhead at the ESU and distinct population segment (DPS) levels (hereafter referred to as salmon or steelhead species) with respect to biological requirements indicative of survival and recovery and the primary constituent elements (PCEs) of any designated critical habitat (Section 3).

- Evaluates the relevance of the environmental baseline in the action area to biological requirements and the species' current status, as well as the status of any designated critical habitat (Section 4).

- Determines whether the proposed action reduces the abundance, reproduction, or distribution of the species, or alters any PCEs of designated critical habitat (Section 5).

- Determines and evaluates any cumulative effects within the action area (Section 6).

- Evaluates whether the effects of the proposed action, taken together with cumulative effects and conditions under the environmental baseline, can be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of the affected species, or are likely to destroy or adversely modify their designated critical habitat (Section 7; see CFR §402.14(g)).

In completing the last step, NMFS determines whether the action under consultation is likely to jeopardize the ESA-listed species or adversely modify critical habitat. If so, NMFS must identify a reasonable and prudent alternative to the action as proposed that avoids jeopardy or adverse modification of critical habitat and meets other regulatory requirements (see CFR §402.02). In making these determinations, NMFS must rely on the best available scientific and commercial data. NMFS based its analysis in this Opinion on a review and synthesis of the best available scientific and commercial information. Specific sources are listed in the bibliography and cited throughout the document.

In its critical habitat analysis, NMFS determines whether the proposed action will destroy or adversely modify designated or proposed critical habitat for ESA-listed species by examining any expected change in the conservation value of primary constituent elements (PCEs) of that critical habitat. This analysis focuses on statutory provisions of the ESA, including those in

Section 3 of the ESA that define "critical habitat" and "conservation," in Section 4 of the ESA that describe the designation process, and in Section 7 in the ESA that set forth the substantive protections and procedural aspects of consultation. This Opinion does not rely on the regulatory definition of "destruction or adverse modification" of critical habitat at 50 C.F.R. § 402.2. Instead, we have relied upon the standard articulated in the statute and the August 6, 2004, Ninth Circuit Court of Appeals decision in Gifford Pinchot Task Force v. U.S. Fish and Wildlife Service (No. 03-35279) to complete our analysis with respect to critical habitat.

2. PROPOSED ACTION

Energy Northwest's Packwood Lake Hydroelectric Project, FERC No. 2244, received its initial license in 1960. The majority of the Project is located in the Gifford Pinchot National Forest. The Project consists of an intake canal; a concrete drop structure (dam) and intake building on Lake Creek; a 21,691-ft system of concrete pipe and tunnels; a 5,621 ft penstock; a surge tank; a powerhouse with a 26,125 kW turbine generator; an 8,009-ft 69kV transmission line; and a 6,690-ft tailrace canal.

The source of water for the Project, Packwood Lake, is situated at approximately 2,857 feet above mean sea level (msl), about 1,800 ft higher than the powerhouse. Water discharged from the Project is released to the Cowlitz River via a tailrace channel. Power from the Project is delivered over an 8,009-ft 69 kV transmission line to the Packwood substation.

2.1 Action Area

The action area is defined as all areas affected directly or indirectly by the Federal action and not merely the immediate area involved in the action (50 CFR § 402.02(d)). The action area for the purposes of this consultation includes all areas that could be affected by construction activities, including downstream effects such as turbidity and biological monitoring and evaluation studies will take place. This area extends downstream from the Packwood Lake Hydroelectric Project powerhouse following the route of the tailrace canal and tailrace slough to a point 500 feet downstream of the confluence of the tailrace slough with the main channel of the Cowlitz River.

2.2 Proposed Action

Energy Northwest proposes to prevent the upstream movement of fish into the Project tailrace and stilling basin by constructing a fish barrier approximately 20 ft upstream of the terminus of the tailrace. Energy Northwest awarded the contract to design the permanent fish barrier to HDR/FishPro on July 19, 2006. Construction of the barrier is planned during the annual Project shutdown for maintenance in October of 2007 and will be complete by the time the Project resumes operations in November.

Plan and sectional views of the proposed tailrace barrier are found in the BA (see Figures 2-3 and 2-4 in <cite for the BA>). The area to be affected by the installation of the barrier consists of a 200 ft by 200 ft stilling basin and an approximately 6,690 ft long, concrete and asphalt lined tailrace which empties into the tailrace slough, which in turn connects to the Cowlitz River. The stilling basin empties into the tailrace about 200 ft downstream of the powerhouse discharge conduit. The tailrace channel is trapezoidal in shape, with a width of approximately 29 ft at the top of the asphalt lining and 9 ft at the base. The average depth of the lined part of the tailrace is approximately 5.75 ft. The length of the flume over Hall Creek is 356 ft, and the length of the culvert under U.S. Highway 12 is 200 ft. Appendix C of the BA displays drawings of the stilling basin and tailrace to its confluence with the Cowlitz River.

The Packwood stilling basin collects and reregulates the water discharged from the powerhouse. Water depths fluctuate depending upon the level of generation. The deepest water in the stilling basin can reach approximately 11 feet during high generation events. The apron directly in front of the outflow and certain portions of the upper wall of the basin are concrete lined. The remainder of the wall and the bottom of the basin are made up of natural substrates ranging from large boulders to sand and silt. The substrates in the stilling basin are primarily small and large cobble (3 to 12 inches in diameter) in that order. Outflow discharges can range from a low of 17 cfs to a high of approximately 222 cfs. Most of the margin surrounding the stilling basin has no overhanging vegetative cover. The exception is the extreme western side of the basin where a few overhanging branches may provide some refuge for juvenile salmonids; within the basin, cover is provided by large boulders.

2.2.1 Barrier Description

The proposed barrier consists of a concrete containment structure that is designed to house the rotating drum screens. It will be constructed of rebar reinforced concrete, approximately 40 feet in length and 32 feet wide, with side walls approximately 7.35 feet tall. The structure will provide the structural support and guide slots for the drum screens. The walkway will traverse the length of the screens and provide access for inspections. The structure will also be provided with a stationary gantry that is capable of lifting the screens out of the water for repair or maintenance, should that become necessary. Upon completion of the installation, a security fence will enclose the structure. The automated, motor-driven drum screen is designed to continuously rotate during operation. Debris passes over the drum screen to the downstream channel. Any debris which is not passed through or over the drum screen must be removed using a debris rake or other manual means. In the event that debris could not be automatically passed downstream or manually removed, a perforated plate (with ¼-inch holes) can be lowered into guide slots located just upstream of the drum screens. The drum could then be raised to allow lodged debris to flush under the drum screen. The use of the temporary screen prevents juvenile fish from passing through the barrier while the drums are raised.

The basic characteristics of the clam-shaped drum screens are:

- Two 14 ft long by 4 ft diameter drum screens will be installed with ¼-inch mesh size; the minimum open area for the mesh will be 50 percent of the total area.
- The fish barrier is being designed to prevent upstream passage of both adult and juvenile fish larger than the ¼ inch mesh size. The drum screens are designed to be operated between 80 and 120 cfs with approach velocities between 0.8 and 1.0 ft/sec at each flow, respectively.
- The screens will pass 220 cfs with an approach velocity of 1.3 ft/sec.
- The drum screens will have an invert elevation approximately equal to the bottom of the current asphalt channel (approximate elevation of 1,036.75 ft msl) with the top of the drums at approximate elevation 1,040.75 ft msl.
- A ¼ inch opening mesh flat panel shall extend from the top of the drum screens (elevation 1,040.75 ft msl) to elevation 1,044 ft msl (assumed top of west levee elevation).

- The fish barrier is designed to prevent upstream passage into the tailrace channel for Cowlitz River water stages that do not exceed elevation 1,044 ft msl. If the elevation of the Cowlitz River exceeds 1,044 ft msl, river water will be able to overtop the west levee road and the top of the fish barrier, allowing fish to pass into the tailrace and stilling basin.
- The fish barrier will be created by constructing a concrete structure within the tailrace. The drum screens will be fabricated by WDFW's Screen Shop in Yakima, WA.
- Once the concrete structure is complete, the drum screens will be lowered into large, stainless steel guide slots using a steel rail/hoist system and connected to the mechanical system that turns the drums.

Energy Northwest proposed to construct the tailrace barrier during in October, 2007. This construction window coincides with Project shutdown when the tailrace will be dry. The tentative schedule is for excavation, formwork, and concrete placement to begin on October 1, 2007 and be completed by October 21, 2007. The fish barrier and ancillary equipment are being shop fabricated and are to be installed the last week of October once the concrete cure has had enough time to cure. The facility will be tested once flow has been restored to the tailrace. For Site Plans and Construction Drawings and Details see Appendix D of the BA (EES, 2007a).

Drawings:

- C-l, Site Plan and Sections
- G-I, Existing Site Plans and Drawing Index
- G-2, General Notes and Details
- S-i, Foundation Plan and Sections
- S-2, Foundation Plan and Details
- S-3, Foundation Details

These drawings are 90 percent complete. The applicant submitted complete drawings and specifications to the FERC Regional Engineer 60 days prior to beginning work. All excavation, backfill and concrete work will be conducted in accordance with the Project's Stormwater Pollution Prevention Plan (Energy Northwest 2004a) and Spill Prevention, Control and Countermeasure Plan (Energy Northwest 2004b). Where asphalt and concrete channel of floors are to be removed, sawcutting or other approved method shall be performed. No blasting is anticipated.

WDFW's Yakima Screen Shop has indicated that over their years of operating these drum screens they have never had to lift the drums to remove debris (EES, 2007a). Therefore, the option of raising the drum screen would only be implemented in an emergency. Additionally, the automated drum screens will have the ability to be manually turned in the event of a power failure.

2.2.2 Biological Monitoring Program

As part of the relicensing process, Energy Northwest initiated a fish rescue program in 2006 (Energy Northwest and EES Consulting 2006) that will be conducted until the tailrace barrier is operational. After the permanent barrier is in place, Energy Northwest is proposing to conduct a monitoring program to determine whether the barrier is effective in excluding fish of all species and life stages from the tailrace and stilling basin. The stilling basin will be seined just prior to the Project's maintenance shutdown period (currently October) to determine if fish are bypassing the barrier. If two consecutive years of seining during this period document that fewer than 50 fish (total of all salmonid species and life stages) are captured, seining will be conducted every third year. If any adult salmonids or more than 50 fish (total of all salmonid species and life stages) are captured, then seining will be conducted again the following year.

3. RANGEWIDE STATUS OF LISTED SPECIES AND DESIGNATED CRITICAL HABITAT

In Step 2 of its analysis, NMFS considers the current range-wide status of the listed species, taking into account viability criteria (population size, productivity, population spatial structure, and diversity) (McElhany et al. 2000). To assess current status, NMFS starts with the determinations made in its decision to list for ESA protection LCR Chinook salmon and also considers any new data that are relevant to the determination. The following sections briefly describe the current status of the species (listing status, general life history, and population dynamics) in a manner that is relevant to the species' biological requirements.

3.1 Rangewide Status of the Species

Four species of anadromous salmonids listed under the ESA occur in the Cowlitz Basin. Of these, Columbia River chum salmon do not occur within the action area and are therefore not subject to this consultation. LCR Chinook, LCR coho salmon, and LCR steelhead are found within the action area and are listed as threatened under the ESA (Table 3-1).

Table 3-1. ESA status of listed anadromous salmonids in the Cowlitz River Basin

SPECIES	ESU (SALMON) OR DPS (STEELHEAD)	STATUS	LISTING	CRITICAL HABITAT
Oncorhynchus tshawytscha	Lower Columbia River Chinook salmon	Threatened	NMFS 1999 NMFS 2005a	NMFS 2005b
O. kisutch	Lower Columbia River coho salmon	Threatened	NMFS 2005a	Not designated
O. mykiss	Lower Columbia River steelhead	Threatened	NMFS 1998 NMFS 2006	NMFS 2005b

The Lower Columbia Fish Recovery Board (LCFRB) has identified abundance levels indicative of viability for Washington populations of LCR Chinook and coho salmon and steelhead (see Tables 3-6 in LCFRB 2005). The LCFRB also described the target viability levels for each of the four extant upper Cowlitz salmonid populations (though they are in the same ESU, the spring and fall runs of Chinook in the Cowlitz are different populations [Table 3-2.]).

Table 3-2. Target viability levels for the four extant upper Cowlitz salmonid populations

POPULATION	TARGET VIABILITY
LCR Chinook (tule fall run)	"stabilizing" (to be maintained at the current level)
LCR Chinook (spring run)	"primary +" (to be restored to a level of viability between "high" and "very high" as defined by the TRT[1])
LCR coho	"contributing" (some restoration will be needed to achieve an average of medium viability across the Cascade stratum or major population group)
LCR steelhead (winter run)	"contributing"

To achieve these goals for the ESU, Cowlitz Basin stocks must both increase their numbers and stabilize the populations. NMFS adopted the LCFRB's abundance goals and viability targets as part of its interim recovery plan for these populations (Lohn 2006).

3.2 Life Histories, Population Trends, and Limiting Factors

The biological requirements, life histories, migration timing, historical abundance, and factors contributing to the decline of the three salmon and steelhead species in the action area have been well documented. The following sections summarize the relevant biological information contained in these documents. Additional detailed information is available in NMFS' Status Reviews (Weitkamp et al. 1995, Busby et al. 1996, Johnson et al. 1991, Myers et al. 1998, and Good et al. 2005), in NMFS' listing determination (NMFS 2005a, 2005b), and Technical Recovery Team documents (McElhany et al., 2003, 2004, 2006, Myers et al. 2006) and in the Lower Columbia Fish Recovery Board's salmon recovery plan (LCFRB 2004).

3.2.1 LCR Chinook

ESU Description

The LCR Chinook salmon ESU includes all naturally spawned populations of Chinook salmon in tributaries to the Columbia River from a transition point located east of the Hood River, Oregon, and the White Salmon River, Washington, to the mouth of the Columbia River at the Pacific Ocean and in the Willamette River below Willamette Falls, Oregon (excluding spring Chinook salmon in the Clackamas River). Not included stream-type spring Chinook salmon found in the Klickitat River (which are considered part of the unlisted Middle Columbia River spring-run Chinook salmon ESU) or the introduced Carson spring Chinook salmon strain. Tule fall Chinook salmon in the Wind and Little White Salmon Rivers are included, but not the introduced upriver bright fall-run Chinook salmon populations in the Wind, (Big) White Salmon, and Klickitat Rivers. The Cowlitz, Kalama, Lewis, Washougal, and White Salmon Rivers constitute the major systems on the Washington side of the Cascade mountains. The ESU is currently dominated by fall-run populations; there is some question whether any natural-origin spring Chinook salmon persist in this ESU.

[1] The upper Cowlitz and Cispus Rivers were two of the most significant production areas for spring-run Chinook salmon in the LCR ESU.

Current Viability
Many populations within the LCR Chinook salmon ESU exhibited pronounced increases in abundance and productivity in recent years, possibly due to improved ocean conditions. Abundance estimates of naturally spawned populations have been uncertain until recently due to a high (about 70 percent) fraction of naturally spawning hatchery fish. The accuracy of abundance estimates of naturally produced spring Chinook salmon have improved since 2001 due to the marking of all hatchery spring Chinook salmon releases (compared to a previous marking rate of only 1 percent to 2 percent), which allows for the separation in counts at weirs and traps and on spawning grounds.

Despite recent improvements, long-term trends in productivity (based on 20- to 40-year time series) were below replacement for the majority of populations in the ESU as of 2005. Of the 31 historical populations, eight to ten have been extirpated or nearly so. The ESU exhibits a broad spatial distribution in a variety of watersheds and habitat types. Natural production currently occurs in about 20 populations, although only one population has a mean spawner abundance exceeding 1,000 fish. About 35 percent of historical habitat has been lost behind impassable barriers (WCSBRT, 2003).

The West Coast Salmon Biological Review Team (BRT) expressed concern that most of the extirpated populations are spring-run, and that the disproportionate loss of this life history type represents a risk to ESU diversity (Good et al. 2005). Additionally, of the four hatchery spring-run Chinook salmon populations considered part of the ESU, two are propagated in rivers that, although they are within the historical geographic range of the ESU, probably did not support spring-run populations. High hatchery production poses genetic and ecological risks to the natural populations and complicates assessments of their performance. The BRT also expressed concern over the introgression of out-of-ESU hatchery stocks. In its conclusion, the BRT found moderately high risk for all viable salmon population (VSP) categories for this ESU.

Limiting Factors
The major factors limiting recovery are:

- Reduced access to spawning/rearing habitat in tributaries,
- Hatchery impacts,
- Loss of habitat diversity and channel stability in tributaries,
- Excessive sediment in spawning gravel,
- Elevated water temperatures in tributaries, and
- Harvest impacts to fall Chinook (NMFS 2005c).

3.2.2 LCR Steelhead

Distinct Population Segment Description
The LCR steelhead DPS includes all naturally produced steelhead in tributaries to the Columbia River between the Cowlitz and Wind Rivers in Washington and the Willamette and Hood Rivers in Oregon, excluding steelhead in the Upper Willamette River above Willamette Falls (i.e., the Upper Willamette River DPS) (Busby et al. 1996). Steelhead in the LCR DPS belong to the coastal genetic group (Schreck et al. 1986; Reisenbichler et al. 1992; Chapman et al. 1994) and include both winter steelhead (Cowlitz, Toutle, Coweeman, Kalama, Washougal, Sandy, Hood,

Clackamas, and Wind Rivers) and summer steelhead (Kalama, Lewis, Hood, Wind, and Washougal Rivers). The Washington Department of Fisheries (WDF) et al. (1993) identified 19 stocks considered to be predominantly derived from natural production. Hatchery programs using endemic natural stocks of winter steelhead have been developed in the Sandy, Kalama, and Hood Rivers since the listing.

Current Viability

The Willamette/Lower Columbia Technical Recovery Team (WLCTRT) reviewed the status of LCR steelhead and found that six populations had a moderate probability of persistance, 16 populations had a low probability of persistance, and three populations had a very low probability of persistance (McElhany et al. 2004).

While some anadromous populations in the Lower Columbia River DPS, particularly summer-run populations, have shown increases in abundance in the past few years, abundance levels remain low. Only half of the historical populations currently exhibit appreciable natural production. Spatial distribution of the DPS remains relatively good, despite loss of approximately 35 percent of historical habitat (much of which contained historically important spawning areas). Genetic diversity is a concern due to high proportions of hatchery-origin spawners, releases of non-native hatchery stocks in some watersheds, and disproportionate declines in the summer steelhead life history (NMFS 2004).

Limiting Factors

The major factors limiting recovery are:

- Degraded floodplain and stream channel structure and function,
- Reduced access to spawning/rearing habitat,
- Altered streamflow in tributaries,
- Excessive sediment and elevated water temperatures in tributaries, and
- Hatchery impacts (NMFS 2005c).

3.2.3 LCR Coho Salmon

ESU Description

The Lower Columbia River coho ESU includes all naturally spawned populations of coho salmon in the Columbia River and its tributaries from the mouth of the Columbia up to and including the Big White Salmon and Hood Rivers, and includes the Willamette River to Willamette Falls, Oregon. Twenty-five artificial propagation programs are considered to be part of the ESU: Grays River, Sea Resources Hatchery, Peterson Coho Project, Big Creek Hatchery, Astoria High School (STEP) Coho Program, Warrenton High School (STEP) Coho Program, Elochoman Type-S Coho Program, Elochoman Type-N Coho Program, Cathlamet High School FFA Type-N Coho Program, Cowlitz Type-N Coho Program in the upper and lower Cowlitz Rivers, Cowlitz Game and Anglers Coho Program, Friends of the Cowlitz Coho Program, North Fork Toutle River Hatchery, Kalama River Type-N Coho Program, Kalama River Type-S Coho Program, Lewis River Type-N Coho Program, Lewis River Type-S Coho Program, Fish First Wild Coho Program, Fish First Type-N Coho Program, Syverson Project Type-N Coho Program, Washougal River Type-N Coho Program, Eagle Creek NFH, Sandy Hatchery, and the Bonneville/Cascade/Oxbow complex coho hatchery programs. NMFS determined that these

artificially propagated stocks are no more divergent relative to the local natural population(s) than what would be expected between closely related natural populations within the ESU (NMFS 2005a).

Current Viability

McElhany et al. (2004) identified a total of 21 extant, demographically independent populations in three major population groups in this ESU: Coastal, Cascade, and Gorge. There are only two extant populations in the LCR coho salmon ESU with appreciable natural productivity, those in the Clackamas and Sandy Rivers, down from an estimated 23 historical populations. Although total adult returns in 2000 and 2001 for the Clackamas and Sandy River populations exhibited moderate increases, the recent 5-year mean of natural-origin spawners for both populations represents less than 1,500 adults. The Sandy River population has exhibited recruitment failure in 5 of 10 recent years and a poor response to reductions in harvest. During the 1980s and 1990s, natural spawners were not observed in the tributaries farther downstream. Coincident with the 2000-2001 abundance increases in the Sandy and Clackamas populations, a small number of coho salmon spawners of unknown origin have been surveyed in some lower elevation tributaries. Short- and long-term trends in productivity are below replacement.

The lack of naturally produced spawners is contrasted by the very large number of hatchery-produced adults. The abundance of hatchery coho salmon returning to the Lower Columbia River in 2001 and 2002 exceeded 1 million and 600,000 fish, respectively. The BRT (Good et al. 2005) expressed concern that the magnitude of hatchery production continues to pose significant genetic and ecological threats to the extant natural populations in the ESU. However, these hatchery stocks collectively represent a significant portion of the ESU's remaining genetic resources. The 21 hatchery stocks considered to be part of the ESU, if appropriately managed, may prove essential to the restoration of more widespread naturally spawning populations. Several of these risks have recently begun to be addressed by improvements in hatchery practices. Out-of-ESU broodstock is no longer used, and almost 100 percent of hatchery fish are marked to improve monitoring and evaluation of broodstock and hatchery- and natural-origin returns.

NMFS' assessment of the effects of artificial propagation concluded that hatchery programs collectively mitigate the immediacy of extinction risk for the LCR coho salmon ESU in the short term, but these programs do not substantially reduce extinction risk in the foreseeable future. At present, within-ESU hatchery programs significantly increase t abundance. Without adequate long-term monitoring, the contribution of hatchery programs to the productivity of the ESU is uncertain.

Limiting Factors

Approximately 40 percent of historical habitat is currently inaccessible, which restricts the number of areas that might support natural production, and further increases the ESU's vulnerability to environmental variability and catastrophic events. The extreme loss of naturally spawning populations, the low abundance of extant populations, diminished diversity, and fragmentation and isolation of the remaining naturally produced fish confer considerable risks to the ESU.

3.2.4 Factors Affecting All Listed Salmon and Steelhead Species in the Estuary and Nearshore Ocean Environment

The Columbia River estuary and plume provide habitat for one of three major life stages of salmon and steelhead. The estuary is where juveniles and adults complete the physiological changes needed to transition to and from saltwater (LCFRB 2004). However, estuary and plume environments have been changed by human activities. Historically, the downstream half of the estuary was a dynamic environment with multiple channels, extensive wetlands, sandbars, and shallow areas. Winter and spring floods, low flows in late summer, large woody debris floating downstream, and a shallow bar at the mouth of the Columbia River kept the environment dynamic. Today, navigation channels have been dredged, deepened, and maintained; jetties and pile-dike fields have been constructed to stabilize and concentrate flow in navigation channels; marsh and riparian habitats have been filled and diked; and causeways have been constructed across waterways.

More than 50 percent of the original marshes and spruce swamps in the estuary have been converted to industrial, transportation, recreational, agricultural, or urban uses. More than 3,000 acres of this habitat have been converted to other uses since 1948. Many wetlands along the shore in the upper reaches of the estuary have been converted to industrial and agricultural lands after levees and dikes were constructed. The loss of established habitats is thought to have reduced the number of niches available to juvenile migrants and thus the potential for enhancing population viability through geographic diversity (LCFRB 2004).

3.3 Rangewide Status of Designated Critical Habitat

NMFS reviews the status of designated critical habitat affected by the proposed action by examining the condition and trends of PCEs throughout the designated area. The PCEs consist of the physical and biological features identified as essential to the conservation of the listed species in the documents that designate critical habitat. In other words, these PCEs are the essential components of critical habitat. NMFS has designated critical habitat for two of the three salmon and steelhead species that would be affected by the proposed action (Table 3-3).

Table 3-3. Types of sites and essential physical and biological features named as PCEs in critical habitat designations for LCR Chinook salmon and LCR steelhead

SITE	ESSENTIAL PHYSICAL AND BIOLOGICAL FEATURES	SPECIES LIFE STAGE
Freshwater spawning	Water quality, water quantity, and substrate	Spawning, incubation, and larval development
Freshwater rearing	Water quantity and floodplain connectivity	Juvenile growth and mobility
	Water quality and forage	Juvenile development
	Natural cover [a]	Juvenile mobility and survival
Freshwater migration	Free of artificial obstructions; water quality and quantity and natural cover[b]	Juvenile and adult mobility and survival
Estuarine areas	Free of artificial obstructions; water quality and quantity and natural cover	Juveniles reach ocean in a timely manner, avoid predators, compete successfully, and complete the behavioral and physiological changes needed for life in the ocean

[a] Natural cover includes shade, large wood, log jams, beaver dams, aquatic vegetation, large rocks and boulders, side channels, and undercut banks.

[b] Forage includes aquatic invertebrate and fish species that support growth and maturation.

Many factors, both human-caused and natural, have contributed to the decline of salmon over the past century. Salmon habitat has been altered through activities such as urban development, logging, grazing, power generation, and agriculture. These habitat alterations have resulted in the loss of important spawning and rearing habitat and the loss or degradation of migration corridors (Table 3-4).

Table 3-4. Major factors limiting the conservation value of designated critical habitat by species (NMFS 2005d).

SPECIES	MAJOR LIMITING FACTORS FOR CRITICAL HABITAT
LCR Chinook salmon	• Reduced access to spawning/rearing habitat in tributaries • Loss of habitat diversity and channel stability in tributaries • Excessive sediment in spawning gravel • Elevated water temperature in tributaries
LCR steelhead	• Degraded floodplain and stream channel structure and function • Reduced access to spawning/rearing habitat • Altered streamflow in tributaries • Excessive sediment and elevated water temperatures in tributaries

Critical habitat relevant to this Opinion is the same area for both species. Critical habitat includes the stream channels within the designated stream reaches, and extends laterally up to the ordinary high-water line. In areas where ordinary high-water line has not been defined, the lateral extent is the bankfull elevation (i.e., the level at which water begins to leave the channel and move into the floodplain), generally reached at a discharge with a 1- to 2-year recurrence interval. Within these areas, the PCEs essential for the conservation of these species are those sites and habitat components that support one or more life stages, including freshwater spawning, freshwater rearing, and freshwater migration corridors.

In determining which habitat to designate as critical, NMFS evaluated the importance of the populations associated with an area to the recovery of their respective ESUs and DPSs, and the contribution of the area to the conservation (i.e., recovery) of each population through either its current or potential productivity. The Critical Habitat Analytical Review Teams (CHARTs) rated 47 occupied fifth field hydrologic units (referred to as HUC5s or watersheds) for LCR Chinook and 41 HUCs for LCR steelhead in the Lower Columbia River Basin. An HUC5 is a watershed ranging in size from 40,000 to 250,000 acres (the action area in this Opinion intersects three fifth field HUCs). Since critical habitat is assigned at the scale of fifth field HUC, some portions of a particular HUC may lack the PCEs associated with critical habitat. The CHARTs gave each of these occupied HUC5s a high, medium, or low rating. High value watersheds are those with a high likelihood of promoting conservation, while low value watersheds/areas are expected to contribute relatively little. Conservation value was determined by considering the factors listed in Table 3-4.

Table 3-5. Factors considered by Columbia Basin CHARTs to determine the conservation value of occupied HUC5s.

FACTORS	CONSIDERATIONS
PCE quantity	Total stream area or number of reaches in the HUC5 where PCEs are found; compares to both distribution in other HUC5s and to probable historical quantity within the HUC5.
PCE quality – current condition	Existing condition of the quality of PCEs in the HUC5.
PCE quality – potential condition	Likelihood of achieving PCE potential in the HUC5, either naturally or through active conservation/ restoration, given known limiting factors, likely biophysical responses, and feasibility.
PCE quality – support of rarity/importance	Support of rare genetic or life history characteristics or rare/important types in the HUC5.
PCE quantity – support of abundant populations	Support of variable-sized populations relative to other HUC5s and the probably historical levels in the HUC5.
PCE quality – support of spawning/rearing	Support of spawning or rearing of varying numbers of populations (i.e., different run-timing or life history types within a single ESU and or different ESUs)

4. ENVIRONMENTAL BASELINE

In Step 3 of this analysis, NMFS evaluates the relevance of the environmental baseline to the species' current and future status in the action area. Regulations implementing the ESA (50 CFR 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, including 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." It does not include the effects of the action under review in the consultation (ESA Section 7 Consultation Handbook [USFWS and NMFS 1998] p. 4-22).

4.1 Status of the Species Within the Action Area

4.1.1 LCR Chinook Salmon

Spring (stream-type) and fall (ocean-type) Chinook salmon are native to the upper Cowlitz River Basin. Spawning occurs in September and October, and fry emerge from December through February. Spring Chinook salmon typically rear through the summer and migrate downstream in the spring one year after emergence (WDW 1990). Adult fall-run Chinook salmon begin upstream migration in the Cowlitz River during late August, peaking in mid-September. Spawning occurs from September through November, fry emerge from January through March, and juvenile rearing lasts through mid-June. Juvenile emigration peaks during June through August and ends in December (WDW 1990).

4.1.2 LCR Steelhead

The Cowlitz River Basin supports both winter and summer steelhead runs, although historically, winter steelhead were the dominant form. Adult winter steelhead enter the Cowlitz River from mid-November through June. Spawning occurs from mid-March through early June, and emergence occurs from April through July (WDW 1990). Natural juvenile rearing generally lasts for 2 to 3 years prior to spring ocean emigration (WDW 1990).

4.1.3 LCR Coho Salmon

Historically, two separate runs of coho salmon were reported to enter the Cowlitz River. The early run (Type-S) entered the Cowlitz beginning in late August and September, with a spawning peak in late October. The late run (Type-N) entered the Cowlitz from October through March, with a spawning peak in late November. Coho salmon fry spend the spring and summer within their natal streams, although larger, more dominant fish displace smaller fish downstream, especially during freshets (Sandercock 1991). Coho salmon smolts typically emigrate as yearlings during the spring following emergence.

4.2 Factors Affecting the Status of Populations in the Action Area

The Cowlitz River ecosystem has undergone considerable change since the arrival of Euro-Americans. In the lower Cowlitz River, the construction of Mayfield and Mossyrock Dams blocked the migration of anadromous salmonids to the upper Cowlitz Basin. Efforts to pass salmon and steelhead upstream of the dam were abandoned in the 1970s and no anadromous salmonids were present in the upper Cowlitz Basin until a reintroduction effort was started in 1994. This reintroduction relies on trapping the returning adults downstream of Mayfield Dam, transporting them by truck and releasing them into Lake Scanewa and the upper Cowlitz or Cispus Rivers. Juvenile downstream passage is dependent on a collection facility located at Cowlitz Falls Dam (upstream of Mossyrock Dam).

The historical and ongoing effects of the Packwood Lake Hydroelectric Project associated with the proposed action include:

- Anadromous salmonids and other fish enter the Packwood Lake Hydroelectric Project tailrace canal and stilling basin. In addition to risk of direct injury, spawners have been delayed in the stilling basin, and fish present in the basin and tailrace during project shutdowns have been stranded or killed due to poor water quality.
- Project shutdowns or other alterations of flow associated with Project operations have stranded adults or rearing juveniles in the tailrace slough and/or dewatered redds present in the tailrace slough

4.3 Primary Constituent Elements of Designated Critical Habitat within the Action Area

The extent, nature, and conservation value of the PCEs of the critical habitat that has been designated for LCR Chinook salmon and LCR steelhead are discussed in Section 3.3. In that section, NMFS identifies and discusses the status of the PCEs that are within the action area for this consultation.

NMFS determined that the tailrace slough and sections of the Cowlitz River within the action area represent spawning, rearing, and migration habitat for LCR Chinook and LCR steelhead.

4.4 Summary of the Environmental Baseline

The biological requirements of LCR Chinook and coho salmon and LCR steelhead populations and the conservation value of their designated critical habitat in the upper Cowlitz Basin are not met under the existing environmental baseline. Current populations are depressed from historical run sizes and critical habitat has become degraded or is not accessible. The effects of historical activities, including the existence and operation of Packwood Hydroelectric Project have contributed to this condition. Maintenance or further degradation of the existing conditions within the action area would contribute to the long-term decline of LCR Chinook and LCR Coho salmon and LCR steelhead. Within the action area specifically, the lack of a barrier to prevent listed salmonids from entering the project tailrace and stilling basin exposes fish to the risk of delay, injury or mortality.

5. EFFECTS OF THE PROPOSED ACTION

5.1 Effects of the Proposed Action

Effects of the action are defined in 50 CFR §402.02 as "the direct and indirect effects of an action on the species, together with the effects of other activities that are interrelated or interdependent with the action, that will be added to the environmental baseline." Direct effects occur at the project site and may extend upstream or downstream based on the potential for impairing important habitat elements. Indirect effects are defined as "those that are caused by the proposed action and are later in time, but still are reasonably certain to occur." They include the effects on listed species of future activities that are induced by the proposed action and that occur after the action is completed. Interrelated actions are "those that are part of a larger action and depend on the larger action for their justification." Interdependent actions are "those that have no independent utility apart from the action under consideration." 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 considered in this analysis.

5.2 Methods of Analysis

In Step 3 of its analytical approach, NMFS evaluates the effects of the proposed action on the environment, including the geographic distribution, nature, intensity, timing, frequency, and/or duration of the effect. NMFS then looks at the effects of the action on individual fish and populations and on the primary constituent elements of critical habitat within the action area.

5.3 Effects of Construction Activities

NMFS expects that construction related effects to LCR Chinook salmon, LCR coho, and LCR steelhead will include direct and indirect harm to fish and to PCEs associated with the following: (1) Potential interruption of flow to the tailrace slough (2) increased suspended sediment and turbidity during construction (3) handling and transport of fish during salvage operations (4) increased suspended sediment and turbidity from the in-river construction work or stormwater runoff from construction sites; (5) leaking or spill of chemical contaminants or hazardous material (gasoline, oil, grease, concrete) into the river from use of heavy equipment nearby; (6) short-term loss of fish habitat; (7) permanent removal of riparian habitat

The likely effects include: (1) injury or mortality of a small proportion of the juvenile salmon and redds downstream of the construction; (2) fish injury, stress, or mortality associated with salvage operations (3) the risk of pollution due to accidental hazardous spill events (4) behavioral changes from physical effects such as noise and in-stream activities, elevated contaminant and or turbidity levels during in-river work; and (5) short-term decrease in habitat carrying capacity caused by temporary loss of spawning, rearing and holding habitats. These effects are discussed in greater detail in the following sections.

5.3.1 Water Quality

Turbidity

Construction of the screen, soil disturbance in the riparian area from removal of trees and use of heavy machinery are likely to mobilize fine sediments, causing short-term increases in localized turbidity levels in the tailrace slough and up to 500 feet downstream in the Cowlitz River below the tailrace slough confluence.

Increased turbidity may cause sub-lethal effects to juvenile or adult individuals in the immediate area, such as gill flaring/irritation, increased rate of respiration, or minor physiological stress. Construction of the screen facility may cause soil disturbance that could increase turbidity levels in the tailrace and immediately downstream. Such erosion is anticipated to result in short-term and minor increases in turbidity. Increased turbidity may also affect PCEs for spawning, rearing, and migration corridors by temporarily reducing water quality. However, because the turbidity increases are anticipated to be short-term and localized for the above activities, the effects of turbidity are not anticipated to have an observable effect on the abundance, distribution, diversity or productivity at the population level or on conservation value of critical habitat at the watershed scale.

Contaminants

Use of heavy equipment and concrete in and around the waterway increases the potential for contaminants to enter fish habitat. This risk is primarily to fish which may be present downstream of the construction site, as most fish at or upstream of the site will have been removed by fish salvage operations. Accidental releases of fuels, lubricants and other construction-related chemicals from equipment could negatively affect water quality and thus habitat, if spills occur. Such releases may also affect PCEs for spawning, rearing, and migration corridors by reducing water quality.

5.3.2 Habitat Access

Installation of the screen may displace juveniles or adults from holding a rearing habitat in the tailrace slough. This effect will only last for the duration of construction activities.

The screen will permanently exclude juvenile and adult salmonids from the project tailrace and stilling basin. Since this habitat presents a risk of delay, injury or mortality, exclusion from these risks will benefit populations of listed fish in the upper Cowlitz Basin.

5.3.3 Habitat Elements

Installation of the screen may negatively affect habitat elements in the tailrace slough. Any sediments or contaminants released during construction may degrade habitat in the tailrace slough and the Cowlitz River downstream of the tailrace slough. Use of the procedures proposed by FERC and Energy Northwest to reduce risk of spills, and limit sediment releases will minimize this risk.

Adult and juvenile salmonids are likely to be displaced from holding and rearing habitat in the tailrace slough during construction activities which are expected to last 4 weeks.

5.4 Effects of the Biological Monitoring and Evaluation Program and Fish Salvage Operations

Some fish may be injured or killed during seining of the tailrace and stilling basin. However, because there is an established protocol and trained personnel will conduct the sampling, the expected levels of injury and/or mortality will be low.

5.5 Effects of Screen Construction

During the four weeks of the construction period construction related effects to LCR Chinook salmon, LCR coho, and LCR steelhead juveniles and adults could include direct and indirect harm to fish and to PCEs associated with the following: (1) injury or mortality through physical contact with the screen or support structures, (2) delay due to attraction to flows moving through the screen, and (3) the potential for contamination due to a spill of a chemical or another hazardous material (gasoline, oil, grease, concrete) into the river during screen operations or maintenance. However, because most of the listed fish will be removed from the area during the pre-construction salvage operation, the likelihood of exposure to these hazards is very small.

5.5.1 Fish Injury, Stress, or Mortality Associated with Screen Operations

The proposed screen design was reviewed by a NMFS fish passage engineer. NMFS has determined that the screen design meets its criteria for exclusion screens. These criteria were developed to ensure that a screen reduces the risk of delay through false attraction, injury, and/or mortality. Mortality and injury rates for the type of screen proposed are typically low assuming proper operation.

5.5.2 Potential Direct Injury and Mortality Due to Accidental Hazardous Spill Events

Use of heavy equipment during maintenance operations increases the potential for contaminants to enter fish habitat. This risk is primarily to fish or redds which may be present downstream of the construction site, as most fish at or upstream of the site will have been removed by fish salvage operations Accidental releases of fuels, lubricants, and other chemicals from equipment could negatively affect water quality and thus habitat, if spills occur. Such releases may also affect PCEs for spawning, rearing, and migration corridors by reducing water quality.

5.5.3 Reduced Delay and Risk of Mortality Because Fish are Excluded from Project Tailrace and Stilling Basin

Currently, large numbers of juvenile salmonids (primarily LCR coho with smaller numbers of Chinook and steelhead) and smaller numbers of adult salmonids have been observed in and recovered from the Project stilling basin. Salmonids have also been identified in the lined portion of the Project tailrace. These fish are at risk of injury or mortality from contact with Project equipment and facilities. Fish present in the stilling basin and tailrace may also be

stranded or suffer the effects of degraded water quality when flows are interrupted during project shutdowns (planned and unplanned).

Excluding salmonids from the stilling basin and tailrace is likely to benefit salmonids in the upper Cowlitz Basin because they will no longer be exposed to risks present in the stilling basin and tailrace. Additionally, spawning success may be increased because adult salmonids will no longer be trapped or at least delayed in the project stilling basin.

5.6 Summary of Effects for the Screen Construction, Monitoring, and Operations

Construction of the screen facility will result in some short-term negative effects, primarily temporary loss of habitat in the tailrace slough and localized turbidity increases. Juvenile Chinook, coho, and steelhead could be present during the construction period. However, surveys of habitat use only found juvenile coho (~1000, EES 2007a). If juvenile Chinook or steelhead were present, NMFS would expect them to be present in smaller numbers than the juvenile coho. Adult Chinook and coho will be present in the upper Cowlitz during the construction period, though none have been observed in the tailrace slough during the scheduled construction period. Chinook spawning in the Upper Cowlitz begins in August and continues through September but spawning surveys did not observe any Chinook redds in the tailrace slough (EES 2007b). Given that Chinook typically require more area for spawning than coho, if any redds were present in the tailrace slough NMFS would expect less than the 45 coho redds observed in the tailrace slough (EES 2007c). Coho spawning in the upper Cowlitz has not been observed before November (which is after the proposed construction period). Monitoring will result in some sublethal effects and incidental take from handling. Screen operations could cause some injury or mortality to salmonids which will be minimized by proper maintenance and operation of the screen facility.

Operation of the screen facility is likely to result in a long term benefit to listed salmonids in the upper Cowlitz Basin. Overall injury and mortality rates should decrease because juvenile and adult salmonids will no longer be subject to risks present in the Project stilling basin and tailrace. Spawning success is also likely to increase because spawners will not enter the Project stilling basin where they are at risk of injury or delay.

Fish collections conducted for fish salvage and monitoring operations may cause injury or mortality of listed salmonids. However, established protocols and experienced personnel reduce these risks.

5.7 Effects of the Proposed Action on Critical Habitat

The effects of the proposed action on Chinook and steelhead critical habitat are described in table 5-1. The majority of the negative effects are likely to be of short duration, not continuing beyond the completion of fish screen construction (November 1, 2007). The effects of the proposed action are likely to affect critical habitat for both species in similar ways.

Table 5-1. Summary of effects of the Proposed Action on the upper Cowlitz River population of LCR Chinook salmon, LCR coho salmon, and LCR steelhead and on the PCEs of designated critical habitat within the action area.

SALMONID LIFE STAGE	ELEMENT OF PROPOSED ACTION	TYPE OF EFFECT / VSP PARAMETERS	PCES AFFECTED	EXTENT OF EFFECT (TIME AND SPACE)	PROBABILITY OF EFFECT OCCURRING
Adult - Holding (life stage where adults enter the river and remain for several weeks or months prior to spawning)	Installation of Fish Screen	Will reduce amount of habitat available for adult holding – however, an adequate amount of habitat for this adult behavior is available in the upper Cowlitz Basin (productivity)	Freshwater migration corridors with adequate natural cover	Short-term (adults will be displaced during October)	Likely
	Biological monitoring and evaluation	Sublethal stress for most; death for no more than 1% of the adults handled (abundance)	N/A	Permanent for mortalities; short-term sublethal stress (<2 hours) for most adults	Likely
	Fish Screen operations	Sublethal stress for some; death highly unlikely (abundance)	N/A	Permanent for mortalities; short-term sublethal stress for most adults	Unlikely
		Excluded from risks associated with delay in the tailrace and stilling basin (productivity, abundance)		Reduced risk of delay mortality or injury Permanent	Certain
Adult - Spawning	Fish Screen installation	Unlikely to effect anadromous salmonid spawning due to timing (October)	Freshwater spawning sites with adequate substrate	None	Certain
	Fish Screen Operation	Reduced likelihood of delay or risk of injury or death associated with tailrace and stilling basin (abundance, productivity, and spatial structure)	N/A	Long-term (benefits will accrue as long as fish screen is operated)	Certain
Juvenile - Egg to sac fry	Fish Screen Installation	Potential mortality or sublethal stress from sediment or contaminant releases during construction (Chinook only)	Freshwater spawning sites with adequate substrate	Permanent for mortalities; short-term sublethal stress	Likely

Table 5-1. Cont'd.

	Installation of Fish Screen	Will reduce amount of habitat available for juvenile rearing – however, adequate habitat for this life stage is available in the upper Cowlitz Basin	Freshwater rearing sites with adequate physical habitat conditions	Short-term (juveniles of all species may be displaced during October)	Certain
Juvenile - Rearing	Operation of Fish Screen	Sublethal stress for some; death highly unlikely (abundance)	N/A	Permanent for mortalities; short-term sublethal stress for most adults	Unlikely
		Excluded from risks associated with tailrace and stilling basin (productivity, abundance)		Reduced risk of delay mortality or injury Permanent	Certain
	Salvage Operation	Sublethal stress for most; death for no more than 5% of the juveniles handled; (abundance)	N/A	Permanent for mortalities; short-term sublethal stress (< 2 hours) for most juveniles	Likely
	Biological monitoring and evaluation	Sublethal stress for most; death for no more than 5% of the fewer than 1,000 juveniles handled; (abundance)	N/A	Permanent for mortalities; short-term sublethal stress (< 2 hours) for most juveniles	Likely
Juvenile - Migration	Installation and operation of screens	No known effects	N/A	N/A	N/A

6. CUMULATIVE EFFECTS

Cumulative effects are defined in 50 CFR § 402.02 as "those effects of future State, tribal, local or private actions, not involving Federal activities, that are reasonably certain to occur in the action area." Future Federal actions, including the ongoing operation of hatcheries, fisheries, and land management activities, are not considered within the category of cumulative effects for ESA purposes because they require separate consultations under Section 7 of the ESA, after which they become part of the environmental baseline. Potential cumulative effects within the action area, including any rural development, timber harvest on private lands, road building on private forest lands, and increased fish harvest, are likely to have an effect on the future potential for recovery of the listed species.

Between 1980 and 2000, the population of Lewis County increased by 12,575. Based on trends in U.S. census data for 1980, 1990, 2000, and 2003, Crossett (2004) predicted that the area of the Pacific Northwest that includes Lewis County will grow another 5 to 10 percent between 2003 and 2008. Thus, state, tribal, and private actions that provide infrastructure and services for population growth, including water supply and runoff from impermeable surfaces, are likely to continue within the action area. However, NMFS is not aware of any specific future non-Federal activities within the action area that are reasonably certain to occur and thus does not consider specific cumulative effects in this consultation.

7. CONCLUSION

This section presents NMFS' Biological Opinion regarding whether the effects of the factors analyzed under the environmental baseline (Section 4), the effects of the Proposed Action (Section 5), and the cumulative effects (Section 6) in the action area, when considered in the context of the current range-wide status of the species (Section 3), are likely to jeopardize the continued existence of the listed species considered in this Opinion. This section also represents NMFS' Biological Opinion regarding whether the Proposed Action is likely to result in the destruction or adverse modification of designated critical habitat.

This Opinion and these conclusions only consider the construction and operation of a fish screen to exclude anadromous fish from the project tailrace through the expiration of the current Project license in 2010. This Opinion and these conclusions do not cover the effects of the operation of Packwood Lake Hydroelectric Project as a whole on listed species or critical habitat. The effects of Project operations will be reviewed in an upcoming Biological Opinion for the new Project operating license expected to be issued in 2010.

After reviewing the current status of the listed species, the environmental baseline within the action area, the effects of the Proposed Action, and cumulative effects, it is NMFS' Biological Opinion that the Proposed Action is not likely to jeopardize the continued existence of LCR Chinook salmon, LCR coho salmon or LCR steelhead or to destroy or adversely modify critical habitat designated for the Chinook ESU and the steelhead DPS. In reaching this opinion, NMFS has relied on the best available scientific and commercial information. These conclusions are based on the following considerations.

Construction of the fish screen will primarily result in sub-lethal, short-term, localized impacts to fish in the action area. Timing of the construction sequence minimizes impacts for the proposed construction. Once the screen is completed and operational, fish will be excluded from the tailrace and stilling basin where they are at risk of delay, injury, stranding or mortality Construction of the fish screen will result in short-term negative effects to PCEs for rearing and migration corridors. Long term benefits to the population will be exclusion of adults and juveniles from the tailrace and stilling basin where they are at risk of delay, injury, stranding or mortality.

Therefore, based on NMFS' consideration of the range-wide status of the species and its designated critical habitat, the effects of the action, and any cumulative effects that are reasonably certain to occur, NMFS concludes that the Proposed Action will not jeopardize the survival and recovery or destroy or adversely modify the designated critical habitat of the ESA-listed species considered in this Opinion.

8. REINITIATION OF CONSULTATION

As provided in 50 CFR §402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded, (2) new information reveals effects of the agency action on listed species or designated critical habitat in a manner or to an extent not considered in this Opinion, (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this Opinion, or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

9. INCIDENTAL TAKE STATEMENT

Section 9(a)(1) of the ESA prohibits any taking (to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, collect, or attempt to engage in any such conduct) of endangered species without a specific permit or exemption. Protective regulations adopted pursuant to Section 4(d) of the ESA extend the prohibition to threatened species. 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 spawning, rearing, feeding, and migrating (50 CFR §222.102; NMFS 1999c). Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity by a Federal agency or applicant (50 CFR §402.02). 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 to be prohibited under the ESA, provided that such taking is in compliance with the terms and conditions of the incidental take statement.

This 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. The measures described in this section are nondiscretionary. If FERC fails to assume and implement the terms and conditions of this incidental take statement, the protective coverage of Section 7(a)(2) may lapse. To monitor the effect of incidental take, FERC must report the progress of the action and its effect on each listed species to NMFS, as specified in this incidental take statement (50 CFR §402.14(i)(3)).

9.1 Amount or Extent of Take

The Proposed Action is designed to minimize incidental take of LCR Chinook and LCR coho salmon and LCR steelhead juveniles and adults that enter the Project tailrace and stilling basin. In Section 5, NMFS described the mechanisms by which ESA-listed anadromous fish and designated critical habitat would likely be affected (taken) by construction activities, biological monitoring, and screen operations.

Construction of the screen in October 2007 is likely to result in instream disturbance and water quality impairment that is likely to harass individuals of listed species by limiting or preventing their use of the area immediately downstream of the project tailrace to the confluence of the tailrace slough with the Cowlitz River. Downstream of the construction site, adult Chinook and coho, juvenile Chinook, coho and steelhead, and Chinook redds are all potentially present in the action area during and after construction. However, because construction will be conducted during project shutdown, after which a fish salvage action will be conducted, no fish will be present in the Project tailrace where actual construction will occur. Surveys of anadromous salmonid use of the tailrace slough found 81 juvenile coho present during July (EES 2007c). A few juvenile Chinook (1-4) and no juvenile steelhead were observed during the surveys. Based on these surveys NMFS would not expect there to be no more than 100 juvenile Chinook, coho, or steelhead present in the tailrace slough during construction. Adult Chinook and coho are present in the upper Cowlitz during the period proposed for construction, but none were observed in the tailrace slough during surveys in October (EES 2007b). The tailrace slough has

little good holding habitat for adults so NMFS would expect no more than 20 adults of either species to be present during the construction period. No coho redds were observed in the tailrace slough before November during spawning surveys. Chinook salmon were observed spawning in the upper Cowlitz and Cispus Rivers during August and September, though no Chinook redds were observed in the tailrace slough during spawning surveys (EES 2007b). If Chinook redds were present, since Chinook make larger redds, NMFS would expect the maximum number to be less than the 45 coho redds documented by spawning surveys (EES, 2007b). Construction will be completed by early November 2007. Effects of the action on juvenile and adult salmonids are most likely to be in the form of harassment and displacement of fish from rearing or holding habitat. There is some potential for harming or killing adult and juvenile salmonids if there are large releases of sediment or chemicals. Any Chinook eggs in redds located in the tailrace would be subject to being harmed or killed if there were large releases of chemicals or sediment.

Salvage operations for juvenile and adult LCR Chinook and juvenile LCR coho and steelhead in the Project tailrace and stilling basin will also result in harassment and limited mortality (less than 5 percent of the fewer than 1,000 fish handled) of fish present in the tailrace and stilling basin.

The biological monitoring and evaluation activities are anticipated to result in harassment of adult and juvenile Chinook, and potentially some mortality. NMFS anticipates that few fish are likely to pass the screen, so few are likely to be encountered in sampling activities in the tailrace and stilling basin after screen construction (less than 5 percent of a total of less than 100 juvenile and adult fish handled).

Maintenance activities could result in instream disturbance and water quality impairment that is likely to harass individuals of listed species present in the tailrace slough. The number of individuals harassed is likely to be the same as noted for the construction period. Maintenance will occur periodically.

9.2 Reasonable and Prudent Measures and Terms and Conditions

NMFS believes that the following reasonable and prudent measures and terms and conditions are necessary and appropriate to minimize or to monitor the incidental take of the ESA-listed species and its critical habitat resulting from the Proposed Action. In order to be exempt from the prohibitions of Section 9 of the ESA, FERC must comply with all of the reasonable and prudent measures and terms and conditions set forth below.

1. Minimize the likelihood of incidental take from the construction of the screen facility by applying permit conditions or project specifications that avoid or minimize adverse effects to riparian and aquatic habitats during construction.

2. Minimize take from fish handling during monitoring/evaluation studies and fish salvage operations by applying permit conditions that avoid or minimize adverse effects.

3. Conduct monitoring to determine if screen is effectively excluding fish from Project tailrace and stilling basin without causing delay, injury, or mortality of listed species

4. Develop procedures and schedules for maintenance of screens that ensures their continued efficacy and minimizes risk of water quality impairment and disturbance of listed fish within the tailrace.

9.2.1 Terms and Conditions

To be exempt from the prohibitions of Section 9 of the ESA, FERC must fully comply with all conservation measures described as part of the proposed action and the following terms and conditions that complete the reasonable and prudent measures described above. These terms and conditions are non-discretionary. NMFS may amend the provisions of this incidental take statement consistent with its statutory and regulatory authorities.

1. To implement reasonable and prudent measure #1, FERC must do the following:

   A. Timing of In-water Work: Work below the bankfull elevation[2] will be completed during the proposed in-water work period from October 1 to November 1. FERC or Energy Northwest must notify NMFS 1 week before in-water work begins and again one day prior to the anticipated start.

   B. Construction Area: All construction impacts must be confined to the minimum area necessary to complete the project, and 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.

   C. Cessation of Work: Cease Project operations under high flow conditions that may result in inundation of the project area, except for efforts to avoid or minimize resource damage.

   D. Fish Screens: Have a fish screen installed, operated, and maintained according to NMFS' fish screen criteria[3] on each water intake used for project construction, including pumps used to isolate an in-water work area. Screens for water diversions or intakes that will be used for irrigation, municipal or industrial purposes, or any use besides project construction are not authorized.

   E. Pollution and Erosion Control Plan: Prepare and carry out a pollution and erosion control plan to prevent pollution caused by surveying or construction operations. The plan must be available for inspection on request by NMFS.

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

[3] 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).

i. *Plan Contents.* The pollution and erosion control plan will contain the pertinent elements listed below, and meet requirements of all applicable laws and regulations.
   a. The name and address of the party(s) responsible for accomplishment of the pollution and erosion control plan.
   b. Practices to prevent erosion and sedimentation associated with access roads, stream crossings, drilling sites, construction sites, borrow pit operations, haul roads, equipment and material storage sites, fueling operations, staging areas, and roads being decommissioned.
   c. Practices to confine, remove and dispose of excess concrete, cement, grout, and other mortars or bonding agents, including measures for washout facilities.
   d. A description of any regulated or hazardous products or materials that will be used for the project, including procedures for inventory, storage, handling, and monitoring.
   e. A spill containment and control plan with notification procedures, specific cleanup and disposal instructions for different products, quick response containment and cleanup measures that will be available on the site, proposed methods for disposal of spilled materials, and employee training for spill containment.
   f. 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, monitor instream turbidity and inspect all erosion controls daily during the rainy season (October through May) and weekly during the dry season (June through September), or more often as necessary, to ensure the erosion controls are working adequately[4].
   a. If monitoring or inspection shows that the erosion controls are ineffective, mobilize work crews immediately to make repairs, install replacements, or install additional controls as necessary.
   b. Remove sediment from erosion controls once the sediment has reached ⅓ of the exposed height or capacity of the control.

F. Construction Discharge Water: Treat all discharge water created by construction (e.g., concrete washout, pumping for work area isolation, vehicle wash water, drilling fluids) as follows:
   i. *Water Quality.* Design, build and maintain facilities to collect and treat all construction discharge water, including any contaminated water produced by drilling, using the best available technology applicable to site conditions. Provide treatment to remove debris, nutrients, sediment, petroleum hydrocarbons, metals, and other pollutants likely to be present.

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

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

iii. *Pollutants.* Do not allow pollutants including green concrete, contaminated water, silt, welding slag, sandblasting abrasive, or grout cured less than 24 hours to contact any wetland or the 2-year floodplain (elevation 1255 ft).

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

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

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

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

G. Piling Removal: If a temporary or permanent piling will be removed from water containing fish, the following conditions apply.

i. Dislodge the piling with a vibratory hammer.

ii. Once loose, place the piling onto the construction barge or other appropriate dry storage site.

iii. If a treated wood piling breaks during removal, either remove the stump by breaking or cutting 3 feet below the sediment surface or push the stump in to that depth, then cover it with a cap of clean substrate appropriate for the site.

H. Treated Wood:

i. Except as noted in the NMFS-approved design drawings for Packwood Lake screen facility, treated wood[5] is not authorized where it may contact flowing water or where it will be placed over water and exposed to mechanical abrasion or where leachate may enter flowing water.

ii. Visually inspect treated wood before final placement to detect and replace wood with surface residues and/or bleeding of preservative.

iii. Projects that require removal of treated wood will use the following precautions.

a. Take care to ensure that no treated wood debris falls into the water. If treated wood debris does fall into the water, remove it immediately.

b. Dispose of all treated wood debris removed during a project, including treated wood pilings, at an upland facility approved for hazardous materials of this classification. Do not leave a treated wood piling in the water or stacked on the stream bank.

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

I. Preconstruction Activity: Complete the following actions before significant[6] alteration of the project area.

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.

a. A supply of sediment control materials (e.g., silt fence, straw bales).

b. An oil-absorbing, floating boom whenever surface water is present.

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

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

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

ii. *Vehicle and Material Staging*. Store construction materials and fuel, operate, maintain, and store vehicles as follows.

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

b. Complete vehicle staging, cleaning, maintenance, refueling, and fuel storage in a vehicle staging area placed 150 feet or more from any stream, water body or wetland, unless otherwise approved in writing by NMFS.

c. Inspect all vehicles operated within 150 feet of any stream, water body or wetland daily for fluid leaks before leaving the vehicle staging area. Repair any leaks detected in the vehicle staging area before the vehicle resumes operation. Document inspections in a record that is available for review on request by NMFS.

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

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

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

K. Site Preparation: Conserve native materials for site restoration.
   i. If possible, leave native materials where they are found.
   ii. If materials are moved, damaged or destroyed, replace them with a functional equivalent during site restoration.
   iii. Stockpile any large wood[7], native vegetation, weed-free topsoil, and native channel material displaced by construction for use during site restoration.

L. Earthwork: Complete earthwork (including drilling, excavation, dredging, filling and compacting) as quickly as possible.
   i. Drilling and sampling. If drilling, boring or jacking is used, the following conditions apply.
      a. Isolate drilling operations from wetted stream channels using a steel pile, sleeve, or other appropriate isolation method to prevent drilling fluids from contacting water.
      b. If it is necessary to drill through a bridge deck, use containment measures to prevent drilling debris from entering the wetted stream channel.
      c. If directional drilling is used, the drill, bore, or jack hole will span the channel migration zone and any associated wetland or wetted stream channel.
      d. Sampling and directional drill recovery/recycling pits, and any associated waste or spoils will be completely isolated from surface waters, off-channel habitats, and wetlands. All waste or spoils must be covered if precipitation is falling or imminent. All drilling fluids and waste will be recovered and recycled or disposed to prevent entry into flowing water.
      e. If a drill boring conductor breaks and drilling fluid or waste is visible in water or a wetland, all drilling activity will cease pending written approval from NMFS to resume drilling.
   ii. *Site Stabilization.* Stabilize all disturbed areas, including obliteration of temporary roads, following any break in work unless construction will resume within 4 days.
   iii. *Source of Materials.* Obtain boulders, rock, woody materials, and other natural construction materials used for the project outside the riparian area. Spawning gravel for augmentation of spawning habitats must be washed (i.e. cleaned, rinsed rock), of suitable size for LCR Chinook, and coho spawning, and if possible, from a source within the Cowlitz River watershed.

M. Stormwater Management: Prepare and carry out a stormwater management plan for any project that will produce a new impervious surface or a land cover conversion that slows the entry of water into the soil. The plan must be available for inspection on request by NMFS.

[7] For purposes of this Opinion, 'large wood' means a tree, log, or rootwad big enough to dissipate stream energy associated with high flows, capture bedload, stabilize streambanks, influence channel characteristics, and otherwise support aquatic habitat function, given the slope and bankfull channel width of the stream in which the wood occurs.

i. *Plan Contents*. The goal is to avoid and minimize adverse effects due to the quantity and quality of stormwater runoff for initial construction, and throughout the life of the Project by maintaining or restoring natural runoff conditions. The plan will meet the following criteria and contain the pertinent elements listed below, and meet requirements of all applicable laws and regulations.

   a. A system of management practices and, if necessary, structural facilities, designed to complete the following functions:
      1) Minimize, disperse and infiltrate stormwater runoff onsite using sheet flow across permeable vegetated areas to the maximum extent possible without causing flooding, erosion impacts, or long-term adverse effects to groundwater.
      2) Pretreat stormwater from pollution generating surfaces, including bridge decks, before infiltration or discharge into a freshwater system, as necessary to minimize any nonpoint source pollutant (e.g., debris, sediment, nutrients, petroleum hydrocarbons, metals) likely to be present in the volume of runoff predicted from a 6-month, 24-hour storm[8].
   b. Document completion of the following storm water management activities according to a regular schedule for the operation, inspection, and maintenance of all structural facilities and conveyance systems, in a log available for inspection on request by NMFS.
      1) Inspect and clean each facility as necessary to ensure that the design capacity is not exceeded, heavy sediment discharges are prevented, and whether improvements in operation and maintenance are needed.
      2) Promptly repair any deterioration threatening the effectiveness of any facility.
      3) Post and maintain a warning sign on or next to any storm drain inlet that says, as appropriate for the receiving water, 'Dump No Waste - Drains to Ground Water, Streams, or Lakes.'
      4) Only dispose of sediment and liquid from any catch basin in an approved facility.

ii. *Runoffs/Discharge into a Freshwater System*. When stormwater runoff will be discharged directly into fresh surface water or a wetland, or indirectly through a conveyance system, the following requirements apply.

   a. Maintain natural drainage patterns and, whenever possible, ensure that discharges from the project site occur at the natural location.
   b. Use 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.
   c. Stabilize any erodible elements of this system as necessary to prevent erosion.

[8] A 6-month, 24-hour storm may be assumed to be 72% of the 2-year, 24-hour amount. See Washington State Department of Ecology (2001), Appendix I-B-1.

d. Do not divert surface water from, or increase discharge into, an existing wetland if that will cause a significant adverse effect to wetland hydrology, soils, or vegetation.
e. The velocity of discharge water released from an outfall or diffuser port may not exceed 4 feet per second.
f. Waste anesthetic-laden water must be disposed of in accordance with applicable laws.

2. To complete reasonable and prudent measure #2 (fish handling), FERC must ensure that:

A. Capture and Release of Fish: For capture and release of fish during salvage operations:

i. Intermittently during isolation of an in-water work area, fish trapped in the area must be captured using a trap, seine, electrofishing, or other methods as are prudent to minimize risk of injury, then released at a safe release site. The fish biologists for Energy Northwest or WDFW, or their subordinate staff, must conduct all fish salvage operations, unless otherwise approved in writing by NMFS.
ii. Electrofishing is not to be used if water temperatures exceed 18°C, or are expected to rise above 18°C, unless no other method of capture is available.
iii. Electrofishing equipment used to capture fish must comply with NMFS electrofishing guidelines (NMFS 2000).
iv. ESA-listed fish must be handled 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.
v. Water quality conditions must be adequate in tanks used to transport fish by providing circulation of clean, cold water, using aerators to provide dissolved oxygen, and minimizing holding times.
vi. Fish must be released into a safe release site as quickly as possible, and as near as possible to capture sites. In general, any fish removed from the work area must be released back into the Cowlitz River immediately downstream of the work area, unless otherwise directed by NMFS, USFWS, or WDFW.
vii. ESA-listed fish must not be transferred to anyone except the fish biologists for the Energy Northwest or WDFW, or their designated subordinate staff, unless otherwise approved in writing by NMFS.
viii. All other Federal, state, and local permits necessary must be obtained to conduct the capture and release activity.
ix. NMFS or its designated representative must be allowed to accompany the capture team during the capture and release activity, and to inspect the team's capture and release records and facilities.
x. An electronic copy of the Salvage Report Form must be submitted to NMFS within 10 calendar days of completion of the salvage operations, noting the quantities and species of fish salvaged.

B. When Cowlitz River flow results in water backing up in the lower end of the Project tailrace to an elevation of 1,044 feet msl, meeting or exceeding the height of the fish exclusion racks on the barrier (1044 ft msl) or water is observed flowing into the tailrace canal upstream of the barrier, a seining operation will be conducted in the Project stilling basin as soon as waters recede to a level where fish salvage can be safely conducted.

3. To complete reasonable and prudent measure #3 (screen efficacy testing), FERC must:

   A. Complete tailrace and stilling basin sampling as described in the BA.

   B. Develop and submit to NMFS for approval a plan for monitoring or testing the screen itself to determine if the screen causes delay, injury, or mortality of juvenile salmonids.

   C. Log any mortalities observed on the screen or during screen maintenance operations.

   D. Prepare an annual monitoring report to summarize the results of biological monitoring and evaluations and summarize the upcoming year's activities, including all biological monitoring and evaluations. This report must be submitted to NMFS for review and comment by January of each year, beginning in 2008.

4. To complete reasonable and prudent measure #4 (screen maintenance), FERC must:

   A. Complete and submit to NMFS for approval a plan for maintenance of the screen. The plan will include measures described in reasonable and prudent measure #1 to minimize risk of water quality degradation or fish disturbance or mortality.

   B. Upon request, allow NMFS or WDFW biologists to inspect the screen facility.

   C. Log dates and description of maintenance activities and any fish mortalities discovered during maintenance activities.

   D. Notify NMFS of damage or other factors that may interrupt screen operations.

   E. Respond to NMFS or WDFW requests for screen repair or maintenance within 48 hours. Requested maintenance or repair will be completed within a period of time deemed reasonable by NMFS.

   F. Prepare an annual report summarizing maintenance activities, inspections, mortalities, and any proposed major repairs or modifications. Periods when the screen was not in operation will also be reported. This report may be combined with the report described in reasonable and prudent measure #2 above.

Failure to provide timely reporting may cause the Incidental Take Statement to expire. The annual coordination meeting between NMFS and FERC must take place, or NMFS may assume the action has been modified in a way that invalidates this Incidental Take Statement.

10. CONSERVATION RECOMMENDATIONS

To preserve the habitat value of the tailrace slough for juvenile and adult salmonids the applicant should apply the guidelines in the following documents when developing plans for streambank protection and other modifications associated with constructing or protecting the screen structure.

WDFW, WDOT, WDOE, and USACE (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 (April 2003) (http://www.wdfw.wa.gov/hab/ahg/ispgdoc.htm)

11. MAGNUSON-STEVENS FISHERY CONSERVATION AND MANAGEMENT ACT

11.1 Background

The consultation requirement of Section 305(b) of the MSA directs Federal agencies to consult with NMFS on all actions, or proposed actions that may adversely affect EFH. Adverse effects include the direct or indirect physical, chemical, or biological alterations of the waters or substrate and loss of, or injury to, benthic organisms, prey species and their habitat, and other ecosystem components, if such modifications reduce the quality or quantity of EFH. Adverse effects to EFH may result from actions occurring within EFH or outside EFH, and may include site-specific or EFH-wide impacts, including individual, cumulative, or synergistic consequences of actions (50 CFR 600.810). Section 305(b) also requires NMFS to recommend measures that may be taken by the action agency to conserve EFH.

The Pacific Fishery Management Council designated EFH for Chinook salmon, coho salmon, and Puget Sound pink salmon (PFMC 1999). The Proposed Action and action area for this consultation are described in Sections 2 and 4 (Proposed Action and Environmental Baseline, respectively) to this document. The action area includes areas designated as EFH for various life-history stages of Chinook (*Oncorhynchus tshawytscha*) and coho (*Oncorhynchus kistuch)* salmon.

Based on information provided in the BA and the analysis of effects presented in the ESA portion of this document, NMFS concludes that the Proposed Action will have the adverse effects on EFH designated for Pacific Coast salmon described in Section 5 (Effects of the Action).

11.2 EFH Conservation Recommendations

NMFS believes that the conservation measures consisting of the ESA Terms and Conditions 1-4 described above are necessary to conserve EFH. Consequently, NMFS adopts these terms and conditions mentioned above as its EFH conservation recommendations.

11.3 Statutory Response Requirement

Federal agencies are required to provide a detailed written response to NMFS' EFH conservation recommendations within 30 days of receipt of these recommendations (16 U.S.C. 1855(b)(4)(B). The response must include a description of measures proposed to avoid, mitigate, or offset the adverse affects of the activity on EFH. If the response is inconsistent with the EFH conservation recommendations, the response must explain the reasons for not following the recommendations. The reasons must include 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.

In response to increased oversight of overall EFH program effectiveness by the Office of Management and Budget, NMFS established a quarterly reporting requirement to determine how many conservation recommendations are provided as part of each EFH consultation and how many are adopted by the action agency. Therefore, in the FERC statutory reply to the EFH portion of this consultation, NMFS asks that the FERC clearly identify the number of conservation recommendations accepted.

11.4 Supplemental Consultation

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

12. DATA QUALITY ACT DOCUMENTATION AND PRE-DISSEMINATION REVIEW

Section 515 of the Treasury and General Government Appropriations Act of 2001 (Public Law 106-554) (Data Quality Act (DQA)) specifies three components contributing to the quality of a document. They are utility, integrity, and objectivity. This section of the Opinion addresses these DQA components, documents compliance with the DQA, and certifies that this Opinion has undergone pre-dissemination review.

Utility

This document records the results of an interagency consultation. The information presented in this document is useful to two agencies of the Federal government (NMFS and FERC), and the general public. These consultations help to fulfill multiple legal obligations of the named agencies. The information is also useful and of interest to the general public as it describes the manner in which public trust resources are being managed and conserved. The information presented in these documents and used in the underlying consultations represents the best available scientific and commercial information and has been improved through interaction with the consulting agency.

This consultation will be posted on the NMFS Northwest Region website (http://www.nwr.noaa.gov). The format and name adhere to conventional standards for style.

Integrity

This consultation was completed on a computer system managed by NMFS in accordance with relevant information technology security policies and standards set out in Appendix III, 'Security of Automated Information Resources,' Office of Management and Budget Circular A-130; the Computer Security Act; and the Government Information Security Reform Act.

Objectivity

Information Product Category: Natural Resource Plan.

Standards: This consultation and supporting documents are clear, concise, complete, and unbiased; and were developed using commonly accepted scientific research methods. They adhere to published standards including the ESA Consultation Handbook, ESA Regulations, 50 CFR 402.01 et seq., and the MSA implementing regulations regarding EFH, 50 CFR 600.920(j).

Best Available Information: This consultation and supporting documents use the best available information, as referenced in the literature cited section. The analyses in this Opinion/EFH consultation contain more background on information sources and quality.

Referencing: All supporting materials, information, data and analyses are properly referenced, consistent with standard scientific referencing style.

Review Process: This consultation was drafted by NMFS staff with training in ESA and MSA implementation, and reviewed in accordance with Northwest Region ESA quality control and assurance processes.

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