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

January 17, 2003

Thomas F. Mueller
Chief Regulatory Branch
Department of the Army
Seattle District Corps of Engineers
Post Office Box 3755
Seattle, Washington 98124-3755

Re: Endangered Species Act Section 7 Formal Consultation and Magnuson-Stevens Fishery Conservation and Management Act and Essential Fish Habitat Consultation for the Maryhill State Park Boat Launch Reconstruction and Improvement Project, Klickitat County, WA (NOAA Fisheries No. 2002/00775).

Dear Mr. Mueller:

The attached document transmits the National Marine Fisheries Service (National Oceanic and Atmospheric Administration [NOAA] Fisheries) Biological Opinion (Opinion) on the proposed Maryhill State Park Boat Launch Reconstruction and Improvement Project in accordance with section 7 of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531).

The U.S. Army Corps of Engineers (COE) has determined that the proposed action was not likely to adversely affect Upper Columbia River (UCR) spring-run chinook (*Oncorhynchus tshawytscha*), Snake River (SR) fall chinook (*O. tshawytscha*) , SR spring/summer-run chinook (*O. tshawytscha*), SR Basin steelhead (*O. mykiss*), SR sockeye salmon (*O. nerka*), Upper Columbia River (UCR) steelhead (*O. mykiss*), and Middle Columbia River (MCR) steelhead (*O. mykiss*) Evolutionary Significant Units. NOAA Fisheries did not concur with the initial effect determination and formal consultation was initiated on October 29, 2002.

This Opinion reflects formal consultation and an analysis of effects covering the above listed species in the Columbia River above The Dalles Dam and below the John Day Dam, Washington. The Opinion is based on information provided in the biological assessment received by NOAA Fisheries on July 5, 2002, subsequent information transmitted by telephone conversations, electronic mail, and facsimile transmittals received on October 15th and 18th. A complete administrative record of this consultation is on file at the Washington State Habitat Branch Office.

NOAA Fisheries concludes that the implementation of the proposed project is not likely to jeopardize the continued existence of the above listed species or result in the destruction or adverse modification of their critical habitat. Please note that the incidental take statement, which includes reasonable and prudent measures and terms and conditions, was designed to minimize take. If you have any questions, please contact Justin Yeager of the Washington Habitat Branch Office at (509) 925-2618.

Sincerely,

For Michael R Crouse

D. Robert Lohn
Regional Administrator

Endangered Species Act - Section 7 Consultation

Biological Opinion

and

Magnuson-Stevens Fishery Conservation and Management Act

Essential Fish Habitat Consultation

Maryhill State Park Boat Launch Reconstruction and Improvement Project
Klickitat County, Washington

NOAA Fisheries No. 2002/00775

Agency: U.S. Army Corps of Engineers

Consultation Conducted By: NOAA Fisheries, Northwest Region, Washington Habitat Branch

Issued By: for Michael R Crouse

Date Issued: January 10, 2003

D. Robert Lohn
Regional Administrator

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1.0 INTRODUCTION

This document is the product of an Endangered Species Act (ESA) Section 7 formal consultation and Magnuson-Stevens Fishery Conservation and Management Act (MSA) Essential Fish Habitat (EFH) consultation between the National Marine Fisheries Service (National Oceanic and Atmospheric Administration [NOAA Fisheries]) and the U.S. Army Corps of Engineers (COE) on the proposed reconstruction and improvement of the Maryhill State Park boat launch facilities in Klickitat County, Washington. The proposed action will occur within the geographic boundaries and habitats of several Evolutionarily Significant Units (ESU[1]) and the ESA listed salmon and steelhead therein, including endangered Snake River (SR) sockeye (*Oncorhynchus nerka*), threatened SR fall (SRF) chinook (*O. tshawytscha*), threatened Snake River spring/summer (SRSS) chinook (*O. tshawytscha*), threatened Snake River Basin (SRB) steelhead (*O. mykiss*), endangered Upper Columbia River spring-run (UCRS) chinook (*O. tshawytscha*), endangered Upper Columbia River (UCR) steelhead (*O. mykiss*), and threatened Middle Columbia River (MCR) steelhead (*O. mykiss*). Additionally, the proposed Action Area is designated as EFH for chinook (*O. tshawytscha*) and coho (*O. kisutch*) salmon.

The purpose of this document is to present NOAA Fisheries opinion on whether the proposed action is likely to jeopardize the continued existence of the SR sockeye, SRF chinook, SRSS chinook, SRB steelhead, UCRS chinook, UCR steelhead, and MCR steelhead ESUs listed under the ESA, or result in the destruction or adverse modification of their designated Critical Habitat (excluding SR steelhead, UCRS chinook, UCR steelhead, and MCR steelhead; see footnote 2). Further, this document will determine if the proposed action will adversely affect designated coho and chinook salmon EFH. These ESA and EFH determinations will be reached by analyzing the biological effects of construction activities related to the Maryhill State Park boat launch projects, relating those effects to the biological and ecological needs of listed species, and then adding these effects to the environmental baseline of the Action Area.

1.1 Background Information

Maryhill State Park (The Park), located at river mile 209.1 on the north shore of the Columbia River, was acquired by lease from the COE in 1972. The Park consists of 99 acres, 4,700 feet of waterfront, with year around camping and two boat launches. The boat launches have been in existence since before the park was established in 1972. The upper part of the launch was reconstructed as part of the initial park development, including a paved approach and parking lot. No major maintenance has been performed since 1972. The facilities are now at the end of their useful operational life. The purpose of the project is to extend the operational life and enhance the function of the boat launch ramp, handling floats, and parking lot.

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

1.2 Consultation History

On July 5, 2002, NOAA Fisheries received a request from the COE for ESA section 7 informal consultation and EFH consultation to permit the reconstruction and improvement of the Maryhill State Park boat launch. Based on the potential for take of ESA-listed salmonids, NOAA Fisheries did not concur with the COE's "not likely to adversely affect" (NLAA) determination. In addition, NOAA Fisheries did not concur with the COE's determination of will not adversely affect for EFH. Formal consultation was initiated on October 29, 2002.

This combined ESA and EFH consultation is based on the information presented in the BA and EFH assessment received July 5, 2002, phone conversations, electronic mail correspondence, and facsimile transmittals received on October 15 and 18.

1.3 Description of the Proposed Action

The COE proposes to issue a permit to The Washington State Parks and Recreation Commission for the reconstruction and improvement of boat launch facilities at Maryhill State Park. The projects included are: reconstruction of the existing boat launch ramp and handling floats; modification of the existing parking lot; construction of a fish cleaning station; and riparian vegetation enhancement. The purpose of the project is to extend the operational life and enhance the function of the boat launch ramp, handling floats, and parking lot. The project is located along the Columbia River at river mile 209.1 at Maryhill State Park in Klickitat County, Washington, Township 2 North, Range 16 East, SW $^{1}/_{4}$ Section 4.

1.3.1 Reconstruction of the existing boat launch and handling floats

The first step consists of removing the existing floats, pier, and pilings. Five wooden 20'x6' handling floats (600 square feet total) and one wooden 20'x6' pier (120 square feet) will be removed and placed in an offsite landfill. Four creosote piles and one steel pile will be removed with a vibratory hammer and if necessary cut off at the base and placed in an offsite landfill. If the pilings are pulled the holes will be backfilled with clean gravel fill, if they are cut-off no obstructions will protrude above the bed of the river. After the above structures are removed the cofferdam construction will begin. The cofferdam consists of sheet piles placed with a vibratory hammer around the perimeter of the existing boat launch. Upon completion of the cofferdam the area will be dewatered with pumps to an upland discharge area located 300 feet from ordinary high water (OHW), with no return flow to surface waters. Once the area is dewatered the existing 147'x40' boat launch (5,880 square feet) will be removed with a backhoe or tracked excavator. Roughly 260 cubic yards of gravel, asphalt, and concrete inside the cofferdam will be removed to an offsite landfill. Outside of the cofferdam, 160 cubic yards of sand, gravel, and quarry spalls will also be removed.

The second step is constructing the new boat launch. It will be 126'x34', about 4,284 square feet, of which 3,264 square feet are waterward of OHW. A backhoe or tracked excavator will excavate the launch to subgrade and place geotextile fabric and base material. Forms will be constructed and concrete will be poured for the launch and piers. Once the concrete has cured, two feet of riprap will be placed along the edges of the boat launch.

The third step is cofferdam removal and dock construction. The cofferdam will be removed with a vibratory hammer with each sheet pile slowly lifted from the substrate and placed in an offsite landfill. The two docks consist of a 6'x20' concrete pier and five 6'x20' floats with two 12" steel pilings. The entire surface of the float will be grated and the floatation material will be fully encapsulated. The floats will be placed by crane into the water and connected by hinges. The pilings will be installed with a vibratory hammer. If the vibratory hammer cannot sufficiently achieve the desired pile depth a down-the-hole hammer drill will be used.

1.3.2 Parking lot modification

An existing parking lot will be modified to improve traffic flow and better define the launch approaches. This part of the project will add 3,408 square feet of new pavement. There will be no work waterward of OHW.

1.3.3 Fish cleaning station

Construction of a 15'x15' (225 square feet) fish cleaning station. Existing underground water and electrical utilities will be extended to the fish cleaning station. The new fish cleaning station and pressure distribution system will be located more than 200 feet landward of the Columbia River. There will be no discharge to surface waters.

1.3.4 Riparian plantings

The Washington State Parks and Recreation Commission has proposed a mitigation area to help replace functions lost in the riparian area and to compensate for other project impacts. This mitigation area includes removing and eradicating false indigo brush from the riparian area 90-feet east of the boat launch, and from the waterward edge of the riparian area to the upland transition to the park lawn (2,250 square feet). Plant removal will be done using mechanical removal (*e.g.* pulling by hand or hand tools).

In addition, the Washington State Parks and Recreation Commission is proposing to plant 2,250 square feet of native woody shrubs (*e.g.* red-osier dogwood, willow and serviceberry) and four cottonwood trees. The cottonwoods will be spaced approximately 30-feet apart and will be planted at the landward edge of the riparian area.

The Washington State Parks and Recreation Commission has proposed the following conservation measures to minimize the impacts of the proposed project to listed salmonids.

- Construction activities will be conducted between November 1, 2002 and February 28, 2003.

- Within seven calendar days of project completion, all disturbed areas shall be protected from erosion using vegetation or other means.

- Within one year of project completion, banks and riprap areas shall be revegetated with native or other approved woody species.

- Re-vegetated areas shall be maintained as necessary for three years to ensure 80% survival.

1.4 Description of the Action Area

Under the ESA, the "Action Area" is defined as all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action (50 C.F.R. 402.02). For the purposes of this consultation the Action Area includes Lake Celilo/The Dalles Dam reservoir from The Dalles Dam at river mile 191.5 to the John Day Dam at river mile 215.6 of the Columbia River. Although most effects of the action will be localized, increases in predator population and boating activity have the potential to affect listed salmonids throughout the reservoir.

2.0 ENDANGERED SPECIES ACT

2.1 Biological Opinion

The objective of this Biological Opinion (Opinion) is to determine whether the proposed project is likely to jeopardize the continued existence of the SR sockeye, SRF chinook, SRSS chinook, SRB steelhead, UCRS chinook, UCR steelhead, and MCR steelhead ESUs, or result in the destruction or adverse modification of their designated Critical Habitat (excluding SR steelhead, UCRS chinook, UCR steelhead, and MCR steelhead).

2.1.1 Status of Species and Critical Habitat

The listing status, biological information, and Critical Habitat elements or potential Critical Habitat for NOAA Fisheries listed species that are the subject of this consultation are described below in Table 1. Most of the information listed in the following table is available for download at http://www.nwr.noaa.gov/1salmon/salmesa/index.htm.

Species	Listing Status	Critical Habitat	Protective Regulations	Biological Information
Snake River sockeye salmon	November 20, 1991; 56 FR 58619, Endangered	December 28, 1993; 58 FR 68543	November 20, 1991; 56 FR 58619	Waples *et al.* 1991a; Burgner 1991

Snake River fall chinook salmon	April 22, 1992; 57 FR 14653, Threatened	December 28, 1993; 58 FR 68543	April 22, 1992; 57 FR 14653	Waples *et al.* 1991b; Healey 1991
Snake River spring/summer-run chinook salmon	April 22, 1992; 57 FR 14653, Threatened	December 28, 1993; 58 FR 68543	April 22, 1992; 57 FR 14653	Matthews and Waples 1991; Healey 1991
Snake River Basin steelhead	August 18, 1997; 62 FR 43937, Threatened	Not Designated[2]	July 10, 2000; 65 FR 42422	Busby *et al.* 1995; 1996
Upper Columbia River spring-run chinook salmon	March 24, 1999; 64 FR 14308, Endangered	Not Designated	July 10, 2000; 65 FR 42422	Myers *et al.*1998; Healey 1991
Upper Columbia River steelhead	August 18, 1997; 62 FR 43937, Endangered	Not Designated	July 10, 2000; 65 FR 42422	Busby *et al.* 1995; 1996
Middle Columbia River steelhead	March 25, 1999; 64 FR 14517, Threatened	Not Designated	July 10, 2000; 65 FR 42422	Busby *et al.* 1995; 1996

Table 1. References for Additional Background on Listing Status, Biological Information, and Critical Habitat Elements for the Listed and Proposed Species Addressed in this Opinion.

The proposed action will occur within the designated Critical Habitat of endangered SR sockeye, threatened SRF chinook, and threatened SRSS chinook salmon. Essential features of this Critical Habitat include substrate (especially spawning gravels), water quality/quantity, water temperature, water velocity, cover/shelter, food, riparian vegetation, space, and safe passage conditions (58 Fed. Reg. 68543, December 28, 1993).

Throughout the Columbia and Snake River Basins, salmonids have been negatively affected by a combination of habitat alteration and hatchery management practices. Mainstem dams on the Snake River, as well as downstream facilities on the Columbia River, are perhaps the most significant source of habitat degradation in the ESUs addressed under this consultation. The dams act as a partial barrier to passage, kill out-migrating smolts in their turbines, raise temperatures throughout the river system, and have created lentic refugia for salmonid predators. In addition to dams, irrigation systems have had a major negative impact by diverting large quantities of water, stranding fish, acting as barriers to passage, and returning effluents containing chemicals and fine sediments. Other major habitat degradation has occurred through urbanization and livestock grazing practices (WDFW *et al.* 1993; Busby *et al.* 1996; NMFS 1996a; 1998; 2000; 57 Fed. Reg. 14653, April 22, 1992; 62 Fed. Reg. 43937, August 18, 1997).

[2]Under development. On April 30, 2002, the U.S. District Court for the District of Columbia approved a NOAA Fisheries consent decree withdrawing a February 2000 Critical Habitat designation for this and 18 other ESUs.

Habitat alterations and differential habitat availability (*e.g.*, fluctuating discharge levels) impose an upper limit on the production of naturally spawning populations of salmon and steelhead. The National Research Council Committee on Protection and Management of Pacific Northwest Anadromous Salmonids identified habitat problems as a primary cause of declines in wild salmon runs (NRCC 1996). Some of the habitat impacts identified were the fragmentation and loss of available spawning and rearing habitat, migration delays, degradation of water quality, removal of riparian vegetation, decline of habitat complexity, alteration of streamflows and streambank and channel morphology, alteration of ambient stream water temperatures, sedimentation, and loss of spawning gravel, pool habitat and large woody debris (NMFS 1996a; 1998; NRCC 1996; Bishop and Morgan 1996).

Hatchery management practices are suspected to be a major factor in the decline of these ESUs. The genetic contribution of non-indigenous, hatchery stocks may have reduced the fitness of the locally adapted native fish through hybridization and associated reductions in genetic variation or introduction of deleterious (non-adapted) genes. Hatchery fish can also directly displace natural spawning populations, compete for food resources, or engage in agonistic interactions (Campton and Johnston 1985; Waples 1991; Hilborn 1992; NMFS 1996a; 63 Fed. Reg. 11798, March 10, 1998).

The following information summarizes the status of Columbia River salmonids by ESU that are the subjects of this consultation. Most of this narrative was largely taken from the Opinion on Reinitiation of Consultation on Operation of the Federal Columbia River Power System, Including the Juvenile Fish Transportation Program, and 19 Bureau of Reclamation Projects in the Columbia Basin (FCRPS; NMFS 2000).

2.1.1.1 Snake River Sockeye

The SR sockeye salmon ESU, listed as endangered on November 20, 1991 (56 Fed. Reg. 58619), includes populations of sockeye salmon from the Snake River Basin, Idaho (extant populations occur only in the Salmon River subbasin). Under NOAA Fisheries' interim policy on artificial propagation (58 Fed. Reg. 17573; April 5, 1993), the progeny of fish from a listed population that are propagated artificially are considered part of the listed species and are protected under ESA. Thus, although not specifically designated in the 1991 listing, SR sockeye salmon produced in the captive broodstock program are included in the listed ESU. Given the dire status of the wild population under any criteria (16 wild and 264 hatchery-produced adult sockeye returned to the Stanley Basin between 1990 and 2000), NOAA Fisheries considers the captive broodstock and its progeny essential for recovery. Critical Habitat was designated for SR sockeye salmon on December 28, 1993 (58 Fed. Reg. 68543).

Snake River sockeye were historically abundant in several lake systems of Idaho and Oregon. However, all populations have been extirpated in the past century; the only remaining sockeye in the Snake River system are found in Redfish Lake, in the Stanley Basin on the Salmon River. The nonanadromous form (kokanee), found in Redfish Lake and elsewhere in the Snake River Basin, is included in the ESU. SR sockeye occur within the Action Area only during their smolt and adult migrations.

2.1.1.2 Snake River Fall Chinook

The SRF chinook salmon ESU, listed as threatened on April 22, 1992 (57 Fed. Reg. 14653), includes all natural-origin populations of fall chinook in the mainstem Snake River and its tributaries. Fall chinook from the Lyons Ferry Hatchery are included in the ESU but are not listed. Critical Habitat was designated for SRF chinook salmon on December 28, 1993 (58 Fed. Reg. 68543).

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

SRF chinook salmon remained stable at high levels of abundance through the first part of the twentieth century, but then declined substantially. Although the historical abundance of fall run chinook salmon in the Snake River is difficult to estimate, adult returns appear to have declined by three orders of magnitude since the 1940s, and perhaps by another order of magnitude from pristine levels. Irving and Bjornn (1981) estimated that the mean number of fall-run chinook salmon returning to the Snake River declined from 72,000 during the period 1938 to 1949 to 29,000 during the 1950s. Further declines occurred upon completion of the Hells Canyon Dam complex, which blocked access to primary production areas in the late 1950s (see section 2.1.2.2.2). SRF chinook occur within the Action Area only during their smolt and adult migrations.

2.1.1.3 Snake River Spring/Summer chinook

The SRSS ESU, listed as threatened on April 22, 1992 (57 Fed. Reg. 14653), includes all natural-origin populations in the Tucannon, Grande Ronde, Imnaha, and Salmon rivers. Some or all of the fish returning to several of the hatchery programs are also listed including those returning to the Tucannon River, Imnaha, and Grande Ronde hatcheries, and to the Sawtooth, Pahsimeroi, and McCall hatcheries on the Salmon River. Critical Habitat was designated for SRSS chinook salmon on December 28, 1993 (58 Fed. Reg. 68543), and was revised on October 25, 1999 (64 Fed. Reg. 57399).

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

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

2.1.1.4 Snake River Basin Steelhead

The SRB steelhead ESU, listed as threatened on August 18, 1997 (62 Fed. Reg. 43937), includes all natural-origin populations of steelhead in the Snake River Basin of southeast Washington, northeast Oregon, and Idaho. None of the hatchery stocks in the Snake River Basin are listed, but several are included in the ESU. Critical Habitat is not presently designated for SRB steelhead, although a re-designation is likely forthcoming (see footnote 2).

Steelhead spawning habitat in the Snake River is distinctive in having large areas of open, low-relief streams at high elevations. In many Snake River tributaries, spawning occurs at a higher elevation (up to 2,000 m) than for steelhead in any other geographic region. SRB steelhead also migrate farther from the ocean (up to 1,500 km) than most. SRB steelhead occur within the Action Area only during their smolt and adult migrations.

2.1.1.5 Upper Columbia River Spring Chinook

The UCRS chinook salmon ESU, listed as endangered on March 24, 1999 (64 FR 14308), includes all natural-origin, stream-type chinook salmon from river reaches above Rock Island Dam and downstream of Chief Joseph Dam, including the Wenatchee, Entiat, and Methow River basins. All chinook in the Okanogan River are apparently ocean-type and are considered part of the UCR summer- and fall-run ESU. The spring-run components of the following hatchery stocks are also listed: Chiwawa, Methow, Twisp, Chewuch, and White rivers and Nason Creek. Critical Habitat is not currently designated for UCRS chinook, although a re-designation is likely forthcoming (see footnote 2).

The populations are genetically and ecologically separate from the summer- and fall-run populations in the lower parts of many of the same river systems (Myers et al. 1998). Although fish in this ESU are genetically similar to spring chinook in adjacent ESUs (*i.e.*, mid-Columbia and Snake), they are distinguished by ecological differences in spawning and rearing habitat preferences. For example, spring-run chinook in upper Columbia tributaries spawn at lower elevations (500 to 1,000 meters) than in the Snake and John Day River systems.

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

2.1.1.6 Upper Columbia River Steelhead

The UCR steelhead ESU, listed as endangered on August 18, 1997 (62 FR 43937), includes all natural-origin populations of steelhead in the Columbia River basin upstream from the Yakima River, Washington, to the U.S./Canada border. The Wells Hatchery stock is included among the listed populations. Critical Habitat is not presently designated for UCR steelhead, although re-designation is likely forthcoming (see footnote 2).

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

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

2.1.1.7 Middle Columbia River Steelhead

The MCR steelhead ESU, listed as threatened on March 25, 1999 (64 FR 14517), includes all natural-origin populations in the Columbia River basin above the Wind River, Washington, and the Hood River, Oregon, including the Yakima River, Washington. This ESU includes the only populations of winter inland steelhead in the United States (in the Klickitat River, Washington, and Fifteenmile Creek, Oregon). Both the Deschutes River and Umatilla River hatchery stocks are included in the ESU, but are not listed. Critical Habitat is not presently designated for MCR steelhead, although re-designation is likely forthcoming (see footnote 2).

The MCR steelhead ESU includes some of the driest areas of the Pacific Northwest, generally receiving less than 40 centimeters of precipitation annually (Jackson 1993). Summer steelhead are widespread throughout the ESU; winter steelhead occur in Mosier, Chenowith, Mill, and Fifteenmile creeks, Oregon, and in the Klickitat and White Salmon rivers, Washington. The John Day River probably represents the largest native, natural spawning stock of steelhead in the region.

Estimates of historical (pre-1960s) abundance specific to this ESU are available for the Yakima River, which has an estimated run size of 100,000 (WDF et al. 1993). Assuming comparable run sizes for other drainage areas in this ESU, the total historical run size may have exceeded 300,000 steelhead. MCR steelhead occur within the Action Area only during their smolt and adult migrations.

2.1.2 Evaluating Proposed Actions

The standards for determining jeopardy are set forth in Section 7(a)(2) of the ESA as defined by 50 C.F.R. part 402 (the consultation regulations). NOAA Fisheries must determine whether the action is likely to jeopardize the listed species and/or whether the action is likely to destroy or adversely modify Critical Habitat. This analysis involves the initial steps of (1) defining the biological requirements of the listed species, and (2) evaluating the relevance of the environmental baseline to the species' current status.

From that, NOAA Fisheries evaluates whether the action is likely to jeopardize the listed species by determining if the species can be expected to survive with an adequate potential for recovery. In making this determination, NOAA Fisheries considers estimated level of mortality attributed to: (1) collective effects of the proposed or continuing action, (2) the environmental baseline, and (3) any cumulative effects. This evaluation must take into account measures for survival and recovery specific to the listed species' life stages that occur beyond the Action Area. If NOAA Fisheries finds that the action is likely to jeopardize, NOAA Fisheries must identify reasonable and prudent alternatives for the action.

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

Based on the best available information, NOAA Fisheries concludes that not all of the biological requirements of SR sockeye, SRF chinook, SRSS chinook, SRB steelhead, UCRS chinook, UCR steelhead, and MCR steelhead are being met under the environmental baseline. The specific biological requirements affected by the proposed action include water quality, food, and unimpeded migratory access.

Guidance for making determinations on the issue of jeopardy and adverse modification of habitat are contained in *The Habitat Approach, Implementation of Section 7 of the Endangered Species Act for Actions Affecting the Habitat of Pacific Anadromous Salmonids*, August 1999 (available online at: www.nwr.noaa.gov/1habcon/habweb/pubs/newjeop9.pdf).

For the proposed action, NOAA Fisheries' jeopardy analysis considers direct or indirect mortality of fish attributable to the action. NOAA Fisheries' Critical Habitat analysis considers the extent to which the proposed action impairs the function of essential biological elements necessary for juvenile and adult migration, and juvenile rearing of the listed species.

2.1.2.1 Biological Requirements

The first step in the methods NOAA Fisheries uses for applying ESA section 7(a)(2) to listed salmon is to define the species' biological requirements that are most relevant to each consultation. NOAA Fisheries also considers the current status of the listed species; taking into account population size, trends, distribution, and genetic diversity. To assess the current status of the listed species, NOAA Fisheries starts with the determinations made in its original decision to list the species for protection under the ESA. In addition, the assessment will consider any new information or data that are relevant to the determination.

The relevant biological requirements are those necessary for the listed species to survive and recover to naturally reproducing population levels at which time protection under the ESA would be unnecessary. Species or ESUs not requiring ESA protection have the following attributes: population sizes large enough to maintain genetic diversity and heterogeneity, the ability to adapt to and survive environmental variation, and are self-sustaining in the natural environment.

SR sockeye, SRF chinook, SRSS chinook, SRB steelhead, UCRS chinook, UCR steelhead, and MCR steelhead share similar basic biological requirements. These requirements include food, flowing water (quantity), high quality water (cool, free of pollutants, high dissolved oxygen concentrations, low sediment content), clean spawning substrate, and unimpeded migratory access to and from spawning and rearing areas (adapted from Spence et al. 1996). Even slight modifications of these habitat elements can produce deleterious effects to these listed salmonids and their Critical Habitat (in the case of SR sockeye, SRF chinook, and SRSS chinook).

NOAA Fisheries has related the biological requirements for listed salmonids to a number of habitat attributes, or pathways, in the Matrix of Pathways and Indicators (MPI). These pathways (Water Quality, Habitat Access, Habitat Elements, Channel Condition and Dynamics, Flow/Hydrology, Watershed Conditions, Disturbance History, and Riparian Reserves) indirectly measure the baseline biological health of listed salmon populations through the health of their habitat. Specifically, each pathway is made up of a series of individual indicators (*e.g.,* indicators for Water Quality include Temperature, Sediment, and Chemical Contamination) that are measured or described directly (see NMFS 1996). Based on measurement or description, each indicator is classified within a category of the properly functioning condition (PFC) framework: (1) properly functioning, (2) at risk, or (3) not properly functioning. Properly functioning condition is defined as "the sustained presence of natural habitat forming processes in a watershed that are necessary for the long-term survival of the species through the full range of environmental variation."

2.1.2.2 Factors Affecting the Species at the Population Scale

In other Biological Opinions, NOAA Fisheries assessed life history, habitat and hydrology, hatchery influence, and population trends in analyzing the effects of the underlying action on affected species at the population scale (see, for example, FCRPS, NMFS 2000). A thumbnail description of each of these factors for each ESU covered under this consultation is provided below.

2.1.2.2.1 Snake River Sockeye

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

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

Population Trends and Risks. NOAA Fisheries proposed an interim recovery level of 2,000 adult SR sockeye salmon in Redfish Lake and two other lakes in the Snake River Basin (Table 1.3-1 in NMFS (1995)). Low numbers of adult SR sockeye salmon preclude a Cumulative Risk Initiative (CRI)- or Quantitative Analysis of Risks (QAR)-type analysis of the status of this ESU (for more information, see http://www.nwfsc.noaa.gov/cri/index.html). However, because only 16 wild and 264 hatchery-produced adult sockeye returned to the Stanley Basin between 1990 and 2000, NOAA Fisheries considers the status of this ESU to be dire under any criteria. The risk of extinction is very high.

2.1.2.2.2 Snake River Fall Chinook

Life History. Fall chinook salmon in this ESU are ocean-type. Adults return to the Snake River at ages 2 through 5, with age 4 most common at spawning (Chapman *et al.* 1991). Spawning, which takes place in late fall, occurs in the mainstem and in the lower parts of major tributaries (NWPPC 1989; Bugert *et al.* 1990). Juvenile fall chinook salmon move seaward slowly as subyearlings, typically within several weeks of emergence (Chapman *et al.* 1991). Based on modeling by the Chinook Technical Committee, the Pacific Salmon Commission estimates that a significant proportion of SRF chinook (about 36%) are taken in Alaska and Canada, indicating a far-ranging ocean distribution. In recent years, only 19% were caught off Washington, Oregon, and California, with the balance (45%) taken in the Columbia River (Simmons 2000).
Some SRF chinook historically migrated over 1,500 km from the ocean. Although the Snake River population is now restricted to habitat in the lower river, genes associated with the lengthier migration may still reside in the population. Because longer freshwater migrations in chinook salmon tend to be associated with more-extensive oceanic migrations (Healey 1983), maintaining populations occupying habitat that is well inland may be important in continuing diversity in the marine ecosystem as well.

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

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

Population Trends and Risks. For the SRF chinook salmon ESU as a whole, NOAA Fisheries estimates that the median population growth rate (lambda) over the base period[3] ranges from 0.94 to 0.86, decreasing as the effectiveness of hatchery fish spawning in the wild increases compared to that of fish of wild origin (McClure *et al.* 2000). NOAA Fisheries has also

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[3]Estimates of median population growth rate, risk of extinction, and the likelihood of meeting recovery goals are based on population trends observed during a base period that varies between spawning aggregations. Population trends are projected under the assumption that all conditions will stay the same into the future.

estimated the risk of absolute extinction for the aggregate SRF chinook salmon population, using the same range of assumptions about the relative effectiveness of hatchery fish. At the low end, assuming that hatchery fish spawning in the wild have not reproduced (*i.e.*, hatchery effectiveness = 0), the risk of absolute extinction within 100 years is 0.40 (McClure *et al*. 2000). At the high end, assuming that the hatchery fish spawning in the wild have been as productive as wild-origin fish (hatchery effectiveness = 100 percent), the risk of absolute extinction within 100 years is 1.00 (McClure *et al*. 2000).

2.1.2.2.3 Snake River Spring/Summer Chinook

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

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

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

Population Trends and Risks. For the SRSS chinook salmon ESU as a whole, NOAA Fisheries estimates that the median population growth rate (lambda) over the base period ranges from 0.96 to 0.80, decreasing as the effectiveness of hatchery fish spawning in the wild increases compared to the effectiveness of fish of wild origin (McClure *et al*. 2000). NOAA Fisheries has also estimated median population growth rates and the risk of absolute extinction for the seven spring/summer chinook salmon index stocks, using the same range of assumptions about the relative effectiveness of hatchery fish. At the low end, assuming that hatchery fish spawning in the wild have not reproduced (*i.e.*, hatchery effectiveness = 0), the risk of absolute extinction within 100 years for the wild component ranges from zero for Johnson Creek to 0.78 for the Imnaha River (McClure *et al*. 2000). At the high end, assuming that the hatchery fish spawning in the wild have been as productive as wild-origin fish (hatchery effectiveness = 100 percent), the risk of absolute extinction within 100 years ranges from zero for Johnson Creek to 1.00 for the wild component in the Imnaha River (McClure *et al*. 2000).

2.1.2.2.4 Snake River Basin Steelhead

Life History. Fish in this ESU are summer steelhead. They enter freshwater from June to October and spawn during the following March to May. Two groups are identified, based on migration timing, ocean-age, and adult size. A-run steelhead, thought to be predominately age-1-ocean, enter freshwater during June through August. B-run steelhead, thought to be age-2-ocean, enter freshwater during August through October. B-run steelhead typically are 75 to 100 mm longer at the same age. Both groups usually smolt as 2- or 3-year-olds. All steelhead are iteroparous, capable of spawning more than once before death.

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

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

Population Trends and Risks. For the SRB steelhead ESU as a whole, NOAA Fisheries estimates that the median population growth rate (lambda) over the base period ranges from 0.91 to 0.70, decreasing as the effectiveness of hatchery fish spawning in the wild increases compared to that of fish of wild origin (McClure *et al*. 2000). NOAA Fisheries has also estimated the risk of absolute extinction for the A- and B-runs, using the same range of assumptions about the relative effectiveness of hatchery fish. At the low end, assuming that hatchery fish spawning in the wild have not reproduced (*i.e.*, hatchery effectiveness = 0), the risk of absolute extinction within 100 years is 0.01 for A-run steelhead and 0.93 for B-run fish (McClure *et al*. 2000). At the high end, assuming that the hatchery fish spawning in the wild have been as productive as wild-origin fish (hatchery effectiveness = 100 percent), the risk of absolute extinction within 100 years is 1.00 for both runs (McClure *et al*. 2000).

2.1.2.2.5 Upper Columbia River Spring Chinook

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

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

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

Population Trends and Risks. For the UCRS chinook salmon ESU as a whole, NOAA Fisheries estimates that the median population growth rate (lambda) over the base period ranges from 0.85 to 0.83, decreasing as the effectiveness of hatchery fish spawning in the wild increases compared to that of fish of wild origin (Tables B-2a and B-2b in McClure *et al.* 2000b). NOAA Fisheries has also estimated median population growth rates and the risk of absolute extinction for the three spawning populations identified by Ford *et al.* (1999), using the same range of assumptions about the relative effectiveness of hatchery fish. At the low end, assuming that hatchery fish spawning in the wild have not reproduced (*i.e.*, hatchery effectiveness = 0), the risk of absolute extinction within 100 years ranges from 0.97 for the Methow River to 1.00 for the Methow and Entiat rivers (Table B-5 in McClure *et al.* 2000b). At the high end, assuming that the hatchery fish spawning in the wild have been as productive as wild-origin fish (hatchery effectiveness = 100%), the risk of extinction within 100 years is 1.00 for all three spawning populations (Table B-6 in McClure *et al.* 2000b).

NOAA Fisheries has also used population risk assessments for UCRS chinook salmon and steelhead ESUs from the draft QAR (Cooney 2000). Risk assessments described in that report were based on Monte Carlo simulations with simple spawner/spawner models that incorporate estimated smolt carrying capacity. Population dynamics were simulated for three separate spawning populations in the UCRS chinook salmon ESU, the Wenatchee, Entiat, and Methow populations. The QAR assessments showed extinction risks for UCRS chinook salmon of 50% for the Methow, 98% for the Wenatchee, and 99% for the Entiat spawning populations. These estimates are based on the assumption that the median return rate for the 1980 brood year to the 1994 brood year series will continue into the future.

2.1.2.2.6 Upper Columbia River Steelhead

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

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

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

Population Trends and Risks. For the UCR steelhead ESU as a whole, NOAA Fisheries estimates that the median population growth rate (lambda) over the base period ranges from 0.94 to 0.66, decreasing as the effectiveness of hatchery fish spawning in the wild increases compared to that of fish of wild origin (Tables B-2a and B-2b in McClure *et al.* 2000b). NOAA Fisheries has also estimated the risk of absolute extinction for the aggregate UCR steelhead population, using the same range of assumptions about the relative effectiveness of hatchery fish. At the low end, assuming that hatchery fish spawning in the wild have not reproduced (*i.e.*, hatchery effectiveness = 0), the risk of absolute extinction within 100 years is 0.25 (Table B-5 in McClure *et al.* 2000b). Assuming that the hatchery fish spawning in the wild have been as productive as wild-origin fish (hatchery effectiveness = 100%), the risk of absolute extinction within 100 years is 1.00 (Table B-6 in McClure *et al.* 2000b). Because of data limitations, the QAR steelhead assessments in Cooney (2000) were limited to two aggregate spawning groups-the Wenatchee/Entiat composite and the above-Wells populations. Wild production of steelhead above Wells Dam was assumed to be limited to the Methow system. Assuming a relative effectiveness of hatchery spawners of 1.0, the risk of absolute extinction within 100 years for UCR steelhead is 100%. The QAR also assumed hatchery effectiveness values of 0.25 and 0.75. A hatchery effectiveness of 0.25 resulted in projected risks of extinction of 35% for the Wenatchee/Entiat and 28% for the Methow populations. At a hatchery effectiveness of 0.75, risks of 100% were projected for both populations.

2.1.2.2.7 Middle Columbia River Steelhead

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

Habitat and Hydrology. The only substantial habitat blockage now present in this ESU is at Pelton Dam on the Deschutes River, but minor blockages occur throughout the region. Water withdrawals and overgrazing have seriously reduced summer flows in the principal summer steelhead spawning and rearing tributaries of the Deschutes River. This is significant because high summer and low winter temperatures are limiting factors for salmonids in many streams in this region (Bottom *et al.* 1985).

Hatchery Influence. Continued increases in the proportion of stray steelhead in the Deschutes River basin is a major concern. The ODFW and the Confederated Tribes of the Warm Springs Reservation of Oregon (CTWSRO) estimate that 60% to 80% of the naturally spawning population consists of strays, which greatly outnumber naturally produced fish. Although the reproductive success of stray fish has not been evaluated, their numbers are so high that major genetic and ecological effects on natural populations are possible (Busby *et al.* 1999).

The negative effects of any interbreeding between stray and native steelhead will be exacerbated
if the stray steelhead originated in geographically distant river basins, especially if the river basins are in different ESUs. The populations of steelhead in the Deschutes River basin include the following:

• Steelhead native to the Deschutes River
• Hatchery steelhead from the Round Butte Hatchery on the Deschutes River
• Wild steelhead strays from other rivers in the Columbia River basin
• Hatchery steelhead strays from other Columbia River basin streams

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

Population Trends and Risks. For the MCR steelhead ESU as a whole, NOAA Fisheries estimates that the median population growth rate (lambda) over the base period ranges from 0.88 to 0.75, decreasing as the effectiveness of hatchery fish spawning in the wild increases compared to that of fish of wild origin (Tables B-2a and B-2b in McClure *et al.* 2000b). NOAA Fisheries has also estimated the risk of absolute extinction for four of the spawning aggregations, using the same range of assumptions about the relative effectiveness of hatchery fish. At the low end, assuming that hatchery fish spawning in the wild have not reproduced (*i.e.*, hatchery effectiveness = 0), the risk of absolute extinction within 100 years ranges from zero for the Yakima River summer run to 1.00 for the Umatilla River and Deschutes River summer runs (Table B-5 in McClure *et al.* 2000b). Assuming that the hatchery fish spawning in the wild have been as productive as wild-origin fish (hatchery effectiveness = 100%), the risk of absolute extinction within 100 years ranges from zero for the Yakima River summer run to 1.00 for the Deschutes River summer run (Table B-6 in McClure *et al.* 2000b).

2.1.2.3 Factors Affecting the Species within the Action Area

Section 4(a)(1) of the ESA and NOAA Fisheries listing regulations (50 C.F.R. 424) set forth procedures for listing species. The Secretary of Commerce must determine, through the regulatory process, if a species is endangered or threatened based upon any one or a combination of the following factors; (1) the present or threatened destruction, modification, or curtailment of its habitat or range; (2) overutilization for commercial, recreational, scientific, or educational purposes; (3) disease or predation; (4) inadequacy of existing regulatory mechanisms; or (5) other natural or human-made factors affecting its continued existence.

The proposed action includes activities that will have some level of effects with short-term impacts from category (1) in the above paragraph, and the potential for long-term impacts as described in categories (3), (4), and (5). The characterization of these effects and a conclusion relating the effects to the continued existence of the listed salmon and steelhead that are the subject of this consultation is provided below, in Section 2.1.3.

The major factors affecting SR sockeye, SRF chinook, SRSS chinook, SRB steelhead, UCRS chinook, UCR steelhead, and MCR steelhead within the Action Area include hydroelectric facility operations and maintenance, and land use and shoreline development. NOAA Fisheries uses the MPI to analyze and describe the effects of these factors on listed salmon and steelhead. As described above, the MPI relates the biological requirements of listed species to a suite of habitat variables. In the analysis presented here, each factor is considered in terms of its effect on relevant pathways and associated indicators (*properly functioning, at risk, or not properly functioning*).

2.1.2.3.1 Hydroelectric Facilities

Hydropower development in the Columbia River has profoundly altered the riverscape of the Action Area, which is located within The Dalles Dam pool (Lake Celilo), directly downstream of John Day Dam. These dams and other similar structures have caused a broad range of habitat degradation, and altered the structure and function of the Columbia River by converting a riverine environment to a series of reservoirs. Consequently, a host of indicators within numerous pathways of the MPI have been affected. Specifically, hydroelectric facility operations and maintenance have altered natural flow regimes, produced broad diel flow fluctuations, altered temperature profiles, inundated spawning habitat, created passage barriers, diminished sediment transport, eliminated lotic channel characteristics, altered riparian habitat, and expanded suitable habitat for piscivorous species (both native and exotic) that prey on or compete with salmonids.

Flow/Hydrology. Streamflow in the Columbia River within the Action Area was historically driven by natural watershed processes, but is presently more significantly controlled by the operation of mainstem dams (*i.e.*, Bonneville and The Dalles Dams). In an unregulated condition, the Columbia River in the Action Area would exhibit the hydrograph of a snowmelt-dominated system where discharge peaked in the spring concurrent with melting snow, and reached baseflow during the mid- to late-summer. Under these conditions, river ecosystems experienced a range of flows that served to promote floodplain riparian ecosystems, provide habitat for aquatic species assemblages, and protect vital ecosystem linkages and channel structure (Leopold *et al.* 1964; Ward and Stanford 1995a; 1995b; Fisher *et al.* 1998). Accordingly, aquatic biota have, over the eons, evolved life-history strategies that are spatially and temporally synchronized to seasonal runoff patterns (Groot *et al.* 1995; Stanford *et al.* 1996).

Presently, however, reservoir operations within the Action Area have attenuated and truncated the natural runoff regime, and produced a river system that is substantially out of phase with its unregulated, natural hydrograph. Further, hydropower peaking operations often cause broad daily flow fluctuations below dam facilities. Flow regimes that deviate from the natural condition are well understood to produce a diverse array of negative ecological consequences (Hill *et al.* 1991; Ligon *et al.* 1995; Richter *et al.* 1996; Stanford *et al.* 1996). The hydrograph of the Columbia River within the Action Area is temporally and spatially discordant with its supporting watershed and, consequently, the aquatic and riparian biota of the system have suffered accordingly. In the MPI analysis, streamflow falls under the Flow/Hydrology pathway, and Change in Peak/Base flow indicator. Presently, for the reasons described above, this indicator is *not properly functioning*. In this instance, *not properly functioning* is defined as "pronounced changes in peak flow, base flow and/or flow timing relative to an undisturbed watershed of similar size, geology, and geography."

Water Quality. Water quality within the Action Area has been degraded by hydroelectric dams that contribute to high instream temperatures, high concentrations of dissolved atmospheric gases, and high concentrations of nutrients and pollutants bound to fine sediments that settle out in reservoir pools (Spence *et al.* 1996; NMFS 2000). Portions of the Action Area have been placed on the Washington State 303(d) list (Clean Water Act) for degraded temperature and total dissolved gas parameters (WDOE 1996; 1998). Based on this information, NOAA Fisheries concludes that relevant water quality indicators (Temperature, Sediment/Turbidity, and Chemical Contamination/Nutrients), and thus the Water Quality pathway of the MPI are *not properly functioning*.

Habitat Access. Hydroelectric dams control river stage and flow within the Action Area and can inhibit safe passage of listed salmonids by creating conditions where listed salmonids may be killed or injured by mechanical impingement or high dissolved gas levels (NMFS 1996, Spence *et al.* 1996; NMFS 2000). Additionally, the dams create a false attraction to impassable areas, habitat for predators, and otherwise delay the progress of migrants. Therefore, based on the direct presence of hydroelectric dams and the secondary passage problems they cause, NOAA Fisheries concludes that the Habitat Access pathway (Physical Barriers indicator) of the MPI is *not properly functioning* within the Action Area because "manmade barriers present in the watershed prevent upstream and/or downstream fish passage at a range of flows."

Habitat Elements. Yet another consequence of reservoir impoundment for hydropower development is expressed as general habitat degradation within the Action Area. Habitat is a collective term that encompasses various physical, biological, and chemical interactions within a river and its watershed that produce the spatial and temporal environs in which riverine species exist. Numerous instream and floodplain elements of habitat (*e.g.*, substrate, large woody debris (LWD), pool frequency and quality, off-channel areas, and refugia) are vital to the production and maintenance of native fish assemblages (Everest *et al.* 1985; Bjornn and Reiser 1991; Karr 1991; Spence *et al.* 1996; NRCC 1996; NMFS 1996a).

When the Columbia River was transformed into a series of slow moving reservoirs, much of the historic habitat was inundated and most habitat functions were lost (NMFS 2000). Sediment transport has been restricted to the extent that fine materials (silt, sand) settle out of the water column in the reservoirs instead of being flushed downstream (causing sedimentation) (NMFS 1996). In addition, low water velocity, the physical presence of the dams (both upstream and in the Action Area), and a management approach that maintains comparatively static reservoir pools acts to trap spawning substrates, preventing downstream recruitment (NMFS 1996). Off-channel habitat, refugia (*i.e.,* remnant habitat that buffers populations against extinction (Sedell *et al.* 1990)), and large woody debris production areas have been reduced or entirely eliminated by reservoir inundation. Streamflow in the Action Area is highly regulated between dams, and channel-forming materials and processes are greatly diminished. This wholesale simplification of habitat has reduced or eliminated pools, riffles, and other instream habitat features that are vital to the foodweb and listed salmonids (Stanford *et al.* 1996). These factors have impaired every indicator (*e.g.*, Substrate, LWD, Pool Frequency and Quality, Off-channel Habitat, and Refugia) of the Habitat Elements pathway such that all are *not properly functioning* within the Action Area.

Channel Condition and Dynamics. Large reservoirs are often the defining hydrologic feature in arid environments such as the Action Area, and their operational regimes often alter mainstem rivers both upstream and downstream of dam structures, as well as streams tributary to a reservoir pool (Collier *et al.* 1996). Reservoir structural elements and management scenarios force tributaries to equilibrate to new base levels by aggradation or incision, and these mechanisms often cascade throughout each tributary subwatershed (Lane 1955; Williams and Wolman 1984; Montgomery and Buffington 1998; Shields *et al.* 1995, 2000). Gravels trapped behind a dam are no longer available to downstream reaches for bank and bed formation/maintenance, and can limit substratum for spawning salmonids and other members of the riverine food web (Moreau 1984; Ramey *et al.* 1987; Ligon *et al.* 1995; Ward and Stanford 1995b). The availability and cycling of sediment along the river continuum has a controlling influence on channel morphology, floodplain and channel complexity, and riparian species assemblages (Leopold *et al.* 1964; Williams and Wolman 1984; Dunne and Leopold 1978; Vannote *et al.* 1980; Gregory *et al.* 1991; Ligon *et al.* 1995). In addition, altered flow regimes (from an unregulated condition) can impact hydraulic parameters with associated biologic components (*i.e.*, sediment transport, gravel recruitment, and bank stability and morphology) that are important to riverine aquatic species (O'Brien 1984, Williams and Wolman 1984; Waters 1995; Ligon *et al.* 1995). Finally, periodic flooding redeposits silts, provides passage for biota to and from floodplain habitats, leads to extensive nutrient transformations, promotes channel maintenance, facilitates floodplain storage and enhances floodplain biodiversity and production (Bayley 1991; Junk *et al.* 1989; Sedell *et al.* 1989; Power *et al.* 1995).

The Columbia River throughout the Action Area presently bears little resemblance to the riverine environment that existed previous to hydrosystem development. The floodplain and mainstem channel of the Columbia River is buried under many feet of reservoir water, and tributary junctions are affected by inundation and pool fluctuation as well. Thus, riverine processes and their ecological linkages important to listed salmonids and the aquatic environment such as those described in the preceding paragraph are greatly diminished if not totally absent. Consequently, all requisite indicators of the Channel Condition and Dynamics pathway (*e.g.*, Width/Depth Ratio, Streambank Condition, and Floodplain Connectivity) are *not properly functioning* in the Action Area; the historic channel of the Columbia River no longer exists save for short tailwater reaches below the dams.

2.1.2.3.2 Land Use and Shoreline Development

In the Action Area of this project, numerous anthropogenic features and/or activities (*e.g.,* dams, marinas, docks, residential dwellings, roads, railroads, rip-rap, and landscaping) have become permanent fixtures on the landscape and have displaced and altered native riparian habitat to some degree. Consequently, the potential for normal riparian processes (*e.g.*, shading, bank stabilization and LWD recruitment) to occur is diminished, and aquatic habitat has become simplified (Ralph *et al.* 1994; Young *et al.* 1994; Fausch *et al.* 1994; Dykaar and Wigington 2000).

Shoreline development has reduced the quality of nearshore salmonid habitat by eliminating native riparian vegetation, displacing shallow water habitat with fill materials, and by further disconnecting the Columbia River from historic floodplain areas. Further, riparian species that evolved under the environmental gradients of riverine ecosystems are not well suited to the present hydraulic setting of the Action Area (*i.e.*, static, slackwater pools), and are thus often replaced by nonnative, exotic species (Rood and Mahoney 1990; Scott *et al.* 1996; Rood and Mahoney 2000; Braatne and Jamieson 2001). Therefore, the Watershed Conditions pathway and Riparian Reserves indicator *is not properly functioning* in the Action Area because "the riparian reserve system is fragmented, poorly connected, and provides inadequate protection of habitats and refugia for sensitive aquatic species (<70% intact)."

2.1.2.4 Environmental Baseline

The environmental baseline represents the current basal set of conditions to which the effects of the proposed action would be added. The term “environmental baseline” means “the past and present impacts of all Federal, state, or private actions and other human activities in the Action Area, the anticipated impacts of all proposed Federal projects in the Action Area that have already undergone formal or early section 7 consultation, and the impact of state or private actions which are contemporaneous with the consultation in process” (50 C.F.R. 402.02).

The most recent evaluation of the environmental baseline for the Columbia River is part of the NOAA Fisheries’s Opinion for the Federal Columbia River Power System (FCRPS) issued in December 2000. This Opinion assessed the entire Columbia River system below Chief Joseph Dam, and downstream to the farthest point (the Columbia River estuary and nearshore ocean environment) at which ESA-listed salmonids are influenced. A detailed evaluation of the environmental baseline of the Columbia River basin can be found in the FCRPS Opinion (NMFS 2000).

The quality and quantity of freshwater habitats in much of the Columbia River basin have declined dramatically in the last 150 years. Forestry, farming, grazing, road construction, hydrosystem development, mining, and urbanization have radically changed the historical habitat conditions of the basin. Depending on the species, they spend from a few days to one or two years in the Columbia River and its estuary before migrating out to the ocean, and another one to four years in the ocean before returning as adults to spawn in their natal streams.

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

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

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

Based on the best available information regarding the current status of the listed species range wide, the population status, trends, genetics, and the poor environmental baseline conditions within the Action Areas, NOAA Fisheries concludes that the biological requirements of these species are not currently being met. Degraded habitat resulting from agricultural practices, forestry practices, road building, and residential construction, indicate that many aquatic habitat indicators are not properly functioning within the Columbia River Basin. Actions that do not maintain or restore properly functioning aquatic habitat conditions would be likely to jeopardize the continued existence of these species.

2.1.3 Effects of the Proposed Action

The proposed permitting of the reconstruction and improvement of the boat launch facilities at Maryhill State Park is likely to adversely affect the above listed species. The portion of the Columbia River that flows through the action is a migration corridor for both adults and smolts, it also provides juvenile rearing habitat for all of the above listed species. The Action Area is also within the designated Critical Habitat for SR sockeye, SR fall chinook, and SR spring/summer-run chinook.

NOAA Fisheries' ESA implementing regulations define "effects of the action" as "the direct and indirect effects of an action on the species or Critical Habitat together with the effects of other activities that are interrelated or interdependent with that action, that will be added to the environmental baseline" (50 C.F.R. 402.02).

2.1.3.1 Direct Effects

Direct effects are the immediate effects of the project on the species or its habitat. Direct effects result from the agency action and include the effects of interrelated and interdependent actions. Future Federal actions that are not a direct effect of the action under consideration (and not included in the environmental baseline or treated as indirect effects) are not evaluated (USFWS and NMFS 1998).

2.1.3.1.1 Turbidity

Boat launch and dock installation will mobilize sediments and temporarily increase local turbidity levels in the Columbia River. In the immediate vicinity of the construction activities (several meters), the level of turbidity would likely exceed the natural background levels by a significant margin and potentially affect fish.

Quantifying turbidity levels, and their effect on fish species, is complicated by several factors. First, turbidity from an activity will typically decrease as distance from the activity increases. How quickly turbidity levels attenuate is dependent upon the quantity of materials in suspension (*e.g.*, mass or volume), the particle size of suspended sediments, the amount and velocity of ambient water (dilution factor), and the physical/chemical properties of the sediments. Second, the impact of turbidity on fish is not only related to the turbidity levels, but also the particle size of the suspended sediments.

For salmonids, turbidity has been linked to a number of behavioral and physiological responses (*i.e.*, gill flaring, coughing, avoidance, increase in blood sugar levels) which indicate some level of stress (Bisson and Bilby 1982; Sigler *et al.* 1984; Berg and Northcote 1985; Servizi and Martens 1992). The magnitude of these stress responses is generally higher when turbidity is increased and particle size decreased (Bisson and Bilby 1982; Servizi and Martens 1987; Gregory and Northcote 1993). Although turbidity may cause stress, Gregory and Northcote (1993) have shown that moderate levels of turbidity (35-150 NTU) accelerate foraging rates among juvenile chinook salmon, likely because of reduced vulnerability to predators (camouflaging effect).

It is expected that turbidity arising from the project will be short-lived and have a low potential for causing take. Turbidity impacts are expected to be of low intensity because the use of a cofferdam will limit water exchange from the project area and the Columbia River and installation would occur when listed species are least likely to be present near the project site, minimizing the potential for adverse effects. In addition, a breakwater dike, just downstream of the project area, helps create a backwater area that should help contain any turbidity and sediment from traveling downstream.

2.1.3.1.2 Pile Driving Noise

Pile driving is known to produce sound pressure levels which may harm fishes, and this harm can vary from disruption of normal behavior patterns to physical injury and death. The type of harm inflicted depends on the type and intensity of the sounds produced, which, in turn, depend on a variety of factors, including, but not limited to, the type and size of the pile, the firmness of the substrate into which the pile is being driven, the depth of water and the type and size of the pile-driver. When driving steel piles, vibratory pile drivers produce a sound with a repetition rate of approximately 20-30 Hz, which is in the infrasound range. Such sounds are similar to those that have been shown to elicit an avoidance response in fishes (Enger et al. 1992; Sonalysts, Inc. 1997; Knudsen et al. 1997; Sand et al. 2000; Carlson et al. 2001). At infrasound frequencies, fishes respond to the particle acceleration of the pressure wave (at a threshold of level of 0.01 m/s2), that the fish must be close to the source of the sound (within 1 wavelength), and the fish must be exposed to the sound for several seconds (Enger et al. 1992; Knudsen et al. 1994; Sand et al. 2000). Carlson (2001) estimated that for 9-inch diameter steel pile, the avoidance threshold for particle acceleration would not be exceeded beyond 20-30 ft from the pile. Therefore, within a limited area around the pile, avoidance of vibratory pile-driving activity by juvenile salmonids may disrupt normal behavior patterns such as feeding and downstream migration.

Excessively high sound pressure levels can injure, or kill, fishes, and are a cause for concern during pile driving activity. A number of recently reported fish-kills associated with pile driving in the Pacific Northwest have contributed to the growing body of evidence that this activity can harm fishes (e.g., FRDP, Ltd. 2001; Washington State Ferries 2001; NOAA Fisheries 2002; Stadler, pers. comm. 2002). However, all of these reported kills have occurred when an impact hammer, and not a vibratory hammer, was being used. The injuries and death associated with impact hammers are likely due to the intense, sharp spike of sound produced when the hammer strikes the pile. As their name implies, vibratory hammers use vibration instead of impact to drive the piles, producing sounds that are less intense and less sharp than those produced by impact hammers (Stadler, pers. com. 2002). Since the harmful effects from vibratory hammers have not been studied, it is uncertain what, if any, these effects are, but it is likely that vibratory hammers pose less of a threat of physical harm than do impact hammers.

Research and field observations show that effects associated with pile driving can range from disruption of schooling behavior to fish death. Deleterious effects to listed salmonids in the Action Area would be minimized because the project proponent is using a vibratory pile driver. In addition, in-water operations will only occur between November 1st and February 28th in the year(s) during which the project receives permit(s). Restricting in-water operations to this time period minimizes the potential for adverse effects to listed sockeye, chinook, and steelhead because adults and juveniles are least likely to be present in the Action Area during this work-window.

2.1.3.2 Indirect Effects

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

2.1.3.2.1 Predation

During migration, juvenile fall chinook salmon typically orient toward shallow, nearshore habitats (Dawley *et al*. 1986, Carrasquero 2001). Sockeye salmon and steelhead juveniles are normally found mid-river during migration (Dawley *et al*. 1986). Juvenile salmonid species such as spring chinook, sockeye, and coho salmon and up-river steelhead usually move down river relatively quickly and in the main channel. Ledgerwood *et al*. (1991) found that subyearling chinook were found along the shoreline during the day and coho, yearling chinook, sockeye, and steelhead were predominately found mid-river. This would aid in predator avoidance (Gray and Rondorf 1986). Fall and summer chinook salmon are found in littoral habitats and are particularly vulnerable to predation (Gray and Rondorf 1986, Tabor *et al*. 1993). Rieman *et al*. (1991) found that mortality from predation in John Day Reservoir was lower for yearling chinook and steelhead than that for subyearling chinook. In addition, the presence of predators may force smaller prey fish species into less desirable habitats, disrupting foraging behavior, resulting in less growth (Dunsmoor *et al*. 1991).

When a salmon stock occurs in low abundance, predation can contribute significantly to its extinction (Larkin 1979). Further, providing temporary respite from predation may contribute to increasing Pacific salmon abundance (Larkin 1979). A substantial reduction in predators will generally result in an increase in prey (in this case, salmonids) abundance (Campbell 1979). Bell (1991) states that "It is considered advantageous to reduce the rate of predation on the economically important food and sports fish species." Rieman *et al*. (1991) state that "Efforts to reduce predation could produce substantial benefits in salmon and steelhead production." Gray and Rondorf (1986), in evaluating predation in the Columbia River basin, state that "The most effective management program may be to reduce the susceptibility of juvenile salmonids to predation by providing maximum protection during their downstream migration." Conversely, Campbell (1979), discussing management of large rivers and predator-prey relations, advocates that a "do nothing" approach (as opposed to predator manipulations) coupled with a strong habitat protectionist policy, should receive serious consideration.

Predator species such as northern pikeminnow (*Ptychocheilus oregonensis*), and introduced predators such as largemouth bass (*Micropterus salmoides*), smallmouth bass *(Micropterus dolomieu*), black crappie (*Pomoxis nigromaculatus*), white crappie (*P. annularis*) and, potentially, walleye (*Stizostedion vitreum*) (Ward *et al*. 1994, Poe *et al*. 1991, Beamesderfer and Rieman 1991, Rieman *et al*. 1991, Bell 1991, Petersen *et al*. 1990, Pflug and Pauley 1984, and Collis *et al*. 1995) may use habitat created by over-water structures (Ward and Nigro 1992, Plug and Pauley 1984, Kahler *et al*. 2000) such as piers, float houses, floats and docks (Carrasquero 2001). Rieman *et al*. (1991) concluded that predation has contributed to the decline of salmon and steelhead runs in the Columbia River.

Largemouth bass are considered the principal warmwater predatory fish in the United States (Heidinger 1975, McCammon and von Geldern 1979). Habitat types utilized by largemouth bass include vegetated areas, open water and areas with cover such as docks and submerged trees (Mesing and Wicker 1986, Stuber *et al*. 1982, Miller 1975). Miller (1975) indicates that largemouth bass are primarily lake, pond and quiet water residents. Funk (1975) states that where both smallmouth and largemouth bass co-occur, largemouth bass usually inhabit quiet, weedy, backwater areas. Stuber *et al*. (1982) indicate that adult largemouth bass are most abundant in areas of low current velocities; areas with velocities greater than 20 cm/sec are unsuitable. Although they can be found in open water areas, largemouth bass are more commonly found along the shoreline (Heidinger 1975, McCammon and von Geldern 1979). During the summer, bass prefer pilings, rock formations, areas beneath moored boats, and alongside docks. Kahler *et al*. (2000) indicate that largemouth bass are often found under docks in the spring in Lake Washington. Colle *et al*. (1989) found that, in lakes lacking vegetation, largemouth bass distinctly preferred habitat associated with piers, a situation analogous to the Columbia River. Wanjala *et al*. (1986) found that adult largemouth bass in a lake were generally found near submerged structures suitable for ambush feeding.

Kahler *et al*. (2000) and Carrasquero (2001) indicate that both smallmouth and largemouth bass utilize docks and piles. Coble (1975), Miller (1975) and Edwards *et al*. (1983) indicate that smallmouth bass prefer streams with moderate currents, gravel or rubble substrate and rocks or logs creating slack water, whereas largemouth bass prefer streams with sluggish current, silt and mud substrate, and aquatic vegetation. Tabor *et al*. (1993) found that smallmouth bass may be a major predator of subyearlings due to their overlap in littoral habitat use. Edwards *et al*. (1983) state that smallmouth bass use all forms of submerged cover and prefer protection from light. Bevelhimer (1996), in studies on smallmouth bass, indicates that ambush cover and low light intensities create a predation advantage for predators and can also increase foraging efficiency.

Reynolds and Casterlin (1976) indicate that smallmouth bass prefer cover affording areas of darkness. Pflug and Pauley (1984) and Carrasquero (2001) citing Kahler *et al*. (2000) states that small mouth bass in Lake Sammamish locate their nests near piers and associated in-water structures. Gilliland *et al*. (1991) in studies on smallmouth bass in Lake Texoma found that they preferred rock riprap berms that extended perpendicular to the shore. Edwards *et al*. (1983) state that both juvenile and adult smallmouth bass prefer low velocity water near a current. Reynolds and Casterlin (1976) indicate that smallmouth and largemouth bass are crepuscular, with activity peaks at dawn higher than those at dusk. Danehy and Ringler (1991) and Vigg *et al*. (1991) also indicate that smallmouth bass feed primarily at dawn and dusk. Dawley *et al*. (1986) found that migrating fall chinook salmon had diel movement peaks in the morning (0800-1100) and evening (1800-2000). Ledgerwood *et al*. (1991) found that juvenile salmonids decreased movements during darkness. This behavioral trait could facilitate increased predation by bass on juvenile salmonids, particularly during the evening hours.

Black crappie and white crappie are known to prey on juvenile salmonids (Ward *et al*. 1991). Ward *et al*. (1991), in their studies of crappies within the Willamette River, found that the highest density of crappies at their sampling sites occurred at a wharf supported by closely spaced pilings. They further indicated that suitable habitat for crappies includes pilings and riprap areas. Walters *et al*. (1991) also found that crappie were attracted to in-water structures and recommended placement of structures as attractants in lake environs.

Zimmerman and Ward (1999) found that juvenile predation by northern pikeminnow was greatest downstream of Bonneville Dam. Zimmerman (1999) found that 92% of identifiable fish remains in northern pikeminnows and 12% in smallmouth bass collected downstream of Bonneville Dam were salmonids. Ward (1992) found that stomachs of northern pikeminnow in developed areas of Portland Harbor contained 30% more salmonids than those in undeveloped areas, although undeveloped areas contained more northern pikeminnow. Giorgi *et al*. (1994) state that predatory fish, principally pikeminnow, are abundant and consume large numbers of juvenile salmonids. Ledgerwood *et al*. (1993) state that northern pikeminnow are inhabitants of slack water areas. Carrasquero (2001) indicates that northern pikeminnows are important salmonid predators in Columbia River reservoirs because of their preference for low-velocity microhabitats which are created by in-water structures. Bell (1991) states that pikeminnows are of particular concern as salmonid predators in reservoirs and slack water areas.

There are four major predatory strategies utilized by piscivorous fish: (1) They run down prey; (2) ambush prey; (3) habituate prey to a non-aggressive illusion; or (4) stalk prey (Hobson 1979). Ambush predation is probably the most common strategy. Predators lie-in-wait, then dart out at the prey in an explosive rush (Gerking 1994). Kahler *et al*. (2000) state that bass are expected to benefit from structures placed in the littoral zone because of their propensity for ambush predation and preference for the littoral zone. Predators may use sheltered areas that provide slack water to ambush prey fish in faster currents (Bell 1991). The slower currents created by pilings make this area conducive to predator fish.

Light plays an important role in defense from predation. Prey species are better able to see predators under high light intensity, thus providing the prey species with an advantage (Hobson 1979, Helfman 1981). Petersen and Gadomski (1994) found that predator success was higher at lower light intensities. Prey fish lose their ability to school at low light intensities, making them vulnerable to predation (Petersen and Gadomski 1994). Howick and O'Brien (1983) found that in high light intensities prey species (bluegill) can locate largemouth bass before they are seen by the bass. However, in low light intensities, the bass can locate the prey before they are seen. Walters *et al*. (1991) indicate that high light intensities may result in increased use of shade producing structures. Helfman (1981) found that shade, in conjunction with water clarity, sunlight and vision, is a factor in attraction of temperate lake fishes to overhead structure. Carrasquero (2001) hypothesizes that shade cast by structures may disrupt juvenile migration by creating visual barriers and promoting disorientation and increasing mortality risk.

An effect of over-water structures is the creation of a light/dark interface that allows ambush predators to remain in a darkened area (barely visible to prey) and watch for prey to swim by against a bright background (high visibility). Carrasquero (2001) postulates that bass gain an element of surprise by hovering in shaded regions. Prey species moving around the structure are unable to see predators in the dark area under the structure and are more susceptible to predation.

In addition to piscivorous predation, in-water structures (tops of pilings) also provide perching platforms for avian predators such as double-crested cormorants (*Phalacrocorax auritis*) (Kahler *et al*. 2000), from which they can launch feeding forays or dry plumage. Their high energy demands associated with flying and swimming create a need for voracious predation on live prey (Ainley 1984). Cormorants are underwater pursuit swimmers (Harrison 1983) that typically feed on mid-water schooling fish (Ainley 1984), but they are known to be highly opportunistic feeders (Derby and Lovvorn 1997; Blackwell *et al*. 1997; Duffy 1995. Double-crested cormorants are known to fish cooperatively in shallow water areas, herding fish before them (Ainley 1984). Krohn *et al*. (1995) indicate that cormorants can reduce fish populations in forage areas, thus possibly affecting adult returns as a result of smolt consumption. Because their plumage becomes wet when diving, cormorants spend considerable time drying out their feathers (Harrison 1983) on pilings and other structures near feeding grounds (Harrison 1984). Placement of piles to support the dock structures will potentially provide for some usage by cormorants. However, placement of anti-perching devices on the top of the pilings should preclude their use by any potential avian predators.

Carrasquero (2001) indicates that structures that modify the shoreline configuration, eliminating shore zone habitat and refugia may force juvenile salmonids into deeper water where predatory diving birds may have increased success preying on them.

Based on the presence of young salmonids and native and exotic predators in the Action Area, and the additional shading created by the installation of 600 square feet of new overwater structure, it appears likely that the proposed action will contribute to increased predation rates on listed juvenile and young of the year salmonids. The relative roles that added in/over-water structure itself and reduced light play in benefitting predaceous fish is unknown and the proposed actions will minimize both types of effects by incorporating conservative design criteria. Surfacing all of the floats and ramps with metal grating and using white materials for in-water structures will greatly reduce shading as compared to traditional dock designs. Minimizing and reducing the overall number of pilings and spacing them at least 18 feet apart is expected to reduce structure-dependent benefits to predaceous fish. Although the proposed design is expected to reduce the impact on listed salmonids, NOAA Fisheries expects the risk of predation to increase.

2.1.3.2.2 Littoral Productivity

Docks may also have some general effects on littoral productivity. The shade that docks create may inhibit the growth of aquatic macrophytes and other plant life (*e.g.*, epibenthic algae and pelagic phytoplankton). These plants are the foundation for most aquatic food webs and their presence or absence affects many higher trophic levels (*e.g.*, invertebrates and fishes). Consequently, the shade from docks may affect local plant/animal community structure or species diversity. At a minimum, shade from docks may affect the overall productivity of littoral environments (White 1975, Kahler *et al* 2000).

Additional litter input from riparian planting may partially compensate for lost productivity. Surfacing the entirety of each float deck with grating and using reflective materials for in-water components is expected to result in more natural light conditions beneath the proposed structures than would result from using traditional materials. However, it is unknown how effective these measures will be in limiting the expected reduction in primary productivity. Consequently, it is unknown to what degree the proposed action will negatively affect listed species through reducing photosynthesis.

2.1.3.2.3 Boating Activity

Adding new docks is likely to increase levels of boating activity in the reservoirs, especially near the docks. Boating activity might cause several impacts on listed salmonids and aquatic habitat. Engine noise, prop movement, and the physical presence of boat hulls may disturb or displace nearby fishes (Mueller 1980, Warrington 1999a).

Boat traffic may also cause (1) increased turbidity in shallow waters, (2) uprooting of aquatic macrophytes in shallow waters, (3) aquatic pollution (through exhaust, fuel spills, or release of petroleum lubricants), and (4) shoreline erosion (Warrington 1999b). These boating impacts indirectly affect listed fish in a number of ways. Turbidity may injure or stress affected fishes, as discussed in more detail in section 2.1.3.1.1. The loss of aquatic macrophytes may expose salmonids to predation, decrease littoral productivity, or alter local species assemblages and trophic interactions. Despite a general lack of data specifically for salmonids, pollution from boats may cause short-term injury, physiological stress, decreased reproductive success, cancer, or death for fishes in general. Further, pollution may also impact fishes by impacts to potential prey species or aquatic vegetation. However, these activities are beyond the discretionary action under consultation and take related to boat use will not be covered in the incidental take statement.

2.1.3.3 Population Scale Effects

As detailed in Section 2.1.2.2, NOAA Fisheries has estimated the median population growth rate (lambda) for each species potentially affected by the Maryhill State Park boat launch reconstruction and improvement project. Under the environmental baseline, life history diversity has been limited by the influence of hatchery fish, by physical barriers that prevent migration to historical spawning and/or rearing areas, and by water temperature barriers that influence the timing of emergence, juvenile growth rates, or the timing of upstream or downstream migration. Additionally, hydropower development has profoundly altered the riverine environment and those habitats vital to the survival and recovery of the ESUs that are the subject of this consultation.

The Maryhill State Park boat launch reconstruction and improvement project is expected to add temporary, construction-related detrimental effects to the existing environmental baseline. Further, NOAA Fisheries believes that long-term, minor increases in predation rates and predator populations will occur as well. However, these effects, as detailed above, are not expected to have any significance at the population level. Therefore, NOAA Fisheries believes that the proposed action does not contain measures that are likely to influence population trends, habitat and hydrology, life-history diversity, or the influence of hatcheries on the ESU compared to conditions under the environmental baseline.

2.1.3.4 Effects on Critical Habitat

NOAA Fisheries designates Critical Habitat for a listed species based upon physical and biological features that are essential to that species. Essential features of Critical Habitat for SR Sockeye, SRF chinook, and SRSS chinook include substrate, water quality/quantity, water temperature, water velocity, cover/shelter, food, riparian vegetation, space, and safe passage conditions (58 Fed. Reg. 68543, December 28, 1993). Critical Habitat is not currently designated for the SRB steelhead UCRS chinook, UCR steelhead, and MCR steelhead ESUs (see footnote 2).

The direct and indirect effects previously discussed include effects on Critical Habitat, to a limited extent. The avenues in which Critical Habitat may be affected are apparent in the MPI analysis: specifically, in the Water Quality, Habitat Access, Habitat Elements, Channel Condition and Dynamics, Flow/Hydrology, and Watershed Conditions pathways. Within these pathways, and when considering the action under consultation in comparison to the environmental baseline, the functional quality of most indicators will be maintained. However, pile driving activities will briefly degrade indicators in the Water Quality pathway (*i.e.,* Sediment/Turbidity) by creating turbid water within the Action Area. Relating this indicator back to essential habitat elements, the primary impact of this action will be a short-term decline in water quality and substrate conditions.

The long-term effects of the project are likely to impact safe passage conditions for listed fish, to some degree. Based on the best available scientific data, NOAA Fisheries believes that installing overwater structures will improve predation and rearing conditions for both native and exotic piscivorus fish, and could contribute to at least a localized increase in predator populations. Migrating juvenile listed fish may be inclined to seek refuge in the velocity shadow of the overwater structure, and may then fall prey to predators. However, when compared to the environmental baseline, it appears that the proposed action is unlikely to appreciably diminish the value of this element of Critical Habitat. When the short- and long-term effects of the proposed action are taken as a whole, it appears unlikely that the Maryhill Sate Park boat launch project will adversely modify SR Sockeye, SRF chinook, and SRSS chinook Critical Habitat.

2.1.4 Cumulative Effects

Cumulative effects are defined as "those effects of future state or private activities, not involving Federal activities, that are reasonably certain to occur within the Action Area of the federal action subject to consultation" (50 C.F.R 402.02). Future federal actions that are unrelated to the proposed actions are not considered in this section because they require separate consultation pursuant to section 7 of the ESA.

In the Action Area for this project, agricultural activities are the main land use. Riparian buffers are not properly functioning, containing little woody vegetation. Agricultural practices leave little stream buffer width. NOAA Fisheries does not expect any further habitat degradation from agricultural practices. NOAA Fisheries assumes that non-Federal land owners in those areas will also take steps to minimize or avoid land management practices that would result in the take of those species. Such actions are prohibited by section 9 of the ESA, and subject to the incidental take permitting process under section 10 of the ESA.

2.1.5 Conclusion/Opinion

NOAA Fisheries has reviewed the direct, indirect, and cumulative effects of the proposed action on the above listed species and their habitat. NOAA Fisheries evaluated these effects in light of existing conditions in the Action Area and the measures included in the action to minimize the risk of effects. The proposed action is likely to cause short-term adverse effects on listed salmonids by modifying habitat, removing and transporting fish, construction activities, and through removing riparian vegetation. These effects are reasonably certain to result in incidental take, but the extent of harm is likely to be minimized by specific measures included in the action. In addition, the overall footprint of the boat launch is being reduced from 5,880 square feet to 4,284 square feet. As a result, the effects of the action are unlikely to adversely influence the existing population trends or risks for listed salmonids. Consequently, the proposed action is not likely to jeopardize the continued existence of listed salmonids.

2.1.6 Reinitiation of Consultation

This concludes formal consultation for the Maryhill boat launch reconstruction and improvement project. Consultation must be reinitiated if: (1) the amount or extent of taking specified in the Incidental Take Statement is exceeded, or is expected to be exceeded; (2) new information reveals effects of the action may affect listed species in a way not previously considered; (3) the action is modified in a way that causes an effect on listed species that was not previously considered; or (4) a new species is listed or Critical Habitat is designated that may be affected by the action (50 C.F.R. 402.16). To reinitiate consultation, the COE should contact the Habitat Conservation Division (Washington Branch Office) of NOAA Fisheries. Upon reinitiation, the protection provided by this incidental take statement, section 7(o)(2), becomes invalid.

2.2 Incidental Take Statement

Section 9 of the ESA and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species without special exemption. “Take” is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct. Harm is further defined as significant habitat modification or degradation that results in death or injury to listed species by “significantly impairing behavioral patterns such as breeding, spawning, rearing, migrating, feeding, and sheltering” (50 C.F.R. 222.102). Incidental take is take of listed animal species that results from, but is not the purpose of, the Federal agency or the applicant carrying out an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to, and not intended as part of, the agency action is not considered prohibited taking provided that such taking is in compliance with the terms and conditions of this incidental take statement.

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

2.2.1 Amount or Extent of Take Anticipated

As stated in Section 2.1.1, above, listed salmon and steelhead use the Action Area for migratory purposes and possibly rearing. Also, as detailed in NMFS (2000) it is possible to encounter SR sockeye, SRF chinook, SRSS chinook, SRB steelhead, UCRS chinook salmon, UCR steelhead, and/or MCR steelhead in the Action Area any day of the year. Therefore, take of these listed fish is reasonably certain to occur incidental to the proposed action. The proposed action includes measures to reduce the likelihood of incidental take. For any residual take, the following reasonable and prudent measures and terms and conditions are required to minimize the take. NOAA Fisheries has determined that the proposed action will add approximately 39 cubic feet of inwater structure and 600 square feet of overwater structure. This project will also return about 1,416 square feet of benthic habitat to more natural conditions by reducing the footprint of the ramp itself. Despite the use of the best scientific and commercial data available, NOAA Fisheries cannot estimate the number of fish that would be injured or killed by these occurrences. However, the spatial extent of these environmental changes is a habitat surrogate for estimating the amount of take. As such, these spatial estimates represent the limits on incidental take that will be authorized through this Incidental Take Statement. Therefore, should any one of these limits be exceeded during the construction of the project, work must stop and the COE must reinitiate consultation. For a more detailed discussion of the mechanisms by which take could occur, the reader is encouraged to refer to Section 2.1.3.1 of this BO.

NOAA Fisheries believes that the action, as described, is reasonably certain to result in incidental take of listed salmonids from (1) detrimental effects of increased turbidity arising from positioning equipment, stabilizing barges, and driving piles, (2) detrimental effects from increased sound levels resulting from vibratory-driven steel piles, (3) increased predation by piscivorus fish as an indirect result of the addition of in- and over-water structures, and (4) disruption of migration behavior of SRF chinook resulting from in-water structures. The possible take through detrimental effects of turbidity and sound are being minimized by the defined work window (November 1, 2002 to February 28, 2003) when the risk of any take is the lowest. The addition of in- and over-water structures will result in an increase in predation or salmonids that would be difficult to detect. NOAA Fisheries cannot quantify the behavioral disruption to SRF chinook, however lethal take is not expected to occur. Finally, if the COE or the project proponent observe any dead or injured fish at the project site, construction will immediately cease and NOAA Fisheries will be contacted for further guidance.

2.2.2 Reasonable and Prudent Measures

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

NOAA Fisheries believes that the following reasonable and prudent measures, along with conservation measures described by the COE, are necessary and appropriate to minimize the likelihood of take of ESA-listed fish resulting from implementation of this Opinion. These reasonable and prudent measures would also minimize adverse affects to designated Critical Habitat.

1. Minimize the likelihood of incidental take from boat docks and ramps by applying methods to avoid or minimize predator habitat and disturbance to riparian and aquatic systems.

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

3. Minimize the likelihood of incidental take from erosion control activities requiring streambank and shoreline protection by using an ecological approach to bank protection and the best available bioengineering technology.

4. Minimize the incidental take from construction activities associated with the cofferdam dewatering and fish removal.

2.2.3 Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the ESA, the COE must comply with the following terms and conditions, which implement the reasonable and prudent measures described above. These terms and conditions are non-discretionary.

1. To implement the Reasonable and Prudent Measure No. 1 (minimize predator habitat and disturbance to riparian and aquatic systems), the COE shall ensure that in addition to their proposed conditions:

    1.1 Pilings shall be limited in size and quantity to the minimum necessary to support dock structures.

    1.2 All pilings and navigational aids, such as moorings, and channel markers, will be fitted with devices to prevent perching by piscivorus bird species.

    1.3 All parking lots, picnic areas, toilets, trails and other non-water dependent facilities will be constructed such that all runoff from parking lots and other impervious surfaces will be collected and treated to remove contaminants prior to return to any receiving waters. All runoff will meet state water quality standards for temperature, turbidity, and other state water quality criteria before it reaches a receiving water.

    1.4. All stormwater runoff must be managed to ensure that it will not result in a change in the existing hydraulic conditions or an increase of pollutants to the receiving water.

2. To Implement Reasonable and Prudent Measure No. 2 (in-water work), the COE shall

ensure that:

2.1 The Contractor will develop and implement a site-specific spill prevention, containment, and control plan (SPCCP), and is responsible for containment and removal of any toxicants released. The Contractor will be monitored by the COE to ensure compliance with this SPCCP. The plan must contain the pertinent elements listed below, and meet requirements of all applicable laws and regulations.

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

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

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

2.1.4 A spill containment and control plan with notification procedures, specific clean up and disposal instructions for different products, quick response containment and clean up measures that will be available on the site, proposed methods for disposal of spilled materials, and employee training for spill containment.

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

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

2.2.2 No construction discharge water may be released within 300 feet upstream of spawning areas.

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

2.4 During excavation, native streambed materials will be stockpiled above the bankfull elevation for later use.

2.5 The following erosion and pollution control materials shall be onsite:

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

2.5.2 An oil absorbing, floating boom is available on-site during all phases of construction. The boom must be of sufficient length to span the wetted channel.

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

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

2.6.1 Areas of bare soil within 150 feet of waterways, wetlands or other sensitive areas will be stabilized by native seeding, mulching, and placement of erosion control blankets and mats, if applicable, but within 14 days of exposure.

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

2.6.3 Seeding outside of the growing season will not be considered adequate nor permanent stabilization.

2.7 All erosion control devices will be inspected during construction to ensure that they are working adequately.

2.7.1 Erosion control devices will be inspected daily during the rainy season, weekly during the dry season.

2.7.2 If inspection shows that the erosion controls are ineffective, work crews will be mobilized immediately, during working and off-hours, to make repairs, install replacements, or install additional controls as necessary.

2.7.3 Erosion control measures will be judged ineffective when turbidity plumes are evident in waters occupied by listed salmonids during any part of the year.

2.8 Sediment will be removed from sediment controls once it has reached 1/3 of the exposed height of the control. Whenever straw bales are used, they will be staked and dug into the ground. Catch basins will be maintained so that sediment does not accumulate within traps or sumps.

2.9 Sediment-laden water created by construction activity will be filtered before it enters a stream or other water body. Silt fences or other detention methods will be installed as close as reasonable to outlets to reduce the amount of sediment entering aquatic systems.

2.10 Any hazardous materials spill will be reported to NOAA Fisheries.

2.10.1 In the event of a hazardous materials or petrochemical spill, immediate action shall be taken to recovery toxic materials from further impacting aquatic or riparian resources.

2.10.2 In the event of a hazardous materials or petrochemical spill, a detailed description of the quantity, type, source, reason for the spill, and actions taken to recover materials will be documented. The documentation should include photographs.

2.11 Refueling and hazardous materials

2.11.1 All staging and refueling shall occur at least 150 feet from the ordinary high-water mark, except as stated below.

2.11.2 No auxiliary fuel tanks will be stored within 150 feet of the ordinary highwater mark.

2.12 Boundaries of the clearing limits associated with site access and construction will be flagged to prevent ground disturbance of riparian vegetation, wetlands and other sensitive sites beyond the flagged boundary.

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

2.14 All project operations, except efforts to minimize storm or high flow erosion, will cease under high flow conditions that may result in inundation of the immediate work area.

3. To implement Reasonable and Prudent Measure No. 3 (erosion control), the COE shall ensure that:

3.1 All damaged areas will be restored to pre-work conditions. Damaged streambanks must be restored to a natural slope, pattern and profile suitable for establishment of permanent woody vegetation.

3.2 All exposed soil surfaces, including construction access roads and associated staging areas, will be stabilized at finished grade with mulch, native herbaceous seeding, and native woody vegetation. Areas requiring revegetation must be replanted between October 15 and April 15 with a diverse assemblage of species that are native to the project area or region, including grasses, forbs, shrubs and trees.

3.3 No herbicide application will occur within 300 feet of any stream channel as part of this action. Mechanical removal of undesired vegetation and root nodes is permitted.

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

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

3.6 Plantings will achieve 100 percent survival after 1 year, and 80 percent survival or 80 percent ground cover after 5 years (including both plantings and natural recruitment). If the success standard has not been achieved after 5 years, the COE will submit an alternative plan to NOAA Fisheries. The alternative plan will address temporal loss of function for the 5 years.

4. To implement Reasonable and Prudent Measure No. 4 (cofferdam dewatering and fish removal), the COE shall ensure that:

4.1 If possible, fish will be captured by seining under the supervision of a fishery biologist experienced in such efforts and all staff working with the seining operation must have the necessary knowledge, skills, and abilities to ensure the safe handling of all ESA-listed fish.

4.2 If seining is not possible, fish may be captured using electrofishing gear as described in NOAA Fisheries guidelines (NMFS 2000). No electrofishing may occur if water temperatures exceed 18˚ C, or are expected to rise above this temperature before concluding the capture.

4.3 ESA-listed fish must be handled with extreme care and kept in water to the maximum extent possible during capture and transfer procedures. The transfer of ESA-listed fish must be conducted using a sanctuary net that holds water during transfer, whenever necessary to prevent the added stress of an out-of-water transfer.

4.4 Captured fish must be released in appropriate habitat, as near as possible to the capture site.

4.5 Within three months of any fish removal activities, the COE shall provide a report to NOAA Fisheries that contains all of the information for reporting take that is contained in the 2001 Washington Department of Fish and Wildlife Scientific Taking Permit application.

3.0 MAGNUSON-STEVENS FISHERY CONSERVATION AND MANAGEMENT ACT

3.1 Background

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

- Federal agencies must consult with NOAA Fisheries on all actions, or proposed actions, authorized, funded, or undertaken by the agency, that may adversely affect EFH (§305(b)(2));

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

- Federal agencies must provide a detailed response in writing to NOAA Fisheries within 30 days after receiving EFH conservation recommendations. The response must include a description of measures proposed by the agency for avoiding, mitigating, or offsetting the impact of the activity on EFH. In the case of a response that is inconsistent with NOAA Fisheries EFH conservation recommendations, the Federal agency must explain its reasons for not following the recommendations (§305(b)(4)(B)).

EFH means those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity (MSA §3). For the purpose of interpreting this definition of EFH: Waters include aquatic areas and their associated physical, chemical, and biological properties that are used by fish and may include aquatic areas historically used by fish where appropriate; substrate includes sediment, hard bottom, structures underlying the waters, and associated biological communities; necessary means the habitat required to support a sustainable fishery and the managed species' contribution to a healthy ecosystem; and "spawning, breeding, feeding, or growth to maturity" covers a species' full life cycle (50 C.F.R. 600.10). Adverse effect means any impact which reduces quality and/or quantity of EFH, and may include direct (*e.g.*, contamination or physical disruption), indirect (*e.g.*, loss of prey or reduction in species fecundity), site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions (50 C.F.R. 600.810).

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

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

3.2 Identification of EFH

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

3.3 Proposed Actions

The proposed action and Action Area are detailed above in Section 1.3 and 1.4 of this document. The Action Area includes habitats that have been designated as EFH for various life-history stages of chinook and coho salmon.

3.4 Effects of Proposed Action

As described in detail in Section 2.1.3 of this document, the proposed action may result in short- and long-term adverse effects to a variety of habitat parameters.

1. Temporary increases in suspended sediment as a result of instream excavation.

2. Temporary risk of contamination of waters through the accidental spill or leakage of petroleum products from heavy equipment.

3. Temporary reduction of riparian vegetation through removal of non-native plant species.

3.5 Conclusion

NOAA Fisheries concludes that the proposed action would adversely affect designated EFH for chinook salmon.

3.6 EFH Conservation Recommendations

Pursuant to Section 305(b)(4)(A) of the MSA, NOAA Fisheries is required to provide EFH conservation recommendations to Federal agencies regarding actions which may adversely affect EFH. While NOAA Fisheries understands that the conservation measures described in the BA will be implemented by the COE, it does not believe that these measures are sufficient to address the adverse impacts to EFH described above. To minimize the adverse effects to designated EFH for Pacific salmon (suspended sediment, contamination of waters, and riparian habitat alteration), NOAA Fisheries recommends that the COE implement Terms and Conditions 1 (1.3 and 1.4), 2, and 3 as described in Section 2.2.3 of this document.

3.7 Statutory Response Requirement

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

3.8 Supplemental Consultation

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

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