COVER SHEET
April 2003

Title of Environmental Review:

Environmental Assessment of NOAA Fisheries' Approval of Five Fisheries Management and Evaluation Plans Submitted by the Oregon Department of Fish and Wildlife and the Washington Department of Fish and Wildlife and of NOAA Fisheries' Determination that the Plans Adequately Address Section 4(d) Limit 4 Criteria and Do Not Appreciably Reduce the Likelihood of Survival and Recovery of Salmon and Steelhead Listed Under the Endangered Species Act

Responsible Agencies: NOAA Fisheries – Northwest Region

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Species/ Evolutionarily Significant Units (ESU) Affected:

Lower Columbia River chinook salmon (*Oncorhynchus tshawytscha*)
Lower Columbia River steelhead (*O. mykiss*)
Columbia River chum salmon (*O. keta*)

Activity Considered:

Approval of five FMEPs submitted by the ODFW and WDFW under limit 4 of the 4(d) rule. The five FMEPs describe state-managed programs for fisheries potentially affecting listed salmon and steelhead in tributaries of the Lower Columbia River.

Environmental Assessment Conducted by:

Department of Commerce (DOC)
National Oceanic and Atmospheric Administration (NOAA) – Fisheries
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1.1 Description of the Action

The National Marine Fisheries Service (NOAA Fisheries) issued a final Endangered Species Act (ESA) rule pursuant to section 4(d) (4(d) Rule) adopting regulations necessary and advisable to conserve threatened species, including Lower Columbia River steelhead, chinook salmon, and chum salmon (July 10, 2000, 65 FR 42422). This 4(d) Rule applies the prohibitions in section 9(a)(1) of the ESA, and also sets forth specific circumstances when the prohibitions will not apply, known as 4(d) limits. In the case of fishery management, recreational, tribal, and commercial fisheries can be managed in a way that protects listed salmon and steelhead and allows them to recover. Limit 4 of the 4(d) Rule (50 CFR 223.203(4)) limits the application of the take prohibitions if a fishery management agency develops and implements a Fisheries Management and Evaluation Plan (FMEP) that NOAA Fisheries approves under Limit 4.

The Lower Columbia River chum salmon and chinook salmon Evolutionarily Significant Units (ESUs) were listed as threatened on March 25, 1999 (64 FR 14517); the Lower Columbia River steelhead ESU was listed as threatened on March 19, 1998 (63 FR 13347). The Oregon Department of Fish and Wildlife (ODFW) and the Washington Department of Fish and Wildlife (WDFW) have developed FMEPs to ensure that recreational fisheries adequately protect listed salmon and steelhead. The ODFW submitted four FMEPs: one for chinook salmon (ODFW 2001a), one for chum salmon (ODFW 2001b), one for steelhead excluding the Hood River Basin (ODFW 2001c), and one for steelhead in the Hood River Basin (ODFW 2001d). The WDFW submitted one FMEP (WDFW 2001) covering all three species and all recreational fisheries. These FMEPs describe fisheries occurring in the tributaries only. Impacts on listed fish occurring in fisheries in the mainstem Columbia River and the ocean are assessed by NOAA Fisheries via section 7 consultations completed with the parties of *U.S. v. Oregon* and the Pacific Fisheries Management Council.

Many Columbia Basin hatcheries are designed and funded to produce fish for harvest. These FMEPs are designed to put these fish to their intended use and to protect listed fish. The FMEPs address impacts from all fisheries which may affect listed juvenile and adult steelhead, chinook, and chum in the tributaries of the Lower Columbia River. A variety of fisheries occur year round in the tributaries of the Lower Columbia River and include fishing for salmon, steelhead, trout, sturgeon, smelt, shad, and warmwater species. Thousands of anglers participate in these fisheries annually. It is these fisheries that are fully described in the FMEPs. The implementation of these fisheries would allow fishing for recreational purposes and provide economic benefits for local communities through the sale of licenses, equipment, and other commerce related to the recreational fisheries.

This environmental assessment (EA) evaluates the potential environmental effects as a consequence of the conduct of ODFW's and WDFW's recreational fishery programs and the NOAA Fisheries action of approving the FMEPs under the 4(d) Rule. This EA evaluates two possible alternatives: 1) NOAA Fisheries does not approve WDFW and ODFW FMEPs under limit 4 of the 4(d) Rule, and 2) NOAA Fisheries approves the FMEPs under limit #4 of the 4(d) Rule. The direct and indirect effects from NOAA Fisheries' action of approving these FMEPs, including cumulative effects, are described and assessed below.

In the review of the FMEPs, NOAA Fisheries must consider whether the FMEPs adequately address the criteria contained in the ESA 4(d) Rule. If NOAA Fisheries determines that implementation of the activities described in the FMEPs would not appreciably reduce the likelihood of survival and recovery of listed salmon and steelhead, and the FMEPs otherwise adequately address the criteria in the 4(d) Rule, then NOAA Fisheries may approve the FMEPs, and take prohibitions would not apply to fisheries implemented pursuant to the FMEPs. NOAA Fisheries' approval of the FMEPs constitutes the federal action that is subject to analysis as required by the National Environmental Policy Act (NEPA).

1.2 Purpose of and Need for the Proposed Action

The purpose of the proposed action is to evaluate fishery management and evaluation plans for recreational fisheries in the tributaries of the Columbia River in Oregon and Washington that comply with the requirements of the ESA, and specifically with Limit 4 of the 4(d) Rule. The FMEPs submitted by the states describe fishery regulations designed to conserve the listed steelhead and chum and chinook salmon present in the fishing areas, enforcement measures adequate to ensure that the regulations are being followed, inseason monitoring with the ability to respond to inseason run size and fishery data, and the requirement to evaluate and report fishery impacts and compliance with conservation objectives.

The need for the proposed action is to provide for recreational fishing opportunities that are consistent with the protection and conservation of listed species. In addition to its conservation objectives, Limit 4 is designed to foster cooperative efforts between fishery managers, such as the states, and NOAA Fisheries when implementing recreational fishing programs. Recreational fishing is important socially and economically in the states of Oregon and Washington; this has been recognized by NOAA Fisheries in its policies (e.g., the Policy for Conserving Species Listed or Proposed for Listing Under the Endangered Species Act While Providing and Enhancing Recreational Fisheries Opportunities, jointly issued by the Fish and Wildlife Service and the National Marine Fisheries Service on June 3, 1996 (61 FR 27978)) and now through the 4(d) Rule.

1.3 Scoping

NOAA Fisheries identified only two reasonable alternatives that could achieve the purpose and need as described above. If NOAA Fisheries does not approve the FMEPs, ODFW and WDFW probably would not allow recreational fishing in the Lower Columbia River tributaries (except for those small activities included in the proposed action that do not affect listed salmon and steelhead), and then the only impacts on listed Lower Columbia River salmon and steelhead from fishing would come from illegal harvest. If NOAA Fisheries approves the proposed FMEPs and the states implement fisheries as described, recreational fishing would occur in the Lower

Columbia River tributaries, but most naturally produced salmon and steelhead would be released, and so the bulk of the expected impacts on listed salmon and steelhead would be limited to catch and release mortality and illegal harvest. These alternatives are described in section 2, below, and their anticipated impacts on the human environment are analyzed in section 4.

2.0 Alternatives Including the Proposed Action

Two alternatives were identified and considered in this EA: under Alternative 1 (No Action), the FMEPs would not be approved as qualifying for limitations on take prohibitions as provided in the ESA 4(d) Rule Limit 4; under Alternative 2 (Proposed Action), the FMEPs would be approved, and take prohibitions would not apply to actions implemented pursuant to the FMEPs as provided in the ESA 4(d) Rule Limit 4.

2.1 Alternative 1 (No Action)

Under a "No Action" alternative, NOAA Fisheries would not approve the FMEPs as qualifying for limitation of take prohibitions under the 4(d) Rule, with the result that fisheries described in the FMEPs would be subject to section 9 take prohibitions. Other mechanisms for achieving compliance with the ESA exist. The ODFW and WDFW could, for example, apply for Section 10(a)(1)(B) incidental take permits. Other mechanisms for ESA compliance may exist, but none satisfy cooperative nature of the purpose and need as stated as fully as development of the FMEPs, and the analysis for most other mechanisms would need to consider the same issues as under the current proposed action. Which of several alternatives might be pursued under this alternative is unknown and frankly speculative, but because the closure of fisheries in the absence of ESA authorization or approval is a possible outcome, this alternative provides a lower bound on the potential level of impact. NOAA Fisheries makes this assumption in this NEPA document because it is the alternative with the greatest downward divergence from the proposed action, and therefore provides a realistic minimum harvest scenario for purposes of impact analysis. Therefore, for purpose of this analysis, this alternative represents closure of all tributary fisheries in the action area that might take listed salmon and steelhead.

2.2 Alternative 2 (Proposed Action)

The proposed action is to approve the FMEPs pursuant to Limit 4 of the ESA 4(d) Rule (50 CFR 223.203(b)(4)). This includes determination that the FMEPs adequately address the criteria described in section (b)(4)(I) of that Rule. Upon final determination, NOAA Fisheries would provide a letter of concurrence to ODFW and WDFW, specifying appropriate implementation and reporting requirements. NOAA Fisheries' concurrence would require the states to comply with FMEP implementation and reporting requirements, as defined in the letter of concurrence, that NOAA Fisheries may require as being necessary and/or appropriate. The ODFW and WDFW will evaluate whether the FMEPs' objectives are being accomplished and report regularly to NOAA Fisheries. A comprehensive review of each FMEP is required every five years.

2.2.1 Proposed FMEPs

The FMEPs provide a mechanism for developing, implementing, and adjusting fisheries to achieve management and conservation objectives. The FMEPs developed by ODFW and WDFW describe the management objectives for a variety of recreational fisheries and assess the potential impacts on listed salmon and steelhead in the Lower Columbia River ESUs. The FMEPs include fisheries for salmon, steelhead, trout, sturgeon, smelt, and warmwater species. The proposed fisheries are fully described in the FMEPs, and summarized here.

Nearly all of the tributaries in the Lower Columbia River have recreational fisheries that occur for particular fish species annually. The most popular fisheries are for salmon and steelhead, which occur predominantly during the spring and fall seasons. All streams managed for wild salmon and steelhead in the Lower Columbia River would be subject to fishing regulations that limit the areas open to fishing, restrict fishing to certain seasons, to stay within harvest rates determined by population viability or stock-recruit analyses to be consistent with species survival and recovery.

Fisheries for spring chinook occur in the Sandy, Lewis, Kalama, and Cowlitz rivers. As proposed in the FMEPs, all fisheries targeting spring chinook would allow only the harvest of adipose finclipped fish. All naturally produced spring chinook that are incidentally caught would be released unharmed.

The most popular fisheries for tule fall chinook salmon occur in Big Creek, Gnat Creek, Klaskanine River, Hood River, Cowlitz River, Kalama River, and Lewis River. Fisheries targeting tule fall chinook salmon would be managed according to the Rebuilding Exploitation Rates (RERs) that are specified in section 7 consultations completed by NOAA Fisheries for ocean and mainstem Columbia River fisheries. The fisheries would be managed such that cumulative impacts on Lower Columbia River tule stocks from all fisheries (including the tributaries) would not exceed the RERs.

Bright fall chinook salmon only occur in the Lewis and Sandy rivers. In the Lewis River, fisheries would be managed to meet the minimum escapement of 5,700 adult bright fall chinook salmon. In the Sandy River, no unmarked fall chinook can be harvested. The anticipated mortality of Sandy River brights would occur as a result of being caught and released in other in-river fisheries.

The most popular steelhead fisheries occur in the Clackamas, Sandy, Willamette, Hood, Wind, Washougal, Lewis, Kalama, and Cowlitz rivers. All fisheries described in the FMEPs are being managed to prohibit the retention of unmarked steelhead. Only hatchery-produced steelhead, as indicated by a missing adipose fin, can be harvested.

No fisheries target chum salmon. Fisheries impact chum salmon in the mainstem Columbia River while targeting other fish species. The tributary streams where most of the spawning of chum salmon occurs (e.g., Grays River, Hardy Creek, Hamilton Creek) are closed to fishing during the periods when chum are present.

Other proposed fisheries include those targeting coho, trout, sturgeon, smelt, crayfish, shad, carp, and a variety of warmwater fishes including largemouth bass, smallmouth bass, channel catfish, crappie, bluegill, and walleye. Also included are recreational fisheries in "select areas" – off-channel bays and sloughs where terminal fisheries are conducted for hatchery salmon which were reared and released from net pens, primarily to provide commercial fishing opportunities; commercial fisheries in select areas are not part of the proposed activities considered here.

Fishing for smelt occurs primarily from January to April and fishing for crawfish primarily occurs in the late spring and summer; participants in the smelt fishery use dip nets, while crawfish anglers primarily use pot or traps. Shad and sturgeon fishing is open year-round, with shad fishing concentrated from May through July. Commercial carp fishing season is open year-round, but the majority of the fishing and catch occur between February and June; gears allowed for use in the commercial carp fishery are trammel and beach seine nets. Fisheries targeting adult chinook occur primarily around the peak of the freshwater migration, from March through July for spring chinook and August through November for fall chinook. In Oregon, trout fishing in all streams in the Lower Columbia ESU is restricted to a late-May to October 31 season.

2.2.2 Implementation and Reporting Requirements

The proposed action is to concur with implementation of the activities described in the FMEPs subject to compliance with certain implementation terms, given that the FMEPs adequately address 4(d) Rule Limit 4 criteria. Implementation and reporting requirements relevant to the FMEPs would be included in NOAA Fisheries' concurrence letters to ODFW and WDFW regarding the FMEPs. Implementation and reporting requirements would require ODFW and WDFW to:

> (1) Comply with the guidelines, objectives, and performance standards of the FMEPs, including adoption of any necessary rules to implement their responsibilities under the plan. ODFW and WDFW would be required to conduct sampling, monitoring, assessment, evaluation, enforcement, and reporting tasks or assignments as described in the FMEPs.
>
> (2) Report regularly, as specified in the FMEPs, on the implementation of the fisheries and estimated impact rates on listed salmon and steelhead.
>
> (3) Compile the results of the "Monitoring and Evaluation" tasks, specified in section 3 of the FMEPs, every five years and provide that information to NOAA Fisheries. These reports would include biological and fishery information from the previous five years and would assess how the fisheries performed with respect to the objectives and guidelines established in the FMEPs. If field activities indicate management changes are needed,

NOAA Fisheries would be consulted to ensure that listed species are conserved and that the FMEPs continue to qualify for take limitation.

3.0 Affected Environment

The alternatives identified above potentially affect the physical, biological, social, and economic resources within the proposed action areas. This section describes the major components of the environment and its current baseline condition.

3.1 Physical Environment

The Columbia River is the third largest river system in the United States. The Columbia River exerts a dominant influence on the biota of the Pacific Northwest, although smaller, regional, distinctions exist within the basin. In the Lower Columbia River, the Cowlitz, Kalama, Lewis, White Salmon Rivers are the major river systems on the Washington state side, while the Hood, Willamette and Sandy rivers are the larger systems on the Oregon side (Figure 1).

The Lower Columbia ESUs include portions of several distinct ecoregions: Coastal Range, Puget Lowland, Willamette Valley, and Cascades (Omernik and Gallant 1986). Prominent rivers in the Coastal Range ecoregion include Big Creek, Gnat Creek, Clatskanie River, Lewis and Clark River, Klaskanine River, and Youngs River, all located on the Oregon state side. Prominent rivers in Washington include Grays River, Deep Creek, and Elochoman River. This ecoregion is influenced by medium to high rainfall levels due to the interaction between marine weather systems and the mountainous nature of the region. Topographically, the region averages about 1,600' in elevation, with mountain tops under 4,000'. These mountains are generally rugged with steep canyons. Between the ocean and the mountains lies a narrow coastal plain composed of sand, silt, and gravel. Tributary streams are short and have a steep gradient; therefore, surface runoff is rapid and water storage is relatively short term during periods of no recharge. These rivers are especially prone to low flows during times of drought. Regional rainfall averages 78-95" per year. Average annual river flows for most rivers in the region are among the highest found on the West Coast when adjusted for watershed area. River flows peak during winter rain storms common in December and January. Snow melt adds to the surface runoff in the spring, providing a second flow peak, and there are long periods when the river flows are maintained at least 50% of peak flow. During July or August there is usually little precipitation; this period may expand to 2 or 3 months every few years. River flows are correspondingly at their lowest and temperatures at their highest during August and September. Oregon coastal rivers have the largest relative difference in minimum and maximum flows, where minimum flows are 2-5% of the maximum flows.

The Puget Lowland ecoregion is situated between the Coast Range and Cascade Range ecoregions. This region experiences reduced rainfall (20-50") from the rainshadow effect of the Coast Mountains. The area is generally flat with high hills (2,000') at the southern margin of the ecoregion. Soils are composed of alluvial and lacustrine deposits. These deposits are glacial in origin north of Centralia, Washington. This area tends to have large groundwater resources, with groundwater from the bordering mountain ranges helping sustain river flows during drought periods. Peak river flow varies from December to June depending on the contribution of snowpack to surface runoff for each river system. Rivers tend to have sustained flows (5 to 8 months of flows at 50% of the peak annual flow or more), and low flows are generally 10-20% or more of the peak flows. Major rivers within the Puget Lowland ecoregion include the Cowlitz, Kalama, and Lewis rivers.

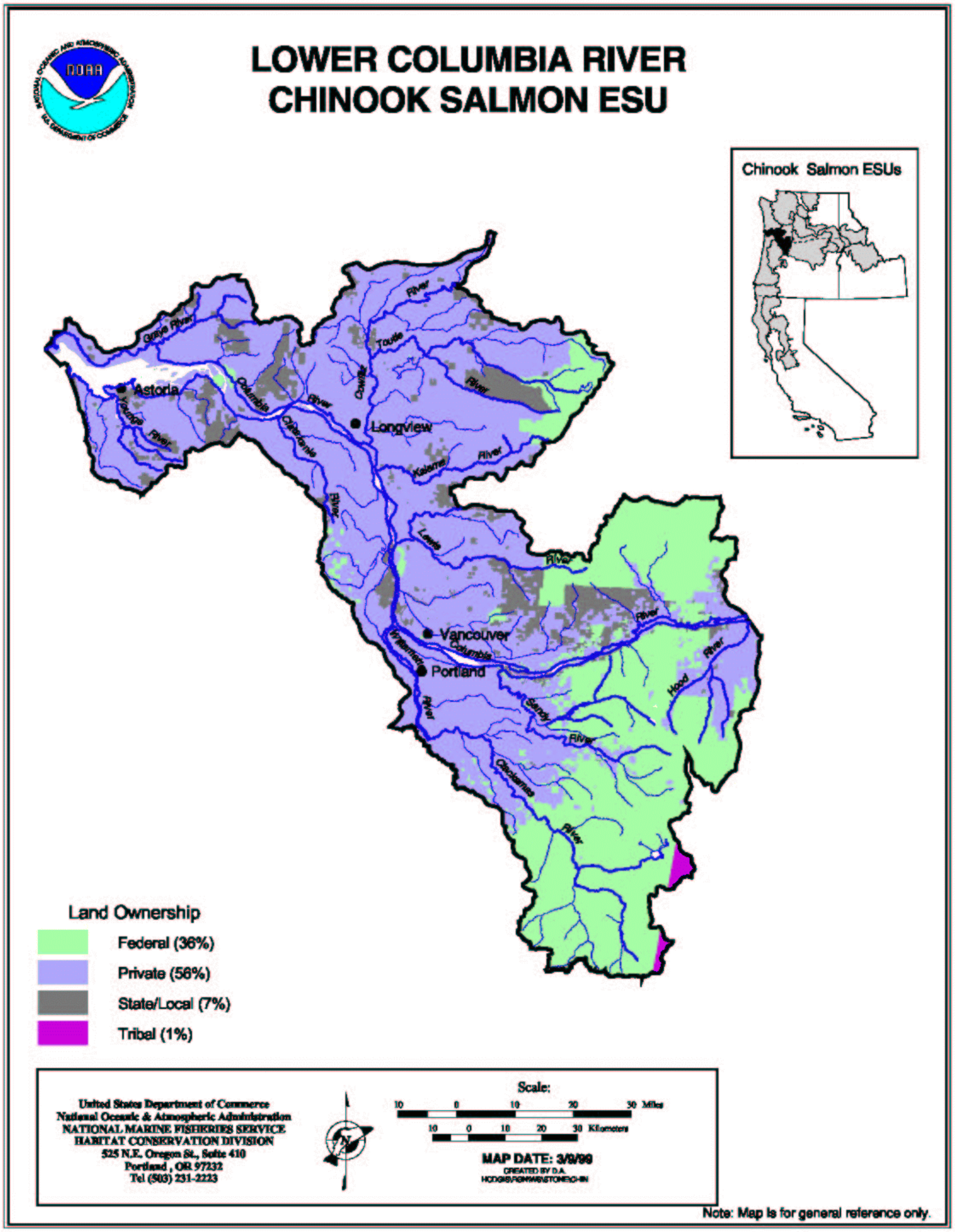

Figure 1. Map of the Lower Columbia River, specific to the Lower Columbia River chinook salmon ESU.

The Willamette Valley ecoregion adjoins the southern border of the Puget Sound Lowland ecoregion at the Lewis River. This region was not glacially influenced. A rainshadow effect, similar to the one influencing the Puget Sound Lowlands, limits rainfall to about 48" per year. River flows peak in December and January and are sustained for 6 or 7 months of the year. Low flows occur in August and September, although the volume is generally 20% of the peak flow. A major river in this ecoregion is the Clackamas River.

The Cascade ecoregion includes the Cascade Range in Washington and Oregon and the Olympic Mountains in Washington state. Peaks above 9,800' are distributed throughout the region. The crest of the Cascade range (averaging 5,000') captures much of the ocean moisture moving eastward in addition to providing a biological barrier. Rainfalls can average over 100" per year, much of which is in the form of heavy snowpack. Intensive rainstorms – those depositing more than 1" per hour – are rare. Rainfall is generally spread over the year with the majority occurring between October and March. Except where porous rock substrates exists, there is little capacity for long-term groundwater storage. In these porous rock areas, streams receive 75-95% of their average discharge as groundwater, and are able to maintain their flows during dry periods. Surface water flow originating in the Cascades and Olympic Mountains influences river flows throughout this region. The major river systems within this ecoregion include the Sandy, Hood, Wind, and Washougal rivers.

Salmon and steelhead that return from the ocean and spawn in the Lower Columbia River basin provide an essential source of nutrients to the physical environment. The carcasses of salmon and steelhead that die either prior to or after spawning decompose in the freshwater environment. This decomposition makes the nutrients in the fish's body available to organisms in the streams. Freshwater systems in the Pacific Northwest tend to be naturally oligotrophic – they produce relatively small amounts of nutrients and organic matter compared to other regions of the world (Cederholm *et al.* 2000). Therefore, the importation of marine nutrients can provide a substantial proportion of usable nutrients available to freshwater organisms. Salmon and steelhead are the primary sources of these marine-derived nutrients; the vast majority of an adult salmonid's body mass develops during ocean residence, with the result that the adult salmonid serves to transport these nutrients to the freshwater ecosystem during the return migration. Actions that reduce the numbers of salmonids transporting marine-derived nutrients back to freshwater (such as fishery harvest, restriction in passage at dams or weirs, or poor ocean conditions) will ultimately result in a reduction in the amount of available nutrients, as will actions that reduce the capability of the ecosystem to retain salmon carcasses (such as removal of large woody debris, artificial straightening of channels, or possibly substantial changes in flow regimes).

Water quality within the Lower Columbia Region has been severely degraded from human activities over the past century. Urbanization, poor land and water management practices, use of pesticides, and industrial pollution have resulted in substantial adverse changes to the quantity and quality of water within all of the streams and rivers within the region. Many of the streams do not currently meet Clean Water Act standards in the Lower Columbia region. The Lower Columbia River is listed on the Clean Water Act's 303(d) list for not meeting water quality standards for temperature, dissolved gas, toxics, and pH (Oregon Department of Environmental

Quality 2003 information found at *http://www.deq.state.or.us/wq/303dlist/303dpage.htm*). The Klaskanine, Skipanon, Clatskanie, Clackamas, Sandy, and Hood rivers are also listed on the 303(d) list for not meeting water quality standards for dissolved oxygen, bacteria, sediment, temperature, and habitat modification.

3.2 Biological Environment

The proposed fisheries are confined to the tributaries that enter the Lower Columbia River within the geographic boundaries of the listed ESUs. The Lower Columbia River chinook salmon ESU includes all natural-origin populations residing below impassable natural barriers from the mouth of the Columbia River to the crest of the Cascade Range just east of Hood River in Oregon and the White Salmon River in Washington. The Lower Columbia River steelhead ESU includes all naturally produced steelhead that spawn in tributaries of the Columbia River between the Cowlitz and Wind Rivers in Washington and the Willamette and Hood Rivers in Oregon, excluding steelhead in the Willamette River upstream of Willamette Falls (which belong to the Upper Willamette ESU). The Columbia River chum salmon ESU includes all naturally produced populations that enter the Columbia River. The ESUs and critical habitat are further described in sections 3.2.1., 3.2.2., and 3.2.3. below. The biological resources discussed below include salmon and steelhead listed under the ESA, and trout and other aquatic and terrestrial species that are likely to be affected by the proposed fisheries. Biological resources outside of these action areas are not considered in this EA.

3.2.1 Lower Columbia River chinook salmon

Chinook salmon, also known by the common names king, spring, quinnat, and tyee salmon, historically ranged from the Ventura River in California to Point Hope, Alaska, in North America (Healey 1991). Additionally, chinook salmon have been reported in the Mackenzie River area of northern Canada (McPhail and Lindsey 1970). Many of the chinook salmon stocks in these ESUs have been in decline for decades (Myers *et al*. 1998). Factors implicated in the decline of the species include dams, logging, agriculture, water withdrawal, mining, and urbanization, all of which contribute to habitat loss and degradation, overfishing, and the wide use of hatcheries and other forms of artificial propagation (Myers *et al*. 1998). In addition, sources suggest that the "inadequacy of existing regulatory mechanisms" is a general reason for overall decline in abundance of chinook salmon (Oregon Natural Resources Council and Nawa 1995).

Of the Pacific salmon, chinook salmon is the largest of the salmon species in body size and exhibits one of the most diverse and complex life history strategies. Two generalized freshwater life-history types were initially described by Gilbert (1912): "stream-type" chinook salmon reside in freshwater for a year or more following emergence, whereas "ocean-type" chinook salmon migrate to the ocean within their first year. Healey (1983; 1991) has promoted the use of broader definitions for "ocean-type" and "stream-type" to describe two distinct races of chinook salmon. This racial approach incorporates life history traits, geographic distribution, and genetic differentiation and provides a valuable frame of reference for comparisons of chinook salmon populations.

Chinook salmon may spend one to six years in the ocean before returning to their natal streams to spawn. Most of the salmon in Oregon and Washington mature as three to five year old adults (Myers *et al.* 1998). Ocean distribution differs between ocean- and stream-type chinook, where ocean-type chinook tend to migrate along the coast, and stream-type chinook migrate far from the coast in the central North Pacific (Healey 1983; 1991). Chinook populations south of Cape Blanco tend to migrate to the south, while those north of Cape Blanco tend to migrate in a northerly direction (Myers *et al.* 1998). Chinook salmon populations can be characterized by their time of freshwater entry as spring, summer, or fall runs. Spring chinook tend to enter freshwater and migrate far upriver, where they remain and become sexually mature before spawning in the late summer and early autumn. Fall chinook enter freshwater in a more advanced stage of sexual maturity, move rapidly to their spawning areas on the mainstem or lower tributaries of their natal rivers and spawn within a few days or weeks of freshwater entry (Fulton 1970; Healey 1991). Summer chinook are intermediate between spring and fall runs, spawning in large and medium-sized tributaries, and not showing the extensive delay in maturation exhibited by spring chinook (Fulton 1970).

The Lower Columbia River chinook salmon ESU (Figure 1) includes all natural-origin populations residing below impassable natural barriers from the mouth of the Columbia River to the crest of the Cascade Range just east of Hood River in Oregon and the White Salmon River in Washington (March 24, 1999, 64 FR 14308). The historic site of Celilo Falls, east of the Hood River in Oregon is considered the eastern boundary of this ESU since it may have been a migrational barrier to chinook at certain times of the year (Myers *et al.* 1998). This ESU is located in portions of Clark, Cowlitz, Skamania, and Wahkiakum Counties in Washington, and in portions of Clatsop, Columbia, Multnomah, Hood River, and Clackamas Counties in Oregon. The Cowlitz, Kalama, Lewis, Washougal, and White Salmon Rivers constitute the major systems in Washington; the lower Willamette, Hood, and Sandy Rivers are the major systems in Oregon. Major river basins containing spawning and rearing habitat for this ESU comprise approximately 6,338 square miles in Oregon and Washington (NMFS 2002).

The ESU does not include spring populations above Willamette Falls or the introduced Carson spring chinook salmon strain in the Wind River. Tule fall chinook salmon in the Wind and Little White Salmon Rivers and fall chinook produced at the Spring Creek National Fish Hatchery are included in this ESU, but not introduced upriver bright fall chinook salmon populations in the Wind and White Salmon Rivers. WDF *et al.* (1993) identified 20 stocks within the ESU, but surveyed only Washington stocks, which did not include the Clackamas tule, Sandy spring, or Sandy fall bright spawning aggregations in Oregon. NOAA Fisheries is currently engaged in delineating the population structure of this and other ESUs as an initial step in a formal recovery planning effort that is now underway.

There are three different historic runs of chinook salmon in this ESU: spring-run, late fall brights, and early fall tules. Lower Columbia River chinook mature from two to six years of age, primarily returning as three and four year old adults (Myers *et al.* 1998). Spring-run chinook salmon on the lower Columbia River, like those from coastal stocks, enter freshwater in March and April, well in advance of spawning in August and September. Historically, fish migrations were synchronized with periods of high rainfall or snow melt to provide access to upper reaches of most tributaries where spring stocks would hold until spawning (Fulton 1970; Olsen *et al.* 1992; WDF *et al.* 1993). Fall run fish do not enter the Columbia River until August.

Estimated overall abundance of chinook salmon in this ESU is not cause for immediate concern. However, about half of the populations comprising this ESU are very small, increasing the likelihood that risks due to genetic and demographic processes in small populations will be important. Long-term trends in fall run escapement are mixed, with most larger stocks positive, while the spring run trends are positive or stable. Short-term trends for both runs are more negative, some severely so (Myers *et al.* 1998). Apart from the relatively large and apparently healthy fall-run population in the Lewis River, production in this ESU appears to be predominantly hatchery-driven with few identifiable native, naturally reproducing populations.

Spring chinook were present historically in the Sandy, Clackamas, Hood, Cowlitz, Kalama, and Lewis rivers (Clackamas River spring chinook are considered part of the listed Upper Willamette River chinook ESU). Spawning and juvenile rearing areas have been eliminated or greatly reduced by dam construction on all these rivers. The native Lewis run became extinct soon after completion of Merwin Dam in 1932. The natural Hood River spring chinook population was extirpated in the 1960's after a flood caused by the natural breaching of a glacial dam resulted in extensive habitat damage in the West Fork production areas. Currently, non-listed hatchery spring chinook from the Deschutes River are being released into the Hood River as part of an experimental reintroduction program. The remaining spring chinook stocks in the Lower Columbia River ESU are found in the Sandy, Lewis, Cowlitz, and Kalama Rivers. Numbers of naturally spawning spring-run chinook salmon are very low. Hatchery spring chinook salmon continue to be planted in these areas. Escapements above Marmot Dam on the Sandy River between 1996 and 2000 average 2,200 natural-origin adults, and have generally been increasing (ODFW 2001a; WDFW and ODFW 2002). Hatchery-origin spring chinook are no longer released above Marmot Dam; the proportion of first generation hatchery fish in the escapement is relatively low, on the order of 10-20% in recent years. Recent average escapements of naturally spawning spring chinook adults in the Cowlitz, Kalama, and Lewis Rivers are 237, 198, and 364, respectively (LeFleur 2000; LeFleur 2001). The amount of natural production resulting from these escapements is unknown, but is presumably small since the remaining habitat in the lower rivers is not the preferred habitat for spring chinook (WDFW and ODFW 2002). Hatchery escapement goals have been consistently met in the Cowlitz and Lewis Rivers. In the past, when it was necessary, brood stock from the Lewis River was used to meet production goals in the Kalama River.

Fall chinook populations in the Lower Columbia River are self-sustaining and escapements are generally stable (WDFW and ODFW 2002). All medium to large tributaries in the area once had native populations of fall chinook. The tule component of the fall chinook populations spawn in the Coweeman, East Fork Lewis, and Clackamas Rivers. Escapements for these populations have averaged several hundred to 1,000 per year (data provided by C. LeFleur, WDFW, to S. Bishop, NOAA Fisheries, April 9, 2000). Some natural spawning of tule fall chinook occurs in other areas but is thought to result primarily from hatchery-origin strays. Tule fall chinook are produced from the Elochoman, Cowlitz, Toutle, Kalama, Spring Creek, and Washougal hatcheries in Washington and Big Creek hatchery in Oregon. The late fall bright component of Lower Columbia River chinook spawn in the North Fork Lewis, Sandy, and East Fork Lewis Rivers. Lower Columbia River bright stocks are among the few healthy natural chinook stocks in the Columbia River basin. Returns to the North Fork Lewis River have exceeded the escapement goal of 5,700 by a substantial margin every year since 1980, except 1999, with a recent five year average escapement of 8,400. Escapements of the two smaller populations of brights in the Sandy and East Fork Lewis River have been stable for the last 10-12 years and are largely unaffected by hatchery fish (WDFW and ODFW 2002).

Freshwater habitat is in poor condition in many basins, with problems related to forestry practices, urbanization, and agriculture. Dam construction on the Cowlitz, Lewis, White Salmon, and Sandy Rivers has eliminated access to a substantial portion of the spring-run spawning habitat, with a lesser impact on fall-run habitat (Myers *et al.* 1998).

Lower Columbia River spring chinook salmon still exhibit distinctive genetic and behavioral characteristics compared to other chinook salmon. However, the potential loss of fitness and diversity resulting from the introgression of hatchery fish within the ESU is a valid concern. In response to concerns about straying into tributaries of the Lower Columbia River (Myers *et al.* 1998), the release locations for non-ESU Rogue River bright fall-run fish in Youngs Bay were changed and, as a result, stray rates have declined markedly (R.Turner, NOAA Fisheries, to S. Bishop, NOAA Fisheries, pers. comm., February 19, 2002).

3.2.2 Lower Columbia River steelhead

Steelhead (*Oncorhynchus mykiss*) occur in North America from Northwestern Mexico to the Kuskokwim River in Alaska (Lichatowich 1999). Steelhead exhibit more complex life history traits than other Pacific salmonid species. Some forms of *O. mykiss* are anadromous while others, called rainbow or redband trout, are resident forms that remain permanently in freshwater. Anadromous steelhead reside in freshwater for as long as seven years before moving to the ocean. Steelhead typically reside in marine waters for 2 or 3 years before returning to their natal stream to spawn at 4 or 5 years of age. Some Oregon and California populations include “half-pounders” that migrate from the ocean to freshwater and return to the ocean without spawning (Busby *et al.* 1996).

Steelhead can be divided into two basic run types based on the level of sexual maturity at the time of river entry and the duration of the spawning migration (Burgner *et al*. 1992). The stream-maturing type (inland), or summer steelhead, enters freshwater in a sexually immature condition and require several months in freshwater to mature and spawn. The ocean-maturing type (coastal), or winter steelhead, enters freshwater with well-developed gonads and spawns shortly after river entry (Barnhart 1986). Variations in migration timing exist between populations. Both summer and winter steelhead occur in British Columbia, Washington, and Oregon; Idaho has only summer steelhead; California is thought to have only winter steelhead (Busby *et al.*

1996). In the Pacific Northwest, summer steelhead enter freshwater between May and October, and winter steelhead enter freshwater between November and April.

Steelhead are iteroparous, or capable of spawning more than once before death. Repeat spawning by steelhead probably ranges from 10%-20% of the spawning population annually. Steelhead spawn in cool, clear streams with suitable gravel size, depth, and current velocity. Intermittent streams may also be used for spawning (Barnhart 1986; Everest 1973). Steelhead enter streams and arrive at spawning grounds weeks or even months before they spawn, where they are vulnerable to disturbance and predation. Cover – in the form of overhanging vegetation, undercut banks, submerged vegetation, submerged objects such as logs and rocks, and floating debris – deep water, turbulence, and turbidity are required to reduce disturbance and predation of spawning steelhead. Summer steelhead usually spawn further upstream than winter steelhead (Behnke 1992). Juveniles typically rear in freshwater from 1 to 4 years before migrating to the ocean. Winter steelhead generally smolt after 2 years in freshwater (Busby *et al.* 1996).

Based on catch data, juvenile steelhead tend to migrate directly offshore during their first summer, rather than migrating nearer the coast as do salmon. During fall and winter, juveniles move southward and eastward (Hartt and Dell 1986). Available fin-mark and coded-wire tag data suggest that winter steelhead tend to migrate farther offshore but not as far north into the Gulf of Alaska as summer steelhead (Burgner *et al.* 1992) and that southern Oregon and California populations are south-migrating rather than north-migrating (Nicholas and Hankin 1988; Pearcy *et al.* 1990; Pearcy 1992). Ocean distribution data for specific ESUs is limited. Maturing Columbia River steelhead are found off the coast of Northern British Columbia and west into the North Pacific Ocean (Myers *et al.* 1998). At the time adults are entering freshwater, tagging data indicate that immature Columbia River steelhead are out in the mid-North Pacific Ocean. Even less is known about the marine distribution patterns of California steelhead. No tag recoveries of mature California steelhead have been reported from the North Pacific Ocean or northern inland waters. A few immature California steelhead were recovered during the 1956-1995 time period in the open ocean, consistent with the winter-run life history (Myers *et al.* 1996). Tags from California coho and chinook are recovered almost exclusively in California and Oregon fisheries. Since California coho and chinook stocks share similar patterns of ocean distribution, it is reasonable to assume that listed California steelhead ESUs would also have a southerly distribution.

The Lower Columbia River steelhead ESU includes all naturally produced steelhead in tributaries to the Columbia River between the Cowlitz and Wind Rivers in Washington and the Willamette and Hood Rivers in Oregon, excluding steelhead in the upper Willamette River above Willamette Falls (Upper Willamette ESU) (Busby *et al.* 1996). Major river basins containing spawning and rearing habitat for this ESU comprise approximately 5,017 square miles in Oregon and Washington. The following counties lie partially or wholly within these basins (or contain migration habitat for the species): Oregon - Clackamas, Clatsop, Columbia, Hood River, Marion, Multnomah, and Washington; Washington - Clark, Cowlitz, Lewis, Pacific, Skamania, and Wahkiakum. This ESU was listed as a threatened species on March 19, 1998 (63 FR 13347).

Steelhead in this ESU belong to the coastal genetic group (Schreck *et al.* 1986; Reisenbichler *et al.* 1992; Chapman *et al.* 1994) and include both winter steelhead (Cowlitz, Toutle, Coweeman, Kalama, Washougal, Sandy, Hood, Clackamas and Wind rivers) and summer steelhead (Kalama, Lewis, Hood and Washougal Rivers). WDF *et al.* (1993) identified 19 stocks considered to be predominantly of natural production. Among hatchery stocks, late-spawning Cowlitz River Trout Hatchery and the late-spawning Clackamas River hatchery stock are part of the ESU, but are not considered essential for recovery (NMFS 2000c, Appendix C). Hatchery programs that use local natural stocks of winter steelhead have been developed in the Cowlitz River, Kalama River, Sandy River, Clackamas River, and Hood River basins.

Life history attributes for steelhead within this ESU appear to be similar to those of other west coast steelhead. Most Lower Columbia River steelhead rear two years in freshwater and spend one or two years in the ocean prior to re-entering fresh water, where they may remain up to a year prior to spawning (Howell *et al.* 1985; BPA 1992). Summer-run stocks generally enter freshwater from May through October while winter stocks generally enter freshwater from November to May (Busby *et al* 1996). Peak entry generally occurs in July (B. Leland, WDFW, to S. Bishop, NOAA Fisheries, pers. comm., July 1999).

No estimates of historical abundance (pre-1960s) specific to this ESU are available. A conservative estimate of current abundance puts the average run size at greater than 16,000 naturally produced fish. Abundance trends are mixed and may be affected by short-term climate conditions. The majority of stocks for which data are available within this ESU have been declining in the recent past, but some have been increasing strongly. However, the strongest upward trends are those of either non-native stocks (Lower Willamette River and Clackamas River summer steelhead) or stocks that are recovering from major habitat disruption and are still at low abundance (mainstem and North Fork Toutle River) (Busby *et al.* 1996). There has been a general increasing trend for the naturally produced steelhead populations in this ESU from the lows observed in 1996, with some populations rebounding quicker than others (WDFW 2001; ODFW 2001c; ODFW 2001d).

The magnitude of hatchery production, habitat blockages from dams, and habitat degradation from logging and urbanization are areas of concern. The widespread production of hatchery steelhead within this ESU (hatchery contribution in some areas is over 50% of the total return) creates specific genetic and ecological concerns for summer steelhead and Oregon winter steelhead stocks, where there appears to be substantial overlap in spawning between hatchery and natural fish (Busby *et al.* 1996). Most of the hatchery stocks originate from stocks within the ESU, but many are not native to local river basins. Because of their limited distribution in upper tributaries and the urbanization surrounding the lower tributaries, summer steelhead appear to be more at risk from habitat degradation than winter steelhead.

3.2.3 Columbia River chum salmon

Historically, chum salmon (*Oncorhynchus keta*) were distributed throughout the coastal regions of western Canada and the United States, as far south as Monterey Bay, California. Presently, major spawning populations are found only as far south as Tillamook Bay on the northern Oregon coast (Johnson *et al.* 1997). Also known as dog salmon, chum salmon are the second largest Pacific salmonid in body size after chinook and may have also been the most abundant salmonid. It is estimated that, prior to the 1940s, chum salmon accounted for almost 50 percent of the total Pacific Ocean salmonid biomass.

Chum salmon spend more of their life history in marine waters than other Pacific salmonids. Chum spend two to five years in the northeast Pacific Ocean feeding areas prior to migrating southward during the summer months as maturing adults along the coasts of Alaska and British Columbia in returning to their natal streams (WDFW and PNPTT 2000). Most chum salmon mature as four year old adults (Johnson *et al.* 1997). Chum salmon usually spawn in the lower reaches of rivers, with redds usually dug in the mainstem or in side channels of rivers from just above tidal influence to nearly 100 km from the sea. Juveniles outmigrate to salt water almost immediately after emerging from the gravel that covers their redds (Salo 1991). This ocean-type migratory behavior contrasts with the stream-type behavior of some other species in the genus *Oncorhynchus* (e.g., coastal cutthroat trout, steelhead, coho salmon, and most types of chinook and sockeye salmon), which usually migrate to sea at a larger size, after months or years of freshwater rearing. This means that survival and growth in juvenile chum salmon depend less on freshwater conditions (unlike stream-type salmonids which depend heavily on freshwater habitats) than on favorable estuarine conditions. Another behavioral difference between chum salmon and species that rear extensively in freshwater is that chum salmon form schools, presumably to reduce predation (Pitcher 1986).

The Columbia River chum salmon ESU includes all naturally produced populations that enter the Columbia River. The Columbia River chum salmon ESU occurs in portions of Clark, Cowlitz, Lewis, and Wahkiakum Counties in Washington and Clatsop, Columbia, and Multnomah Counties in Oregon.

Historically, chum salmon were abundant in the lower reaches of the Columbia River and may have spawned as far upstream as the Walla Walla River (Johnson *et al.* 1997). However, reductions in available habitat currently limit chum salmon in the Columbia River to tributaries below Bonneville Dam. Presently only two chum salmon population groups are recognized and monitored in the Columbia River (Grays River, and Hardy and Hamilton Creeks/Ives Island/Duncan Creek group), although chum salmon have been reported in other areas (Salo 1991; Kostow 1995).

The information on ocean migration patterns and distribution is limited and no region-specific information for this ESU is available (Johnson *et al.* 1997). There is some speculation that Columbia River chum salmon had a more southerly ocean distribution similar to the present-day distribution and migration pattern of Columbia River coho (Sandercock 1991). Grays River chum salmon enter the Columbia River from mid-October to mid-November, but apparently do not reach the Grays River until late October to early December. These fish spawn from early November to late December. Fish returning to Hamilton and Hardy Creeks begin to appear in the Columbia River earlier than Grays River fish (late September to late October) and have a more protracted spawn timing (mid-November to mid-January).

Historically, hundreds of thousands of chum salmon returned to the Columbia River (Johnson *et al.* 1997). Information from stream surveys of the remaining populations suggests that there may be between a few hundred and 5,000 chum spawning annually in the entire Columbia River basin. The estimated minimum run size for the Columbia River chum salmon ESU has been relatively stable since the run collapsed during the mid-1950s (Johnson *et al.* 1997), although, in 2000, only one chum was counted during stream surveys in the Oregon tributaries (WDFW 2001; ODFW 2001b). Because of the reduction in geographic occurrence, and because current abundance of this ESU is less than 1% of historic levels, the ESU has likely lost some of its original genetic diversity (Johnson *et al.* 1997).

Decline of this ESU is attributed to dams and habitat degradation primarily due to diking and wetland loss (Sherwood *et al*. 1990; Johnson *et al.* 1997). Hatchery fish have likely had little influence on the wild component of the Columbia River chum salmon ESU because there is only limited production of hatchery chum salmon in the Columbia River Basin (Johnson *et al.* 1997). The retention of chum salmon has been prohibited in all Oregon-side Columbia River tributaries since 1992, and in Washington-side tributaries since 1995.

3.2.4 Other Listed Fish Species

Bull Trout – Another ESA-listed fish species that could be present in the areas where the fisheries are proposed to occur is bull trout (*Salvelinus confluentus*). The Columbia River population segment of bull trout was listed as threatened by USFWS in 1998 (June 10, 1998, 63 FR 31647).

The Columbia River population segment encompasses a vast geographic area including portions of Idaho, Montana, Oregon, Washington, and British Columbia. Bull trout are present in some portions of the mainstem Columbia River, but likely in low numbers. In the Willamette River, bull trout are found only in the upper reaches of the McKenzie River (a tributary of the upper Willamette River). No other rivers addressed by the FMEPs support populations of bull trout.

Bull trout populations are known to exhibit four distinct life history forms: resident, fluvial, adfluvial, and anadromous. Resident bull trout spend their entire life cycle in the same (or nearby) streams in which they were hatched. Fluvial and adfluvial populations spawn in tributary streams where the young rear from 1 to 4 years before migrating to either a lake (adfluvial) system or a river (fluvial) system, where they grow to maturity. Anadromous fish spawn in tributary streams, with major growth and maturation occurring in salt water.

Migratory bull trout have been restricted and/or eliminated due to stream habitat alterations, including seasonal or permanent obstructions, detrimental changes in water quality, increased temperatures, and the alteration of natural stream flow patterns. The disruption of migratory corridors, if severe enough, will result in the loss of migratory life history types and isolate resident forms. Historic bull trout populations of the lower Columbia River consisted of adfluvial, fluvial, and resident components. While each life history form is still represented, the resident form is dominant, followed by the fluvial, and adfluvial. There are no recent records of bull trout use, juvenile or adult, in the Columbia River estuary, but based on unconfirmed historic information, adults may occur there.

Oregon Chub –The Oregon chub (*Oregonichthys crameri*) is a small minnow endemic to the Willamette River drainage of western Oregon (Markle *et al.* 1991). This species is currently listed as endangered (October 18, 1993, 58 FR 53800). This species was formerly distributed throughout the Willamette River Valley in off-channel habitats such as beaver ponds, oxbows, side channels, backwater sloughs, low gradient tributaries, and flooded marshes (Snyder 1908). Historical records show Oregon chub were found as far downstream as Oregon City and as far upstream as Oakridge. Records of Oregon chub collections exist for the Clackamas River, Molalla River, Mill Creek, South Santiam River, North Santiam River, Luckiamute River, Long Tom River, McKenzie River, Calapooia River, Muddy Creek, Mary's River, Coast Fork Willamette River, Middle Fork Willamette River, and the mainstem Willamette River (Markle *et al*. 1991; Scheerer and McDonald 2000).

Oregon chub are found in slack water off-channel habitats such as beaver ponds, oxbows, side channels, backwater sloughs, low gradient tributaries, and flooded marshes. These habitats usually have silty and organic substrate, little or no water flow, and considerable aquatic vegetation as cover for hiding and spawning (Pearsons 1989; Markle *et al*. 1991; Scheerer and McDonald 2000). The average depth of Oregon chub habitats is typically less than two meters (six feet) and the summer temperatures typically exceed 16 degrees Celsius (61 degrees Fahrenheit). Adult Oregon chub seek dense vegetation for cover and frequently travel in the mid-water column in beaver channels or along the margins of aquatic plant beds. Larval chub congregate in near shore areas in the upper layers of the water column in shallow areas (Pearsons 1989; Scheerer 1997). Juvenile Oregon chub venture farther from shore into deeper areas of the water column (Pearsons 1989). In the winter months, Oregon chub can be found buried in the detritus or concealed in aquatic vegetation (Pearsons 1989). Fish of similar size classes school and feed together. In the early spring, Oregon chub are most active in the warmer, shallow areas of the ponds.

In the last 100 years, backwater and off-channel habitats have disappeared due to changes in seasonal flows resulting from the construction of dams throughout the basin, channelization of the Willamette River and its tributaries, removal of snags for river navigation, and agricultural practices. Various non-native aquatic species were introduced to the Willamette Valley over the same period. These activities reduced available Oregon chub habitat, isolated the existing Oregon chub populations, restricted mixing between populations, reduced the probability of successful recolonization by Oregon chub, and introduced new competitors and predators into Oregon chub habitat (USFWS 1998).

3.2.5 Non-listed Fish Species

Many other fish species that are not currently listed under the ESA reside in the tributaries of the Lower Columbia River. The species most likely to be caught by anglers in the tributaries are described below.

Coho Salmon – Coho salmon (*Oncorhynchus kisutch*) were historically abundant throughout the Lower Columbia region. On the Oregon side of the Lower Columbia, remnant populations of coho salmon are still present in the Sandy and Clackamas rivers. In recent years, the runs to these rivers have ranged from zero to several hundred fish. The abundance of coho salmon in the 1960's (when monitoring began in these rivers) were typically four to five thousand fish per year and ranged as high as 20,000 fish. Natural spawning of coho may also occur in other areas such as the Lewis and Clark River, Klaskanine River, Youngs River, Big Creek, Clatskanie River, and Gnat Creek. In 1995, NOAA Fisheries defined coho in the Columbia River to be part of the Lower Columbia River/Southwest Washington ESU, and determined that listing was not warranted (July 25, 1995, 60 FR 38011). However, the ESU is designated as a candidate for listing, and its status is subject to on-going review. The state of Oregon has listed coho salmon in the Lower Columbia River under the state ESA. On the Washington side, coho salmon spawning occurs primarily in the Grays, Elochoman, Cowlitz, Kalama, and Lewis rivers. Due to the depressed status of wild coho stocks in the Lower Columbia River, fishery impacts have been substantially reduced. Recent cumulative harvest rates from ocean and freshwater fisheries have been less than 15%, compared to historic harvest rates of 80 to 90%. All fisheries have required the release of wild coho salmon in the Lower Columbia River and tributaries since 1998.

Rainbow trout – Only anadromous forms of *O. mykiss* are listed under the ESA (August 18, 1997, 62 FR 43937). In the Lower Columbia River, resident rainbow trout occur but are not really prominent in many areas. The tributaries are dominated by the steelhead life form. Little information exists on the status and abundance of resident trout because of their low numbers. Impacts on resident rainbow trout are likely to have been substantially reduced from regulation changes and elimination of hatchery trout stocking from efforts to help protect steelhead and cutthroat (Hall *et al.* 1997). Recent fisheries for resident trout where listed steelhead co-occur are entirely catch-and-release; no unmarked trout can be retained. Since no wild trout can be retained by anglers and fishing effort is low, potential impacts on resident rainbow trout are likely to be very low. Resident trout fisheries are included in the FMEPs to assess potential impacts on listed salmon and steelhead.

Cutthroat Trout – Coastal cutthroat (*Oncorhynchus clarki clarki*) are present throughout the Lower Columbia region. Coastal cutthroat exhibit a wide range of life history strategies. The three basic variations include a resident or primarily non-migratory form, freshwater migrants, and marine migrants (sea-run) (Hall *et al*. 1997). Resident forms stay within the same stream reach their entire life. Freshwater migrants typically move from small tributaries to larger streams or to lakes and reservoirs. Marine migrants move from their natal stream to estuarine and nearshore, coastal areas for a period of time. Current abundance of cutthroat trout is lower than historical levels; however information is sparse throughout the region. The U.S. Fish and

Wildlife Service concluded the Southwestern Washington/Columbia River Distinct Population Segment did not warrant listing under the ESA (July 5, 2002, 67 FR 44934). Many of the fishery regulations in the FMEPs for steelhead affect coastal cutthroat trout because the two species are sympatric in most areas of the Lower Columbia region.

Sturgeon – Two species of sturgeon are found in the Columbia River, the white (*Acipenser transmontanus*) and the green (*A. medirostris*). Green sturgeon are more marine-associated than white sturgeon, and are harvested almost exclusively in the fall season commercial gill-net fishery in the lower Columbia River. Very few green sturgeon are caught in the estuary recreational fishery in the summer.

The white sturgeon is the more valuable species in river fisheries because of its larger size and higher-quality flesh. The white sturgeon population below Bonneville Dam is considered healthy and productive, while the health of those populations above Bonneville Dam are considered to be improving but still depressed, due to their segmented nature resulting from reservoir impoundments. Recreational and commercial fisheries in the lower Columbia River were constrained in the late 1980's to prevent overharvest and allow additional recruitment into the legal-sized portion of the population. Increased abundance, and adjustments in the size limits in recent years, have allowed harvest to increase for both recreational and commercial fisheries.

Smelt – Smelt (or eulachon; *Thaleichthys pacificus)* are found in the mainstem Lower Columbia River and tributaries downstream from Bonneville Dam. Smelt first enter the Columbia River, usually in December and January, when water temperature is favorable, near 40 degrees Fahrenheit. Spawning occurs primarily in the mainstem and Cowlitz, but in some years runs occur in the Grays, Elochoman, Lewis, Kalama, and Sandy rivers (WDFW and ODFW 2002). Commercial and recreational (dip-netting) fisheries occur in the mainstem Columbia River and Cowlitz River. Commercial landings of smelt declined precipitously from the 1980's to the late 1990's, suggesting a decline in the overall health of the smelt run (NMFS 1997). NOAA Fisheries concluded harvest of smelt should be reduced because indicators suggested the smelt run was declining substantially in the 1990s (NMFS 1997). In 2001 and 2002, the status of smelt improved from the low abundances observed in the mid-1990s, most likely due to fishery harvest constraints and increased freshwater and ocean productivity (WDFW and ODFW 2001).

Shad – Shad (*Alosa sapidissima*), a species not native to the West Coast, is abundant in the Columbia River. Counts of shad at Bonneville Dam steadily increased after the mainstem dams were constructed and reached a record high run size of four million fish in 1990. The abundance of shad typically exceeds one to two million fish per year across Bonneville Dam. In the Lower Columbia River action area, shad are most abundant in the lower Willamette River below the Falls. Recreational and commercial fisheries target shad from April through June in the mainstem Columbia and Willamette rivers.

Warmwater Fish Species – Many introduced warmwater fishes (family Centrarchidae) are found in the Lower Columbia River. The most popular fisheries target bass, crappie, and bluegill. However, since these species are most abundant in standing water bodies and in the mainstem Columbia River, most of the fishing occurs in these areas and not in the tributaries of the Lower Columbia River.

3.2.6 Other Aquatic and Terrestrial Species

Many other aquatic and terrestrial species are found in the fishing areas of the Lower Columbia River. Other non-game fish species that may be present include dace (*Rhinichthys* spp.), sculpin (*Cottus* spp.), largescale sucker (*Catostomus macrocheilus*), Northern pikeminnow (*Ptychocheilus oregonensis*), and redside shiners (*Richardsonius balteatus*). Other terrestrial species, including belted kingfisher (*Ceryle alcyon*), great blue heron (*Ardea herodias*), green heron (*Butorides striatus*), common merganser (*Mercus merganser*), river otter (*Lutra canadensis*), raccoon (*Procyon lotor*), and mink *(Mustela vison*), are commonly found along rivers and streams in the Lower Columbia region.

3.3 Social and Economic Environment

Salmon are culturally, economically, and symbolically important in the Pacific Northwest. Natural and hatchery-origin salmon continue to play an important role for Native American cultural, religious, subsistence, and commercial purposes in the action area. The current depleted status of salmon and steelhead populations has severely limited many of the cultural practices and subsistence uses of salmonids by the local tribes. Tribal harvest throughout the Pacific Northwest has declined 90% in recent years, from about 5 million salmon in 1986 to about 500,000 in 1999 (Frank 2002). Much of this decline is in response to conservation concerns for reduced salmonid populations, as a result of a variety of factors for decline (as described above), as well as the actual decrease in abundance of many of the salmonid aggregations upon which the fisheries are based.

The early history of non-Indian use of fishery resources in the Columbia River Basin was described by Craig and Hacker (1940). Early traders, trappers, and settlers began arriving around 1800. These early immigrants began taking salmon for their own use and consumption, often trading for fish with the Indians. Early attempts at commercial taking of salmon began in 1829, with salmon harvest as a commercial industry beginning in earnest by the mid-1880s. The first cannery on the Columbia River produced its first pack of canned salmon in 1866. By 1887, the number of canneries in the basin peaked at 39. Salting, mild-curing, and other methods of salmon preparation were also taking place, and Columbia River salmon were becoming well-known internationally. The total production of canned, mild-cured, and frozen salmon and steelhead in the Columbia River Basin rose from 272,000 pounds in 1886 to annual productions between 20 and 50 million pounds from 1874 through 1936.

The gear used to fish commercially for Columbia River salmon included gill nets, purse seines, traps, dip nets, fish wheels, and a variety of other methods (Craig and Hacker 1940). The combined gear types were landing an average of 24,477,370 pounds of salmon and steelhead annually between 1927 and 1934.

The increased use of gasoline engines on boats enhanced the development of trolling as a commercial salmon harvest method after about 1905, predominantly for chinook and coho salmon. Between 1926 and 1934, the average annual troll catch in the Columbia River was 894,000 pounds of chinook and 2.6 million pounds of coho salmon (Craig and Hacker 1940).

In the early 1900s, as increased agriculture, industry, and land development began to reduce the amount of suitable habitat for salmon spawning and rearing, the annual catch of chinook salmon fluctuated widely. As chinook salmon abundances began to decline, starting around 1911, the focus of commercial harvest operations began to shift to other species. As total salmonid abundances in Columbia River fisheries continued to decline, concerns for the continued health of salmonid stocks increased. Management actions began to be developed and implemented to slow the decline of salmon abundances, including the elimination of fish wheels and purse seines on the Columbia River, and reduced commercial gillnet seasons. In recent years, with salmonid numbers severely reduced due primarily to habitat degradation and hydropower development in the mainstem river, commercial and recreational fisheries have been considerably cut back from earlier levels. Harvest rates are managed at conservative levels until improvements in other sectors of the environment are able to take effect.

The Lower Columbia River region attracts many anglers annually. The fisheries are popular, especially with anglers from the Portland metropolitan area (the most populated area in the state of Oregon with a population of approximately 2 million people). Fishing provides important economic benefits to local communities from the sale of fishing licenses, boats and tackle, lodging, gasoline, and food. Fishing effort for spring chinook and winter steelhead in the Lower Columbia tributaries has been high from 1974 to 1997 – an average of at least 150,000 angler days per season (Foster 1998). A 1996 survey showed anglers in Oregon spend approximately $80 per day for fishing-related costs (USDI and USDC 1996). These estimates would equate to revenue of more than $12 million dollars per season for this area for fishery activities alone. Additional revenue accrues to the region from tourism and other non-consumptive uses, some portion of which is dependent upon or encouraged by the presence of salmon and steelhead.

3.4 Environmental Justice

Executive Order 12898 (59 FR 7629) states that Federal agencies shall identify and address, as appropriate "…disproportionately high and adverse human health or environmental effects of [their] programs, policies and activities on minority populations and low-income populations…." While there are many economic, social, and cultural elements that influence the viability and location of such populations and their communities, certainly the development, implementation and enforcement of environmental laws, regulations and policies can have impacts. Therefore, Federal agencies, including NOAA Fisheries, must ensure fair treatment, equal protection and meaningful involvement for minority populations and low-income populations as they develop and apply the laws they are responsible for.

In the analysis area, there are minority and low income populations that this Executive Order could apply to, including Native American Indian tribes, and Hispanics. Hispanic populations traditionally were found in agricultural areas drawn by jobs on farms and in food processing plants. More and more first and second generation Hispanics now live and work in urban areas, where there are increasing employment and business opportunities.

Section 3.3, Social and Economic Environment (above), of this document provides further information relevant to this section.

4.0 Environmental Consequences

Several EAs were prepared on NOAA Fisheries' ESA 4(d) Rule, including consideration of the limits for the Lower Columbia River ESUs (NMFS 2000a; NMFS 2000b). NOAA Fisheries determined that the ESA 4(d) Rule and its implementation would not significantly affect the quality of the human environment. The analyses and determinations in the EAs and Findings of No Significant Impact are incorporated by reference herein.

4.1 Alternative 1 (No Action)

Under the No Action Alternative, NOAA Fisheries would not approve ODFW's and WDFW's FMEPs submitted under limit 4 of the 4(d) Rule. As described in section 2.1, above, NOAA Fisheries assumes that under this outcome ODFW and WDFW would not implement the fisheries specified in the FMEPs.

4.1.1 Effects on the Physical Environment

There would be no adverse impacts from fishing on the physical environment under the No Action Alternative. No structures or other physical features would be moved, removed, or altered as the result of not opening fisheries. Streambanks would still be accessed for other purposes, but human use would dramatically decrease if no fishing was allowed. Since fishing activities do not substantially affect the water quality of the streams, there would likely be no improvement in water quality from closing the rivers to fishing. As stated above, many of the streams have degraded water quality that is attributed primarily to land management practices (Meehan 1991).

4.1.2 Effects on the Biological Environment

4.1.2.1 Lower Columbia River chinook salmon

Under the No Action Alternative, there would be little improvement in the escapement of chinook salmon in the tributaries because only approximately 3% of the total harvest of these chinook stocks occurs in the tributaries. Approximately 97% of the chinook harvest by anglers occurs in non-tributary areas like the mainstem Columbia River, the estuary, and ocean. Therefore, if fishing were closed in the tributaries, there would only be a minor change in the long term outlook for the survival and recovery of these stocks.

4.1.2.2 Lower Columbia River steelhead

Under the No Action Alternative, if fisheries for steelhead in the tributaries were closed, there would be less impact on steelhead populations. However, since all the fisheries currently require all unmarked, wild steelhead to be released unharmed under permanent state regulations, there would not be much improvement to the long-term recovery outlook because these fisheries result in low impacts on wild steelhead. Catch and release mortality at the population level is in the range of 0 to 5% for Lower Columbia steelhead populations.

4.1.2.3 Columbia River chum salmon

In the tributaries of the Lower Columbia, areas in which chum salmon spawn are closed to fishing and would remain so. Under the No Action Alternative, the vast majority of fisheries would have no effect on chum salmon because chum salmon are rare or not present in the other rivers. Fisheries in the mainstem Columbia River occurring September through December have the greatest potential to catch chum salmon. However, these fisheries are addressed under other consultations and are not included in this assessment. These fisheries also require all chum salmon to be released unharmed.

4.1.2.4 Other Listed Fish Species

Under the No Action Alternative there would be little, if any, benefit to listed bull trout or chub. Bull trout and chub are found primarily in the upper Willamette Basin and rarely found if ever downstream in the Lower Columbia region. Even if these species are caught in the Lower Columbia region, no retention of bull trout or chub is allowed. The state fishing regulations currently in place for bull trout and chub would remain in effect even if the FMEPs are not approved. Any impacts on these species would occur as the result of incidental take in fisheries directed at other species.

4.1.2.5 Non-listed Fish Species

No substantial effects on fish species not listed under the ESA are anticipated to occur as a result of not opening the proposed fisheries. The current fisheries management regime has been reformed to help conserve these species. The states usually have opportunity to re-design these fisheries to avoid any take of listed salmon and steelhead, with some concomitant reductions in fishery opportunity. Therefore, it is likely that fisheries could still be implemented that target the species considered here, without incurring take of listed salmon or steelhead. However, this would likely result in fisheries at least somewhat reduced in scope and effort than would occur under the proposed management, and so some benefits might accrue to the non-listed fish species through reduction in effort and catch.

4.1.2.6 Other Aquatic and Terrestrial Species

The effects on other aquatic and terrestrial species under the No Action Alternative would be minor. The fisheries in the recent past did not have a measurable effect on these species. Elimination of fisheries would therefore not be expected to have an effect on these species.

4.1.3 Effects on the Social and Economic Environment

Due to the ESA status of steelhead, chinook salmon, and chum salmon in the Lower Columbia River ESUs, fishery impacts have been substantially reduced in recent years. The proposed fisheries represent the last remaining opportunities for catching anadromous salmonids within the Lower Columbia River tributaries. Closure of the fisheries described in the FMEPs would result in substantial economic losses to local fishermen and communities within the Lower Columbia River. Because some fishing would still occur in areas outside those addressed in the FMEPs, it is not clear how much revenue would be lost by not allowing the proposed fisheries. However, it is clear that a large proportion of the estimated $12 million accruing each season to local economies would be lost. This loss would come as the result of a reduction of up to 150,000 angler days or more per season in fishing effort in years of average or better returns. This loss of fishing effort translates into not only adverse economic effects, but also into adverse impacts on quality of life through loss of fishing opportunity in any season for which the proposed fisheries are not implemented.

4.2 Alternative 2 (Proposed Action)

The effects of NOAA Fisheries' action of approving the FMEPs would occur as a result of the States of Washington and Oregon implementing the proposed fisheries pursuant to the FMEPs. The effects of the proposed action on the environment are described below.

4.2.1 Effects on the Physical Environment

Impacts of the proposed activities on the habitat of the ESA-listed species are expected to be only somewhat greater than, if at all different from, the No Action Alternative. Most activities occur in existing recreational areas or are of limited magnitude and duration. Impacts may include those of boats or of anglers walking and wading along the streambanks, largely in areas already experiencing traffic or improved for streamside use (e.g., existing boat ramps and parks). Possible impacts on riparian vegetation and habitat would occur primarily through bank fishing, movement of boats and gear to the water, and other streamside use. Construction activities directly related to fisheries remain limited to maintenance and repair of existing facilities, and are not expected to result in additional impacts on riparian habitats. The facilities used in association with river fisheries are essentially all in place.

Water quality could be adversely affected to a small extent by the proposed fisheries as a result of the release of boat engine by-products, trash, and other effluents into the water. However, such substances are released in small quantities, and dilution effects that would occur nearly immediately would result in nearly negligible impact on water quality as a whole.

An alternate effect on water quality is related to the presence of salmonid carcasses in the water, as a result of dying after spawning, or dying during unsuccessful upstream migration. The historical amounts of nutrients available to the ecosystem from these carcasses was large, and contributed to the enhancement of many forms of aquatic life, including the organisms juvenile salmon feed upon during rearing. However, since most of the anticipated mortality is from catch and release mortality, this impact is likely to be negligible because most fish will still be within the river and available for decomposition and use by other organisms. The number of carcasses produced by the proposed fisheries is the number expected to die through catch and release mortality, some of which would have died prior to reaching a hatchery or natural production areas. This total number of carcasses would vary year to year, based ultimately on the run size and the design of the fishery given that run size, but would not be a large proportion of the fish returning to the action area and would be an even smaller proportion of the fish returning to natural spawning areas, because of the fisheries' focus on returning hatchery fish. This small number of carcasses would be available for the same environmental processes as non-fishery-related mortalities, though some proportion of the fishery mortalities would occur lower in the stream systems and therefore not be available to exactly the same rearing areas.

4.2.2 Effects on the Biological Environment

Most of the expected impacts on listed Lower Columbia salmon and steelhead resulting from the proposed fishery programs would result from incidental mortality. The take levels and supporting analyses are fully described in section 2 "Effects on ESA-listed salmonids" of the FMEPs (ODFW 2001a, 2001b, 2001c, 2001d; WDFW 2001). The expected take numbers reflect conservative management policies by ODFW and WDFW and concern for the health of the listed Lower Columbia River chinook salmon, steelhead, and chum salmon. There is little additional risk to listed anadromous fish species from the proposed fisheries compared to the No Action Alternative. Below is a summary of how these conclusions were reached for each ESU.

4.2.2.1 Lower Columbia River chinook salmon

The anticipated effects on listed chinook salmon from the fisheries proposed in the FMEPs are fully described in ODFW (2001a) and WDFW (2001) and summarized here.

Impacts on spring chinook salmon have been substantially reduced in recent years to help protect the wild runs that currently exist in the Sandy, Cowlitz, Lewis, and Kalama rivers. Historically, these populations were subjected to high harvest rates from recreational and commercial fisheries occurring in the mainstem Columbia River and tributaries. Freshwater harvest rates for the Sandy River population typically ranged from 40% to 50% over the last two decades (ODFW 2001a). Higher harvest rates were common for some of the other populations. During this period of relatively high inriver harvest, the wild spring chinook salmon populations have fluctuated widely. During periods when river and ocean conditions were very favorable for salmon survival, returns of wild chinook increased even when harvest rates were in the range of 40-50%. During poor survival conditions and high harvest, the runs have persisted but at low abundances. The FMEPs are proposing to implement fisheries that allow only finclipped spring chinook to be harvested. All unmarked, naturally produced fish must be released unharmed. The anticipated impacts from the tributary fisheries is in the range of 2% to 5% per population. This represents at least an eight-fold reduction in harvest impacts on these wild populations. The Population Viability Analysis conducted in ODFW (2001a) concludes that under the new selective fishing regime in the FMEP will ensure the protection and recovery of the Sandy River spring chinook population. The probability of meeting the specified recovery criteria for this population is 97%, compared to 1% under historic harvest rates observed from 1984-2000. The risks associated with selective fishing were also not appreciably greater than if fishing was banned entirely. The substantial reduction in harvest rates for these populations and the analyses showing a high probability of population persistence and recovery leads to the conclusion the fisheries proposed in the FMEPs will not impede the survival and recovery potential for these listed populations.

For the tule fall chinook stocks in the Lower Columbia River, the lack of information on the status of naturally produced spawners makes it uncertain to what degree fishing is affecting the remaining wild tule populations in the ESU. Hatchery programs in the Lower Columbia River release millions of juvenile tule fall chinook annually. These hatchery fish are not marked and thus cannot be differentiated from fish that were produced naturally when they return to spawn. Available information suggests most (40-100%) of the fish spawning in the tributaries of the Coast Range in Oregon are of hatchery origin (ODFW 2001a). In the Western Cascade and Columbia River Gorge streams, the percentage of hatchery fish spawning naturally is typically in the range of 5% to 30%.

In evaluating whether the fisheries for tule fall chinook salmon in the tributaries impose a high risk to the survival and recovery potential of these populations, the following were evaluated. Tule fall chinook salmon are harvested in fisheries from Southeast Alaska to the coast of Oregon. Cumulative harvest rates on tule stocks have been as high as 85%. From 1976-90 the average harvest rate was 68%. In the 1990's, overall harvest rates were reduced primarily because of ocean fishery changes designed to protect weak stocks of coho salmon in the US and Canada. Since the listing of the Lower Columbia River chinook salmon ESU, fishery management changes have occurred to reduce harvest impacts on tule stocks. During section 7 consultations by NOAA Fisheries on ocean and mainstem Columbia River fisheries, Rebuilding Exploitation Rates (RERs) have been specified and are being used to cap harvest impacts on tule stocks. NOAA Fisheries specified an RER for 2001 fisheries of 63%. In 2002, the RER was 48%. NOAA Fisheries' analysis concluded these RERs would not jeopardize the continued existence of these tule stocks. Cumulative harvest rates have been reduced recently and RERs will continue to be assessed to ensure the rebuilding of these tule stocks on a regular basis through section 7 consultations with the Pacific Fishery Management Council for ocean fisheries. The proposed FMEPs will implement some key changes to fisheries for tules in the tributaries. First, in many of the streams fishing will be prohibited in September when most of the tules are spawning. In the Sandy and Clackamas rivers, the FMEPs propose to not allow any retention of unmarked chinook salmon. Thus, impacts on fall chinook salmon in these rivers will only be from the incidental catch and release mortality from fisheries targeting other species (primarily hatchery coho salmon). Based on Oregon catch card data from 1985 to 1998, tributary fisheries have accounted for, on average, only 3% of the cumulative harvest rate observed on Lower Columbia tule stocks (16% impact from freshwater fisheries of which 20% occurs in the tributaries). By implementing the above regulation changes, fishery impacts will be reduced even further in the tributaries.

For the bright stocks of fall chinook salmon in the Lower Columbia, the Lewis population will be managed to exceed a minimum escapement of 5,700 fish in the basin. For Sandy River brights, the FMEP proposes to not allow any harvest of unmarked fall chinook salmon. Since no hatchery fall chinook salmon are released in the Sandy River, this change will reduce impacts from approximately 40% to less than 4% (ODFW 2001a). All impacts will be from fisheries targeting other species, primarily hatchery coho salmon and winter steelhead.

4.2.2.2 Lower Columbia River steelhead

Steelhead fisheries have been reformed substantially over the past several years to further protect listed populations (Figure 2). The biggest change was the prohibition of retention of any unmarked, wild steelhead caught in any rivers of the Lower Columbia River ESU. By implementing catch and release fishing for adult wild steelhead, fishing related mortality would be reduced to incidental injuries associated with the catch and release of steelhead. Information assessing hook and release mortality of adult steelhead is limited. However, available information suggests that hook and release mortality is low. Hooton (1987) found catch and release mortality of adults in winter steelhead fisheries to be, on average, less than 5% when using barbed and barbless hooks, bait and artificial lures. Hooton concluded that catch and release of adult steelhead was an effective mechanism for maintaining angling opportunity without negatively impacting stock recruitment. Reingold (1975) showed that adult steelhead hooked, played to exhaustion, and then released returned to their target spawning stream as well as steelhead not hooked and played to exhaustion. Historically, in the Sandy River, Cramer *et al.* (1997) and Murtaugh *et al.* (1997) estimated harvest rates of wild steelhead to be in the range of 50-80%. By implementing catch and release fisheries for steelhead, fishery impacts on the Sandy River population will be reduced to less than 4%, using previous harvest rates as the handling or encounter rate. Similar impact levels are expected for the other popular steelhead fisheries in the Clackamas, Kalama, Cowlitz, and Lewis Rivers.

Naturally produced steelhead smolts might be vulnerable to rainbow trout fisheries. However, current management of *O. mykiss* is focused on protecting juvenile steelhead in Lower Columbia River tributaries while providing some angling opportunity for resident trout. Trout fisheries have been reformed in recent years to reduce incidental impacts on juvenile steelhead from being caught by anglers. The changes in management include catch-and-release fisheries, prohibiting the use of bait during the general trout season, use of artificial flies and lures only, reducing daily bag limits, increasing the minimum size for trout, and closing important steelhead spawning and rearing areas to fishing.

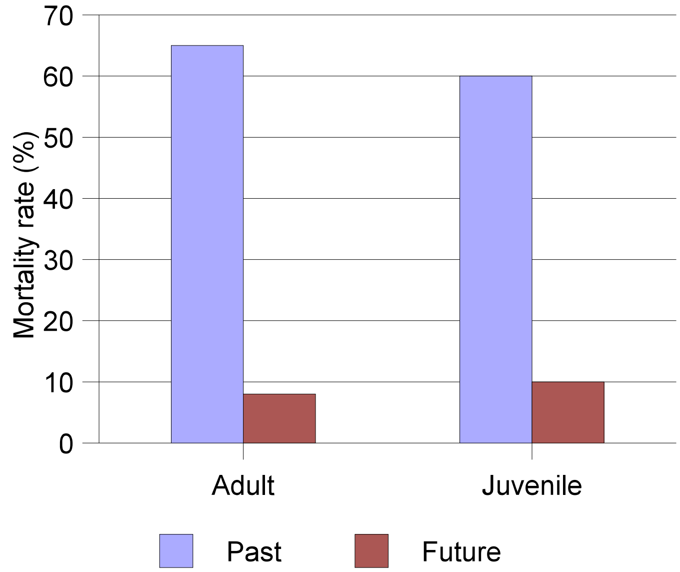

Figure 2. Comparison of previous and anticipated future mortality rates of steelhead after implementing changes to fishing regulations.

Fish may also be killed as the result of illegal harvest, whether intentional or inadvertent, but the incidence of such illegal harvest typically is small, based on information from state enforcement activities, and this additional source of impact is included in the analyses provided by the FMEPs. The FMEPs describe enforcement measures and educational efforts intended to further reduce the incidence of illegal harvest activity.

4.2.2.3 Columbia River chum salmon

The primary tributary spawning areas for chum salmon are Grays River, Hardy, and Hamilton Creeks; all located in Washington. The WDFW (2001) proposes to not allow any retention of chum salmon. These tributaries are closed to angling during peak spawning of chum salmon. The WDFW estimates total fishery impacts to be less than 15% of the return, with all impacts occurring in fisheries outside the purview of the submitted FMEPs – implementation of the fisheries described in this FMEP would have no effect on chum salmon in Washington waters.

4.2.2.4 Other Listed Fish Species

Bull trout – The expected impacts on threatened bull trout are expected to be negligible or nonexistent. All impacts on bull trout would be from the mortality associated with being caught and released, which is expected to be small or nonexistent. No harvest of bull trout is permitted by state fishing regulation in these areas.

Oregon chub – Oregon chub are not expected to be affected by the proposed fisheries, due to their preference for habitats not frequented by salmon and steelhead anglers and their low susceptibility to salmon and steelhead angling gear and techniques.

4.2.2.5 Non-listed Fish Species

The proposed fisheries are carefully designed to maximize angler exploitation of specific groups of fish. Recreational fisheries are carefully managed to minimize impacts on non-target species, and are closely monitored and regulated to best ensure long-term sustainability of the target species. Therefore, non-target species are relatively infrequently taken incidentally in fisheries and when they are, due to non-retention regulations, are subjected to relatively low mortality rates. Generally, these factors combined result in little, if any, adverse impacts on populations of fish from fisheries like those proposed. Below is a brief assessment of effects of the proposed fisheries on the non-listed fish species identified in section 3.2.5.

Coho Salmon – Fishery impacts on naturally produced coho salmon in the Lower Columbia Region occur primarily from fisheries targeting hatchery coho salmon and fall chinook salmon. Due to the poor status of Lower Columbia River coho, fishery impacts have been curtailed substantially the last few years. In recent years, the fisheries have been managed to not exceed 15% cumulative harvest impact on the Sandy and Clackamas River populations. All fisheries in the tributaries of the Lower Columbia River require the release of all unmarked, wild coho salmon. The tributary fisheries probably result in a 1-3% mortality rate. This level of mortality alone is not likely to substantially impact coho populations. The incidental effects on listed anadromous fish in these fisheries are low.

Rainbow Trout – Because rainbow trout fisheries have a potential to take large numbers of steelhead smolts, the trout fisheries have been subjected to a suite of changes in management (see above). Largely, these changes have resulted in reduced fishery intensity on trout. Therefore, rainbow trout populations in the Lower Columbia River basin are not likely to be affected to a great degree by the proposed fisheries. The incidental effects on listed anadromous fish from these fisheries are very low.

Cutthroat Trout – As described above, fishing regulation changes for steelhead may also benefit cutthroat trout populations. Most of the specific regulations for each stream do not distinguish between rainbow and cutthroat trout. Both of these species are managed as trout. Therefore, it is expected cutthroat would benefit from the management of steelhead in the FMEPs through reductions in incidental take of cutthroat during steelhead fisheries. The incidental effects on listed anadromous fish from these fisheries are very low.

Sturgeon – Fisheries for sturgeon occur primarily in the Columbia River, with most of the harvest occurring in the estuary. The most popular sturgeon fishery in the tributaries occurs in the lower Willamette River. An occasional sturgeon may be intercepted by anglers targeting other species in other tributaries. Currently, only sturgeon between 42 and 60 inches can be retained by anglers. The sturgeon population below Bonneville Dam is managed on an optimal sustained yield basis with total harvest ranging from 30,000 to 50,000 fish the last couple of decades (WDFW and ODFW 2001). In 2002, the fishery had time and area closures to reduce the harvest of sturgeon. There was some indication that commercial and recreational harvest had exceeded the optimum yield objective. The tributary fisheries have a negligible impact on the sturgeon population because catch is a small proportion of the total population below Bonneville Dam. The incidental effects on listed anadromous fish in these fisheries are very low.

Smelt – Commercial and recreational dip-netting fisheries for smelt occur predominantly in the mainstem Columbia and Cowlitz rivers. Commercial harvest was reduced in recent years. In the last several years, smelt return numbers have increased, probably due to improved environmental conditions and large restrictions in harvest. Current harvest of smelt is carefully monitored to remain responsive to run size and so is not expected to have a substantive adverse effect on smelt populations (WDFW and ODFW 2001). The incidental effects on listed anadromous fish in these fisheries are very low.

Shad – The primary fishery for shad occurs in the Lower Willamette River. Fishing effort from April through June is high because of the presence of shad, salmon, and steelhead in the Willamette River. Information on the total catch of shad in this fishery and the effects on the shad population is not available. However, due to the high catch rates in the fishery, the total abundance of shad is likely to be high and relative effects of the fishery on shad numbers therefore is likely to be low. The incidental effects on listed anadromous fish in these fisheries are very low.

Warmwater Fish Species – Centrarchids are present in many of the basins throughout the Lower Columbia River. These fish are most common in the mainstem Columbia River and in closed water bodies. Restrictive regulations are currently in effect for most warmwater species and are expected to continue to maintain or improve current abundances. Available information suggests the past harvest of bass does not appreciably affect the overall population dynamics of these introduced species (ODFW and NMFS 1999). The incidental effects on listed anadromous fish from these fisheries are very low.

4.2.2.6 Other Aquatic and Terrestrial Species

Because activities associated with the proposed fisheries would likely only make use of existing facilities (boat ramps and other access points), no substantial additional impacts on other aquatic or terrestrial organisms, ESA-listed or unlisted, are anticipated.

4.2.3 Effects on the Social and Economic Environment

Beneficial effects would likely occur under the proposed action on local communities compared to the No Action Alternative. If the FMEPs are approved and the proposed fisheries are allowed to occur, economic benefits would accrue to residents within the Lower Columbia River region. Revenue not otherwise available under the No Action Alternative would be generated from the sale of fishing licenses, tackle, lodging, and food. Fishing effort for spring chinook and winter steelhead in the Lower Willamette River and Clackamas River (tributary) has been high – an average of more than 150,000 angler days per season (Foster 1998). Fisheries would provide an economic value of more than $12 million dollars per season based on recent estimates, much of which would not have been generated if the fisheries could not be implemented. This alternative would also maintain public support of salmon and steelhead recovery efforts.

4.2.4 Cumulative Impacts

Cumulative impacts from NOAA Fisheries' current proposed action under 4(d) rule Limit 4 will be minor if at all measurable. Incremental impacts on the environment are included in the discussion above. NOAA Fisheries' 4(d) rule is only one element of a large suite of regulations and environmental factors that may influence the overall management of fishery actions in the affected environment, and that may impact the health of listed salmon populations and their habitat. The FMEPs included in this EA address all fisheries in the tributaries of the Lower Columbia ESUs. There are no other fishery programs that need ESA authorization in this area if the FMEPs are approved. The impacts from fisheries occurring in other areas (e.g. ocean, estuary, and mainstem Columbia fisheries) are included in the assessment of cumulative harvest in the FMEPs Those fishery programs that meet the requirements of the 4(d) rule Limit 4 include monitoring and adaptive management measures so that fishery managers can respond to changes in the status of affected listed salmon. Monitoring and adaptive management will help ensure that the affected ESUs are adequately protected and help counter-balance any negative cumulative impacts.

4.3 Environmental Justice

No alternative under consideration would have an impact on Environmental Justice described in 3.4, Environmental Justice.

5.0 Agencies Consulted

The following agencies and entities were consulted during the development of this environmental assessment.

NOAA Fisheries
Oregon Department of Fish and Wildlife
Washington Department of Fish and Wildlife

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7.0 Finding of No Significant Impact

The National Marine Fisheries Service (NOAA Fisheries) Northwest Region (NWR) has prepared an Environmental Assessment (EA) for its proposed approval of five Fisheries Management and Evaluation Plans (FMEPs) submitted by the Oregon Department of Fish and Wildlife and the Washington Department of Fish and Wildlife under limit 4 of the 4(d) Rule.

NOAA Fisheries considered and analyzed the following alternatives, each of which is discussed in detail in the EA:

> Alternative 1 (No Action): Do not approve the FMEPs, which would potentially result in substantially reduced recreational fishing opportunity for anglers in Oregon and Washington tributaries of the Lower Columbia, with little, if any, benefit to other aspects of the human environment.
>
> Alternative 2 -(Proposed Action): Approve the FMEPs as submitted, including implementation and reporting requirements necessary to minimize adverse impacts on the ESA listed salmonids and to enhance conservation efforts.

The proposed action was selected as the preferred alternative because it will allow ODFW and WDFW to implement fisheries that are protective of listed salmon and steelhead in the Lower Columbia River ESUs. The fisheries are fully described in the EA and in the FMEPs submitted by ODFW and WDFW.

Implementation of NOAA Fisheries' decision would be expected to result in the following environmental, social and economic effects:

- Minor effects on riparian and stream habitat from anglers walking along the stream and using boats.
- Fishery effects on ESA-listed salmon and steelhead in the Lower Columbia ESUs expected individually and cumulatively with other actions to be below the level that would appreciably reduce the likelihood of survival and recovery of the listed ESUs, as specified within the FMEPs.
- Few, if any, effects on other aquatic and terrestrial species from fishing activities.
- Economic and social benefits to the local communities within the Lower Columbia Region.

These effects are fully described in the EA.

In the EA, NOAA Fisheries considered the context and intensity of the factors identified in NOAA NAO 216-6 section 6.01b, as well as short and long term effects of the proposed action. Based on the analysis in the EA, NOAA Fisheries finds that:

> 1. Public health and safety will be minimally affected by the selected alternative. Any degradation of water quality will be minor, if at all measurable.

2. The selected alternative's effects on the human environment are not likely to be highly controversial based on a review of the absence of new information during the public comment period and the comparatively low level of impact on socioeconomic resources expected (as described in the EA).

3. This action does not establish a precedent for future actions with significant effects nor does it represent a decision in principle about a future consideration because NOAA Fisheries has analyzed many comparable fishery programs under limit 4 of the 4(d) Rule.

4. This action is of limited context and intensity, with limited environmental effects, individually or cumulatively. Cumulative impacts were considered but no significant cumulative impacts are expected from implementation of the proposed action.

5. The effects of this action are relatively certain and do not involve unique or unknown risks because the fisheries are similar in scope and intensity to other fisheries NOAA Fisheries has considered and authorized.

6. The proposed action will not adversely affect areas listed in or eligible for listing in the National Register of Historic Places, or cause loss or destruction of significant scientific, cultural or historic resources.

7. ESA-listed salmon and steelhead in the Lower Columbia River ESUs will be adversely affected by the proposed action. However, based on NOAA Fisheries' analysis, the proposed action will not appreciably reduce the likelihood of survival and recovery of Lower Columbia River steelhead, chinook salmon, and chum salmon in the wild.

8. The proposed action will not adversely modify or destroy designated critical habitat as defined by the ESA or designated essential fish habitat (EFH) as defined by the Magnuson-Stevens Act. As discussed in the EA, any adverse effects will be minimal. The proposed permit conditions and operating procedures are designed to minimize the adverse effects.

9. The proposed action does not threaten a violation of Federal, State, or local law requirements imposed for the protection of the environment.

Environmental Justice: Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*. The analysis of the impacts in the EA indicates that there will be no disproportionately high and adverse environmental impacts, as described in the executive order, on minority and low-income populations by the proposed action.

References:

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Determination

Based on the analysis in the EA, I conclude that the proposed action to approve the five FMEPs for the Lower Columbia River ESUs does not constitute a major Federal action significantly affecting the quality of the human environment within the meaning of section 102(2)(c) of the National Environmental Policy Act of 1969 (as amended). Therefore, an environmental impact statement is not required.

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National Oceanic and Atmospheric Administration

5/22/03
Date