DRAFT ENVIRONMENTAL ASSESSMENT

REINTRODUCTION OF BULL TROUT TO THE CLACKAMAS RIVER, OREGON

Comment Due Date

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Prepared by:

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Oregon Fish and Wildlife Office

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Summary

The U.S. Fish and Wildlife Service (Service), along with our cooperators the U.S. Forest Service (USFS) and the Oregon Department of Fish and Wildlife (ODFW), and based on the best scientific and commercial data available, propose to reintroduce bull trout (*Salvelinus confluentus*) into a portion of its historical range in the Clackamas River and its tributaries and to designate the entire Clackamas River subbasin as well as the mainstem Willamette River, from Willamette Falls to its points of confluence with the Columbia River including Multnomah Channel, as a "nonessential experimental population" (NEP) area pursuant to section 10(j) of the Endangered Species Act (ACT). This proposal constitutes the Service's proposed action for the purposes of this draft environmental assessment (EA).

Bull trout from the Metolius River subbasin (Deschutes River Basin) have been identified as suitable donor stock and can provide sufficient individuals for release into suitable habitat identified in the upper portion of the Clackamas River subbasin (defined as the headwaters down to North Fork Reservoir, RM 30). The Service anticipates releasing bull trout annually into the upper Clackamas River via a three-phased adaptive management approach until either: (1) an evaluation of the program shows the Purpose of the Action (Section 1.2) has been met; (2) mid-process outcome evaluation suggests the reestablishment of bull trout is unlikely (i.e., the project is not showing success); or (3) evaluation indicates greater than anticipated impacts to other federally listed fish species in the Clackamas River from predation and/or competition.

In addition to the proposed action, we analyzed the no action alternative, and considered five other action alternatives, which were eliminated from detailed study. The proposed action has been designed to accomplish the following:

(1) It meets the purpose and need identified in this draft EA.

(2) Incidental take associated with otherwise lawful activities would not pose a substantial threat to bull trout recovery in the Clackamas River subbasin, as activities that currently occur in the NEP area are compatible with bull trout recovery. Thus, more stringent legal protections are unnecessary.

(3) Land owners, land managers, and the general public are more likely to accept bull trout in the Clackamas River with the regulatory flexibility provided by a 10(j) NEP designation.

Submitting Comments

This draft EA is being released for public comment concurrent with publication in the *Federal Register* of a proposed rule to reintroduce bull trout to the Clackamas River as a nonessential experimental population under 10(j) of the Endangered Species Act. You may view or download both the proposed rule and the draft EA from the internet at the following link:

http://www.fws.gov/oregonfwo/Species/Data/BullTrout/ReintroductionProject.asp

Both documents may also be viewed by appointment at the Fish and Wildlife Service, Oregon Fish and Wildlife Office, 2600 SE 98th Avenue, Portland, Oregon 97266. The public comment period on both the proposed rule and the draft EA is open for 60-days. To ensure we are able to consider your comments on the proposed rule and/or the draft EA, they must be received on or before February 8, 2010. Please note that the process for submitting comments on the proposed rule is different than the process for submitting comments on the draft EA. Directions for submitting comments are as follows:

You may submit comments on the proposed rule only by one of the following methods:

1) Federal eRulemaking Portal: http://www.regulations.gov. Follow the instructions for submitting comments to Docket No. FWS-R1-ES-2009-0050.

2) U.S. mail or hand-delivery: Public Comments Processing, Attn: FWS-R1-ES-2009-0050; Division of Policy and Directives Management; U.S. Fish and Wildlife Service; 4401 N. Fairfax Drive, Suite 222; Arlington, VA 22203.

You may submit comments on this draft EA only by one of the following methods:

1) U.S. mail or hand-delivery: Field Supervisor, U.S. Fish and Wildlife Service, Oregon Fish and Wildlife Service, 2600 SE 98th Avenue, Portland, Oregon 97266

2) By electronic mail (i.e., email) at the following email address: clackamasbulltroutea@fws.gov

1.0 Introduction, Purpose and Need

1.1 Introduction

On November 1, 1999, we published a final rule to list bull trout within the coterminous United States as threatened under the Act (64 FR 58910). The historical range of bull trout in the coterminous United States extended from the Canadian border south to the Jarbidge River in northern Nevada and from the Pacific Ocean inland to the Clark Fork River in western Montana and the Little Lost River in central Idaho. Recent genetic analysis shows that bull trout in the coterminous United States are divided into three major genetically differentiated groups or lineages (Spruell et al, 2003). These lineages are characterized as:

(1) "Coastal," including the Deschutes River and all of the Columbia River drainage downstream (including the Willamette and Clackamas rivers), as well as most coastal streams in Washington, Oregon, and British Columbia;

(2) "Snake River," which includes the John Day, Umatilla, and Walla Walla rivers in Oregon and Washington as well as major river basins in central Idaho; and,

(3) "Upper Columbia River," which includes major river basins in Montana, Washington and northern Idaho. The existence of a "coastal" evolutionary lineage is further supported by the work of Taylor et al. (1999) and a recent range-wide bull trout genetic analysis by the Service (FWS 2008, unpublished data).

The historical distribution of bull trout in the Clackamas River subbasin likely extended from the lower Clackamas River upstream to headwater spawning and rearing areas (Shively et al., 2007). However, it is unlikely that bull trout historically occupied habitat upstream of waterfall barriers known to impede upstream movement of anadromous salmon and steelhead species in the Clackamas River. Bull trout were last documented in the Clackamas River in 1963 and are considered extirpated (Shively et al., 2007).

The current distribution of bull trout in the lower Columbia River portion of the "coastal" lineage includes populations in the Deschutes (including the Metolius River subbasin), Hood, Lewis, Klickitat and the upper Willamette rivers (McKenzie and Middle Fork Willamette subbasins). Throughout much of its historical range, the decline of bull trout has been attributed to habitat degradation and fragmentation, the blockage of migratory corridors, poor water quality, fisheries management and overharvest, entrainment (the incidental withdrawal of fish and other aquatic organisms in water diverted out-of-stream for various purposes) into diversion channels and through dams, and introduced nonnative species. Specific land and water management activities that depress bull trout populations and degrade habitat include dams and other diversion structures, forest management practices, livestock grazing, agriculture, agricultural diversions, road construction and maintenance, mining, and urban and rural development (Beschta et al.,

1987; Chamberlain et al., 1991; Furniss et al., 1991; Meehan, 1991; Nehlsen, et al. 1991; Craig and Wissmar, 1993; Frissell, 1993; McIntosh et al., 1994; Wissmar et al., 1994; MBTSG, 1995a-e, 1996a-f; Light et al., 1996; USDA and USDI, 1995, 1996, 1997).

Range-wide, bull trout exhibit both resident and migratory life history strategies, although bull trout in the "coastal lineage" are generally migratory. Migratory bull trout spawn in tributary streams where juvenile fish rear one to four years before migrating to either a lake (adfluvial form), river (fluvial form) (Fraley and Shepard, 1989; Goetz, 1989), or saltwater (anadromous form) to rear as subadults and to live as adults (Cavender, 1978; McPhail and Baxter, 1996; WDFW et al., 1998). Bull trout normally reach sexual maturity in four to seven years and may live longer than 12 years. They are iteroparous (they spawn more than once in a lifetime). Both consecutive-year and alternate-year spawning have been reported (Fraley and Shepard, 1989). Bull trout's preferred habitat consists of cold water, complex cover, stable channels, loose and clean gravel and barrier-free migratory corridors (Fraley and Shepard, 1989; Goetz, 1989). More information about the life history and decline of bull trout can be found in the final listing decision of the species as threatened (63 FR 58910), the final designation of critical habitat for the species (70 FR 56212), and the Service's Draft Bull Trout Recovery Plan (draft recovery plan) (USFWS 2002).

Bull trout are extirpated from the Clackamas River subbasin and due to geographic distance to extant bull trout populations in other subbasins, natural recolonization is extremely unlikely without human assistance (USFWS 2002, Shively et al., 2007). Extirpation occurred during the 1960s and early 1970s and was likely due to many of the same factors that led to the decline in the species across its range including migration barriers from hydroelectric and diversion dams, direct and incidental harvest in sport and commercial fisheries, targeted eradication with bounty fisheries, and habitat and water quality degradation from forest management and agricultural activities (Shively et al., 2007). The last documented bull trout observation in the Clackamas River subbasin was in 1963 (Stout 1963).

The continued presence of bull trout populations in other subbasins of the Columbia River with similar habitat is evidence that the Clackamas River subbasin may support reestablishment of bull trout. To determine the current suitability of habitat in the Clackamas River subbasin, and availability of an appropriate donor stock, a scientifically rigorous, peer reviewed feasibility assessment was completed by members of the Clackamas River Bull Trout Working Group (CRBTWG) in 2007. The CRBTWG formally convened in 2004, for the purpose of exploring the possibility of reintroducing bull trout into the Clackamas River subbasin as part of overall recovery efforts for the species. The group is comprised of representatives from the Service, ODFW, USFS and other major stakeholders including Portland General Electric (PGE). The Clackamas River Bull Trout Reintroduction Feasibility Assessment (Feasibility Assessment) determined that a reintroduction of bull trout into the upper Clackamas River is feasible based on the following factors:

(1) There is a high level of confidence that bull trout have been locally extirpated from the Clackamas subbasin;

(2) The causes for their decline have been sufficiently mitigated;

(3) High quality habitat is available in sufficient amounts;

(4) Nearby donor stocks are unlikely to naturally recolonize;

(5) Suitable donor stocks are available that can withstand extraction of individuals;

(6) Nonnative brook trout presence is restricted to a small portion of the suitable habitat and not a likely threat; and,

(7) A diverse and abundant fish assemblage would serve as a sufficient prey base with no obvious threats posed by bull trout to these species.

The Service administers the Endangered Species Act (ESA) and is the principal Federal agency responsible for conserving, protecting and enhancing fish, wildlife and plants and their habitats for the continuing benefit of the American people. However, numerous individuals, agencies, and affected parties were involved in the development of the Service's 2002 draft recovery plan or otherwise provided assistance and review. The overall recovery goal identified in the draft recovery plan is to ensure the long-term persistence of self-sustaining, complex, interacting groups of bull trout distributed throughout the species' native range so that the species can be delisted from the ESA. To achieve the goal, the following objectives were identified:

1. Maintain current distribution of bull trout within core areas (the closest approximation of a biologically functioning unit for bull trout).…and restore distribution where recommended.

2. Maintain stable or increasing trends of abundance of bull trout.

3. Restore and maintain suitable habitat conditions for all bull trout life history stages and strategies.

4. Conserve genetic diversity and provide opportunity for genetic exchange.

Draft recovery criteria were developed for each of the identified recovery units across the coterminous range of bull trout. Draft recovery criteria address population distribution, population abundance, population trends and habitat connectivity. Draft recovery criteria specific to the Willamette River Recovery Unit (USFWS 2002) include:

1. Distribution criteria would be met when bull trout are distributed among five or more local populations in the recovery unit: four in the Upper Willamette River core area and one in the Clackamas River core habitat.

2. Abundance criteria would be met when an estimated abundance of adult bull trout is from 900 to 1,500 or more individuals in the Willamette River Recovery Unit, distributed in each core area as follows: 600 to 1,000 in the Upper Willamette core area and 300 to 500 in the Clackamas River core habitat.

3. Trend criteria would be met when adult bull trout exhibit stable or increasing trends in abundance in the Willamette River Recovery Unit, based on a minimum of 10 years of monitoring data.

4. Connectivity criteria would be met when migratory forms are present in all local populations and when intact migratory corridors among all local populations in core areas provide opportunity for genetic exchange and diversity.

Establishment of an experimental population of bull trout in the Clackamas River will further the conservation and recovery of the species by meeting overall draft recovery goals noted above and by meeting draft distribution and abundance criteria developed specifically for bull trout in the Willamette River Basin.

1.2 Purpose of the Action

The purpose of the proposed action is to re-establish a self-sustaining bull trout population ranging from 300 to 500 spawning adults annually in the Clackamas River by 2030 that contributes to the conservation and recovery of bull trout in the Willamette River Basin and to overall draft recovery criteria outlined in the Service's draft bull trout recovery plan (USFWS 2002).

1.3 Need for the Action

Restoring bull trout to historic habitat, where deemed suitable, is a major recovery goal and objective listed in the draft bull trout recovery plan and it is particularly relevant to habitats in the western (i.e., "coastal") portion of the species' range due to the extensive loss of distribution and the documented extirpation of multiple bull trout populations. The Willamette River, a tributary of the lower Columbia River, has experienced extirpations of bull trout from three, and perhaps four, major subbasins, including the Clackamas River. Although the overall recovery strategy is to reduce and minimize threats affecting bull trout and their habitat in the Willamette River Basin, the magnitude of bull trout extirpations, combined with the size of the basin and low probability of natural recolonization, will likely require reintroductions, such as the action proposed in the Clackamas River subbasin.

The Clackamas River, due to the quantity and quality of available habitat, likely provides one of the best opportunities to reestablish a viable population of bull trout into historical habitat within the "coastal" evolutionary lineage.

1.4 Consultation and Coordination

In development of this EA the ODFW has agreed to be a co-lead agency and the USFS has agreed to be a cooperating agency, as defined by NEPA. Representatives from these two agencies, the Service and other major stakeholder groups, including PGE, have been actively involved in the aforementioned CRBTWG.

Due to the presence of, and potential impacts to, federally listed anadromous salmonids in the Clackamas River subbasin, the Service will conduct an ESA section 7 consultation with the National Marine Fisheries Service (NMFS). Furthermore, the Service is consulting with the Confederated Tribes of the Warm Springs Reservation of Oregon (CTWSRO) on a government-to-government basis because (1) two percent of the acreage included in the Clackamas River subbasin is land owned and managed by the CTWSRO; and (2) CTWSRO are co-managers, along with ODFW, of bull trout in the Metolius River subbasin, the preferred donor stock source for a reintroduction to the Clackamas River. The Service is also consulting on a government-to-government basis with the Confederated Tribes of the Grand Ronde Community of Oregon (CTGRCO). The antecedent tribes and bands of CTGRCO included signatories to the Treaty with the Kalapuya Etc. of January 22, 1855, otherwise known as the Willamette Valley Treaty, which ceded the entire Willamette Basin, including the Clackamas River system, to the United States in exchange for certain benefits and reserved rights. Of these reserved rights, one is access to cultural resources. All fish populations present on the ceded lands at the time of treaty signing are cultural resources of CTGRCO; therefore the interest of CTGRCO in the proposed action is that of restoring and protecting Tribal cultural resources.

Presentations have been provided at various stages in the development of this proposal at annual meetings of the Western Division and Oregon Chapter of the American Fisheries Society. The proposed project has also been presented to various conservation groups, Tribes, state and federal agencies and associated committees involved in recovery planning for salmon and steelhead, and other entities investigating bull trout reintroductions elsewhere within their historical range.

1.5 Scoping and Public Participation

The Service and ODFW solicited public input for the development of this draft EA through public stakeholder meetings in October and November 2008. These stakeholder meetings served as scoping meetings to inform the public and allow for comment on this proposed action. Using the comments from the public stakeholder meetings, and previous discussions with the CRBTWG, other agencies, and Tribes, the Service developed a list of issues to address.

1.5.1. Issues and Concerns

The Service separated issues that were identified through the stakeholder meetings and other coordination into two groups: significant and non-significant issues. Significant issues were defined as those directly or indirectly caused by implementing the proposed action. Non-significant issues were identified as those: 1) outside the scope of the proposed action; 2) already decided by law, regulation, or other higher level decision; 3) irrelevant to the decision to be made; or 4) conjectural and not supported by scientific or factual evidence. The Council on Environmental Quality (CEQ) NEPA regulations require this delineation in Sec. 1501.7, "…identify and eliminate from detailed study the issues which are not significant or which have been covered by prior environmental review (Sec. 1506.3)…" A list of non-significant issues and concerns and reasons regarding their categorization as non-significant may be found in Appendix C. As for significant issues, the Service identified three such issues during scoping. These include:

1. Possible negative impacts of the reintroduction on three species of ESA listed anadromous salmon and steelhead in the Clackamas River (inclusive of associated issues such as predation and competition, potential for disease transfer, and sufficiency of forage base).

2. Possible impacts to the success of a reintroduction from hybridization and competition between bull trout and non-native brook trout that inhabit a small portion of suitable bull trout spawning and rearing habitat in the Clackamas River.

3. Possible negative impacts to the donor stock (Metolius River bull trout) from annual depletion of various life stages for transfer to the Clackamas River.

2.0 Alternatives

2.1 Alternative A: Proposed Action

Reintroduce bull trout to the Clackamas River subbasin under 10(j) nonessential experimental population (NEP) designation.

2.1.1 Goal and Objectives of the Proposed Action.

The goal of the proposed action is to re-establish a self-sustaining bull trout population ranging from 300 to 500 spawning adults annually in the Clackamas River by 2030 that contributes to the conservation and recovery of bull trout in the Willamette Basin and to overall recovery criteria outlined in the draft recovery plan (USFWS 2002).

The objectives for the project include the following:

1. Reintroduction is to be consistent with the recovery of other ESA-listed fish species in the Clackamas River.

2. Reintroduction may provide for future recreational fisheries.

3. Reintroduction is to be compatible with social needs and expectations.

4. Reintroduction will be implemented within an adaptive management framework to learn and adapt over time.

2.1.2 Geographic Scope of the Proposed Action

The geographic boundaries of the NEP, which encompasses all potential release sites, would include the entire Clackamas River subbasin as well as the mainstem Willamette River, from Willamette Falls to its points of confluence with the Columbia River, including Multnomah Channel. Based on recent surveys, as summarized in Shively et al. (2007), we have determined that this species currently does not exist in the Clackamas River or the portion of the Willamette River designated in this proposed action. More information about the geographic scope of the proposed action can be found in section 2.1.10.

2.1.3 Selection and Location of Bull Trout Release Sites

The scope of this alternative covers all bull trout releases in the NEP. Release sites would be restricted to Mt. Hood National Forest lands. Primary considerations for identifying bull trout release sites include:

1. Within suitable spawning and rearing habitat as identified in the Feasibility Assessment (Shively et al. 2007).

2. The extent of suitable habitat surrounding a potential release site and its proximity to other similar habitats.

3. Access to release locations (e.g., road access, season of release).

4. Age of fish transferred; adult and subadult bull trout would be transplanted to large mainstem river reaches within patch number one (see Figure 1 below). In general, fry and juvenile bull trout would be released in tributaries of the mainstem Clackamas River within patches one through six.

More detailed information can be found in the Draft Clackamas River Bull Trout Reintroduction Implementation and Monitoring Plan (Implementation and Monitoring Plan) (Appendix A).

2.1.4 Bull Trout Release Techniques

All bull trout that are transferred will be released in habitat determined in Shively et al. (2007) to be suitable for spawning and rearing. Release strategies will be based on life stage transferred. Adults and subadults will be released annually at multiple locations within the upper Clackamas River mainstem in habitat patch one (Figure 1 below). Bull trout fry and juveniles will be released in all suitable streams within habitat patches one thru six on a rotational basis. The first year of implementation will include fry and juvenile transfers to patches one and two; year two will include transfers to patches three and five; and year three will include transfers to patches four and six. This stocking schedule for fry and juveniles would then repeat starting in year four such that each patch will receive at least two rounds of stocking during Phase One of the project. Specific release methodology for fry and juvenile bull trout will be based in part on lessons learned from the successful Middle Fork Willamette River Bull Trout Rehabilitation Program, implemented by the USFS and ODFW. Ongoing releases of transplanted fry and juvenile bull trout from the McKenzie River to the Middle Fork Willamette River have demonstrated the potential of reintroduction as a successful recovery tool for bull trout conservation (ODFW 2007).

2.1.5 Timing and Duration of Reestablishment Activities

In order to meet the Purpose and Need of the proposed action, we anticipate releasing multiple life stages of bull trout into the upper Clackamas River subbasin annually (spring thru fall) during Phase One (year one through year seven). Releases may occur annually during Phase Two (year eight through year 14) and Phase Three (year 15 through year 20) provided monitoring and evaluation indicates signs of success, donor stock continue to be available, and numerical goals have not been realized (see 2.1.1 above). Seasonal timing of releases may be contingent on access to some locations due to snow or other weather related issues. The adaptive management framework that the project will be implemented under will allow for any necessary modifications to the timing and duration of implementation based on information learned from project monitoring and evaluation.

2.1.6 Monitoring

After the initial release of bull trout, we will monitor their presence, absence, and movement at least annually and document spawning behavior or presence of young-of-year fish. Depending on available resources, monitoring may occur more frequently, especially during the first few years of reestablishment efforts. This monitoring will be primarily conducted through passive integrated transponder (PIT) tags, snorkeling, and radio-telemetry by the Service and ODFW with the assistance of the USFS, and U.S. Geological Survey (USGS). Monitoring the status of the donor population will also occur annually. Annual reports will detail release and monitoring activities that took

place during the previous year. We will also fully evaluate the reestablishment efforts every seven years to determine whether to continue, modify, or terminate such efforts.

In addition to monitoring reintroduced bull trout and the donor stock, we also plan to monitor the response of the existing native fish community from the reintroduction of bull trout, with a particular emphasis on Federally-listed salmon and steelhead. To facilitate this monitoring, the Service, together with other members of the CRBTWG, plan to conduct baseline biological surveys in 2009. More information about monitoring is included in the Draft Implementation and Monitoring Plan (Appendix A).

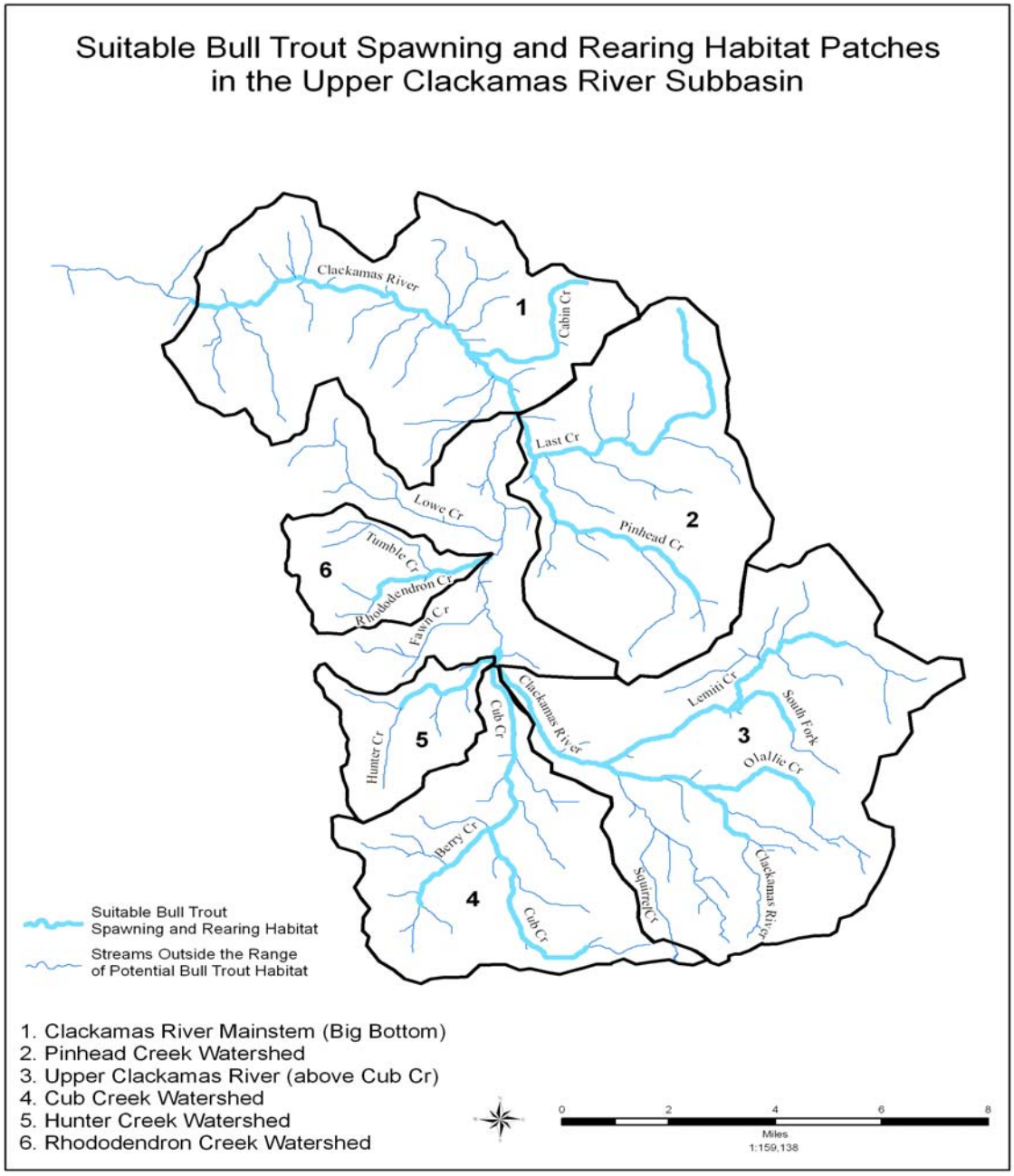

Figure 1. Suitable Bull Trout Spawning and Rearing Habitat Patches in the Upper Clackamas River

2.1.7 Experimental Population

The 1982 amendments to the ESA included the addition of section 10(j) which allows for the designation of reintroduced populations of listed species as "experimental populations." The Service may designate as "experimental" a population of endangered or threatened species that has been or will be released into suitable natural habitat outside the species' current natural range (but within its probable historic range, absent a finding by the Director in the extreme case that the primary habitat of the species has been unsuitably and irreversibly altered or destroyed). The Service has always had the authority to reestablish populations in unoccupied portions of a listed species' historic range when doing so would foster the recovery of the species. However, local citizens often opposed these reestablishments because they were concerned about possible restrictions and prohibitions on Federal and private activities. By designating a population as experimental under section 10(j), the Service increases the regulatory flexibility in managing the species.

Before authorizing the release of an experimental population of an endangered or threatened species, and before authorizing any necessary transportation to conduct the release, the Service must find by regulation that such release will further the conservation of the species. In making such a finding the Service shall use the best scientific and commercial data available to consider: (1) Any possible adverse effects on extant populations of a species as a result of removal of individuals, eggs, or propagules for introduction elsewhere; (2) The likelihood that any such experimental population will become established and survive in the foreseeable future; (3) The relative effects that establishment of an experimental population will have on the recovery of the species; and (4) The extent to which the introduced population may be affected by existing or anticipated Federal or State actions or private activities within or adjacent to the experimental population area.

Furthermore, all experimental populations designated under section 10(j) must provide: (1) Appropriate means to identify the experimental population, including, but not limited to, its actual or proposed location, actual or anticipated migration, number of specimens released or to be released, and other criteria appropriate to identify the experimental population(s); (2) A finding, based solely on the best scientific and commercial data available, and the supporting factual basis, on whether the experimental population is, or is not, essential to the continued existence of the species in the wild; (3) Management restrictions, protective measures, or other special management concerns of that population, which may include but are not limited to, measures to isolate and/or contain the experimental population designated in the regulation from natural populations; and (4) A process for periodic review and evaluation of the success or failure of the release and the effect of the release on the conservation and recovery of the species.

The Service must consult with appropriate State fish and wildlife agencies, local governmental entities, affected Federal agencies, and affected private landowners in developing and implementing experimental population rules. To the maximum extent practicable, 10(j) rules shall represent an agreement between the Service, the affected State and Federal agencies and persons holding any interest in land which may be affected by the establishment of an experimental population.

The Secretary may designate critical habitat as defined in section (3)(5)(A) of the Act for an essential experimental population. However, no designation of critical habitat will be made for nonessential populations.

Any experimental population designated for a listed species (1) determined not to be essential to the survival of that species and (2) not occurring within the National Park System or the National Wildlife Refuge System, shall be treated for purposes of section 7 (other than subsection (a)(1) thereof) as a species proposed to be listed under the Act as a threatened species. This means that formal consultation with the Service for actions likely to adversely affect the experimental population is not required. However, conference with the Service (which is advisory only) for actions likely to jeopardize the continued existence of the population is required for species proposed for listing and nonessential experimental populations.

2.1.8 Nonessential Experimental Population

When the Service establishes experimental populations under section 10(j) of the Act, it must be determined whether such a population is essential to the continued existence of the species in the wild. Although the Service believes an experimental population of bull trout in the Clackamas River will contribute to the recovery of the bull trout in the Willamette River Basin, the reestablishment of bull trout to this subbasin is not essential to the continued existence of the species in the wild. The listed bull trout population segment is broadly distributed, occurring in 121 core areas in five western States and its continued existence is dependent upon conserving a number of interacting populations that are well distributed throughout its range. While conservation of a single local population that does not possess markedly divergent genetic components or adaptive traits and does not occur in a unique or unusual ecological setting or geographical context may contribute to the recovery of the species, such individual local populations, when considered alone, are not essential to the species' continued existence. Because the donor stock for the reintroduction will come from a wild population of bull trout, the reintroduced population will not possess markedly divergent genetic components or adaptive traits. Furthermore, the Clackamas River is not a unique or unusual ecological setting or geographical context for bull trout. Bull trout occur in other portions of the Willamette River Basin and in other nearby tributaries to the Columbia River. Therefore, the Service finds that the proposed experimental population is not essential to the continued existence of the species, and proposes to designate the experimental population in the Clackamas River as a nonessential experimental population.

The NEP designation for the reintroduction alleviates landowner and water-user concerns about possible land and water use restrictions by providing a flexible management framework for protecting and recovering bull trout, while ensuring that the daily activities of landowners and water-users are unaffected. Landowners and managers, and the general public, are more likely to accept bull trout in the Clackamas River adjacent to their lands with the regulatory flexibility provided by a NEP designation. The NEP designation also provides State and Federal agencies flexibility to manage the reintroduced population of bull trout in a manner consistent with the recovery of other ESA-listed species of salmon and steelhead present in the Clackamas River.

Most of the portion of the Clackamas River in which a population of bull trout can be expected to become established is protected and managed for other ESA-listed species of salmonids by the NMFS and managed for other natural resources by several Federal and State agencies. Furthermore, in 1988 Congress designated the Clackamas River from its headwaters to the Big Cliff area just upstream of North Fork Reservoir as part of the Federal Wild and Scenic Rivers System (USFS, 1993). The state of Oregon designated 82 miles of the Clackamas River and its tributaries as part of the Oregon Scenic Waterway Program in 1989 (ORS 390.826). The majority of lands in the upper portion of the Clackamas River subbasin are public forestlands administered by the USFS and Bureau of Land Management (BLM). These lands are managed in accordance with Mt. Hood National Forest Land and Resource Management Plan (USFS 1990) and Salem District BLM Resource Management Plan (USDI 1995), respectively, as amended by the 1994 Northwest Forest Plan (USDA and USDI 1994). The 1994 Northwest Forest Plan established an Aquatic Conservation Strategy (ACS) with protective measures, standards and guidelines, and land allocations to maintain and restore at-risk fish species of which bull trout were included. The ACS Riparian Reserve land allocation extends two full site potential tree heights (300 feet minimum) on both sides of all fish-bearing streams and prohibits scheduled timber harvest. These plans, along with the recently approved Federal legislation (Omnibus Public Land Management Act of 2009) established several new wilderness areas in the upper Clackamas River watershed, provide substantial protections for watersheds and aquatic habitats on public lands in the upper subbasin administered by the USFS and BLM. No additional changes or protections regarding forest management activities on public or non-public forest lands are believed necessary to support a successful reintroduction of bull trout in the Clackamas River subbasin (Shively et al., 2007).

2.1.9 Take

Experimental population special rules contain specific prohibitions and exceptions regarding the taking of individual animals. These special rules are compatible with routine human activities in the expected reestablishment area. Section 3(19) of the Act defines “take” as “to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct.” If the NEP 10(j) rule is finalized, take of bull trout within the experimental population area would be allowed provided that the take is unintentional, not due to negligent conduct, or is consistent with State fishing

regulations that have been coordinated with the Service. We expect levels of incidental take to be low because the reintroduction is compatible with existing activities and practices in the area. As recreational fishing for species other than bull trout is popular within the NEP area, we expect some incidental take of bull trout from this activity but, as long as it is in compliance with ODFW fishing regulations, and Tribal regulations on land managed by the CTWSRO, such take will not be a violation of the Act.

2.1.10 Geographic Boundaries for the Proposed NEP

The NEP action area, which encompasses all potential release sites, would include the entire Clackamas River subbasin as well as the mainstem Willamette River, from Willamette Falls to its points of confluence with the Columbia River, including Multnomah Channel. The Willamette River's confluence with the Columbia River occurs at river mile (RM) 101, near the City of Portland. A secondary channel of the Willamette River, named the Multnomah Channel, branches off the Willamette River approximately three miles upstream from its confluence with the Columbia River. This secondary channel runs approximately 20 river miles along the west side of Sauvie Island before joining the Columbia River at RM 86 near the town of St. Helen's. The NEP boundary extends down the Multnomah Channel to its confluence with the Columbia River, as well as the mainstem Willamette River from Willamette Falls to its confluence with the Columbia River. Based on recent surveys, it has been determined that this species currently does not exist in the Clackamas River subbasin or the portion of Willamette River designated in this action (Shively et al., 2007).

We define the upper portion of the Clackamas River subbasin, the area where reintroduced bull trout can be expected to reestablish a viable population as the headwaters down to and including the North Fork Reservoir (RM 30). Bull trout require cold, clean water in complex river and stream habitats with low levels of fine sediments. These habitat requirements are most stringent for the spawning and rearing life stages of bull trout. The portion of the Clackamas River subbasin providing suitable spawning and rearing habitat today is limited to the mainstem and its tributaries in the very headwaters of the subbasin upstream of the Collawash River confluence. This portion contains a total of 70.1 river miles of suitable spawning and rearing habitat delineated into six separate habitat patches. These patches range in size, configuration, and condition. The most downstream patch occurs along the mainstem Clackamas River in an area known as Big Bottom. This unique and complex reach of the river provides suitable spawning and rearing habitat. The other patches occur either adjacent to or up to a maximum distance of 5.9 river miles upstream into the upper headwaters of the subbasin. It is believed that the upper Clackamas River contains a sufficient amount of habitat to support a self-sustaining population of bull trout (Shively et al., 2007). Based on migration patterns and seasonable habitat use observed in nearby extant bull trout populations, such as from the Lewis, McKenzie and Metolius subbasins, it is possible some reintroduced bull trout will utilize North Fork Reservoir. Based on studies and observations of seasonal bull trout movements in other lower Columbia River bull trout populations, it is likely bull trout

that overwinter in North Fork Reservoir would migrate upstream into the Clackamas River during spring and early summer.

The Service has broadened the action area beyond the expected reestablishment area to account for individual bull trout that may migrate past major hydroelectric operations on the Clackamas River. If bull trout migrate downstream of North Fork Dam, they will do so through one of several mechanisms: via the existing fish bypass system, which deposits fish in the Clackamas River below River Mill Dam at RM 23 (see Figure 2 below); through spill over North Fork Dam; or, via entrainment through the turbines at North Fork Dam. The latter two mechanisms would result in bull trout occupying the river reach above Faraday Dam; these fish could move further down the river system via spill at Faraday Dam or through entrainment through the turbine units at Faraday Dam. Both avenues would deposit bull trout in Estacada Lake, the reservoir behind River Mill Dam. Similar to passage at Faraday Dam, bull trout occupying Estacada Lake could potentially migrate to areas below River Mill Dam by: (1) entrainment in spill provided through the recently constructed fish bypass chute to increase passage; (2) entrainment in spill due to large flow events; or (3) by entrainment through the turbine units.

Although the above information suggests pathways by which bull trout may migrate into the lower Clackamas River below River Mill Dam and into the mainstem Willamette River, we expect the likelihood of this occurrence to be low. Habitat conditions, in particular water temperatures, are not suitable for bull trout for much of the year in the lower Clackamas and Willamette rivers. In addition, observations of bull trout migration patterns and seasonal habitat use in other nearby extant populations suggest reservoirs, such as North Fork Reservoir, often inhibit most bull trout migration to downstream habitats.

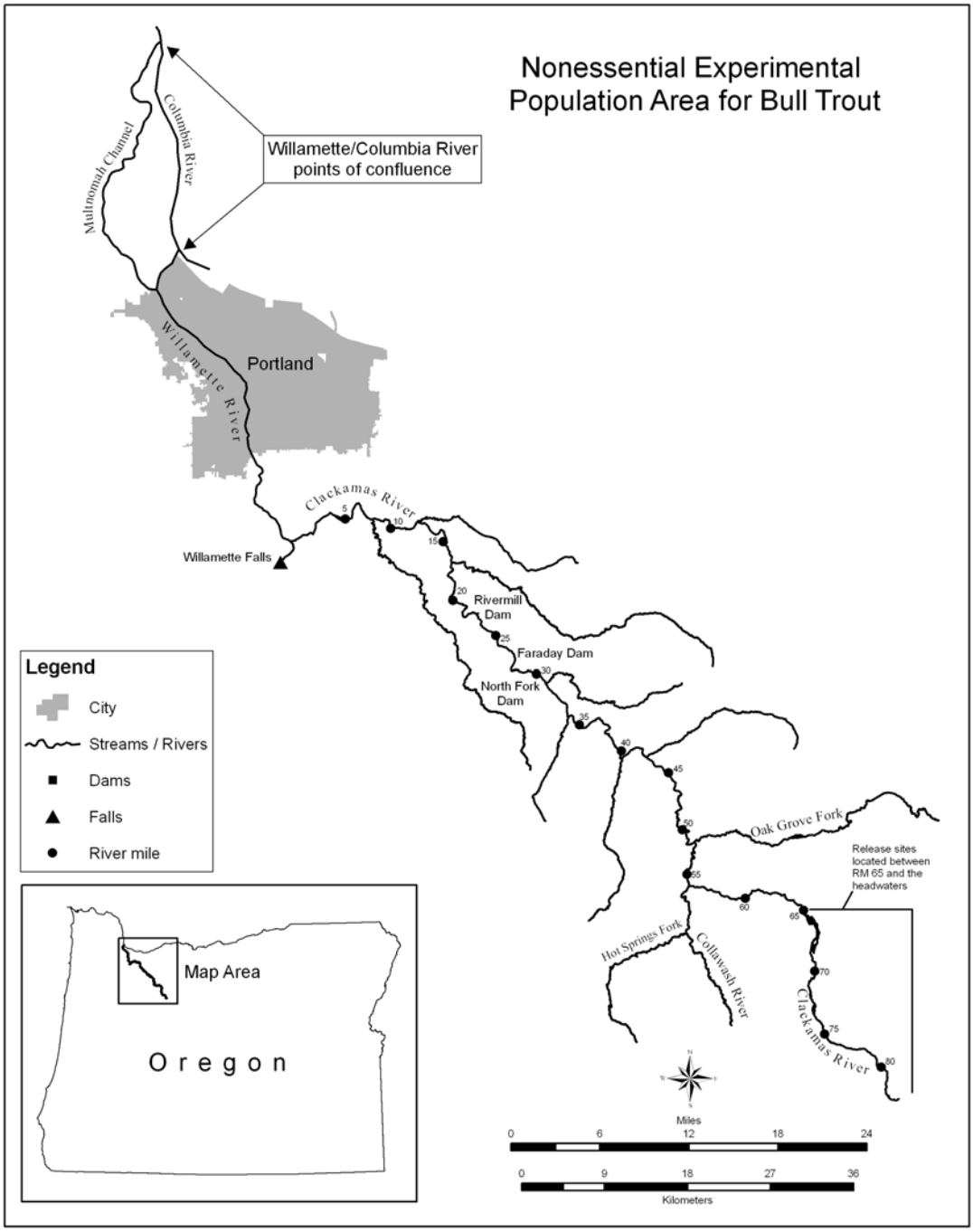

Figure 2. Nonessential Experimental Population Area for Bull Trout

2.2 Alternative B: No Action

Do not reintroduce bull trout into the Clackamas River subbasin. The No Action Alternative would continue existing river management without release of bull trout. In this alternative, bull trout would not be reintroduced in the Clackamas River.

2.3 Alternatives Considered But Eliminated from Detailed Study

2.3.1 Reintroduction to Historical Habitat in Other Willamette Basin Tributaries

Bull trout have been extirpated from multiple major tributaries of the Willamette River, including the Clackamas River. A decision to investigate reintroduction in the Clackamas River was supported by recovery criteria in the Service's draft recovery plan (USFWS 2002). As noted above in section 1.1, draft recovery criteria specific to the Willamette River Recovery Unit called for the reestablishment of a population of bull trout in the Clackamas River. Within the Willamette Basin, the Clackamas River was singled out for its potential to contribute to recovery based on the abundance of information substantiating the historical presence of bull trout relative to information available for other major tributaries. In addition, the Clackamas River was thought by biologists to likely contain a greater amount of suitable habitat relative to other major tributaries in the basin.

If a reintroduction of bull trout occurs in the Clackamas River and is deemed successful, the Service may investigate reintroduction to other major tributaries of the Willamette River Basin, namely the North Santiam River, which like the Clackamas River, is thought to likely contain suitable habitat for reestablishment. However, prior to considering additional reintroductions, the Service would conduct formal feasibility assessments, similar to that conducted for the proposed reintroduction to the Clackamas River.

2.3.2 Reintroduction Utilizing an Alternate Donor Stock

By exploring issues associated with life history strategy, metapopulation dynamics, biogeography, and genetic considerations, the CRBTWG identified bull trout populations in the "coastal" lineage as the best source for a donor population. Any of the "coastal" lineage bull trout populations are likely to carry the genetic material to preserve and protect the "coastal" lineage regardless of localized and specific adaptations. Although these local adaptations are important, each of the populations is likely to contain the evolutionary potential that is characteristic of the "coastal" evolutionary lineage. However, in a further refinement, the CRBTWG determined that donor populations from lower Columbia River tributaries would be most appropriate due to their geographic proximity to the historical bull trout population in the Clackamas River and because genetic studies indicate these populations are more closely related to one another than to

other "coastal" lineage populations (USFWS 2008, unpublished data). The potential lower Columbia River donor populations of bull trout include fish in five river basins: the Willamette River, Hood River, Lewis River, Deschutes River, and Klickitat River (Shively et al. 2007).

Specific benchmarks have been developed concerning the minimum bull trout population size necessary to maintain genetic variation important for short-term fitness and long-term evolutionary potential. Rieman and Allendorf (2001) concluded that an average of 100 spawning adults each year is required to minimize risks of inbreeding in a bull trout population and that 1,000 spawning adults each year will likely prevent loss of genetic diversity due to genetic drift. This later value of 1,000 spawning adults may also be reached with a collection of local populations among which gene flow occurs. The CRBTWG utilized these general benchmarks in the Feasibility Assessment to assess potential risk to each of the five potential donor stocks in the lower Columbia River from the loss of individuals, recognizing that risk increases as donor populations near 100 spawning adults and diminishes as populations approach 1,000 spawning adults (Shively et al. 2007).

When the Feasibility Assessment was developed in December 2007, bull trout from two of the five river basins, the Lewis River and Deschutes River, contained groups of interacting local populations that exceeded 1,000 spawning adults. For the Lewis River basin, this included the combined Pine Creek and Rush Creek populations that occur above Swift Dam. For the Deschutes River basin, this included the three interacting populations present in the Metolius River subbasin. Since publication of the Feasibility Assessment there have been declines in adult spawner abundance in both the Lewis and Deschutes river bull trout groups, with the Lewis River population dropping significantly in 2007 and 2008, to its current estimated adult spawner abundance of 379 individuals (Doyle 2009). Although the Deschutes River (Metolius River subbasin) bull trout population has also decreased over the last 2 years, the total number of annual spawning adults is still large enough (approximately 1,000 spawning adults) to protect against the loss of genetic diversity from genetic drift.

2.3.3 Reintroduction of Bull Trout Without 10(j) Designation

A number of administrative pathways for reintroducing bull trout to the Clackamas River were explored, including section 4(d), section 6, section 7, and 10(j) of the ESA. Of these, section 10(j) provided the most permanent reduction in regulatory burden to private landowners and public land management agencies. Furthermore, 10(j) provides greater management flexibility as compared to the other administrative pathways considered. For these reasons, reintroduction without 10(j) designation was not selected for further analysis.

2.3.4 Reintroduction of Bull Trout Under 10(j) Essential Experimental Population Designation

This alternative was not selected for further analysis because we have determined that this experimental population would not be essential to the continued existence of the species for the reasons listed in section 2.1.7. Furthermore, as discussed above in section 2.1.8, the more stringent legal protection provided by the ESA under an essential population designation is not necessary to protect reintroduced bull trout in the Clackamas River, and the added regulatory burden of such a designation may create resistance to the proposed action from land owners and land managers.

2.3.5 Reintroduction of Bull Trout to the Clackamas River Under 10(j) NEP Designation with Alternative Boundary Areas.

The Service considered limiting the downstream boundary of the NEP area to the lowermost dam on the Clackamas River, Rivermill Dam (RM 23), surmising that the lack of available habitat downstream of the dam would prevent bull trout from establishing themselves outside of the reestablishment area. Upon further consideration, the Service acknowledged the possibility that individual bull trout may utilize one of several mechanisms to move downstream of Rivermill Dam (see section 2.1.10). Once deposited below the dam, these fish may continue downstream into the lower portions of the Clackamas River and into the Willamette River.

Additionally, the Service considered limiting the NEP boundary to the confluence of the Clackamas and Willamette rivers but, again, because of the migration habits of fluvial bull trout, the possibility exist that reintroduced bull trout could migrate downstream into the Willamette River.

A larger boundary area was also considered, specifically the entire Clackamas River basin, the entire Santiam River basin and the mainstem of the Willamette River between the Santiam and Clackamas rivers. The Service found it unlikely that bull trout from the expected reestablishment area on the upper portion of the Clackamas River would migrate past Willamette Falls, further up the Willamette River and into the Santiam River subbasin. While the Santiam River constitutes a possible location for future bull trout reintroduction, this consideration is not part of the Clackamas River reintroduction proposal.

3.0 Environmental Consequences

3.1 Alternative A, Proposed Action

In section 1.5.1, we listed the three primary issues identified through stakeholder meetings and scoping. This section analyzes the environmental consequences associated with each of these three primary issues.

Issue 1. Possible negative impacts of the reintroduction on three species of ESA listed anadromous salmon and steelhead in the Clackamas River (inclusive of associated issues such as predation and competition, potential for disease transfer, and sufficiency of forage base).

Predation and Competition: The issue of predation and competition is largely based on the recreational and economic values put on salmon and steelhead and the large amount of public resources that have been, and continue to be, dedicated to improving the status of these ESA listed fish.

Current understanding of predator/prey relationships between bull trout and other species is limited, as is information on general interactions between bull trout and anadromous fish. Underwood et al. (1995) examined interactions between Chinook, steelhead, and bull trout. However, the life history strategy utilized by the bull trout population studied was resident (smaller sized fish at maturity) where piscivory was not the primary feeding strategy and no predator/prey relationships were noted. Instead the study focused on examining and confirming habitat partitioning between the three species, a trait common among species that evolve together. Habitat partitioning among sympatric species allows the utilization of different resources thereby reducing direct competition. This strategy was documented in several studies investigating interactions between bull trout and cutthroat trout (Marnell 1985; Nakano et al. 1992) and bull trout and rainbow trout (McPhail and Baxter 1996).

Although few studies have attempted to quantify bull trout predation impacts on sympatric fish species, the reputation of bull trout as an apex predator is not undeserved as there is an abundance of literature noting the aggressive piscivorous (i.e., fish eating) nature of this species. This reputation led to fish management actions that for many years included bounties, rotenone treatments, and trap and removal that ultimately extirpated many populations and in part led to the federal ESA listing of the species as threatened. Despite these actions there were no attempts that the Service is aware of to quantify impacts of bull trout predation on anadromous or resident fish populations, relative to the array of other variables that determine population viability such as predation by other piscivorous fish and birds, sport and commercial angling, habitat conditions, migratory conditions, water quality and ocean conditions to name a few.

Bull trout are opportunistic feeders and prey on whatever fish species or aquatic organisms (e.g., crayfish, aquatic macroinvertebrates, etc.) are present and in the most abundance. In many rivers within the native range of bull trout, juvenile anadromous salmonids historically, and in many cases currently, provide the most significant forage base for bull trout. Over the last century, the decline in abundance and distribution of anadromous salmonids in many rivers in the western United States precipitated a forage base shift for many bull trout populations to other fish species. The reduction, and in many cases complete loss of juvenile anadromous fish within portions of the range of bull trout has had unknown consequences. In some areas other species may have filled the niche previously occupied by anadromous fish and bull trout may not have been negatively affected. Conversely, the forage base in other areas may not have been replaced by other species and bull trout populations may have responded accordingly by reductions in abundance and distribution.

Within the native range of bull trout, many populations historically and currently overlap with the distribution of anadromous salmon and steelhead. In Oregon, bull trout, Chinook salmon and steelhead trout co-occur in a number of rivers including the McKenzie (Willamette River Basin), Hood, John Day, Deschutes rivers, the Wenaha, Minam, Lostine and other tributaries of the Grande Ronde River in northeast Oregon, and in the Walla Walla and Umatilla rivers. The status of salmon, steelhead, and bull trout in each of these river systems ranges from healthy to depressed. Although the Service is not aware of any studies assessing interactions between bull trout and anadromous fish in these watersheds, it likewise is unaware of any premise that bull trout within these watersheds are a limiting factor in the status of these salmon and steelhead populations.

If reintroduced, bull trout would add to the already highly diverse assemblage of fish species, native and nonnative, found in the Clackamas River subbasin. The Clackamas River supports naturally reproducing populations of early and late-run stocks of coho salmon (*O. kisutch*), spring Chinook salmon (*O. tshawytscha*), and winter steelhead (*O. mykiss*), all of which are federally listed as threatened under the ESA. A small, remnant run of fall Chinook salmon utilize the lower Clackamas River and a small population of sea-run coastal cutthroat trout also persists in this part of the subbasin. The upper subbasin, above PGE's North Fork Dam, is managed as a wild fish sanctuary and all anadromous salmonids identified as hatchery origin (i.e., those that are adipose fin clipped), are captured at the North Fork Dam fish trap and prevented from migrating past the dam. Pacific lamprey (*Lampetra tridentata*) also occur upstream of North Fork Dam. Downstream of North Fork Dam, hatchery produced spring Chinook, coho, and winter and summer steelhead are released each year at a number of locations.

Other fish species present throughout the subbasin include resident and fluvial coastal cutthroat trout (*O. clarki clarki*), rainbow trout (*O. mykiss*), brook trout (*Salvelinus fontinalus)*, brown trout (*Salmo trutta*), mountain whitefish (*Prosopium williamsoni*), largescale sucker (*Catostomus macrocheilus*), Pacific lamprey, sculpin (*Cottus sp.*), mountain sucker (*C. platyrhynchus*), longnose dace (*Rhinichthys cataractae*), western brook lamprey (*L. richardsoni*), northern pikeminnow (*Pytchocheilus oregonensis*), chisel mouth (*Acrocheilus alutaceus*), redside shiner (*Richardsonius balteatus*),

threespine stickleback (*Gasterosteus aculeatus*), and peamouth (*Mylocheilus caurinus*). Introduced exotic fish species, such as bluegill (*Lepomis macrochirus*), pumpkinseed (*L. gibbosus*), brown bullhead (*Ameiurus nebulosus*), American shad (*Alosa sapidissima*), smallmouth bass (*Micropterus dolomieu*) and other species are encountered in some habitats in the lower watershed below Rivermill Dam (Murtagh et al. 1992).

Historically, juvenile anadromous fish (salmon and steelhead), along with eggs and carcasses of anadromous fish, likely comprised a significant component of the forage base for bull trout in the Clackamas River, as did other native fish such as sculpin, dace, whitefish, suckers and resident rainbow and cutthroat trout. Due to the significant reduction in the abundance of salmon and steelhead in the Clackamas River, reintroduced bull trout would be expected to rely heavily on the resident native fish community which we presume to be generally healthy based on watershed conditions in the upper Clackamas River (Shively et al. 2007).

Reintroducing an apex aquatic predator into the Clackamas River will generate a response by other members of the aquatic community, namely from predation and competition for habitat and food resources. However, predicting and quantifying the response from a foodweb perspective is difficult due to the number of variables that contribute to foodweb dynamics. For example, bull trout eat other predators that consume juvenile anadromous fish and eggs such as resident rainbow and cutthroat trout, mountain whitefish, and sculpin. In addition, foodweb dynamics are influenced by terrestrial organisms such as mammals and avian predators. Finally, there are other uncertainties that will contribute to foodweb response such as the ultimate carrying capacity (i.e., future abundance) of the Clackamas River for bull trout, and the locations of the watershed that will be used by bull trout for spawning, rearing, overwintering and foraging. Given the complexity of these relationships there is uncertainty whether the overall impact to salmon and steelhead at the population scale will be negative, positive or neutral.

Potential predation and competition impacts to the three species of threatened salmon and steelhead in the Clackamas River were identified as a concern during project scoping. In anticipation of this concern, the Service, in July 2008, sponsored an expert science panel workshop to assess potential impacts of a proposed bull trout reintroduction on ESA-listed salmon and steelhead in the Clackamas River. The panel consisted of five experts on bull trout and salmonid biology and ecology, food web dynamics, and population viability modeling. The workshop also solicited expert opinion on critical monitoring and management actions to reduce uncertainty and risk to salmon and steelhead from a reintroduction of bull trout. The results from this workshop are fully presented in Appendix B of this draft EA, and are summarized below.

The panelists were prompted to score the *degree of impact that bull trout would have on the extinction probability of each salmonid species in the Clackamas River over 100 years from the start of the reintroduction project*. The panel used the following seven categories and definitions for scoring potential bull trout impacts:

- **Very High** = bull trout influence contributes to 100% of the extinction probability
- **High** = bull trout influence contributes to about 95% of the extinction probability
- **Moderately High** = bull trout influence contributes to about 75% of the extinction probability
- **Moderate** = bull trout influence contributes to about 50% of the extinction probability
- **Moderately Low** = bull trout influence contributes to about 25% of the extinction probability
- **Very Low** = bull trout influence contributes to about 5% of the extinction probability
- **None** = bull trout influence has no contribution to the extinction probability

It was clarified to the panelists that they were to score only that portion of salmon and steelhead population extinction probabilities that would be caused by bull trout; they were not asked to score overall extinction probabilities. In this way, the relative impact contributed specifically by bull trout would be represented.

The results of the panelists' scoring of possible degree of impact of bull trout on salmonid probability of extinction ranged from moderately high impact to no impact. The mode of overall score values suggested that impact was viewed by the panelists in general to be very low or moderately low for spring Chinook, coho, and winter steelhead; and mostly none to very low for fall Chinook. However, some possible outcomes ranged into higher categories of impact but with far lower score levels.

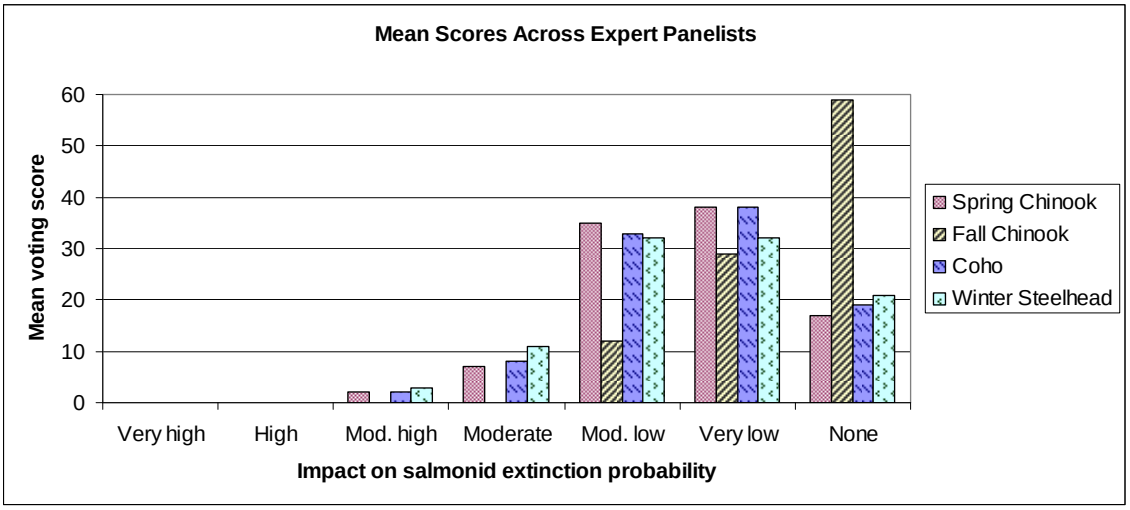

Figure 3. Mean scores of the potential impact of bull trout on salmon and steelhead population extinction probability.

These distributions of composite scores across the outcome categories for each species can be interpreted as expected probability distributions. Outcomes that scored with few points are still possible, according to at least some of the panelists, even if the probability is low.

Although we acknowledge a significant amount of uncertainty regarding the food web effects of a reintroduction of bull trout into the Clackamas River, the best available information, which includes the results of the workshop described above, suggests impacts to salmon and steelhead and other native fish in the subbasin are unlikely to be significant. If the Service and the ODFW determine, in consultation with NMFS and based on project monitoring, that the bull trout reintroduction efforts are not consistent with the recovery of salmon or steelhead, the reintroduction program will be discontinued and actions will be taken to remove bull trout from the experimental population area.

Although we do not anticipate significant impacts to salmon and steelhead, in order to provide the best opportunity for measuring a foodweb response following a bull trout reintroduction, pre-project baseline surveys were initiated in 2009. These surveys will provide a baseline of fish species diversity, distributions, abundances, diets and growth rates in the upper Clackamas River. Provided a reintroduction of bull trout is implemented, it is our intent to replicate these surveys at regular intervals in the future to measure the foodweb response to the restoration of bull trout to the native fish community in the Clackamas River.

Disease: Unwanted parasites and diseases frequently have been introduced through fish transfers (Hoffman and Schubert 1984). To avoid these unintended consequences, translocations of fishes between major river basins should be preceded by a thorough investigation into the potential transfer of pathogens from the donor source, as well as the resistance of the donor stock to any known pathogens present in the receiving habitat.

In order to assess the risk of disease transfer and the presence of pathogens in the Clackamas River, the Service worked closely with ODFW fish pathologists and staff from the Service's Lower Columbia River Fish Health Center. Our assessment utilized previously existing disease information from the Deschutes Basin (and Metolius River subbasin) and new information that was collected from the Clackamas and Lewis rivers as part of the disease assessment. At the time of the disease assessment, bull trout from the Lewis River, in addition to bull trout from the Metolius River, were being considered as potential donor stock for a reintroduction to the Clackamas River.

The results from our testing of fish from the Lewis and Clackamas rivers, combined with existing data from the Deschutes Basin (Engleking 2003) provided valuable information regarding (1) the risk of pathogen transfer to the Clackamas River from the Metolius or Lewis river donor stock; and, (2) the presence or absence of pathogens in the Clackamas River that may influence the health of donor stock from the Lewis or Metolius rivers. Based on the results, it appeared the predominant pathogens of concern to a reintroduction of bull trout to the Clackamas River are Infectious Hematopoietic Necrosis Virus (IHNV) and Renibacterium salmoninarum (BKD). ODFW's expressed primary concern is the potential to introduce the U-clade of IHNV to the Clackamas River. U-clade INHV is present in the Deschutes Basin but has not been detected in bull trout from

below or above PGE's Pelton-Round Butte Hydroelectric Project (a complex of three dams).

It does not appear at this time that existing pathogens from potential donor stock or from the receiving environment will compromise the success of the reintroduction project. In addition, there does not appear to be undue risk to other native salmonids in the Clackamas River from a transfer of bull trout from the Lewis or Metolius river basins. Despite these findings, annual disease screening of a representative sample of bull trout prior to transfer to the Clackamas River is warranted. Guidelines for annual disease screening were developed in coordination with ODFW Fish Pathology. These guidelines can be found in Appendix A of this document.

Forage Base: Bull trout historically coexisted with many other native fish species in the Clackamas River, likely feeding on a variety of different species. Historically, anadromous Pacific salmon were likely the most abundant fish in the Clackamas River subbasin and they probably comprised a significant portion of the bull trout diet. However, current abundance and distribution of anadromous salmon in the subbasin is reduced from historic levels. Bull trout, if reintroduced, may be more dependent upon other native species as a prey base, such as mountain whitefish and largescale sucker, both of which are present and abundant along with other potential prey such as dace, sculpin, and rainbow and cutthroat trout. Available information on bull trout populations from other areas in the lower Columbia River Basin suggest that, while possibly important, bull trout persistence is not dependent upon the presence of anadromous salmon for forage. While the distribution and abundance of Pacific salmon in the Clackamas River is reduced from historical levels, the remaining native fish assemblage is assumed to be healthy. For these reasons, we believe there is a sufficient forage base to support a bull trout reintroduction in the Clackamas River.

Issue 2. Possible impacts to the success of a reintroduction from competition and hybridization between bull trout and nonnative brook trout that inhabit a small portion of suitable bull trout spawning and rearing habitat in the Clackamas River.

Brook trout are widespread throughout the native range of bull trout and are considered an important threat to the persistence of bull trout (Rieman et al. 1997). The influence of nonnative brook trout on bull trout may depend in part on local habitat features. Rich et al. (2003) examined the influence of habitat features on the distribution and co-occurrence of nonnative brook trout and bull trout. The study suggested that bull trout and brook trout may partition themselves naturally based on habitat type and stream temperature, and that bull trout may be more susceptible to brook trout invasion in small, low-gradient streams where brook trout may have a competitive advantage (Nagel 1991; Paul and Post 2001). Brook trout appear to adapt better to degraded habitats and higher water temperatures than bull trout (Clancy 1993, Rich 1996). Yet in areas of clean, cold water with complex habitat, bull trout may successfully compete with brook trout (Paul

and Post 2001; Dunham and Rieman 1999). Hybridization is most common where isolated or remnant bull trout populations overlap with brook trout (Cavender 1978; Leary et al. 1983, 1991; Markle 1992). Small resident populations are particularly susceptible to hybridization from co-occurring brook trout because individuals of spawning age are similar in size, and both spawn in the fall and utilize similar spawning habitat.

Stocking of nonnative brook trout for recreational angling began in the Clackamas River in the early 1900s, and continues today in high elevation lakes. Over time, some lakes have developed naturally reproducing populations of brook trout while others require regular stocking. While the release of brook trout into high elevation lakes with outlet streams has been discontinued, past stocking in lakes resulted in self-sustaining populations of brook trout in some streams in the Clackamas River subbasin.

Stream surveys and biological inventories completed by USFS fish biologists over the last two decades provide a reliable source for documenting observations of brook trout in particular river segments and streams. However, little to no quantitative data exist to characterize their abundance relative to that of native species. Brook trout have been observed in one of the six patches containing suitable bull trout spawning and rearing habitat; Patch Three upper Clackamas River (Figure 1 above). Within Patch Three, brook trout have been observed in Squirrel and Ollalie creeks, and in the upper Clackamas River above its confluence with Squirrel Creek. Of the approximately 70 miles of suitable spawning and rearing habitat identified for bull trout in the upper Clackamas Subbasin in the Feasibility Assessment (Shively et al. 2007), brook trout have been observed to occupy, and be reproducing in, approximately two miles of streams. Brook trout were observed to occupy an additional one and a half miles of adjacent area in low numbers in 2004, but not in 2007 or 2008 (Fishman 2004, T. Horning, USFS, Mt. Hood NF, pers. comm.). Brook trout also occupy, and are stocked, in some of the unconnected headwater lakes in the subbasin.

Brook trout expanded to Squirrel and Ollalie creeks and to the upper Clackamas River above its confluence with Squirrel Creek from historic stocking in headwater, mountain lakes with tributary outlets. Brook trout were repeatedly stocked over many decades by ODFW in various lakes throughout the Ollalie Lakes complex and in other lakes that feed Ollalie and Squirrel creeks. Beginning in 2003, a coordinated effort between ODFW and the USFS led to a discontinuation of stocking brook trout into lakes with tributary outlets to the upper Clackamas River and its tributaries containing suitable bull trout spawning and rearing habitat. Although recent sampling efforts have not been comprehensive, results from surveys in the Upper Clackamas River suggest brook trout distribution may be contracting over time. However, they are persisting with recruitment in the highest reaches of the upper Clackamas River (approximately through the upper 1 ¾ miles (2.8 km). Although additional surveys are warranted, it is possible the range of brook trout in areas that are no longer stocked has decreased.

Based on the best available information, brook trout distribution does not appear to be expanding in the upper Clackamas River and in fact may be contracting. In addition,

recent surveys suggest brook trout may be reproducing in only a portion (2 miles) of their limited three and one-half mile distribution. These three and one-half miles represent only two percent of the 70 miles of identified suitable spawning and rearing habitat in the upper Clackamas River (Shively et al. 2007).

It is unlikely that brook trout will limit the potential establishment of bull trout in the upper Clackamas River for the following reasons: (1) limited distribution and reproduction of brook trout within the reintroduction area; (2) discontinuation of brook trout stocking of headwater lakes with outlets to the upper Clackamas River and its tributaries (3) high quality habitat in the Upper Clackamas River may provide an advantage to bull trout over brook trout based on recent literature (Paul and Post 2001; Dunham and Rieman 1999; Dunham et al. 1999); and (4) Based on the fluvial life history type of the donor stock (Metolius) and the suspected fluvial life history type present in the Clackamas River historically, we expect reintroduced bull trout will adopt a fluvial life history type (larger migratory fish) rather than a resident life history type (small non-migratory fish). Large migratory bull trout would be expected have a competitive and reproductive advantage over the small brook trout that are currently observed in the upper Clackamas River.

Issue 3. Possible negative impacts to the donor stock (Metolius River bull trout) from annual depletion of various life stages for transfer to the Clackamas River.

To implement the reintroduction of bull trout to the Clackamas River we propose to utilize a single donor stock from the Metolius River in Central Oregon. We will collect fish of various life stages (fry, juvenile, subadult, and adult) in proportion to donors available from genetically identifiable groupings of bull trout in the Metolius River. Three major genetic bull trout groupings are present in the Metolious: (1) Whitewater River; (2) Jefferson and Candle Creeks; and, (3) Canyon, Heising, and Jack Creeks. The actual number transferred will depend on current population abundance in the Metolius River, based on ongoing annual monitoring by ODFW, USFS, CTWSRO, and PGE.

Due to limited knowledge regarding the status of bull trout in the Whitewater River, and per a request from CTWSRO, we propose to limit potential donor impacts by not targeting individuals specifically in the Whitewater River. However, collections of bull trout from the mainstem Metolius River and Lake Billy Chinook may include some individuals from the Whitewater River due to the fact they would be physically indistinguishable from bull trout from the other two genetic groupings.

Annual Donor Availability Assessment: The numbers and life stages of donor stock to be transferred from the Metolious River to the Clackamas River were developed by members of the Clackamas Bull Trout Working Group (CBTWG) and members of the Deschutes Bull Trout Working Group (DBTWG). The DBTWG includes members that manage and/or contribute to monitoring bull trout and bull trout habitat in the Metolius River subbasin (ODFW, CTWSRO, USFS, PGE, FWS). Members of these two working

groups assembled in March 2008, to discuss and develop donor stock availability criteria that will inform the number of bull trout available on an annual basis from the Metolius River for the first seven-years (Phase 1) of the reintroduction to the Clackamas River. Members of the Clackamas and Deschutes bull trout working groups that met on the issue of donor availability will be subsequently referred to as the donor stock advisory group.

The donor stock availability criteria, ultimately developed to reduce the potential impact to the donor stock, represent the maximum number of individuals that could be removed on an annual basis based on the recent population status of bull trout in the Metolius River. Should the status of bull trout in the Metolius River significantly change these criteria will be reevaluated by the Service, ODFW, CTWSRO and other members of the donor stock advisory group (advisory group).

Of primary concern to both the Deschutes and Clackamas bull trout working groups is continued viability of bull trout populations within the Metolious River. To that end, the lead implementing agencies of the Clackamas River Bull Trout Reintroduction Project (the Service and ODFW) are committed to an adaptive management framework for the reintroduction effort. All take of bull trout from the Metolius River will be assessed every year at an annual meeting of the donor stock advisory group.

The advisory group's support towards Metolius River bull trout as a donor stock is dependent upon the adult spawning population in the Metolius River remaining above 800 individuals annually. The spawning population estimate peaked in 2004 at approximately 2,500 fish but has since dropped to approximately 900 adult spawners in 2008 (does not include Whitewater River bull trout which likely puts the total count over 1,000). If the adult spawning population drops below 800 individuals (including bull trout in Whitewater River) for a single year, the bull trout co-managers in the Deschutes Basin (ODFW and CTWSRO) and other members of the advisory group, will evaluate and provide further guidance to the Clackamas Project as to donor availability by life stage for subsequent years.

Prior to implementation of the project, measures of success will be developed to better guide transfers of various life stages, particularly adults and subadults. For example, if radio telemetry suggests greater than a yet-to-be-defined percent of adults and subadults are migrating out of the Clackamas River and not returning, then future transfers of adults and subadults may be eliminated or significantly reduced. Likewise, if fry mortality is exceedingly high and few are observed through monitoring during the initial years of the project then fry transfers may be eliminated or reduced in favor of older-aged fish. Defining measures of success by life stage will require further discussions by the CBTWG and others involved with the monitoring and evaluation component of the project.

Adult and Subadult Transfers: The advisory group determined up to a 100 adults and 100 subadults total could be available for transfer to the Clackamas River annually provided the total number of adult spawners in the Metolius River maintains 800 or more individuals as called for in recovery criteria outlined in the draft recovery plan (USFWS

2002). Maintaining 800 spawning individuals is generally consistent with the donor stock risk assessment in the Feasibility Assessment (Shively et al. 2007) which found low risk (from loss of individuals) to populations that maintain a spawning population size that approaches 1,000 individuals.

In practice it is unlikely the reintroduction program would utilize as many as 100 adults and 100 subadults annually unless initial monitoring of smaller numbers (for more detail see *Phase One life Stages and Numbers Transferred* in Appendix A) of transferred adults and subadults over the first few years of the program confirms the majority to be reproducing and remaining within the Clackamas River subbasin.

In general, adults would be captured in the Metolius River arm of Lake Billy Chinook in spring and summer although the project may experiment with trapping adults in the fall as they enter individual spawning tributaries in order to reduce the chance of overburdening a particular spawning group. The collection of subadults would occur primarily in Lake Billy Chinook concurrent with the collection of adults.

Fry and Juvenile Transfers: The group determined up to 1,000 juveniles (age 1+ and 2+) and up to 10,000 fry could be available for transfer to the Clackamas River annually provided that this take was spread among multiple spawning tributaries (excluding direct take of individuals from Whitewater River per request from CTWSRO). In order to replicate as much of the genetic diversity as possible to the Clackamas River we intend to utilize donors from the majority of Metolius River tributaries used by bull trout for spawning. However, the capacity and current number of spawners differs among tributaries and thus the number of individuals removed from each tributary will be commensurate with the number of adult fish spawning in each tributary. For example, we expect to transfer more donors from Jack Creek which averages more than 150 redds annually then from Heising Spring which averages less than 50 redds annually. Collection of juveniles would occur primarily in spawning tributaries whereas the collection of fry will likely occur both in spawning tributaries and in the mainstem Metolius River.

Summary of Donor Stock Risk: The decision to utilize Metolius River (Deschutes Basin) bull trout as a donor stock was based on a rigorous assessment of donor stock suitability in the Feasibility Assessment (Shively et al. 2007). The decision was significantly influenced by the current trend and abundance of the Metolius River bull trout population which is the healthiest population in Oregon. Based on redd counts, the Metolius bull trout population has maintained greater than 1,000 spawning adults since 2002, thereby meeting current minimum abundance criteria (i.e., 800 spawning individuals) outlined in the Service's draft recovery plan (USFWS 2002). Based on the current status of Metolius River bull trout, the donor stock criteria discussed above, the methods of donor stock removal, the commitment on behalf of the donor stock advisory group to assess the donor stock program and status annually, we believe the appropriate safeguards are in place to prevent any negative impacts to the Metolius bull trout population from its donor stock contribution to the Clackamas bull trout reintroduction.

3.2 Alternative B, No Action

3.2.1 Fish and Wildlife

The Service acknowledged in the draft recovery plan the necessity for reestablishing bull trout in portions of its historic range (USFWS 2002). Although the Clackamas River represents a small portion of the historic range of the species that has been lost, reestablishing bull trout in this subbasin would move the species incrementally closer to meeting draft recovery goals. In the Willamette River Basin, where bull trout have been extirpated over a significant portion of its former range, the establishment of bull trout in the Clackamas River would represent a significant achievement towards meeting basin-wide, and range-wide recovery goals for the species. The No Action alternative would eliminate or postpone our ability to meet draft recovery criteria in the Willamette River Basin.

The present status of Clackamas River and Willamette River fish species and communities, threatened and endangered species, and other wildlife in the Clackamas River subbasin and the Willamette River basin is likely to remain unchanged if a NEP is not designated and bull trout are not reintroduced.

Apex predators such as bull trout play important roles in food web dynamics. If a reintroduction of bull trout is successful in the Clackamas River we expect to see a response within the aquatic community driven by predation and competition for habitats and food resources. Impacts may be beneficial for some species and negative for others. Although we expect bull trout would forage on juvenile anadromous salmon and steelhead as well as eggs and carcasses of anadromous fish, they would also forage on other species of native fish that forage on juvenile anadromous fish and eggs such as sculpin, whitefish, and rainbow and coastal cutthroat trout. The response to bull trout presence within the aquatic community is likely to vary by season and by species (see Lowery 2008). Predicting the overall impact on individual species within the foodweb is a difficult endeavor as discussed in section 3.1 above. We acknowledge a successful reintroduction of bull trout to the Clackamas River could potentially have positive effects to some species within the native fish community, perhaps including anadromous salmon and steelhead. Under the No Action alternative, these potential positive and negative effects would not be realized.

3.2.2 Land Use

A decision to forego designation of a NEP and reestablishment of bull trout would have no direct social or economic impacts in the Clackamas River subbasin or the portion of the Willamette River included in the NEP boundary area. Recreational use of these rivers would be largely unaffected by this alternative. The State of Oregon and USFS will continue to exercise authority over most recreational use in the Clackamas River and the

City of Portland will continue its authority over use in the portion of the Willamette River included in the NEP boundary area.

In and upstream from the Clackamas River subbasin, Federal actions would continue to be subject to existing environmental regulations. USFS would continue to manage most of the river and riparian habitat within the upper portion of the Clackamas River subbasin in such a way as to provide for recreation and to preserve the area's ecological character and biological diversity. Likewise there would be no affect on Federal agency actions in the lower Clackamas River or the portion of the Willamette River included in the NEP boundary area.

4.0 List of Preparers

The United States Fish and Wildlife Service, United States Forest Service, and Oregon Department of Fish and Wildlife contributed to the development of this document.

5.0 List of Agencies, Organizations and Persons Contacted

Project Cooperators and Collaborators:
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U.S. Forest Service, Mt. Hood National Forest & Deschutes National Forest
Oregon Department of Fish and Wildlife
National Marine Fisheries Service
U.S. Geological Survey
Confederated Tribes of the Warm Springs Reservation of Oregon

Peer Review of Reintroduction Feasibility Assessment
State of Oregon's Independent Multidisciplinary Science Team

Project Presentations to the Following:
American Fisheries Society – Oregon Chapter and Western Division Chapter
The Nature Conservancy of Oregon
Lower Columbia Technical Recovery Team (for salmon and steelhead)
Oregon Fish and Wildlife Commission

Stakeholder Group:
Portland General Electric
Northwest Steelheaders Association
Native Fish Society
Trout Unlimited
Estacada Tackle Shop
Clackamas Watershed Council
Pure Fishing

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7.0 Appendix A – Draft Clackamas River Bull Trout Reintroduction Implementation and Monitoring Plan

Note: This Draft Implementation and Monitoring Plan is considered a framework to guide development of a more detailed implementation and monitoring plan that will be necessary to carry out the proposed project. The intent with this document is to provide a general overview of the primary components associated with implementation and monitoring of this proposed project. Appendix A was written to be a stand-alone document thus it is redundant with a number of sections in the main body of the draft EA document.

Introduction

Bull trout were abundant and widely distributed in the Clackamas River subbasin. They were a historical component of the river's native fish assemblage that evolved over thousands of years. Presently, based on extensive surveys, bull trout are extirpated from the Clackamas River subbasin. Bull trout were listed as threatened under the Endangered Species Act (ESA) by the U.S. Fish and Wildlife Service (Service) in 1998. The 2002, draft bull trout recovery plan identified the need to assess the feasibility of reintroducing bull trout to the Clackamas River subbasin. Accordingly, the Clackamas River Bull Trout Working Group (CRBTWG) completed a feasibility assessment in 2007 (Shively et al. 2007). The feasibility assessment focused on whether or not a reintroduction is biologically possible (i.e., "Can it be done?"). Four questions were examined:

- Is there a high level of confidence that bull trout are no longer present that would serve as a natural gene bank?
- Is there suitable habitat remaining, what conditions or stressors currently prevent bull trout from occupying suitable habitats, and have these been corrected?
- Is suitable habitat reasonably expected to be re-colonized through natural processes if conditions are improved?
- Is a suitable or compatible donor population(s) available that can itself tolerate some removal of individuals?

There is a very high level of confidence that bull trout have been locally extirpated from the subbasin. Primary factors for their decline began in the early 20th Century and extended into the 1970s. They include migration barriers from hydroelectric and diversion dams, direct and incidental harvest in the sport and commercial fisheries, targeted eradication with bounty fisheries, and habitat and water quality degradation from forest management and agricultural activities. These factors are believed to be sufficiently remedied such that they would not impede the success of a reintroduction attempt.

Bull trout require very cold water for spawning and rearing. The portion of the subbasin providing suitable bull trout spawning and rearing habitat today includes the tributaries and headwaters of the Clackamas River upstream of the Collawash River confluence. This portion of the subbasin contains six separate habitat patches totaling approximately 70 miles of suitable spawning and rearing habitat (see Figure 1 below). Habitat patches range in size, configuration, and condition.

Bull trout specific benchmarks have been developed concerning the minimum population size necessary to maintain genetic variation important for short-term fitness and long-term evolutionary potential. Rieman and Allendorf (2001, pp. 762) concluded that an average of 100 adults spawning each year would be required to minimize risks of inbreeding in a bull trout population and that 1,000 adults will likely prevent loss of genetic diversity due to genetic drift. This later value of 1,000 spawners may also be reached with a collection of local populations among which gene flow occurs. The CRBTWG utilized these general benchmarks in the Feasibility Assessment to assess potential risk to each of the five potential donor stocks in the lower Columbia River from the loss of individuals, recognizing that risk increases as donor populations near 100 spawning individuals and diminishes as populations approach 1,000 spawning individuals (Shively et al. 2007, Ch. 3, pp. 8-14).

At the time the Feasibility Assessment was developed, bull trout from two of the five river basins, the Lewis River and Deschutes River, contained groups of interacting local populations that exceeded 1,000 spawning adults. For the Lewis River basin, this included the combined Pine Creek and Rush Creek populations that occur above Swift Dam. For the Deschutes River basin, this included the three interacting populations present in the Metolius River subbasin. Since publication of the Feasibility Assessment there have been declines in adult spawner abundance in both the Lewis and Deschutes river bull trout groups, with the Lewis River population dropping significantly in 2007 and 2008, to its current estimated adult spawner abundance of 379 individuals (Doyle 2009, pp. 2-7). Although the Deschutes River (Metolius subbasin) bull trout population has also decreased over the last two years, the total number of annual adult spawners is still large enough (approximately 1,000 individuals) to protect against the loss of genetic diversity from genetic drift.

The feasibility assessment concluded the following:

- a high level of confidence that bull trout have been locally extirpated,
- the causes for their decline have been sufficiently mitigated,
- high quality habitat is available in sufficient amounts,
- nearby donor stocks are unlikely to naturally re-colonize,
- suitable donor stocks are available that can withstand extraction of individuals,
- nonnative brook trout presence is restricted to a small portion of the suitable habitat and not a likely threat, and

- a diverse and abundant fish assemblage would serve as a sufficient prey base with no obvious threats posed by bull trout to these species,

The overall conclusion based on the scope of the assessment was: *reintroduction of bull trout into the Clackamas River subbasin is feasible*.

Proposed Action Goals and Objectives:

The goal of the proposed action is to re-establish a self-sustaining bull trout population ranging from 300 to 500 spawning adults annually in the Clackamas River by 2030 that contributes to the conservation and recovery of bull trout in the Willamette Basin and to overall recovery criteria outlined in the Draft Bull Trout Recovery Plan (USFWS 2002).

For this project we define a self-sustaining population as one that has a stable trend in adult abundance over a ten-year period, contains a high level of genetic diversity representative of the donor stock, and requires little or no additional transfers.

The objectives of the proposed action include the following:

- Reintroduction to be consistent with the recovery of other ESA-listed fish species in the Clackamas River
- Reintroduction may provide for future recreational fisheries in the Clackamas River
- Reintroduction to be compatible with social needs and expectations (i.e., 10(j) nonessential experimental population designation under the ESA)
- Implemented within an adaptive management framework to learn and adapt over time

Reintroduction Strategy:

We propose to reintroduce bull trout to the Clackamas River utilizing a three-phased adaptive management strategy. Each phase will last approximately seven years. The three phases are described below.

Phase One (2010-2016): Phase One of the reintroduction will be the key active management and learning phase. The release strategy varies with the life stage being reintroduced and may be modified as necessary based on monitoring results. Adult and subadult bull trout would be released in the mainstem Clackamas in patch 1 (Figure 1). Fry and juveniles would be planted in all feasible patches on a rotating basis (see *Release Strategies* below).

Phase Two (2017-2023): Based on Phase One monitoring, adjust implementation strategy to favor more successful life stages and preferred habitat patches. If Phase One is determined to be unsuccessful, reevaluate components of the reintroduction strategy such as donor stock, release locations and timing, life-

stages and numbers transferred, in order to inform whether to significantly modify or discontinue the project.

Phase Three (2024-2030): By the year 2030 (or sooner if the goal and objectives are achieved) discontinue active management and stop implementation. Depending on the availability of monitoring and evaluation funds, continue post-treatment learning on both the donor and recipient populations.

Adaptive Management Framework

The Service and our project partners believe that employing an adaptive management framework approach offers the highest likelihood for ensuring the success of a reintroduction of bull trout to the Clackamas River. Key information obtained from annual monitoring and evaluation will shed light on the uncertainties identified and allow for necessary adjustments during implementation.

Involved Parties

The ODFW and Service will co-lead project implementation and monitoring with assistance from the USFS Mt. Hood National Forest and U.S. Geological Service (USGS). Confederated Tribes of the Warm Springs Reservation of Oregon (CTWSRO) and Portland General Electric (PGE) may provide assistance to the project by contributions of equipment and/or personnel.

Donor Stock

To implement the reintroduction of bull trout to the Clackamas River we propose to utilize a single donor stock from the Metolius River in Central Oregon. We will collect fish of various life stages (fry, juvenile, subadult, and adult) in proportion to donors available from genetically identifiable groupings of bull trout in the Metolius River. Three major genetic bull trout groupings are present in the Metolious: (1) Whitewater River; (2) Jefferson and Candle Creeks; and, (3) Canyon, Heising, and Jack Creeks. The actual number transferred will depend on current population abundance in the Metolius River, based on ongoing annual monitoring by ODFW, USFS, CTWSRO, and PGE.

Due to limited knowledge regarding the status of bull trout in the Whitewater River, and per a request from CTWSRO, we propose to limit potential donor impacts by not targeting individuals specifically in the Whitewater River. However, collections of bull trout from the mainstem Metolius River and Lake Billy Chinook may include some individuals from the Whitewater River due to the fact they would be physically indistinguishable from bull trout from the other two genetic groupings.

Annual Donor Availability Assessment

The numbers and life stages of donor stock to be transferred from the Metolious River to the Clackamas River were developed by members of the Clackamas Bull Trout Working Group (CBTWG) and members of the Deschutes Bull Trout Working Group (DBTWG). The DBTWG includes members that manage and/or contribute to monitoring of bull trout and bull trout habitat in the Metolius River subbasin (ODFW, CTWSRO, USFS, PGE, FWS). Members of these two working groups assembled on March 13, 2008, to discuss and develop donor stock availability criteria that will inform the number of bull trout available on an annual basis from the Metolius River for the first seven-years (Phase 1) of the reintroduction to the Clackamas River. Members of the Clackamas and Deschutes working groups that met on the issue of donor availability will be subsequently referred to as the donor stock advisory group.

The donor stock availability criteria, ultimately developed to reduce the potential impact to the donor stock, represent the maximum number of individuals that could be removed on an annual basis based on the recent population status of bull trout in the Metolius River. Should the status of bull trout in the Metolius River significantly change these criteria will be reevaluated by the Service, ODFW, CTWSRO and other members of the donor stock advisory group (advisory group).

Of primary concern to both the Deschutes and Clackamas bull trout working groups is continued viability of bull trout populations within the Metolious River. To that end, the lead implementing agencies of the Clackamas River Bull Trout Reintroduction Project (the Service and ODFW) are committed to an adaptive management framework for the reintroduction effort. All take of bull trout from the Metolius River will be assessed every year at an annual meeting of the donor stock advisory group.

The advisory group support detailed below is dependent upon the adult spawning population in the Metolius River remaining above 800 individuals annually. The spawning population estimate peaked in 2004 at approximately 2,500 fish but has since dropped to approximately 900 adult spawners in 2008 (does not include Whitewater River bull trout which likely puts the total count over 1,000). If the adult spawning population drops below 800 individuals for a single year, the bull trout co-managers in the Deschutes Basin (ODFW and CTWSRO) and other members of the advisory group, will evaluate and provide further guidance to the Clackamas Project as to donor availability by life stage for subsequent years.

Prior to implementation of the project, measures of success will be developed to better guide transfers of various life stages, particularly adults and subadults. For example, if radio telemetry suggests a significant percentage (yet-to-be-defined) of adults and subadults are migrating out of the Clackamas River and not returning, then future transfers of adults and subadults may be eliminated or significantly reduced. Likewise, if fry mortality is exceedingly high and few are observed through monitoring during the initial years of the project then fry transfers may be eliminated or reduced in favor of older-aged fish. Defining measures of success by life stage will require further discussions by the CBTWG and others involved with the monitoring and evaluation component of this project.

Adult and Subadult Transfers

Together the advisory group determined up to a 100 adults and 100 subadults total could be available for transfer to the Clackamas River annually provided the total number of adult spawners in the Metolius River maintains 800 or more individuals as called for in recovery criteria outlined in the Draft Bull Trout Recovery Plan (USFWS 2002). Maintaining 800 spawning individuals is generally consistent with the donor stock risk assessment in the Clackamas River Bull Trout Reintroduction Feasibility Assessment (Shively et al. 2007) which found low risk (from loss of individuals) to populations that maintain a spawning population size that approaches 1,000 individuals (see *Introduction* above).

In practice it is unlikely the reintroduction program would utilize as many as 100 adults and 100 subadults annually unless initial monitoring of smaller numbers (see *Phase One life Stages and Numbers Transferred* below) of transferred adults and subadults over the first few years of the program confirms the majority to be reproducing and remaining within the Clackamas River subbasin.

In general adults would be captured in the Metolius River arm of Lake Billy Chinook in spring and summer although the project may experiment with trapping adults in the fall as they enter individual spawning tributaries in order to reduce the chance of overburdening a particular spawning group. The collection of subadults would occur primarily in Lake Billy Chinook concurrent with the collection of adults.

Fry and Juvenile Transfers

Together the group determined up to 1,000 juveniles (age 1+ and 2+) and up to 10,000 fry could be available for transfer to the Clackamas River annually provided that this take was spread among multiple spawning tributaries (excluding direct take of individuals from Whitewater River per request from CTWSRO). In order to transfer as much of the genetic diversity as possible to the Clackamas River we intend to utilize donors from the majority of Metolius River tributaries used by bull trout for spawning. However, the capacity and current number of spawners differs among tributaries and thus the number of individuals removed from each tributary will be commensurate with the number of adult fish spawning in each tributary. For example, we expect to transfer more donors from Jack Creek which averages more than 150 redds annually then from Heising Spring which averages less than 50 redds annually. Collection of juveniles would occur primarily in spawning tributaries whereas the collection of fry will likely occur both in spawning tributaries and in the mainstem Metolius River.

Phase One Life Stages and Numbers Transferred

Based on existing population levels and donor criteria discussed above, we proposed the following approximate numbers of fish by life stage to be transferred each year during

Phase One of the project. As noted previously, monitoring of the donor stock and the first three years of the reintroduction project is expected to inform future numbers and life stages transferred.

- Adults: Approximately 30 per year (approximately equal numbers of males and females) for the first 3 years. Continue through Phase 1 pending monitoring.

- Subadults: Approximately 30 per year (approximately equal numbers of males and females) for the first 3 years. Continue through Phase 1 pending monitoring.

- Juveniles (1+ and 2+): 1,000 per year. Continue through Phase 1 pending monitoring.

- Fry (0+): 10,000 per year. Continue through Phase 1 pending monitoring.

Donor Stock Capture Techniques

Our intent is to implement the capture techniques described below. However, project funding and personnel, initial trapping success, donor stock status, and other variables may all influence the timing, locations, and level of effort associated with trapping efforts through the Phase 1 implementation period.

Adults and subadults will be targeted in Lake Billy Chinook in spring and summer by hook and line angling and potentially with trap nets. Based in part on the success of those methods we may experiment with trapping adults in the late summer and fall with picket weir traps in individual spawning tributaries. There are two advantages of tributary trapping: (1) the ability to quantify the number of individuals removed from each tributary annually which assures we are not overburdening any one individual spawning group or tributary; and, (2) allows us to better meet our goal of transferring as much genetic diversity as possible by ensuring adequate representation from various spawning tributaries and spawning groups. The potential disadvantage of tributary trapping is that these fish would generally be ready to spawn immediately and the handling associated with capture and transport to the Clackamas River may stress the fish such that they do not spawn or spawn in unproductive habitat in the Clackamas River due to the limited time available to seek appropriate spawning habitat. A small number of bull trout are entrained annually over Round Butte Dam and reside in Lake Simtustus, occasionally being subject to capture in a fish trap at the base of Round Butte Dam. It is possible we may consider utilizing a portion of these fish for the reintroduction project provided there is support from the donor stock advisory group.

Current spring and summer monitoring of out-migrating fish by PGE on the lower Metolius River by rotary screw trap has demonstrated the ability to capture age 1 and 2 bull trout. However, low capture rates suggest trapping by rotary screw trap in the

mainstem Metolius River may not meet the project's objective of transferring annually approximately 1,000 juveniles. For that reason we intend to focus efforts to collect juveniles within known spawning tributaries utilizing rotary screw traps and potentially dip-netting at night. The donor stock advisory group recommended that no more than 10% of the total estimated annual outmigration of juveniles be taken annually from a given spawning tributary. In addition, juveniles (and fry) captured for translocation to the Clackamas River should be taken over the course of the outmigration season in order to full represent the diversity of spawning timing within individual tributaries.

To meet project objectives for annual fry transfers (up to 10,000 per year) we anticipate fry will be captured both in concert with juvenile collections by rotary screw traps in spawning tributaries and by rotary screw trap in the mainstem Metolius River. Due to the cost and logistics associated with operating and maintaining screw traps we expect to rotate annual collection efforts among the various spawning tributaries within the spawning groups, excluding Whitewater River. For example, if the project operates two rotary traps per year for collection of fry and juveniles from spawning tributaries we would likely position one trap on a tributary within the Jefferson/Candle Creek spawning group and one trap on a tributary within the Canyon/Heising/Jack Creek spawning group. The following year the traps would be relocated to other tributaries within these two spawning groups but representation from both spawning groups would be maintained.

Timing of Releases

We anticipate releasing multiple life stages of bull trout into the upper Clackamas River subbasin annually (spring thru fall) during Phase 1 (years 1 - 7). Releases may occur annually during Phase 2 (years 8 - 14) and Phase 3 (years 15 - 20) provided monitoring and evaluation indicates signs of success, donor stock continue to be available, and numerical goals have not been realized. The adaptive management framework that the project will be implemented under will allow for any necessary modifications to the timing and duration of implementation based on information learned from project monitoring and evaluation.

Transfers of adults, subadults and juvenile may occur from March through October. Due to the time at which they are most vulnerable to capture, fry transfers will likely be limited to early spring through early summer (March - June).

Release Locations

Release sites would be restricted to Mt. Hood National Forest lands. Primary considerations for identifying bull trout release sites include:

1. Within suitable spawning and rearing habitat identified in the Reintroduction Feasibility Assessment (Shively et al., 2007).

2. The extent of suitable habitat surrounding a potential release site and its proximity to other similar habitats.

3. Access to release locations (e.g., road access, season of release).

4. Life stage of fish transferred.

All bull trout that are transferred will be released in habitat determined in Shively et al. (2007) to be suitable for spawning and rearing. Adults and subadults will be released annually at multiple locations within the upper Clackamas River mainstem in habitat patch one (see Figure 1 below). Bull trout fry and juveniles will be released in all suitable streams within habitat patches one thru six on a rotational basis. The first year of implementation will include fry and juvenile transfers to patches one and two; year two will include transfers to patches three and five; and year three will include transfers to patches four and six. This stocking schedule for fry and juveniles would then repeat starting in year four such that each patch will receive at least two rounds of stocking during Phase 1 of the project. Specific release methodology for fry and juvenile bull trout will be based in part on lessons learned from the successful Middle Fork Willamette River Bull Trout Rehabilitation Program, implemented by the USFS and ODFW (ODFW 2007). Ongoing releases of transplanted fry and juvenile bull trout from the McKenzie River to the Middle Fork Willamette River have demonstrated the potential of reintroduction as a successful recovery tool for bull trout conservation.

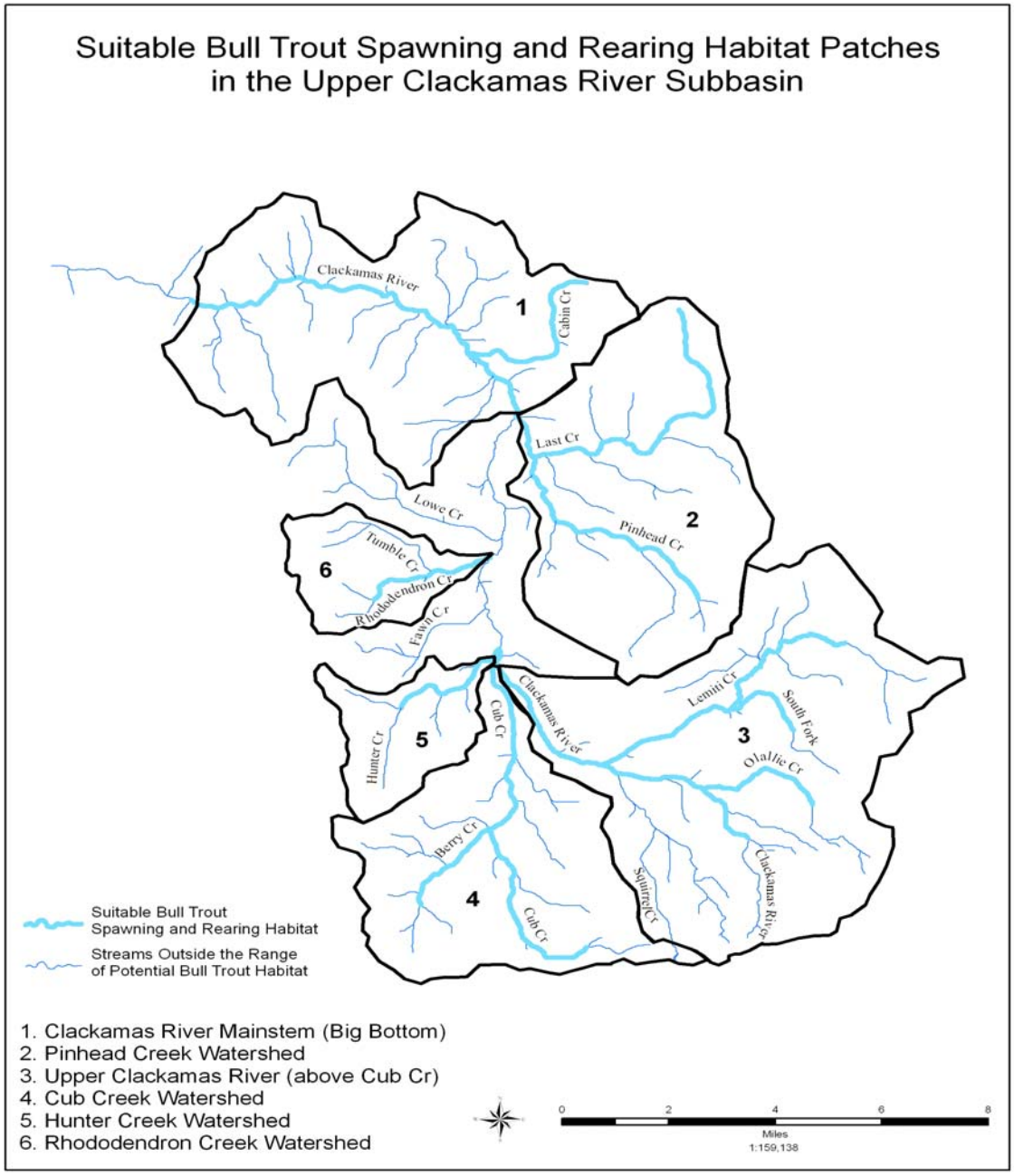

Figure 1. Suitable Bull Trout Spawning and Rearing Habitat Patches

Disease Screening

Unwanted parasites and diseases frequently have been introduced through fish transfers (Hoffman and Schubert 1984). To avoid these unintended consequences, translocations of fishes between major river basins should be preceded by a thorough investigation into the potential transfer of pathogens from the donor source, as well as the resistance of the donor stock to any known pathogens present in the receiving habitat.

In order to assess the risk of disease transfer and the presence of pathogens in the Clackamas River we worked closely with ODFW fish health specialists and staff from the Service's Lower Columbia River Fish Health Center. Our assessment utilized previously existing disease information from the Deschutes Basin (and Metolius subbasin) and new information that was collected from the Clackamas and Lewis rivers as part of the disease assessment. At the time of the disease assessment bull trout from the Lewis River, in addition to bull trout from the Metolius River, were being considered as potential donor stock for a reintroduction to the Clackamas River.

The results from our testing of fish from the Lewis and Clackamas rivers, combined with existing data from the Deschutes Basin (Engelking 2003) provided valuable information regarding (1) the risk of pathogen transfer to the Clackamas River from the Metolius or Lewis river donor stock; and, (2) the presence or absence of pathogens in the Clackamas River that may influence the health of donor stock from the Lewis or Metolius rivers. Based on the results, it appears the predominant pathogens of concern to a reintroduction of bull trout to the Clackamas River are Infectious Hematopoietic Necrosis Virus (IHNV) and *Renibacterium salmoninarum* (the causative agent of BKD). The State's expressed primary concern is the potential to introduce the U-clade of IHNV to the Clackamas River. U-clade INHV is present in the Deschutes Basin but has not been detected in bull trout from below or above the Pelton-Round Butte Project. Transfer of BKD is higher in adult transfers than in fry or juveniles.

It does not appear at this time that existing pathogens from potential donor stock or from the receiving environment will compromise the success of the reintroduction project. In addition, there does not appear to be undue risk to other native salmonids in the Clackamas River from a transfer of bull trout from the Lewis or Metolius river basins. Despite these findings, annual disease screening of a representative sample of bull trout prior to transfer to the Clackamas River is warranted. The following guidelines for annual disease screening were developed in coordination with ODFW Fish Health Services.

Guidelines for Annual Disease Screening

Due to the large-scale effort to reintroduce anadromous fish above PGE's Pelton-Round Butte dam complex (Project), PGE has funded ODFW to provide a full time fish health specialist to monitor potential pathogens in various species of fish transferred above, and that migrate down through, the Project. The disease monitoring also includes assessing the presence of pathogens in resident fish above and below the Project. Based on State

requirements and recommendations from ODFW's senior fish health specialist (A. Amandi), it will be necessary to sacrifice 150 bull trout fry (representing a new brood year) at the beginning of each year of transfer for disease testing, with a particular emphasis on determining the presence or absence of IHNV and more specifically the U-clade strain, our primary concern with transferring fish to the Clackamas River subbasin. The testing, which will occur at either the Fish Health Services labs in Madras or Corvallis, will provide a 95% confidence of disease detection at a 2% incidence rate. If all 150 fry test negative for the U-clade of IHNV and any other pathogens of significant concern, then the State will support moving forward with that years' translocations of fry to the Clackamas River. Based on the recommendation (but not a requirement) to test various year classes of bull trout, we will attempt to also collect ovarian fluid and milt from ripe adults using non-lethal procedures. For adults, a 60 fish sample is desired with at least 60% of the samples comprised of ovarian fluid. If these samples test negative for IHN virus, then the Metolius River population will be considered negative for one brood year. In addition, any moribund bull trout and netting/handling mortality should be bagged, labeled (date and location), placed on ice and immediately transferred over to Fish Health Services for examination and testing.

Monitoring and Evaluation

Project monitoring and evaluation (M&E) will occur annually through all phases of the project. We expect certain aspects of annual M&E to inform subsequent years' efforts, especially in the first two to five years of Phase 1. For example, if monitoring movement of adults and sub-adults during the first few years of implementation suggests they are emigrating from the Clackamas River, or, in the case of adults, no spawning and recruitment is evident, then the utilization of these older age classes in subsequent years may not be warranted.

Population Monitoring

In general, monitoring will be used to confirm the success or failure of the reintroduction effort. Streams will be sampled using a variety of methods (electro-fishing, PIT tagging, snorkel surveys, redd surveys) to determine presence. Although there are a multitude of questions that could be addressed during the course of the proposed project, the question that will be highest priority within a monitoring and evaluation program is "which life stage reintroduced is most successful" and "which habitats among those deemed suitable are translocated fish most successful in"? These high priority M&E components are consistent with our objectives to learn and share information from this project.

Distribution Monitoring

Fish distribution and movement can be monitored using a variety of methods. Adult and subadult movement patterns can be monitored using PIT tag and radio-telemetry technology. Movement of appropriately-sized juveniles can also be monitored using PIT

tags and antenna arrays. Other methods that can be used to confirm presence and identify distribution include snorkel surveys, electro-fishing, and redd surveys.

For fish transferred to the Clackamas River we intend to PIT tag all individuals that exceed 100mm, the minimum length for tagging. For the initial three years of the project we intend to conduct radio-telemetry on approximately 15 to 20 adults and 15 to 20 subadults to track their movements and overall response to being translocated to the Clackamas River subbasin. PIT tag antenna arrays will be installed and monitored both on the mainstem Clackamas River and in tributaries that receive plants of fry and juveniles. Presence/absence surveys using snorkeling and/or minnow traps will occur in tributaries following reintroductions to track whether or not fish are retaining and utilizing the habitats they are stocked in. If telemetry or PIT tag monitoring suggests adults are moving into potential spawning tributaries then redd surveys will be conducted.

Donor Stock Monitoring

Monitoring the donor population is necessary to detect any deleterious effects on the donor population, and also to serve as a guide for the number of fish available for the reintroduction program. Current monitoring by ODFW, USFS, CTWSRO and PGE, consists of redd surveys throughout the Metolius subbasin, creel surveys in Lake Billy Chinook, operation of a screw-trap by for outmigrant monitoring in the Metolius River at Monty Campground, and juvenile bull trout density monitoring at index reaches in spawning streams. We expect this monitoring, which has occurred for almost two-decades, to continue into the future. A Metolius River bull trout baseline genetic analysis was conducted in 2008 by the Service's Abernathy Conservation Genetics Lab. We expect to repeat this type of analysis in the future to ensure the contribution of individuals to the Clackamas River Reintroduction Program is not reducing the genetic fitness of Metolius River bull trout.

Monitoring Salmon and Steelhead Population Response to a Bull Trout Reintroduction

A primary objective of the reintroduction (see *Proposed Action Goals and Objectives* above) is for the reintroduction to be consistent with the recovery of ESA-listed anadromous salmon and steelhead in the Clackamas River; in other words, the reintroduction should not inhibit or slow the recovery of salmon and steelhead. In part to address this objective, the Service sponsored an expert science panel workshop in 2008 to assess the potential impact of a bull trout reintroduction on salmon and steelhead in the Clackamas River. In addition to assessing potential impact, the workshop also resulted in monitoring and management recommendations from the panel to reduce the level of uncertainty and risk regarding impacts (Marcot et al., 2008).

Although results from the workshop suggest the likelihood of potential predation impacts will be very low to moderately low (see Appendix C for a full workshop report) we believe it prudent to monitor, to the degree feasible, the response of salmon and steelhead to a reintroduction of bull trout to the Clackamas River. To that end, and supported by a

recommendation from the panel, we are working with USGS and UW to collect baseline food web information in the Clackamas that will contribute significantly to our ability to measure the food web response once bull trout are present in the system. It is anticipated that the food web analysis would be repeated once bull trout are established in the Clackamas River and then repeated approximately every five years.

In addition to food web assessments, telemetry and PIT tag monitoring, in concert with netting and trapping in PGE project reservoirs, particularly North Fork Reservoir, may provide additional information as to interactions between bull trout and juvenile anadromous salmonids.

8.0 Appendix B - Assessing Potential Impacts of a Proposed Reintroduction of Bull Trout on ESA-Listed Salmon and Steelhead in the Clackamas River

Report on a Bull Trout Expert Panel Workshop Held July 2008 on "Assessing Potential Impacts of a Proposed Reintroduction of Bull Trout on ESA-Listed Salmon and Steelhead in the Clackamas River"

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Chris Allen, USDI Fish and Wildlife Service, Oregon Fish & Wildlife Office
Steve Morey, USDI Fish and Wildlife Service, Science Support Program
Dan Shively, USDA Forest Service, Mount Hood National Forest
Rollie White, USDI Fish and Wildlife Service, Oregon Fish & Wildlife Office

Final version: September 23, 2008

EXECUTIVE SUMMARY OF FINDINGS

On July 21-23, 2008, an expert panel workshop was held in Vancouver, Washington, to help determine the potential impact of reintroducing bull trout into the Clackamas River system, on four existing ESA-listed salmonids: spring Chinook, fall Chinook, Coho, and winter steelhead. The panel consisted of five experts on bull trout and salmonid biology and ecology.

The workshop was rigorously structured using a modified Delphi process so that panelists could learn from other presenters and from each other, yet offer their knowledge individually. The panelists were asked to (1) score possible outcomes of the degree of impact of bull trout on salmonids' probabilities of extinction, among 7 categories ranging from very high impact to no impact; (2) suggest and prioritize possible topics for monitoring, should the proposed project be enacted, and (3) suggest possible management actions, should bull trout be found to have unacceptable adverse effects on salmonids. The panel also discussed related topics, such as the degree of reversibility of a bull trout reintroduction, and lessons learned from other river systems with and without bull trout and other desired fish species. The workshop was also attended by two facilitators and a note-taker, several selected biologists who presented summaries of topics pertinent to bull trout and salmonid biology and habitat ecology, and up to 10 observers consisting of other managers and biologists from a variety of agencies. All workshop participants, including the expert panelists, were specifically not asked to make or recommend policy decisions, as the purpose of the workshop was to provide technical, scientific information for later consideration by managers and decision-makers.

The results of the panelists' scoring of possible degree of impact of bull trout on salmonid probability of extinction ranged from moderately high impact to no impact.

The variation in scores expressed the panelists' individual uncertainty, variability among the panelists, and expected differences among the salmonid species. The mode of overall score values suggested that impact was viewed by the panelists in general to be very low or moderately low for spring Chinook, Coho, and winter steelhead; and mostly none to very low for fall Chinook. However, again, some possible outcomes ranged into higher categories of impact but with far lower score levels.

The panelists identified 19 possible monitoring activities under four main objectives (environment, predator status, prey status, and trophic interactions). The highest priority monitoring categories pertained to determining predator (bull trout) abundance and reproduction, establishing baseline and periodic consumption rates, periodically determining size structure in bull trout populations, annually determining prey abundance and productivity, and determining baseline and periodic rates of trophic interactions. Other monitoring activities pertained to determining bull trout demography, habitat selection, abundance of salmonids, variation in fish distribution, and other topics.

The panelists identified 21 possible management activities that could be used to reduce adverse impacts of bull trout on salmonids, should any be discovered after reintroduction. The management activities fell under six main objectives (monitoring, offsetting impacts of bull trout, direct predator control, prey enhancement and management, public perception, and reservoir management) and pertained to a variety of types and degrees of possible impact.

Discussions by the panelists and observers of each of these scoring and listing tasks, and other topics pertinent to bull trout and salmonid biology and ecology, were recorded by the note taker and presented here in an appendix.

WORKSHOP PURPOSE AND OBJECTIVES

The following problem statement, overall goal, specific objectives, expected products, and agency roles were provided to the attendees (expert panelists, managers, and other observers) prior to the workshop, and again presented during the opening day of the workshop.

Workshop problem statement.--Based on findings from the *Clackamas River Bull Trout Reintroduction Feasibility Assessment* (2007), a proposal to reintroduce bull trout to the Clackamas River, Oregon, is being developed by the Fish and Wildlife Service (FWS) and Oregon Department of Fish and Wildlife (ODFW). Whereas a successful reintroduction of bull trout into the Clackamas would represent a major success for the species' recovery, there are concerns about the impacts of this effort on other ESA-listed species (Chinook and Coho salmon, steelhead trout). In particular, predation on salmon and steelhead by bull trout has been identified as an area of uncertainty.

Overall workshop goal.--Provide a scientific assessment of potential impacts to salmon and steelhead from a reintroduction of bull trout to the Clackamas River and outline monitoring and management strategies that could be implemented to reduce uncertainty and risk following a possible reintroduction.

Specific workshop objectives.--

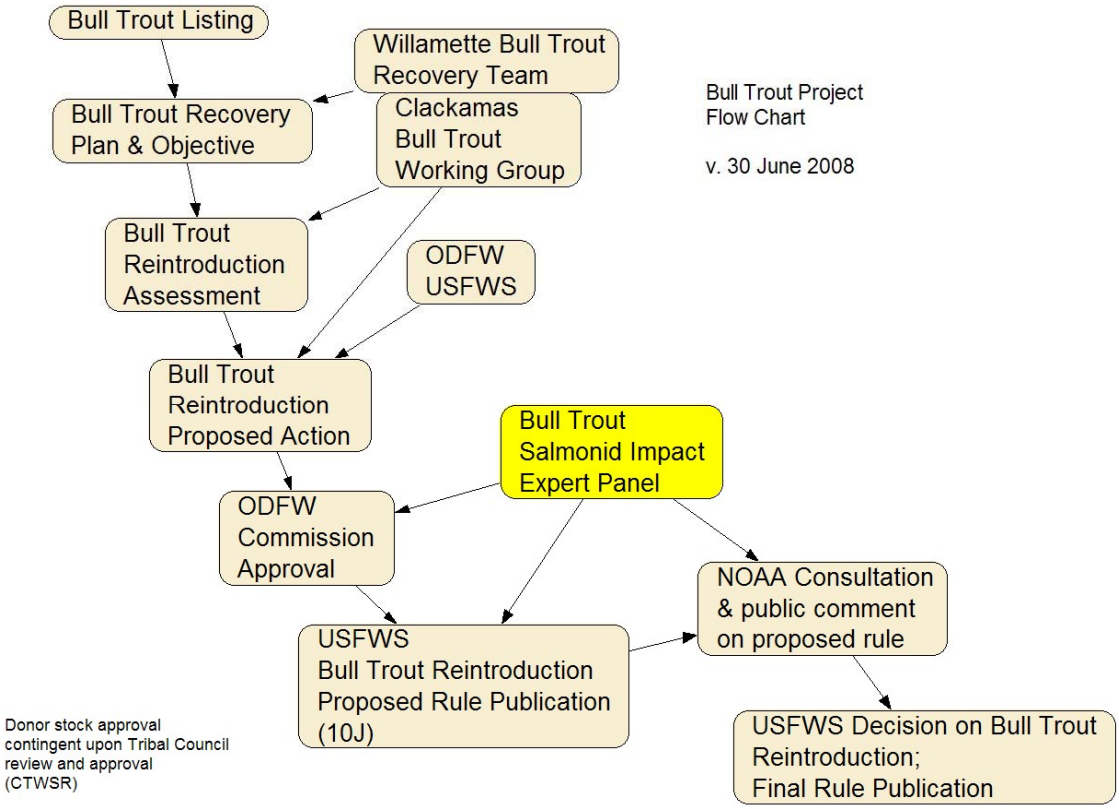
- An evaluation of potential interaction effects between reintroduced bull trout and existing anadromous salmonids in the Clackamas River system
- Suggestions for priority monitoring activities
- Suggestions for possible ameliorative management activities that could reduce undesirable species interactions.

Products derived from the workshop.--

- Provide a scientific assessment of potential risks and uncertainties under the proposed management scenario (i.e., a self-sustaining population of 200 to 500 adult bull trout by 2030 or sooner) and associated actions for bull trout reintroduction.
- Evaluate alternative activities for minimizing risk and uncertainty around the issue of impacts by bull trout on ESA-listed salmon and steelhead trout in the Clackamas River.
- Produce a summary report (this report) that describes the results of the assessment with reference to a potential reintroduction of bull trout into the Clackamas River

Agency roles.--FWS and ODFW are the lead agencies in the development of a reintroduction proposal. The U.S. Forest Service - Mt. Hood National Forest (USFS), National Marine Fisheries Service (NMFS), and the Confederated Tribes of the Warm Springs Reservation (CTWSR) are cooperating agencies. U.S. Geological Survey (USGS) is providing scientific support.

Also presented during the opening section of the workshop was the following flowchart for the Bull Trout Reintroduction Project, specifically to illustrate the context, role, and expected use of the workshop results.



WORKSHOP AGENDA, ATTENDEES, AND METHODS

The agenda for the workshop is presented in Appendix 1.

Pre-workshop materials.--Prior to the workshop, each expert panelist was sent a letter of invitation that explained the purpose, methods, and expected outcome of the workshop (Appendix 2) along with a set of pre-workshop reading materials (Appendix 3) and a list of questions and answers further explaining the overall project (Appendix 4).

Workshop attendees.—The workshop was attended by 5 expert panelists: Dave Beauchamp (University of Washington and USGS), Jason Dunham (USGS), Kathryn Kostow (ODFW), Paul McElhany (NMFS), and Michael Meeuwig (Montana State University). Workshop facilitators, planning team members, and other observers are listed in Appendix 5. The 5 expert panelists were chosen based on their individual expertise in bull trout and salmonid biology and ecology.

Opening presentations.--The workshop was structured with an opening series of presentations (see Appendix 1) to ensure that all expert panelists were equally informed on the following topics:

- the bull trout reintroduction program feasibility assessment and draft proposed action;
- the status and distribution of ESA-listed anadromous fish species in the Clackamas River and current recovery planning efforts;
- Portland General Electric's (PGE) hydro projects, reservoirs, and fish bypass systems in the Clackamas River system; and
- bull trout trophic interactions and food webs.

Model and discussion on trophic interactions and food web dynamics.--Also presented was a preliminary Bayesian network model depicting potential food web and species interaction dynamics relevant to relationships between bull trout, anadromous salmonids, and other predators and prey species in the river system. The model (Appendix 6) was presented to help prompt panel discussion on trophic and food web dynamics, including identifying key areas of uncertainty related to bull trout-salmonid interactions. The Bayesian network model was not used *per se* further in the workshop although the resulting discussions of trophic structure and food web dynamics were recounted and continued throughout the rest of the workshop.

Panel scoring of degree of impact of bull trout on salmonids.--On day 2 of the workshop, the expert panelists were engaged in a structured scoring of potential effects of bull trout on the extinction probability of each of the 4 ESA-listed salmon and steelhead populations of interest in the Clackamas River system: spring Chinook, fall Chinook, Coho, and winter steelhead. The instructions given to the panelists included that they were to (1) assume that bull trout reintroduction objectives would be met, that is, with at least 200-500 adult bull trout sustainable in the Clackamas River system by 2030, and (2) score the relative influence of bull trout on whatever absolute extinction probability might pertain to each salmon and steelhead population. Selection of this particular scoring approach is described in Appendix 7.

The scoring was conducted by using a modified Delphi paneling procedure (Appendix 7). In brief, this procedure involved the panelists scoring how a bull trout reintroduction might influence each salmonid species, by each panelist spreading 100 points (thought of as probabilities) among one or more outcome categories of potential impacts (see Appendix 8 for worksheet used). Spreading points would be an expression of uncertainty of outcomes and a means of displaying potential differences in outcomes among the salmonid species.

The Delphi paneling process entailed the panelists first individually and silently recording an initial set of outcome scores; then the panelists individually disclosing and explaining their scores to each other in a structured discussion, including an opportunity to engage with other observers and experts in the room; and then individually and silently rescoring outcomes based on new knowledge or insights gained from the shared disclosure and open discussion. The disclosure and discussion portion of the panel

ensured that each panelist had equal time to present their ideas, seek clarification, and ask questions. The scores and discussion comments were recorded anonymously using letter codes (A-E) for each panelist. The scoring session encouraged the panelists to synthesize their own expert experience, the pre-workshop readings (Appendix 3), the workshop presentations (Appendix 1, 6), and their shared interpretations and rationale.

The panelists were prompted to score the *degree of impact that bull trout would have on the extinction probability of each salmonid species over 100 years from the start of the reintroduction project*. The panel discussed an initially-presented 5 class system, did a first round of scoring, and then refined the classes and collectively agreed to use the following 7 categories and definitions for scoring potential bull trout impacts:

- **Very High** = bull trout influence contributes to 100% of the extinction probability
- **High** = bull trout influence contributes to about 95% of the extinction probability
- **Moderately High** = bull trout influence contributes to about 75% of the extinction probability
- **Moderate** = bull trout influence contributes to about 50% of the extinction probability
- **Moderately Low** = bull trout influence contributes to about 25% of the extinction probability
- **Very Low** = bull trout influence contributes to about 5% of the extinction probability
- **None** = bull trout influence has no contribution to the extinction probability

It was clarified to the panelists that they were to score only that portion of salmon and steelhead population extinction probabilities that would be caused by bull trout; they were not asked to score overall extinction probabilities. In this way, the relative impact contributed specifically by bull trout would be represented.

The panelists were also asked to provide written documentation of the basis for their scores. After their second (and final) round of scoring, the meeting facilitators displayed the score results on screen, summarizing mean and ranges of score values among the panelists. The panel provided further explanation and discussion of their scores, which was captured in meeting notes.

Identification of possible monitoring and management activities.--After scoring potential degree of impact of bull trout on salmonids, the panelists were then led through two structured brainstorming sessions (see Appendix 7 for further details of methods) in which they were prompted to list possible monitoring and management objectives and specific activities, without regard to the likely cost of each effort, and under the presumption that the bull trout reintroduction project would be enacted.

The list of possible monitoring activities was displayed on screen. After discussing and refining the list, the panelists were given hard copies of the list and asked to individually rank each monitoring activity by three priority levels: (1) essential to conduct, (2) important but not necessarily essential, and (3) worthwhile but of lower importance. The

individual panelists' priority scores were recorded and the monitoring activities were sorted by mean and range of the priority scores, and by overall monitoring objectives. Discussion within the panel and observers ensued and caveats and ideas were recorded in the written meeting notes.

In the final panel task, also in a structured brainstorming procedure, the panelists listed possible management activities to reduce or eliminate effects of bull trout on the four ESA-listed salmon and steelhead populations, assuming that the bull trout reintroduction project would be enacted and that it might be found that bull trout have an unacceptably high adverse impact on the salmonid species. The list of possible management activities, along with type and degree of impact and overall management themes, were displayed on screen. The expert panel and observers then engaged in open discussions as to the feasibility or expected result of the various management activities; discussions were recorded in the written meeting notes.

RESULTS AND DISCUSSION

Opening presentations.--The opening day talks (see Appendix 1) were made with PowerPoint presentations.[1]

Scoring of impacts of bull trout on salmonids.—The individual panelist scores are presented in Appendix 9 along with score sums, means, and ranges. The means of all 5 panelist scores were distributed among the species in Figure 1:

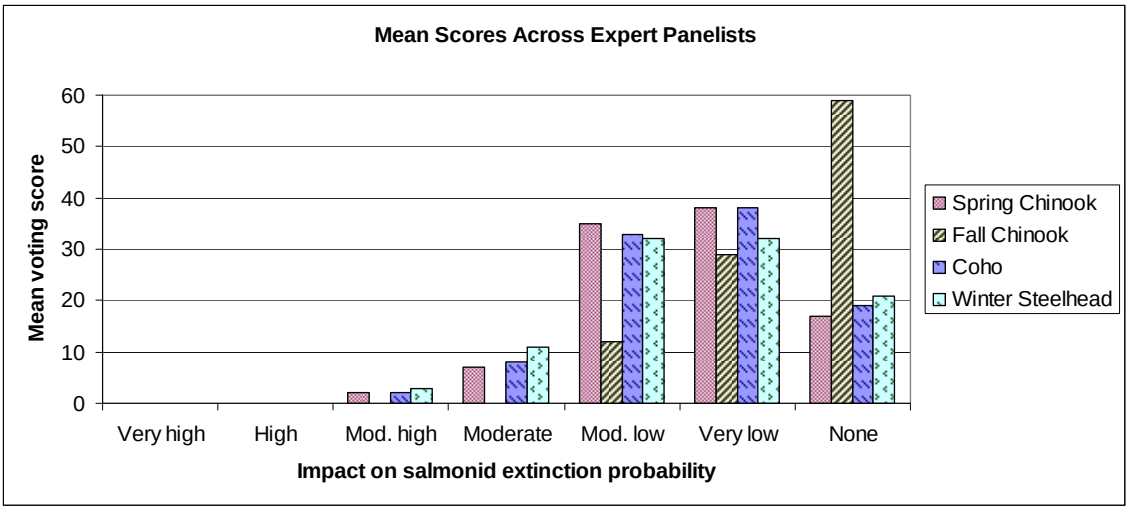


Figure 1. Mean scores of the potential impact of bull trout on salmon and steelhead population extinction probability.

Figure 1 suggests that the panelists generally rated bull trout impacts on extinction probabilities of salmon and steelhead populations as "moderately low," "very low," or

[1] The PowerPoint files are available from the U.S. Fish and Wildlife Service, upon request (Chris Allen, 503.231.6179, chris_allen@fws.gov).

even "none." Also, the mean scores suggested that the panelists in general considered bull trout impacts on salmon and steelhead extinction probability to be lower for fall Chinook than for the other three populations. However, there were non-zero scores suggested even at the "moderately high" and "moderate" degrees of impact for three of the populations; these ratings should not be ignored.

A different way to visualize these patterns is by summing the panelists' scores by salmonid species (Fig. 2):

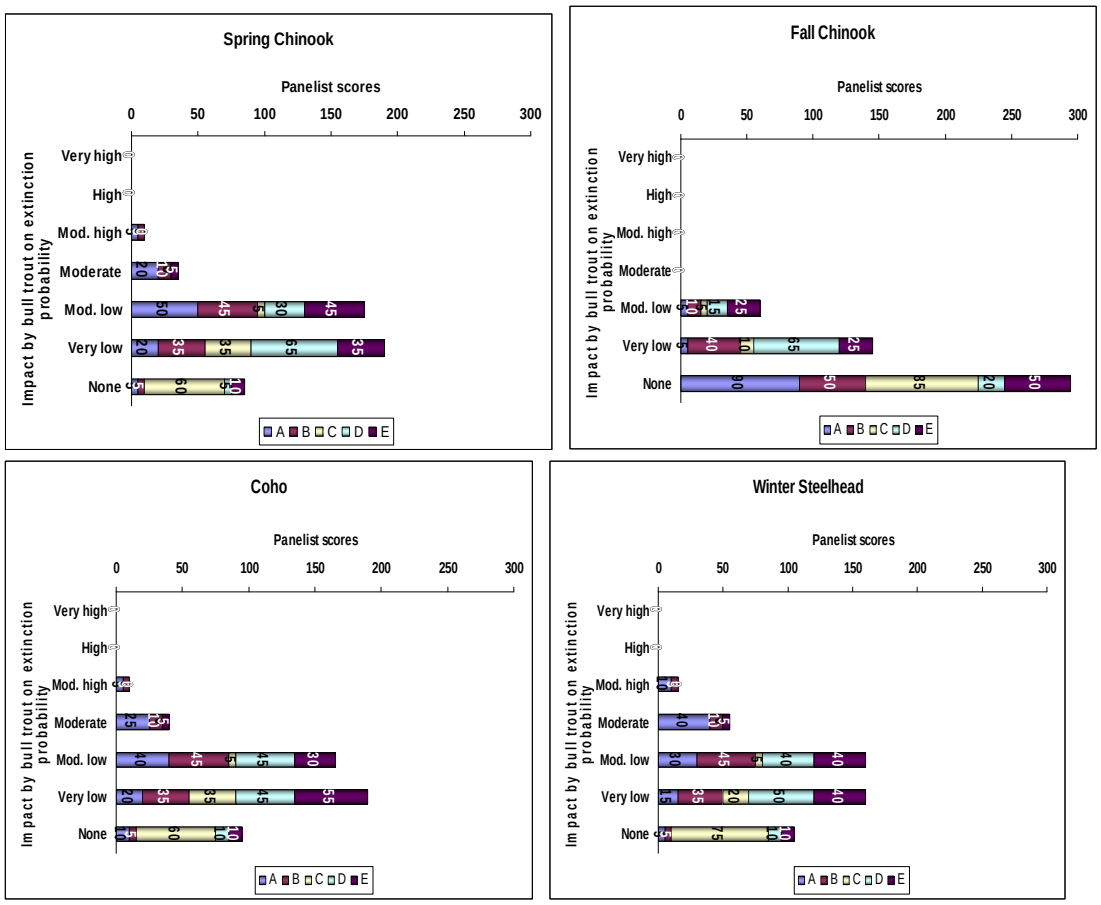


Figure 2. Sum of scores of the potential impact of bull trout on salmon and steelhead population extinction probability, across the 5 panelists (A-E) and by salmonid species.

Summarized in this way (Fig. 2), it is more apparent that the panel generally expected lesser impacts from Bull Trout on Fall Chinook than on the other 3 salmon and steelhead populations. The panel as a whole allocated most of their scores to "None" and "Very low" outcomes for Fall Chinook, and most of their scores to "Very Low" and "Moderately Low" for the other 3 salmon and steelhead populations, with lower score levels allocated to "None," "Moderate," and "Moderately high."

These distributions of composite scores across the outcome categories for each species can be interpreted as expected probability distributions. Outcomes that scored with few points are still possible, according to at least some of the panelists, even if the probability

is low. Whether such expected outcomes as "Moderately high" that scored with few outcome points still trigger concern for the species will be the purview of the decision-makers.

It should be clarified that we did not ask the panelists to reach consensus on their scoring. Thus, it is also instructive to view the individual panelists' degrees of uncertainty and variation among the salmon and steelhead populations considered, across the various outcome categories, and among the individual panelists, as shown in Figure 3.

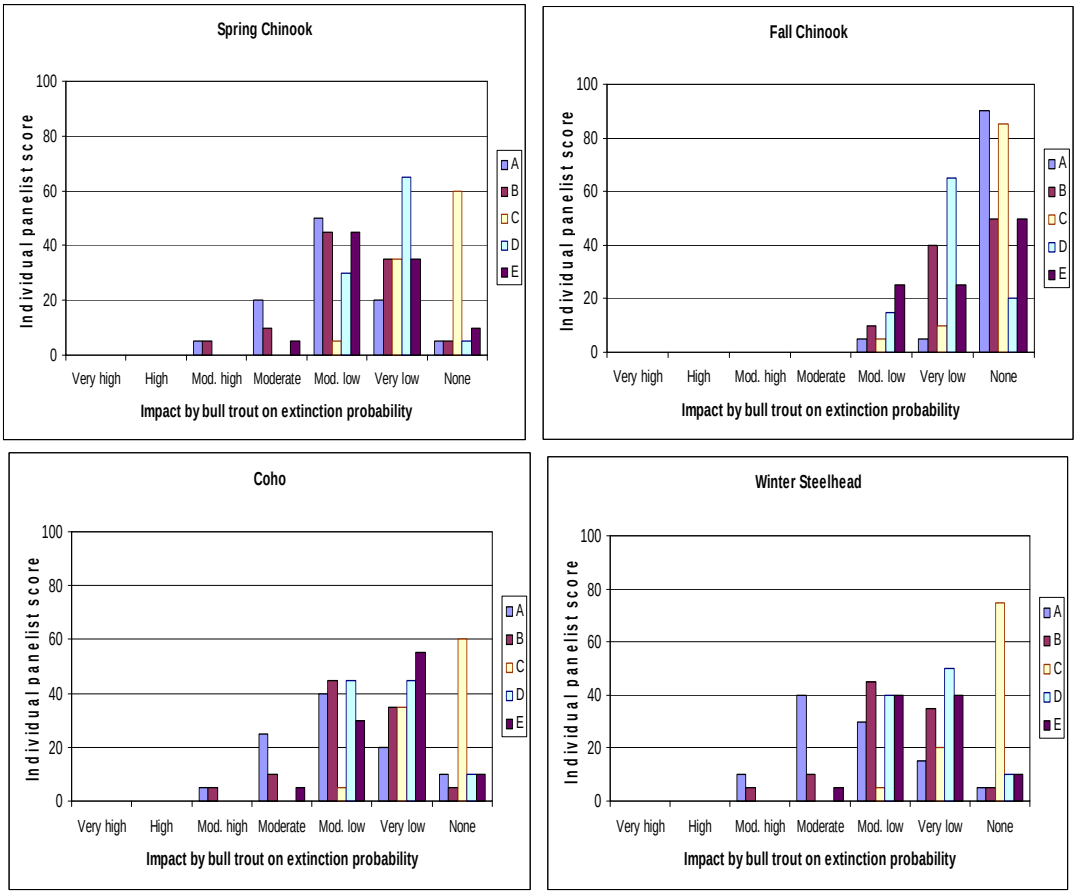


Figure 3. Individual panelist scores of bull trout impact on salmon and steelhead populations after 100 years of bull trout reintroduction. Legend: A-E represents the individual panelists.

Figure 3 suggest that (1) each panelist expressed some degree of uncertainty over the possible impact of bull trout on extinction probability of each salmon and steelhead population, suggested by the spread of scores across multiple outcomes; and (2) although the panelists differed in their specific score values, they concurred by not scoring bull trout impact on any population as "very high" or "high," with modes mostly in the categories of "moderately low" to "none."

Identification of possible monitoring activities.—The expert panel identified a collective set of 19 possible monitoring activities that could follow bull trout reintroduction, without regard to cost. The activities variously pertain to general

objectives for monitoring the overall aquatic environment, predator (bull trout) status, prey (salmon and steelhead population) status, and trophic interactions; and would address various aspects of predator age and growth, angler catch of bull trout, bull trout movement, bull trout size structure, food web and predator consumption dynamics, predator and prey demography, predator and prey habitat selection and reservoir use by prey, predator and prey abundance and productivity, reservoir limnology, and other topics.

The full list of all 19 monitoring activities is presented in Appendix 10. The top activities ranked as essential to conduct by at least 4 of the 5 panelists pertained to monitoring of:

- bull trout reproduction and recruitment, e.g., spawning surveys, age, and size (annual)
- rates of consumption of food by bull trout (baseline and periodic)
- size structure of bull trout in reservoir and river environments (periodic)
- smolt and adult abundance, size, and age of the 3 listed salmon and steelhead species at North Fork Dam (annual)
- juvenile and adult abundance and size structure of the 3 listed salmon and steelhead species above North Fork Reservoir (annual)
- diet and stable isotopes of fish and key invertebrates to identify major predators (fish & others) of salmonids and other fishes (that is, to determine the food web) (baseline and periodic)

Much discussion was held regarding interpretation and qualification of the impact scores and the monitoring activities (Appendix 11).

Identification of possible management activities.—The expert panelists collectively identified some 21 possible management activities that could be pursued, should bull trout be found to have unacceptable impacts on the 4 ESA-listed salmon and steelhead populations if a reintroduction were occur (Appendix 12). The management activities were not prioritized because the type and degree of bull trout impact might vary considerably. Thus, the management activities were categorized by type and degree of impact and by overall management theme, as noted above.

As examples, if the type and degree of impact was found to be high to very high impact from bull trout on the other listed salmonids, one possible management activity pertaining to predator (bull trout) control was identified as complete removal of the bull trout population or maintenance of the bull trout population at a specified lower level. If the type and degree of impact was predation by bull trout on juvenile salmonids in tributaries, one possible management activity pertaining to prey (salmonid) management was identified as adding refuge cover in tributary habitat and other habitat enhancements to reduce predation levels.

Additional comments and discussions.—During the workshop, we recorded a great deal of the discussions and comments made by the expert panelists and observers.[2]

ACKNOWLEDGMENTS

Success of the workshop was largely due to the contributions and participation of the five expert panelists -- Dave Beauchamp, Jason Dunham, Kathryn Kostow, Paul McElhany, and Michael Meeuwig – and from the management support by Chris Wheaton of ODFW, Paul Henson and Miel Corbett of USFWS, and Gary Larson of USFS.

Agencies and institutions that sponsored and contributed to the success of this workshop included USDI Fish and Wildlife Service, USDA Forest Service, Oregon Department of Fish and Wildlife, Portland General Electric, NOAA Fisheries, Confederated Tribes of the Warm Springs Reservation (CTWSRO), and USDI Geological Survey.

We also extend our thanks to the following invited speakers for their presentations: Chris Allen, Todd Alsbury, Doug Cramer, Dave Beauchamp, and Jason Dunham.

[2] These notes are available from the U.S. Fish and Wildlife Service, upon request (Chris Allen, 503.231.6179, chris_allen@fws.gov).

APPENDICES

1. Workshop agenda.

2. Letter of invitation sent to each invited expert panelist.

3. List of pre-workshop reading materials sent to each expert panelist.

4. Project question and answer sheet, sent to each expert panelist prior to the workshop.

5. List of workshop attendees: invited expert panelists, meeting facilitators, workshop planning team, and observers.

6. Bull trout food web model presented at the workshop by Jason Dunham and Bruce Marcot.

7. Detail of expert panel methods used during the workshop.

8. Worksheet used by the expert panelists to score potential impacts from bull trout on each of the 4 ESA-listed salmonids in the Clackamas River system.

9. Results of the expert panel scoring of degree of impact of bull trout on ESA-listed salmon and steelhead populations.

10. Potential monitoring activities identified by the expert panel.

11. Written explanatory notes and discussion comments from the five expert panel participants, recorded from their scoring of bull trout impacts and listing of potential monitoring activities.

12. Potential management activities identified by the expert panel, for reducing or eliminating unacceptable impacts of bull trout on salmon and steelhead populations, sorted by management theme.

APPENDIX 1 - Agenda - Bull Trout Expert Panel Meeting June 21-23, 2008: "Assessing Potential Impacts of a Proposed Reintroduction of Bull Trout on ESA-Listed Salmon and Steelhead in the Clackamas River"

Location: City of Vancouver's Water Resources Education Center
Vancouver, Washington

Prework for Bull Trout Expert Panel:

- Review items sent out in advance – Binder with feasibility study, selected publications

DAY 1 - MONDAY, July 21, 2008

Time	Topic	Main messages	Lead	Objective
1:00-1:20p	**WELCOME** • Roster Check In, introductions (BT Expert Panel; Workshop Facilitators & Advisors; BT Biologist Observers; Manager Observers; Note-taker) • Overall workshop goal • What you should have received/brought • Agenda review • WELCOME by ODFW and USFWS Managers	Introductions to the workshop. No decisions to be made. No major changes to the agenda.	Dan Shively Chris Wheaton with Paul Henson or Rollie White	*Expectations for the workshop:* To provide objective technical information on potential effects of bull trout on salmonids in the Clackamas River system, for informing ODFW, USFWS, NOAA, and other stakeholders.
1:20-1:30p	**OVERVIEW OF METHODS** • Roles of bull trout expert panel, facilitators, and observers – clarify how workshop fits overall project proposed action • Summarize specific workshop objectives • Grounding in terminology: define key terms and concepts to be addressed	Information sharing. Scoring and written info will be anonymous.	Dan Shively, Bruce Marcot	*Present flow chart diagram* of overall project, and how this workshop fits in *Specific workshop objectives*: • Evaluate potential interaction effects between reintroduced Bull Trout and existing salmonids in the Clackamas River system. • Suggest priority monitoring activities. • Suggest possible ameliorative management activities that could reduce undesirable species interactions.

Time	Topic	Main messages	Lead	Objective
1:30-2:00p 2:00-2:40p	**BACKGROUND PRESENTATIONS** (each 20 min, with 10 min Q&A) • Brief Synopsis of Feasibility Assessment Conclusions and Draft Proposed Action • Overview of Status and Distribution of ESA-Listed Anadromous Species in the Clackamas River & Current Recovery Planning Efforts	Presentation Presentation	Chris Allen Todd Alsbury	The purpose of all presentations is to ensure that all panelists are equally up to speed on each presented topic and have a chance to ask questions of each speaker (i.e., leveling and elevating playing field).
2:40-3:00p	**BREAK**			
3:00-3:30 3:30-4:00p	• Overview of PGE's Hydro Projects, Reservoirs, and Fish Bypass Systems • Review of Bull Trout Trophic Interactions	Presentation Presentation	Doug Cramer Dave Beauchamp	Sharing of information (continued)
3:50-4:10p 4:10-4:25p 4:25-4:55p	**PANEL DISCUSSION OF FOOD WEB DIAGRAM AND MODEL** • Review of Bull Trout Food Web • Introduction to Food Web Bayesian Network Model Guided discussion on bull trout/anadromous salmonid interactions (results will provided as a handout tomorrow) • Structural uncertainty • Dynamic uncertainty	Presentation Presentation, model demonstration Expert panel discussion (Note-taker will capture panel's key discussion points)	Jason Dunham Bruce Marcot Dan Shively with Bruce Marcot	Present current thinking on how bull trout fit into the river ecosystem food web. Present working hypothesis model that depicts the dynamics of how food web dynamics interact. Engage expert panel in discussion of food web model. Engage the expert panel in a discussion of how the food web system may be functioning
4:55-5:00	**WRAP-UP OF DAY 1** Briefly review work done today, mention tomorrow's expert panel exercises coming up; address any logistics needs for the evening	Summary	Dan Shively	Summary, wrap-up, preparation for tomorrow

Time	Topic	Main messages	Lead	Objective
	• Optional Social @ McMenamin's 5:30p			

DAY 2 - TUESDAY, July 22, 2008

Time	Topic	Main messages	Lead	Objective
8:00-8:10a	**WELCOME** • Today's objectives, agenda, and expected products • Any logistics needs	Housekeeping	Dan Shively	Welcome, orientation to the day's upcoming work
8:10-8:20a	**BRIEF REVIEW OF PREVIOUS DAY** • Quick reminder of workshop objectives • Quick reminder of the themes of yesterday's presentations • Handout or display results of yesterday afternoon's revision of the food web diagram and/or model	Review, reminders, and handout on interactions list	Dan Shively Bruce Marcot	Recap and address any new ideas or thoughts on food web since Day 1

Time	Topic	Main messages	Lead	Objective
8:20-10:00a	**TASK 1: EXPERT PANEL EVALUATION OF SPECIES INTERACTIONS** **INTRODUCTION** • Objectives, expected products • Review methods - modified Delphi paneling process entailing individual scoring; structured disclosure, discussion, and Q&A; individual rescoring • Ground rules for conduct **FIRST SCORING SESSION** • Individual silent scoring of questions (handout to be provided) **STRUCTURED DISCLOSURE, DISCUSSION, Q&A** **SECOND SCORING SESSION**		Bruce Marcot Bruce Marcot Bruce Marcot	The expert paneling is intended to meet the first of the workshop objectives, that is, to provide an evaluation of potential interaction effects between reintroduced Bull Trout and existing salmonids in the Clackamas River system.
10:00-10:30a	**BREAK**	Entry of scores into spreadsheet by Marcot et al.	(Marcot, Allen)	
10:30-11:30a	**BRIEF PRESENTATION OF SCORING RESULTS** **GUIDED PANEL DISCUSSION ON OVERALL EXTINCTION RISK AND CONTRIBUTION BY BULL TROUT** **OPEN FLOOR FOR MANAGERS AND OTHER OBSERVERS TO ASK CLARIFYING QUESTIONS OF PANELISTS**	Presentation Facilitated discussion	Bruce Marcot Dan Shively	Ensure panel has opportunity to see the distribution of their scores, and at least to briefly discuss meaning and implications; and for the note-taker to capture key points.
11:30a-12:30p	**LUNCH**			

Time	Topic	Main messages	Lead	Objective
12:30-2:30p	**TASK 2: SUGGESTIONS FOR MONITORING ACTIVITIES** • Guided panel brainstorming exercise to identify monitoring themes and activities	Facilitated discussion	Dan Shively & Bruce Marcot	Develop a list of potential monitoring themes, objectives, and activities presuming that the proposed action will take place.
2:30-2:50p	**BREAK**			
2:50-4:50p	**SUGGESTIONS FOR MONITORING ACTIVITIES (CONTINUED)** • Guided panel brainstorming exercise • Summary of results **OPEN FLOOR FOR MANAGERS AND OTHER OBSERVERS TO ASK CLARIFYING QUESTIONS OF PANELISTS**	Facilitated discussion	Dan Shively & Bruce Marcot	(as above)
4:50-5:00p	**WRAP-UP OF DAY 2** Briefly review work done today, mention tomorrow's activities; address any logistics needs for the evening	Summary	Dan Shively	Summary, wrap-up, preparation for tomorrow

DAY 3 - WEDNESDAY, July 23, 2008

Time	Topic	Main messages	Lead	Objective
8:00-8:10a	**WELCOME** • Today's objectives, agenda, and expected products • Any logistics needs	Housekeeping	Dan Shively	Welcome, orientation to the day's upcoming work
8:10-10:00a	**TASK 3: SUGGESTIONS FOR POTENTIAL AMELIORATIVE MANAGEMENT ACTIVITIES TO REDUCE ADVERSE SPECIES INTERACTIONS** • Guided panel brainstorming exercise to identify potential management actions, pertinent not only to food web interactions but also to other factors. • Is the assumption valid that bull trout introduction is reversible? • Could the bull trout population be managed at a particular size(s)?	Facilitated discussion	Dan Shively & Bruce Marcot	Develop a list of potential mitigating or ameliorative management activities to address potential adverse effects on anadromous salmonids, presuming that the proposed action will take place.
10:00-10:20a	**BREAK**			
10:20-11:00a	**SUGGESTIONS FOR POTENTIAL AMELIORATIVE MANAGEMENT ACTIVITIES (CONTINUED)** • Guided panel brainstorming exercise • Summary of results **OPEN FLOOR FOR MANAGERS AND OTHER OBSERVERS TO ASK CLARIFYING QUESTIONS OF PANELISTS**	Facilitated discussion	Dan Shively & Bruce Marcot	(as above)
11:00-11:30a	**WORKSHOP WRAP-UP AND CONCLUSION**	Wrap-up	Dan Shively, Rollie White	Summary of workshop accomplishments; return to overall flowchart of project; next steps in process

Appendix 2. Letter of invitation sent to each invited expert panelist.

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Oregon Fish and Wildlife Office
2600 SE 98th Avenue, Suite 100
Portland, Oregon 97266
Phone: (503) 231-6179 FAX: (503) 231-6195

Reply To: 8183.5304A
File Name: Workshop Invite D Beauchamp.doc
TS Number: 08-865

[name, address of invited expert panelist]

Subject: Clackamas River Bull Trout Reintroduction Expert Panel Meeting

Dear _____:

Thank you for agreeing to participate in the July 21-23, 2008, expert panel workshop to assess impacts of a proposed reintroduction of bull trout on federally listed salmon and steelhead in the Clackamas River, Oregon. The results of this workshop will support various decision making processes associated with a reintroduction of bull trout to the Clackamas River. The workshop will be held in Vancouver, Washington, at the Water Resources Education Center (map and directions enclosed) beginning at 1 pm July 21, ending at 12 pm July 23.

We will follow this letter with a packet of background materials that will include a draft workshop agenda, relevant sections from the Clackamas River Bull Trout Reintroduction Feasibility Assessment, a USGS publication on the Feasibility Assessment, Q&A for the project, and relevant literature. Although we intend to cover some of these items in presentations at the front end of the workshop we ask that you familiarize yourself with these materials ahead of time.

Dan Shively, Fisheries Program Leader for the Mt. Hood National Forest, will facilitate the workshop, and Dr. Bruce Marcot, research wildlife ecologist with Region 1, U.S. Forest Service will serve as a technical facilitator for all exercises involving quantitative scores or estimates. Dr. Jason Dunham, U.S. Geological Survey, who previously contacted you about the workshop, will participate on the panel and continue to serve as one of the workshop contacts for panel members.

The general format for the workshop will be as follows: Day 1 will begin with an overview of workshop goals, objectives, and methods, followed by a series of short background presentations for the panel, and end with a discussion of ecological interactions. Day 2 will focus on expert panel evaluations of species interactions using a modified Delphi paneling process entailing individual scoring, structured disclosure, discussion, Q&A and individual rescoring. The end of day 2 and most of day 3 will focus on a structured brainstorming session and panel discussion of potential monitoring activities to address uncertainty and risk associated with a reintroduction of bull trout, and suggestions for potential ameliorative activities to reduce adverse species interactions.

Per diem (food, lodging, travel) for the workshop is available from the FWS to panel members that require funding assistance. If you are not from the Portland/Vancouver area and will need accommodations, the closest hotel to the Education Center is Homewood Suites, 701 SE Columbia Shores Boulevard, Vancouver, 1-360-750-1100. In order to provide per diem we will need participants to complete several forms prior to the workshop. If you plan to seek per diem please contact our administrative assistant Diana Acosta as soon as possible at 503.231.6179. Please note that in order to accommodate air travel cost, our office will need to process your reservations.

Thank you again for agreeing to participate in the expert panel workshop. If we can be of any assistance or if you wish to discuss any aspect of the panel process, please feel free to call me at (503) 231-6179 or contact Chris Allen of my staff at the same number.

Sincerely,

Miel Corbett
Acting State Supervisor

Appendix 3. List of pre-workshop reading materials sent to each expert panelist.

A. Workshop Statement of Work (see text)

B. Draft Workshop Agenda (see Appendix 1)

C. Directions to Workshop

D. Project Question and Answer Sheet (see Appendix 4)

E. Publications

1. Shively et al. 2007. Clackamas River Bull Trout Reintroduction Feasibility Assessment (select sections most pertinent to workshop goals and objectives)
2. Dunham & Gallo, 2008. Assessing the Feasibility of Native Fish Reintroductions: A Framework and Example Applied to Bull Trout in the Clackamas River, Oregon
3. Beauchamp & Van Tassell, 2001. Modeling Seasonal Trophic Interactions of Adfluvial Bull Trout in Lake Billy Chinook, Oregon.
4. Seddon et al. 2007. Developing the Science of Reintroduction Biology

Appendix 4. Project question and answer sheet, sent to each expert panelist prior to the workshop.

Commonly Asked Questions and Answers

Possible Proposal to Reintroduce Bull Trout to the Clackamas River

Q. What action is being considered?

A. Agencies are considering whether to propose reintroducing a "nonessential experimental population" of bull trout into the Clackamas River, where they were once abundant and widely distributed.

Q. Who is working on this proposal?

A. The U.S. Fish and Wildlife Service and the Oregon Department of Fish and Wildlife in cooperation with the U.S. Forest Service. The U.S. Geological Survey is providing scientific support. Coordination on the proposal is occurring with the Confederated Tribes of the Warm Springs Reservation of Oregon.

Q. Why would this reintroduction be proposed?

A. Bull trout are a species listed as "threatened" under the federal Endangered Species Act, and the goal of that law is to recover species from being threatened or endangered to the point that they no longer need its protection. Their reintroduction into the Clackamas River is under consideration because it would meet objectives of the current Fish and Wildlife Service recovery strategy for the species in the Willamette Basin, as well as other agencies' goals to restore native fish communities.

Q. Why choose the Clackamas River for this proposal?

A. The Clackamas was considered for reintroduction even before the bull trout was listed as threatened, in years of discussion between the Forest Service and Oregon Department of Fish and Wildlife. With these two key partners already exploring the possibility, and the need expressed in the bull trout recovery plan, it was logical to continue exploring the idea. There are other appropriate locations for bull trout reintroduction, and examination of this possible reintroduction will gain knowledge and experience that can be applied elsewhere. From the bull trout's perspective, the Clackamas is a good candidate because bull trout haven't been documented there since about 1963; the factors which caused them to disappear have been remedied, and about 70 miles of the upper river and tributaries contain suitable habitat for bull trout spawning and rearing.

Q. How can a "nonessential" population contribute to recovery?

A. A nonessential experimental population would contribute to the recovery of the bull trout in the Willamette Basin, but it is not essential to the survival of the species in the wild. The designation allows for greater flexibility in managing other land uses and human activities, without the usual level of protections being given to individuals of the reintroduced species. The designation of nonessential experimental

populations [through Section 10(j)] was added to the Endangered Species Act in 1982 by Congress in order to increase the public's tolerance for putting a protected species back into an area where it had been previously.

Q. Would the agencies later want to change the nonessential population to an "essential" designation?

A. It is not likely that the Fish and Wildlife Service would propose to change the nonessential experimental population classification. Any changes that might become necessary would occur in cooperation with the State of Oregon and other affected parties and would require another federal rule-making process. The only likely change would be if the species recovers and is removed from the list of threatened and endangered species, in which case the "nonessential experimental population" designation would be eliminated as part of the delisting.

Q. What will bull trout do to salmon and steelhead in the Clackamas River?

A. Like many other native fish in the Clackamas River, bull trout will eat juvenile salmon and steelhead. They also will eat other fish which would have eaten juvenile salmon and steelhead. These predator/prey dynamics are complex, and despite the fact that these species evolved together, it is uncertain whether bull trout would have a negative, positive, or neutral effect on today's salmon and steelhead populations. Because of this, the agencies are seeking to understand the potential impacts before making the decision to propose the reintroduction. A panel of expert scientists will meet in July 2008 to answer the questions about potential bull trout effects on salmon and steelhead in the Clackamas River.

Q. How is this proposed reintroduction affected by the recent completion of the 5-year status review of bull trout?

A. The U.S. Fish and Wildlife Service completed its 5-year status review of the bull trout with two recommendations: retain threatened status for the species as currently listed throughout its range, and evaluate whether distinct population segments (DPSs) exist and merit protection under the Endangered Species Act. The first recommendation validates the science and decisions underlying this proposal. Any change resulting from the second recommendation will be well in the future, and meanwhile the reasons to continue studying this proposal remain.

Q. Would the presence of a protected species in the Clackamas River affect land management activities, like timber harvest?

A. The proposal under consideration would be to designate a "nonessential experimental population," under the authority of Section 10(j) of the Endangered Species Act, specifically to avoid restricting land management and recreational activities. Throughout the entire nonessential experimental population area, no federal agency or its contractors would be in violation of the Endangered Species Act for harming or killing bull trout as a result of any authorized agency action.

Q. What about impacts of this protected species on recreational river uses?

A. The reintroduction will not conflict with recreational uses of the river. For example, since it would be within a nonessential experimental population area, a person

fishing in accordance with Oregon angling regulations would not be in trouble for inadvertently harming a bull trout.

Q. What activities will be prohibited because of this nonessential experimental population area?

A. It remains illegal to deliberately "take" (harm or kill) bull trout, which generally would occur if they are taken or possessed in violation of state fish and wildlife laws or regulations. In other words: fishing in violation of state regulations which results in catching these fish, or polluting the waters in violation of state or federal law, could result in additional penalties for harming the fish. Fishing and other activities conducted legally will not result in penalties if they happen to result in catching or otherwise harming the fish.

Q. Is it even biologically possible to reintroduce this threatened species here?

A. A report published in 2007 by the agencies concluded that the proposal would be feasible, given what was found on habitat quality and availability, suitable donor stocks, nonnative species interactions, available prey species and threats.

Q. Where in the Clackamas River would the fish be reintroduced?

A. They would be released into historical bull trout habitat in the upper Clackamas River above the confluence with the Collawash River. This reach contains the most suitable habitat for reintroductions.

Q. When might these fish be put into the Clackamas?

A. The reintroduction could begin in the spring of 2009 and continue through the fall depending on whether the fish being moved are juvenile, subadult or adult fish. Transfer would continue annually for ten years in the first phase of the reintroduction. Transfer of fish in phase two (years 11 through 20) would be contingent on the success of phase one.

Q. How would this reintroduced population contribute to recovery of the species?

A. The reestablishment of bull trout in the Clackamas River would reduce the risk of elimination of bull trout from the greater Willamette Basin, and contribute to stabilizing bull trout populations in the lower Columbia River. The specific recovery objectives that would be supported by this action are:

- Maintain current distribution of bull trout and restore distribution where recommended in recovery unit chapters.
- Maintain stable or increasing trend in abundance of bull trout.
- Restore and maintain suitable habitat conditions for all bull trout life history stages and strategies.
- Conserve genetic diversity and provide opportunity for genetic exchange.

Q. Where would the fish come from?

A. The most appropriate donor stock for the reintroduction has been determined to be from the Metolius River, in the Deschutes River Basin, a tributary of the lower Columbia River in north central Oregon.

Q. How many bull trout would be moved?

A. The potential proposed action includes the direct transfer of adult, subadult and juvenile bull trout from the Metolius River to the Clackamas River. For the first few years we anticipate transferring annually approximately 100 adults, 100 subadults, and several thousand juveniles and fry. The numbers and life stages of fish transferred annually will be linked strongly to the annual population size of the donor stock, as well as to information derived from monitoring and evaluating the success of the various life stages over the initial few years of the project.

Q. What happens after the bull trout are released in the river?

A. The Fish and Wildlife Service and partner agencies will monitor them to document survival, movement, spawning and natural recruitment. Reports will document the stocking rates and monitoring activities that took place during the previous year. Periodic progress reports will be released, and the agency will fully evaluate this reintroduction effort after phase one (ten years) is complete to determine whether to continue the project.

Q. Will the bull trout leave the area where they are released?

A. Bull trout do tend to migrate within large river systems, and some of the reintroduced fish are expected to move out of the release area on the upper Clackamas. To ensure that any reintroduced bull trout that may move are covered by the nonessential experimental population designations, the area's boundaries will extend downstream from the release areas the entire length of the Clackamas River, and include the Willamette river downstream to where it meets the Columbia River (including Multnomah Channel) and upstream to Willamette Falls. It is expected that the majority of reintroduced fish and future offspring of these fish will remain within the area boundaries. If bull trout move outside the boundaries, the Fish and Wildlife Service could propose to extend the boundaries to include the entire range of the expanded population.

Appendix 5. List of workshop attendees: invited expert panelists, meeting facilitators, workshop planning team, and observers.

Expert Panel Participants: Dave Beauchamp (UofW/USGS BRD), Jason Dunham (USGS FRESC), Kathryn Kostow (ODFW), Paul McElhany (NMFS Science Center), and Michael Meeuwig (Montana State University).

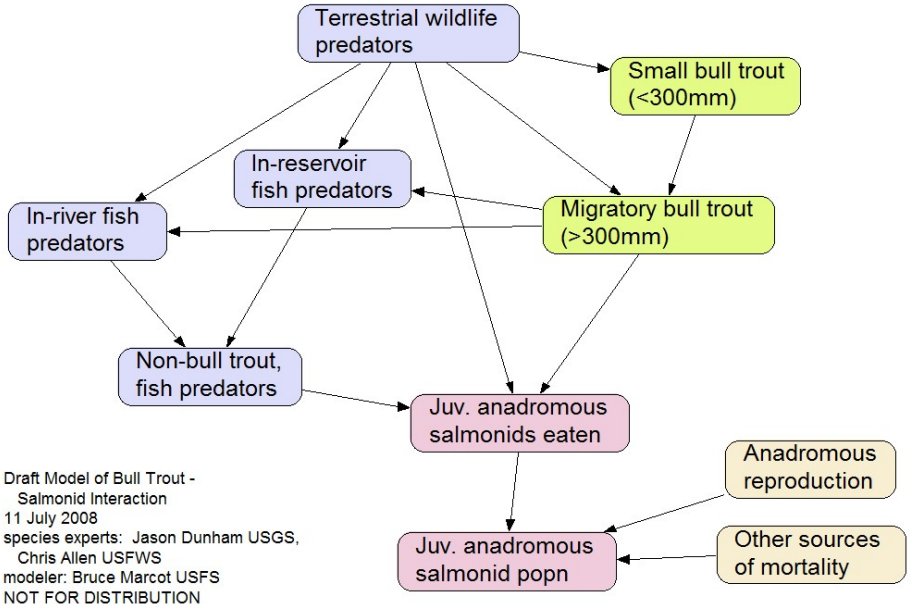
Facilitator: Dan Shively (USFS) with assistance by Bruce Marcot (USFS)

Workshop Planning Team: Dan Shively and Bruce Marcot (USFS); Rollie White, Chris Allen, and Steve Morey (USFWS); Jason Dunham (USGS)

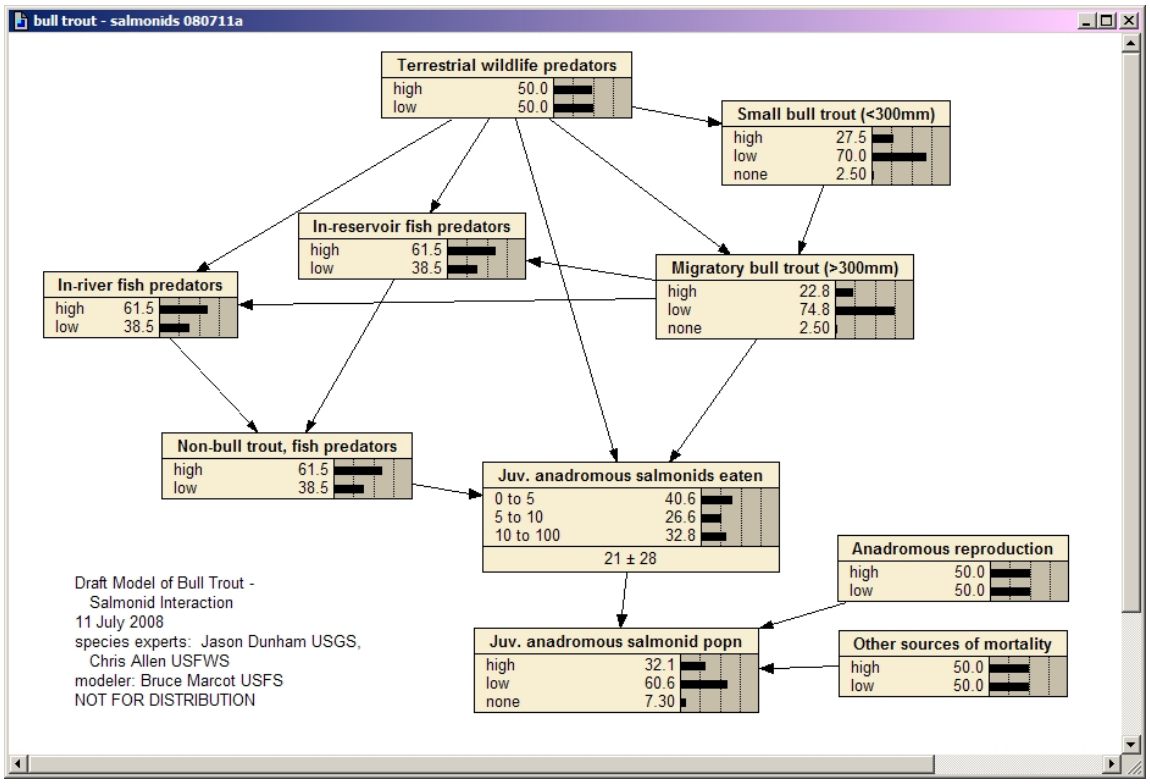
Manager Observers:
Paul Henson (FWS, State Supervisor, Oregon Fish and Wildlife Office), Miel Corbett (FWS OFWO), John Esler (PGE), Gary Larson (USFS, Mt. Hood Forest Supervisor), Chris Wheaten (ODFW, NW Regional Supervisor)

Additional Observers:
Nick Ackerman (PGE), Chris Allen (FWS OFWO), Todd Alsbury (ODFW), Jeff Boechler (ODFW), Doug Cramer (PGE), Brad Goerhring (FWS OFWO), Jen Graham (CTWSRO), Erin Lowery (UW), Rick Swart (ODFW), Rebecca Toland (FWS OFWO), Richard Turner (NOAA Fisheries), Garth Wyett (PGE), Bob Progulske (FWS OFWO).

Appendix 6. Bull trout food web model presented at the workshop by Jason Dunham and Bruce Marcot.



Influence diagram.



Bayesian network model developed from the influence diagram.

Appendix 7. Detail of expert panel methods used during the workshop.

Author: Bruce G. Marcot

This appendix provides a brief overview of concepts of expert paneling and the specific paneling methods used in the Bull Trout Expert Panel Meeting of July 2008.

On Expert Paneling

Expert judgment is often used as a source of information in the absence of, or to supplement, empirical research and statistically-sound studies. In ecology, expert judgment has always been sought for interpreting difficult or otherwise intractable problems in modeling, management, planning, and scientific understanding. Some examples include using expert opinion to evaluate an elk habitat model (Holthausen et al. 1994), to develop general faunal distribution models (Pearce et al. 2001), modeling rare species (Marcot 2006), evaluating adaptive management options (Failing et al. 2004), and many applications.

For many years, experts in particular fields of study have provided knowledge and experience that have been represented in computer expert systems. For example, Cheung et al. (2005) incorporated expert knowledge in an expert system to predict extinction probabilities of marine fishes, Crist et al. (2000) used an expert systems tool to evaluate effects of land use on biodiversity, and O'Keefe et al. (1987) developed an expert system approach to evaluating the conservation status of rivers. Many other examples are found in the literature.

One critical step in all of these examples is the soliciting and representing of expert knowledge in a reliable, repeatable, and unbiased fashion, especially from more than one expert for a particular problem. One major method for this is the conducting of panels of multiple experts in such as way as to ensure that individual and collective expertise is appropriately solicited and summarized.

Expert panels have been used extensively by natural resource and land management agencies for a wide variety of problems. Some examples include evaluating potential effects on species viability from an array of forest and land management planning options (FEMAT 1993, Lehmkuhl et al. 1997), determining the appropriate conservation status for a wide variety of potentially at-risk species under the Northwest Forest Plan (Marcot et al. 2006), developing a management plan for a national forest in Alaska (Shaw 1999), and other programs and projects.

An important consideration in seeking expert judgment from an expert panel is to clarify if consensus among all panelists is desired, or if individual judgment among the panelists is desired. Each of these objectives entails different paneling methods, results, and cautions. For example, to reach consensus among a group of individuals with disparate opinions and preferences, Hajkowicz (2008) and Bojórquez-Tapia et al. (2005) tested and

suggested use of multiple criteria analysis. To provide individual expert judgments, I have used a modified Delphi technique (Marcot 2006, Marcot et al. 2006), described in more detail below. Consensus might entail potential bias from group-think and excluding outlier opinions. Providing individual judgments might entail bias from different, individual motivations.

Reaching consensus is typically the objective of expert panels convened by the National Research Council's programs for developing criteria for contract requests for proposals. Weisberg et al. (2008) found that consensus was possible for evaluating the condition of communities of benthic substrates. However, a consensus outcome of an expert panel does not provide information on the variation in expert judgment among the individual expert panelists. Nor does it provide for "outlier" opinions from experts that might not concur with the majority views.

For the project objectives at hand, it was decided by the workshop planning team that individual expertise, not consensus, was sought as the objective of the paneling process, in large part because (1) the expert panel was to provide technical and scientific information to be later considered by decision-makers, and not specific consensus recommendations for management or a management decision per se, and (2) it was deemed of interest to determine the type and degree of variation *among* selected experts for the difficult questions posed.

Bull Trout Expert Panel Methods

Overall paneling approach

The Bull Trout Expert Panel procedure was structured as a modified Delphi paneling process. The Delphi paneling process entails a structured querying, disclosure, discussion, and revisiting of expert judgment on some focused problem of interest (e.g., see MacMillan and Marshall 2006). In addition to some of the above-cited expert paneling projects, the Delphi process has been used to assess status of wildlife species (Clark et al. 2006), to prioritize urban improvement strategies in India (Gokhale 2001), to develop habitat suitability index curves (Crance 1987), and for other ecological projects.

The standard Delphi process entails eventually reaching consensus among a panel of experts, but the modification used here (and in many previous expert panels) omits the consensus step because it was desired to obtain individual experts' input, in part to discover the range of judgment and interpretation among the experts on the panel. A consensus approach would not provide this.

Scoring of potential bull trout impacts

The specific Delphi method we used in the Bull Trout Expert Panel for scoring of potential impacts of bull trout on ESA-listed salmonids was as follows (also see Appendix 1):

1. Prior to the workshop, each expert panelist was sent a letter of explanation (Appendix 2) along with pre-meeting reading material (see Appendix 3 for list).

The purpose was to ensure that the panelists understood the nature of the questions and the general paneling methods to be used in the meeting, and would all come prepared with having studied the same background material.

2. At the workshop, a series of focused presentations was provided by various experts (some of the presentations by some of the panelists) on various key topics of the Clackamas River system, its dam management structure, and biology and ecology of salmonids (see Appendix 1 for presentation topics).

The purpose of these presentations, as with the pre-meeting reading material, was to ensure that all expert panelists were brought up to the same, common level of understanding of these key topics, that is, bring them to parity, so when they score outcomes they have all been equally informed on the major background information.

3. In preparation for the panel scoring exercise, during the workshop the scoring worksheet format and key terms and definitions were reviewed so that all panelists would understand and interpret the intent and terminology in the same ways.

The overall purpose of steps 1-3 is to reduce or eliminate bias from variation in their understanding of the ecological and environmental context and terminology, and of scoring methodology. The aim is to ensure that whatever variation may result among the panelists' scores and contributions would be principally from their individual ecological interpretations and expertise.

4. The panelists were then asked to provide initial scores of the potential degree of impact of bull trout on the 4 ESA-listed salmonids in the Clackamas River system. See Appendix 8 for the score sheet used.

The scoring was explicitly to be made on the assumption that bull trout reintroduction objectives are met (that is, at least 200-500 adult bull trout would be sustainably present in the Clackamas River system by 2030). The scoring was done by having each panelist spreading 100 points among one or more possible impact outcome categories (ranging None to Very High), for each of the four salmonids (Spring Chinook, Fall Chinook, Coho, and Winter Steelhead). This first round of scoring was done individually, in silence, without interaction and discussion.

5. Next, the panelists engaged in structured disclosure and discussion.

One by one, each panelist was asked to disclose their scoring for each salmonid and explain why they scored as they did. After this structured disclosure, they engaged in more open discussion on their rationale, including how they considered and weighed various factors in their scores. The discussion was followed by then allowing the panelists to ask questions of the observers and other experts in the room. The overall purpose of structured disclosure and discussion was to allow each panelist to learn from reach other, to bring out their best efforts and broadest judgments of all information and considerations.

6. The panelists then engaged in a second, final round of silent scoring, which constituted their final expert contribution on degree of impact. The panelists were also asked to describe, in words on their score sheet, their rationale for why they scored as they did, that is, to denote and describe which main environmental, biological, or ecological factors they considered and weighed in their scoring decisions.

Note that, between steps 4 and 6, the panelists suggested expanding the initial 5-category classification of impact to a 7-category classification, as follows:

Very High = bull trout influence contributes to 100% of the extinction probability
High = bull trout influence contributes to about 95% of the extinction probability
Moderately High = bull trout influence contributes to about 75% of the extinction probability
Moderate = bull trout influence contributes to about 50% of the extinction probability
Moderately Low = bull trout influence contributes to about 25% of the extinction probability
Very Low = bull trout influence contributes to about 5% of the extinction probability
None = bull trout influence has no contribution to the extinction probability

The panelists wanted to be able to more precisely denote possible impacts in the range between None and Moderate; this modification permitted this, and all panelists concurred with this change and felt more comfortable using it for their second round of scoring.

7. Results of the final scores were then presented back to the panelists (Appendix 9) for their information and interpretation (using Excel on a laptop computer projected to a screen).

Potential monitoring activities

The panelists were then quizzed, using a structured brainstorming paneling method, to provide ideas on potential monitoring activities and metrics, again presuming that the bull trout reintroduction program would go forward. The structured brainstorming approach took the form of individually asking each panelist in turn to suggest their "top two" monitoring topics and metrics, without repeating or critiquing what a previous panelist might have suggested; and going around the panel as many times as they felt necessary to provide ideas. Panelists were allowed to "pass" after the first round if they felt that their main ideas had already been suggested and added to the list, which was presented on screen.

The panelists then engaged in an open discussion to refine their list of potential monitoring activities, that is, to exclude, combine, or split out some suggestions. They also provided information on each monitoring activity's overall objective, theme, and duration or frequency (see Appendix 10).

The panelists were then given printouts of the final list of monitoring activities, and asked to score each activity on a 3-class priority scale: 1 = essential to conduct, 2 = important

but not necessarily essential, and 3 = worthwhile but of lower importance. They provided these scores individually in silence (just as they had done the scoring of potential bull trout impact on each salmonid, in the previous exercise).

Their scores were then entered into the spreadsheet; sums, means, and ranges of their scores were calculated; and the monitoring activities were then sorted by on increasing sum scores and then increasing mean scores. This resulted in a final list of suggested monitoring activities sorted by decreasing priority (Appendix 10).

Potential management activities

The expert panelists were then asked to provide ideas on potential management activities that could be considered, should the bull trout reintroduction program go forward *and* it be found that there was unacceptably adverse effects on the salmon and steelhead populations. The panelists provided ideas on such potential management activities again in a structured brainstorming process as described above. The panelists also specified the type and degree of adverse impact and the overall management theme to which potential management activity pertained.

The panel then was asked to engage in an open discussion to revise and refine their list of potential management activities, that is, to exclude, combine, or split out some suggestions. The final list was then sorted by management theme (Appendix 12).

Additional panel activities

The workshop agenda also provided, at the end of the sessions, each panelist to offer any comments of interpretation, caution, recommendation, or any other statement, and to interact more freely with all observers and managers in the room.

The expert panelists were also given an opportunity to review the content of the note taker's summary of each of their main comments (see Appendix 11) to ensure that what is presented in this report correctly captured their statements during the workshop.

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Appendix 8. Worksheet used by the expert panelists to score potential impacts from bull trout on each of the 4 ESA-listed salmonids in the Clackamas River system.

Panelist code: _____
Date: _____

TASK 1: DEGREE OF IMPACT

Assume that bull trout reintroduction objectives are met (that is, at least 200-500 adult bull trout sustainable by 2030). Now, **what are the impacts from bull trout on ESA-listed salmon and steelhead populations?**

Spread 100 points among one or more cells in each column (the spread of points represents your degree of predictability for each species); score each species independently.

Key: Round 1 / Round 2

Degree of impact	Spring Chinook	Fall Chinook	Coho	Winter Steelhead
Very High	/	/	/	/
High	/	/	/	/
Moderately High	/	/	/	/
Moderate	/	/	/	/
Moderately Low	/	/	/	/
Very Low	/	/	/	/
None	/	/	/	/
Total	100 / 100	100 / 100	100 / 100	100 / 100

Very High = bull trout influence contributes to 100% of the extinction probability
High = bull trout influence contributes to about 95% of the extinction probability
Moderately High = bull trout influence contributes to about 75% of the extinction probability
Moderate = bull trout influence contributes to about 50% of the extinction probability
Moderately Low = bull trout influence contributes to about 25% of the extinction probability
Very Low = bull trout influence contributes to about 5% of the extinction probability
None = bull trout influence has no contribution to the extinction probability

Overall rationale for your scoring across all species – *denote only for Round 2*
Check all that apply to your scoring:

- Refer to food web diagram
- Role of reservoirs in juvenile rearing of salmonids
- Migratory timing of salmonids
- Spatial and temporal habitat use by predatory bull trout
- Predator aggregations caused by in-stream structures
- Current abundance and recent trend of each salmonid species
- Other: _____

Appendix 9. Results of the expert panel scoring of degree of impact of bull trout on extinction probabilities of ESA-listed salmon and steelhead populations. See Appendix 8 for worksheet used.

Panelist A

Degree of impact	Spring Chinook	Fall Chinook	Coho	Winter Steelhead
Very high	0	0	0	0
High	0	0	0	0
Mod. high	5	0	5	10
Moderate	20	0	25	40
Mod. low	50	5	40	30
Very low	20	5	20	15
None	5	90	10	5

Panelist B

Degree of impact	Spring Chinook	Fall Chinook	Coho	Winter Steelhead
Very high	0	0	0	0
High	0	0	0	0
Mod. high	5	0	5	5
Moderate	10	0	10	10
Mod. low	45	10	45	45
Very low	35	40	35	35
None	5	50	5	5

Panelist C

Degree of impact	Spring Chinook	Fall Chinook	Coho	Winter Steelhead
Very high	0	0	0	0
High	0	0	0	0
Mod. high	0	0	0	0
Moderate	0	0	0	0
Mod. low	5	5	5	5
Very low	35	10	35	20
None	60	85	60	75

Panelist D

Degree of impact	Spring Chinook	Fall Chinook	Coho	Winter Steelhead
Very high	0	0	0	0
High	0	0	0	0
Mod. high	0	0	0	0
Moderate	0	0	0	0
Mod. low	30	15	45	40
Very low	65	65	45	50
None	5	20	10	10

Panelist E

Degree of impact	Spring Chinook	Fall Chinook	Coho	Winter Steelhead
Very high	0	0	0	0
High	0	0	0	0
Mod. high	0	0	0	0
Moderate	5	0	5	5
Mod. low	45	25	30	40
Very low	35	25	55	40
None	10	50	10	10

SUM OF ALL PANELIST SCORES

Degree of impact	Spring Chinook	Fall Chinook	Coho	Winter Steelhead
Very high	0	0	0	0
High	0	0	0	0
Mod. high	10	0	10	15
Moderate	35	0	40	55
Mod. low	175	60	165	160
Very low	190	145	190	160
None	85	295	95	105
	No. of panelists:	5		

MEAN SCORES

Degree of impact	Spring Chinook	Fall Chinook	Coho	Winter Steelhead
Very high	0	0	0	0
High	0	0	0	0
Mod. high	2	0	2	3
Moderate	7	0	8	11
Mod. low	35	12	33	32
Very low	38	29	38	32
None	17	59	19	21

RANGE OF SCORES (MAX-MIN)

Degree of impact	Spring Chinook	Fall Chinook	Coho	Winter Steelhead
Very high	0	0	0	0
High	0	0	0	0
Mod. high	5	0	5	10
Moderate	20	0	25	40
Mod. low	45	20	40	40
Very low	45	60	35	35
None	55	70	55	70

Appendix 10. Potential monitoring activities identified by the expert panel, listed in decreasing order of mean priority. \1

	Objective	Monitoring theme	When	Brief description, metric	Panelist A	B	C	D	E	Sum	Mean	Range	Comment
1	predator status	predator abundance & reproduction	annual	bull trout reproduction and recruitment, e.g., spawning surveys, age, and size	1	1	1	1	1	5	1	0	
2	trophic interactions	consumption	baseline & periodic	estimate rates of consumption of food by bull trout	1	1	1	1	1	5	1	0	tied with item 6
3	predator status	bull trout size structure	periodic	monitor size structure of bull trout in reservoir and river environments	1	1	1	2	1	6	1.2	1	
4	prey status	prey abundance & productivity	annual	smolt and adult abundance, size, and age of the 3 listed species at North Fork Dam	1	1	2	1	1	6	1.2	1	some redundancy re: adults w/ 5
5	prey status	prey abundance & productivity	annual	juvenile and adult abundance & size structure of the 3 listed species above the North Fork Reservoir	1	1	1	1	2	6	1.2	1	some redundancy re: adults w/ 4
6	trophic interactions	trophic interactions	baseline & periodic	monitor diet & stable isotopes of fish and key invertebrates to identify major predators (fish & others) of salmonines and other fishes (determine food web)	1	1	1	1	2	6	1.2	1	tied with item 2
7	predator status	demography	baseline & periodic	life stage and habitat-specific survival estimation of bull trout	1	1	2	2	2	8	1.6	1	
8	predator status	fish habitat selection	baseline & periodic	habitat selection by predator, probability of habitat use	2	2	1	2	1	8	1.6	1	
9	prey status	species abundance	baseline & annual	monitor Coho, Chinook, & winter steelhead abundance in nearby, adjacent basins, for reference both marine and other common freshwater effects	2	2	2	1	1	8	1.6	1	

	Objective	Monitoring theme	When	Brief description, metric	Panelist A	B	C	D	E	Sum	Mean	Range	Comment
10	trophic interactions	spatial and temporal variation in distribution of species	baseline & periodic	general surveys; over time for temporal variation; seasonally; all aquatic species	1	2	2	1	2	8	1.6	1	"all aquatic species" includes inverts & other taxa; contributes to 6
11	environment	reservoir limnology	~monthly	monitor temp & zooplankton	1	2	3	1	2	9	1.8	2	
12	predator status	age and growth	baseline & periodic	age and growth of all predators	1	1	2	2	3	9	1.8	2	
13	prey status	demography	baseline & periodic	life stage and habitat-specific survival estimation of all prey species	1	2	2	2	2	9	1.8	1	
14	prey status	fish habitat selection	baseline & periodic	habitat selection by prey, probability of habitat use	3	2	2	2	1	10	2	2	
15	prey status	fish use of reservoir	annual or periodic	hydroacoustic survey in reservoir to determine fish species abundance and distribution	2	2	2	3	1	10	2	2	this item is a subset of 10
16	trophic interactions	bull trout movement	periodic	tracking of bull trout movement through the basin, esp. if below the dam, to better understand interaction with prey species	2	2	2	3	1	10	2	2	
17	environment	habitat	baseline & periodic	monitor habitat to determine environmental correlates to better understand potential species interaction	3	2	3	2	3	13	2.6	1	
18	prey status	prey behavior	periodic	monitor of behavior of prey species, microhabitat selection diel activity	3	2	3	2	3	13	2.6	1	
19	predator status	angler catch of bull trout	annual or periodic	monitor angler catch of bull trout	3	3	3	3	3	15	3	0	

\1 Priority scoring: 1 = essential to conduct; 2 = important but not necessarily essential; 3 = worthwhile but of lower importance.

Appendix 11. Written explanatory notes and discussion comments from the five expert panel participants, recorded from their scoring of bull trout impacts and listing of potential monitoring activities.

These notes include any hand written notations, clarifications, comments, justifications etc.. made by individual panelists on their scoring forms.

Task #1 refers to the panelists scoring the potential effect of reintroduced bull trout on the four existing ESA-listed salmonid species in the Clackamas River system. Task #2 refers to potential monitoring activities. (See Appendix 7 for explanation of how these panel tasks were conducted.)

Panel Member A

Task #1 Notes:

Panelist A noted that for this exercise he/she assumed a population of 500 adult bull trout in the Clackamas River (this is the top end of our 200 to 500 fish goal as stated in background presentations from day 1 of the workshop).

Overall Rationale: Panelist A circled all bullets on score sheet and included additional information in italics below:

Refer to food web diagram: *all species*
Role of reservoirs in juvenile rearing of salmonids: *zooplankton during fall and late spring, insects during winter & early spring. Spring Chinook & Coho reportedly immigrate into the reservoir in fall and remain until outmigration in late spring*
Migratory timing of salmonids: *Spring Chinook & Coho vulnerable during migration into reservoir & chronic exposure in reservoir.*
Spatial and temporal habitat use by predatory bull trout: *fraction of subadult and adult bull trout use reservoir during fall through spring, adults move into river in summer, subadults stay in reservoir or go upstream.*
Predator aggregations caused by in-stream structures:
Current abundance and recent trend of each salmonids species:
Other: *Temporal patterns in thermal regime in both stream and reservoir (include vertical profile) will determine the degree of spatial-temporal overlap between predatory bull trout and juvenile salmonids. A cooler and less stratified reservoir will increase predation due to increased spatial-temporal overlap of predators and prey.*
Other: *Relative availability of juvenile salmon and steelhead compared to other forage fish among seasons & between river & reservoir habitat. If juvenile salmonids are the predominant fishes in the reservoir, they will absorb nearly all of the predatory impact by bull trout.*

Task #2 Notes:

In the 3rd row of the scoring sheet, under the column header "Brief description, metric", Panelist A crossed out "…all predators" and replaced with "bull trout".

The same thing was done 3 cells below the previous edit. The panelist crossed out "all predator species" and replaced with "bull trout".

Panel Member B

Task #1 Notes:

Panelist B provided the following rationale for his/her scoring:

- Spring Chinook, Coho & winter steelhead all scored the same because all share time and space with bull trout. No compelling data to conclude one species more vulnerable than another.
- Fall Chinook most likely no impact on risk, little likelihood of significant overlap in time and space.
- For spring Chinook, Coho & steelhead, most likely moderate-low, or low. Bull trout likely to prey on salmon and have some impact but not high relative to other threats. Bull trout part of historical ecosystem; should be able to coexist.
- A few points allocated to moderate & moderate-high risk category because there is possibility of worst case scenario of large artificially high bull trout population in reservoir that eat lots of salmon (analogous to terns in the Columbia). Species translocations have a history of going awry.

Task #2 Notes:

Panelist B noted the following:

- All his/her priority 1 tasks are needed for crisis monitoring
- All his/her priority 2 tasks are needed to understand and manage interactions (e.g. if you want to try to change the environment to reduce interactions). Also priority 2 tasks are generally needed to estimate food webs.
- Circled items are needed to estimate consumption rates (panelist circled 6 rows associated with monitoring activities – rows 3, 5, 6, 13, 17& 19).

Panel Member C

Task #1 Notes:

On the scoring sheet where the "Degree of impact" definitions were provided, Panelist C suggested inserting "biologically significant" into the definition of "None" so that it reads "bull trout influence has no *biologically significant* contribution to the extinction probability.

Panelist C also inserted 2 footnotes in the "Very High" definition. One footnote read: "Relative not absolute extinction probability, threats." The other footnote read: "Consider entire life cycle"

Panelist C provided the following rationale for his/her scoring: "I considered bull trout in the context of 1) the entire Clackamas River and threats therein, and 2) in the context of threats to salmon throughout their life cycle from freshwater to marine habitats and back. In this view I see "moderate" (50% of the risk) to represent a huge fraction of the risk that is not likely to be accounted for by any single variable. The category of "None" was not interpreted as zero, but rather, not biologically significant. Overall given the wide array of known problems with anadromous species & existing threats, the latter seem to loom much larger than I could easily imagine coming from bull trout alone. I erred on the side of caution in according more of the extinction risk to bull trout. Furthermore, I did not consider potential positive effects of bull trout on salmon (e.g. consumption of other predators) that are possible."
Task #2 Notes:

Panelist C provided only one note on the Task #2 scoring sheet and that was to cross out "all predators" and replace with "bull trout" in row 17 under the column header "brief description, metric".

Panel Member D

Task #1 Notes:

Under the "Rationale" portion of the scoring sheet, Panelist D circled the following categories (from the task #1 scoring sheet) that applied to his/her scoring:

Refer to food web diagram:
Role of reservoirs in juvenile rearing of salmonids:
Migratory timing of salmonids:
Spatial and temporal habitat use by predatory bull trout:
Current abundance and recent trend of each salmonids species:

Panelist D provided the following additional rationale:

"Ocean conditions, as well as other factors including passage and non-bull trout predators, likely contribute to population abundance of the anadromous salmonids in question. These topics were outlined in the feasibility assessment. The reintroduction of bull trout would likely result in some added mortality to anadromous salmon, specifically small size-class individuals; however, the variety of other factors influencing population extinction probability of these anadromous salmonids outweigh the influence of an introduced bull trout population, in my opinion. Data suggest that bull trout are opportunistic predators; therefore bull trout may key-in on a certain salmonid prey species when abundant, but may favor other prey sources in the system (e.g. sucker species) in years of low salmon abundance. That is, bull trout will likely not select for anadromous salmonids in years that they are of low abundance (they will likely switch to other prey species)."

Panelist D provided additional rationale for scoring across species:

- Food web diagram: Abundant linkages, prey items, and predators other than bull trout should spread predation risk across many components of the food web, especially for an opportunistic predator.
- Role of reservoir: Bull trout will likely use the reservoir and prey on anadromous salmon but other species (e.g. sucker) may provide a forage base for bull trout.
- Migratory timing: The spatial and temporal overlap of piscivorous bull trout and potential anadromous salmonid prey is a very important question that should be addressed, variability in this overlap added to a large degree in the uncertainty of my scoring.
- Recent trends of salmonids species: Trends in anadromous salmonids are often tied to ocean conditions. This is likely a large contributor to the extinction probability of the species in question and in my opinion outweigh the potential influence of an introduced predator with a shared evolutionary history.

Task #2 Notes:

Panelist D stated that "tracking of bull trout movement through the basin, especially if below the dam, to better understand interaction with prey species" was ranked low (he/she ranked it a 1) because this activity was redundant, although at a finer resolution, with the activity "general surveys; over time for temporal variation; seasonally; all aquatic species" (he/she ranked this a 3). The two activities referred to in Panelist D's notes are from rows 16 and 18 from the Task #2 scoring sheet.

Panel Member E

Task #1 Notes:

Panelist E provided the following scoring rationale that they termed "Contributing Factors" by species on the back of Task #1 score sheet. He/she also provided scoring by percentages by species on the back of the sheet but these numbers correspond to the scoring in the table on the front of the score sheet.

- Spring Chinook: smaller size; higher spatial overlap; yearling/sub yearling duration of vulnerability; relatively abundant now
- Fall Chinook: very small; lower river, no spatial overlap unless bull trout move down river; subyearling short duration of vulnerability; very low abundance now.
- Coho: moderately small; may be preferred; modest spatial overlap; yearlings, but maybe some 2-year olds?; relatively abundant now.
- Winter Steelhead: small to large; modest spatial overlap, but may increase as fish rear; long period of vulnerability (2-3 years); modest abundance now.

Task #2 Notes:

Panelist E provided the following statement at the bottom of the score sheet: "Having problems with "all predators" versus "bull trout". "Some of these are higher priority for bull trout then for all predators or all aquatic species". "Agree with changes to bull trout – use those scores".

For several rows (6 & 17), it appeared Panelist E provided two scores; one score if considering just bull trout, and another if considering all predator species.

Panelist E scored row 18 as a 2 but penciled in the following comment in the margin: "might be higher for some species".

Appendix 12. Potential management activities identified by the expert panel, for reducing or eliminating unacceptable impacts of bull trout on salmon and steelhead populations, sorted by management theme.

Type, degree of impact	Management theme	Brief description of activity
High to very high impact from bull trout on other listed salmonids	Monitoring	Confirm type and degree of impact by collecting better data; improved or more intensive monitoring; to determine if indeed there is an impact so stated
Other threats	Offset impacts of bull trout	Deal with the lower river; mitigate threats to anadromous salmonids in Lower Clack River
All impact levels of bull trout predation on salmonids	Offset impacts of bull trout	Put more management emphasis to address other H and non-native fish species impacts on listed salmon on the Clack. River to offset possible bull trout predation effects
High to very high impact from bull trout on other listed salmonids	Predator control	Bull trout removal in toto, or maintain bull trout population at lower specified level
Moderate to high bull trout predation on salmonids	Predator control	Targeted eradication of bull trout on particular size classes; through public angling or fisheries managers
Moderate to high bull trout predation on salmonids	Predator control	Targeted eradication of bull trout redds to reduce the population
Predation on fall Chinook and chum on lower river	Predator control	Control downstream movement of bull trout at North Fork Dam
Moderate to high bull trout predation on salmonids	Predator control	Stop introducing bull trout; observe effects (passive)
All impact levels of bull trout predation on salmonids	Prey enhancement	Enhance 3 listed prey populations by increasing habitat capacity throughout the range of the populations (including areas below North Fork Dam), and increasing survival of prey populations
All impact levels of bull trout predation on salmonids	Prey enhancement	Ensure healthy mountain whitefish populations and other native resident fish species by increasing habitat capacity throughout the range of the populations and increasing their survival; the purpose is to provide a stable alternative prey base for bull trout
Predation by bull trout on juvenile salmonids in tributary habitats	Prey management	Add refuge cover in tributary habitat; habitat enhancements to reduce predation
Predation in reservoir	Prey management	Trap outmigrating smolts and physically move them below the reservoir
All impact levels of bull trout predation on salmonids	Prey management	Reservoir management to increase populations of other non-salmonid prey items

All impact levels of bull trout predation on salmonids	Prey management	Hatchery rainbow trout management in North Fork Reservoir: increase or decrease stocking levels or sizes of fish dependent on results of the baseline food web monitoring
All impact levels of bull trout predation on salmonids	Prey management	Focused supplementation of salmon carcasses in areas known to be forage hot spots if determined
All impact levels of bull trout predation on salmonids	Prey management	Facilitate upstream lamprey passage at North Fork Dam
All impact levels of bull trout predation on salmonids	Prey management	Add wood or structure to the reservoir and inlet channel as refuge habitat for prey species
Noncompliance with fishing regulations	Public management	Enhance law enforcement controls on enforcing fishing regulations in upper basin
Social impact	Public perception	Public conservation education about bull trout reintroduction objectives
Time and area of acute predation	Reservoir management	Adjust flow regime, or engineering to guide smolts to bypass system more quickly
Thermal impacts on trophic interactions	Reservoir management	Water management to adjust the thermal structure/productivity of reservoirs

10.0 Appendix C – Non-Significant Issues

Non-Significant Issues and Supporting Rationale

The Service separated issues that were identified through the stakeholder meetings and other coordination into two groups: significant and non-significant issues. Significant issues were defined as those directly or indirectly caused by implementing the proposed action. Non-significant issues were identified as those: 1) outside the scope of the proposed action; 2) already decided by law, regulation, or other higher level decision; 3) irrelevant to the decision to be made; or 4) conjectural and not supported by scientific or factual evidence. The Council on Environmental Quality (CEQ) NEPA regulations require this delineation in Sec. 1501.7, "…identify and eliminate from detailed study the issues which are not significant or which have been covered by prior environmental review (Sec. 1506.3)". Issues we identified as significant are listed in Chapter 1, Section 1.5.1 of this document. These significant issues were analyzed in Chapter 3, Environmental Consequences. Issues and concerns we identified as non-significant are listed below, along with supporting rationale regarding their categorization as non-significant.

Non-significant Issues Specifically Associated with Impacts to Salmon and Steelhead

Many of the issues raised during the planning stages of this proposed project and during the stakeholder meetings, revolved around potential impacts to Clackamas River salmon and steelhead due to potential predation and competition from bull trout. We deemed the majority of these issues significant and thus analyzed them in aggregate in Chapter 3, Section 3.1 of this document (draft EA). Remaining issues associated with impacts to salmon and steelhead that we determined to be non-significant are addressed below.

Issue: Reintroduction should not occur until the status of salmon and steelhead improves.
Response: Salmon and steelhead in the Clackamas River are listed threatened under the Federal Endangered Species Act, as are bull trout. A major objective in the draft bull trout recovery plan (USFWS 2002) is to restore bull trout distribution to historical habitat where suitable habitat is deemed to exist. As documented in the Clackamas River Bull Trout Reintroduction Feasibility Assessment (Shively et al. 2007) bull trout were historically widely distributed in the Clackamas River, previous causes for extirpation have been largely ameliorated, and a significant amount of suitable habitat currently exists. Until final recovery plans are published by NMFS for salmon and steelhead in the Clackamas River, we have no way of assessing what constitutes recovery of these fish.

Issue: Reintroduction should start out by transferring low numbers of individuals until we know better how they will respond in the Clackamas River.
Response: Based on stakeholder input, we modified the draft proposed action to reduce the number of adult and subadult bull trout proposed for transfer during the initial years

of Phase One. While an overall conservative transfer strategy has merit, we are concerned with extending the timeframe of active translocation for several reasons. One, it would increase the length of time we would be dependent on the Metolius River as a donor stock, thereby influencing the ability of the Metolius River to contribute as donor stock to other reintroductions currently being investigated, namely into the upper Deschutes River. Secondly, funds to implement this project are likely to be limited and thus we would like to limit the number of years of active fish translocation. The Middle Fork Willamette River Bull Trout Rehabilitation Project has been implemented for over 10 years with limited numbers of fish utilized (approximately 10,000 fry) relative to the resources expended to carryout and evaluate the project. Although the project has shown preliminary success in reestablishing a small population of reproducing bull trout, current abundance levels will require ongoing transfers of fry into the future. Assuming some level of initial success in a reintroduction of bull trout to the Clackamas River, we hope to reach project abundance goals in abbreviated fashion so as to eliminate the time and personnel necessary for active fish transfers.

Issue: What is the likelihood that we will be able to detect a measurable impact to salmon and steelhead from a bull trout reintroduction? Are there alternative approaches to assessing impact?
Response: We acknowledge the likely difficulty in measuring impact to salmon and steelhead from bull trout competition and predation. In order to provide the best opportunity to assess impact we have been working with staff from the U.S. Geological Survey to collect baseline information in the proposed reintroduction area ahead of implementing the project. The collection of this information, which includes species composition, distribution, diet, and growth information will greatly increase our ability to detect impacts and response once bull trout are introduced to the Clackamas River. In addition, ODFW, PGE and the USFS monitor salmon and steelhead populations in the upper Clackamas River annually and this information will continue to be collected and used to assess the status of salmon and steelhead populations. Several alternative approaches were suggested by individuals at our stakeholder meetings. These approaches will be discussed and investigated further prior to implementation of the proposed project.

Issue: With respect to concerns expressed about impacts to salmon and steelhead, shouldn't the overall goal be ecological restoration of native fish assemblages in the Clackamas River?
Response: The Service agrees with this statement. From the early planning stages of the proposed action we have viewed the project as a native fish community restoration project. We do not believe it is appropriate or conducive to pit one listed species against another.

Non-significant Issues Not Associated with Impacts to Salmon and Steelhead

Issue: Why would this reintroduction be proposed and why choose the Clackamas River for this proposal?

Response: Bull trout are a species listed as "threatened" under the federal Endangered Species Act, and the goal of that law is to recover species from being threatened or endangered to the point that they no longer need its protection. Their reintroduction into the Clackamas River is under consideration because it would meet objectives of the current Fish and Wildlife Service recovery strategy for the species in the Willamette Basin, as well as other agencies' goals to restore native fish communities.

The Clackamas was considered for reintroduction even before the bull trout was listed as threatened, in years of discussion between the Forest Service and Oregon Department of Fish and Wildlife. With these two key partners already exploring the possibility, and the need expressed in the bull trout recovery plan, it was logical to continue exploring the idea. There are other appropriate locations for bull trout reintroduction, and examination of this possible reintroduction will gain knowledge and experience that can be applied elsewhere. From the bull trout's perspective, the Clackamas is a good candidate because bull trout haven't been documented there since about 1963; the factors which caused them to disappear have been remedied, and about 70 miles of the upper river and tributaries contain suitable habitat for bull trout spawning and rearing.

Issue: How can a "nonessential" experimental population contribute to recovery?
Response: A nonessential experimental population would contribute to the recovery of the bull trout in the Willamette Basin, but it is not essential to the survival of the species in the wild. The designation allows for greater flexibility in managing other land uses and human activities, without the usual level of protections being given to individuals of the reintroduced species. The designation of nonessential experimental populations [through Section 10(j)] was added to the Endangered Species Act in 1982 by Congress in order to increase the public's tolerance for putting a protected species back into an area where it had been previously.

Issue: Will the bull trout leave the area where they are released?
Response: Bull trout do tend to migrate within large river systems, and some of the reintroduced fish are expected to move out of the release area on the upper Clackamas. To ensure that any reintroduced bull trout that may move are covered by the nonessential experimental population designations, the area's boundaries are proposed to extend downstream from the release areas the entire length of the Clackamas River, and include the Willamette river downstream to where it meets the Columbia River (including Multnomah Channel) and upstream to Willamette Falls. It is expected that the majority of reintroduced fish and future offspring of these fish will remain within the area boundaries. If bull trout move outside the boundaries, the Fish and Wildlife Service could propose to extend the boundaries to include the entire range of the expanded population.

Issue: Do we know how the public will react to a reintroduction?
Response: Although we expect the public is generally supportive of native fish restoration projects such as the one proposed in the Clackamas River, we do not know the specific public response to the action proposed. That is the purpose of the public comment period on both this draft EA and the associated proposed 10(j) rule

(experimental nonessential population) published in the Federal Register. In scoping meetings we saw reactions that ranged from expressions of concern to strong support.

Issue: Why hasn't the bull trout reintroduction in the Middle Fork Willamette River above Hills Creek Dam been a bigger success? On a related note, at what point would the Clackamas effort be abandoned if it is not working?
Response: From the standpoint of reestablishing a reproducing population of bull trout in the Middle Fork Willamette River, the project has absolutely demonstrated success. The currently low numbers of reproducing bull trout may be the result of translocating a life stage with low survival (fry), the relatively few individuals translocated over time (10,000), unknown bull trout carrying capacity of the Middle Fork Willamette River above Hills Creek Dam, or some combination thereof. Ultimately it may be another decade before it is known whether a more abundant and self-supporting population is possible in the Middle Fork Willamette River above Hills Creek Dam.

The effort to reintroduce bull trout to the Clackamas River will be based on an adaptive management framework. The first phase (year 1 through year 7) will be the most active learning phase. Monitoring and evaluation during this phase will help refine the life stages that are utilized, the locations they are translocated, timing of transfers and the numbers transferred, among other project components. If monitoring and evaluation during Phase One do not suggest some level of initial success, and subsequent modifications to implementation strategy during the initial years of Phase Two do not have a positive impact, the project will likely be terminated. The decision to terminate the project would be jointly made by the Service and ODFW with input from other major cooperators such as the U.S. Forest Service. Although we are confident in the ability of the Clackamas River to support a successful reintroduction of bull trout, we view the proposed project as experimental.

Issue: What is the rational behind the various life stages for reintroduction?
Response: As noted above, we view the proposed project as experimental. One of the overarching goals of the project is to learn as much as possible about why reintroductions are successful or not successful so that we can apply this knowledge to other future reintroductions. In the case of bull trout, few reintroductions have occurred and most have utilized only the fry life stage. To the extent possible, we would like to test the success of various life stages to inform not only subsequent phases of this proposed project but future bull trout reintroductions elsewhere within their native range.

Issue: Is the Clackamas River starved of nutrition? Maybe this lack of nutrients is hurting current salmonid populations and would hurt reintroduced bull trout as well?
Response: We are not aware of any studies in the Clackamas River that have investigated this issue, although the reductions of anadromous salmon and steelhead from historical levels have no doubt reduced the overall availability of marine-derived nutrients (from decaying carcasses of anadromous fishes). Marine derived nutrients have been shown to influence aquatic invertebrate production, fish growth, and riparian ecosystems. Despite a reduction in marine-derived nutrients from historical levels, we believe, as outlined in Chapter 4 of the Clackamas Bull Trout Reintroduction Feasibility

Assessment (Shively et al. 2007), that the forage base in the Clackamas River is healthy enough to support the reestablishment of bull trout.

Issue: How would this reintroduced population contribute to recovery of the species?
Response: The reestablishment of bull trout in the Clackamas River would reduce the risk of elimination of bull trout from the greater Willamette Basin, and contribute to stabilizing bull trout populations in the lower Columbia River. The specific recovery objectives that would be supported by this action are:

- Maintain current distribution of bull trout and restore distribution where recommended in recovery unit chapters.
- Maintain stable or increasing trend in abundance of bull trout.
- Restore and maintain suitable habitat conditions for all bull trout life history stages and strategies.
- Conserve genetic diversity and provide opportunity for genetic exchange.

Issue: Would the presence of a protected species in the Clackamas River affect land management activities, like timber harvest? What about recreational river uses?
Response: The proposal under consideration would be to designate a "nonessential experimental population," under the authority of Section 10(j) of the Endangered Species Act, specifically to avoid restricting land management and recreational activities. Throughout the entire nonessential experimental population area, no federal agency or its contractors would be in violation of the Endangered Species Act for harming or killing bull trout as a result of any authorized agency action. The reintroduction will not conflict with recreational uses of the river. For example, since it would be within a nonessential experimental population area, a person fishing in accordance with Oregon angling regulations would not be in trouble for inadvertently harming a bull trout.

Issue: What activities will be prohibited because of this nonessential experimental population area?
Response: It remains illegal to deliberately "take" (harm or kill) bull trout, which generally would occur if they are taken or possessed in violation of state fish and wildlife laws or regulations. In other words: fishing in violation of state regulations which results in catching these fish, or polluting the waters in violation of state or federal law, could result in additional penalties for harming the fish. Fishing and other activities conducted legally will not result in penalties if they happen to result in catching or otherwise harming the fish.