Chapter: 23

State(s): Washington

Recovery Unit Name: Northeast Washington

Region 1
U.S. Fish and Wildlife Service
Portland, Oregon

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Recovery plans delineate reasonable actions that are believed necessary to recover and/or protect listed species. Recovery plans are prepared by the U.S. Fish and Wildlife Service and, in this case, with the assistance of recovery unit teams, State and Tribal agencies, and others. Objectives will be attained and any necessary funds made available subject to budgetary and other constraints affecting the parties involved, as well as the need to address other priorities. Recovery plans do not necessarily represent the views or the official positions or indicate the approval of any individuals or agencies involved in the plan formulation, other than the U.S. Fish and Wildlife Service. Recovery plans represent the official position of the U.S. Fish and Wildlife Service *only* after they have been signed by the Director or Regional Director as *approved*. Approved recovery plans are subject to modification as dictated by new findings, changes in species status, and the completion of recovery tasks.

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NORTHEAST WASHINGTON RECOVERY UNIT
CHAPTER OF THE BULL TROUT RECOVERY PLAN

EXECUTIVE SUMMARY

CURRENT SPECIES STATUS

The U.S. Fish and Wildlife Service issued a final rule listing the Columbia River and Klamath River populations of bull trout (*Salvelinus confluentus*) as a threatened species under the Endangered Species Act on June 10, 1998 (63 FR 31647). The Columbia River Distinct Population Segment is threatened by habitat degradation and fragmentation, blockage of migratory corridors, poor water quality, and past fisheries management practices such as the introduction of nonnative species.

The Northeast Washington Recovery Unit encompasses the mainstem Columbia River and all tributaries above Chief Joseph Dam up to the Canadian border, Spokane River and its tributaries upstream to Post Falls Dam, and the Pend Oreille River and its tributaries from the Canadian border upstream to Albeni Falls Dam. It is likely that historic distribution of bull trout was more expansive than currently observed. Bull trout most likely migrated seasonally from Lake Pend Oreille downstream into the Pend Oreille River tributaries to spawn and rear. Use of the mainstem Pend Oreille River for feeding and overwintering is also likely.

The Northeast Washington Recovery Unit Team identified one core area (Pend Oreille) within the recovery unit. For the purposes of recovery, a core area represents the closest approximation of a biologically functioning unit. Core areas consist of both habitat that could supply all the necessary elements for every lifestage of bull trout (*e.g.*, spawning, rearing, migratory, and adult), and have one or more groups of bull trout. Core areas are the basic units on which to gauge recovery within a recovery unit. The Northeast Washington Recovery Unit Team has identified one extant local population (Le Clerc Creek complex) within the core area. Coordination of recovery actions with the Clark Fork Recovery Unit,

specifically reestablishing the historic connection with Lake Pend Oreille (Idaho), is essential for recovery of the Pend Oreille Core Area in Washington.

Bull trout in the South Fork of the Salmo River may be comprised of both fluvial and resident populations. Uncertainty surrounding the life history patterns of remaining bull trout in the South Fork Salmo River and the use, and reliance on habitat in British Columbia, precluded the delineation of a core area for the Salmo River. The Northeast Washington Recovery Unit Team believes that further survey work is needed in order to distribution of bull trout in this system. Continued cooperation with the British Columbia Ministry of Fisheries will be needed in order to gain a better understanding of the current status and distribution of bull trout in the South Fork Salmo River.

While bull trout have been documented in other areas within the recovery unit outside the Pend Oreille Core Area (*e.g.*, Spokane River, Onion Creek, Big Sheep Creek, Deadman Creek, Boulder Creek, and in Lake Roosevelt), the Northeast Washington Recovery Unit team needs additional information to evaluate how these areas would contribute to recovery. These areas have been identified as research needs. Research needs apply to areas where the Team feels more information is needed in order accurately determine full recovery in this recovery unit and implement recovery actions. The result of research efforts may include the designation of an additional core area and local population(s).

HABITAT REQUIREMENTS AND LIMITING FACTORS

A detailed discussion of bull trout biology and habitat requirements is provided in Chapter 1 of this recovery plan. The limiting factors discussed here are specific to the Northeast Washington Recovery Unit chapter. Within the recovery unit, historical and current land use activities have impacted bull trout local populations. The construction and operation of Albeni Falls, Box Canyon, and Boundary Dams on the Pend Oreille River have fragmented habitat and negatively impacted migratory bull trout. Other dams and diversions without fish passage facilities in tributaries to the Pend Oreille River further fragmented habitat and reduced connectivity. Impacts from past timber harvest have altered habitat conditions in portions of the recovery unit; the legacy of these activities

still persists where high densities of roads, impassable culverts, channel changes, and compaction of hill slopes remain. Livestock grazing has degraded habitat in both upland and riparian areas of most tributaries in the watershed on public and private land. Nonnative species have been introduced in the recovery unit and continue to impact bull trout populations through competition and hybridization.

RECOVERY GOALS AND OBJECTIVES

The goal for bull trout recovery is to **ensure the long-term persistence of self-sustaining complex, interacting groups of bull trout distributed across the species native range, so that the species can be delisted.** To accomplish this goal four objectives dealing with distribution, abundance, habitat, and genetics were identified for the Northeast Washington Recovery Unit.

- Maintain current distribution of bull trout and restore distribution in previously occupied areas within the Northeast Washington Recovery Unit.

- Maintain stable or increasing trends 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.

RECOVERY CRITERIA

Recovery criteria for the Northeast Washington Recovery Unit reflect the stated objectives and consideration of population and habitat characteristics within the recovery unit. Based on four population and habitat elements, bull trout were placed into categories of relative risk. Northeast Washington Recovery Unit Team members evaluated bull trout under current and potential recovered conditions based on the number of local populations, adult abundance, population trends and variability, and the connectivity of the system. These elements were derived from the best scientific information available concerning

bull trout population and habitat requirements. Evaluation of these elements under a recovered condition assumed that actions identified within these chapter had been implemented. Bull trout in the Northeast Washington Recovery Unit may have been extirpated from former habitat, and remaining groups are fragmented, and isolated by a variety of factors.

Recovery criteria identified for the Northeast Washington Recovery Unit are:

1. **Bull trout are distributed among at least nine local populations in the Northeast Washington Recovery Unit (Pend Oreille Core Area).** Local populations under a recovered condition are Cedar Creek (Pend Oreille County), Indian Creek, Mill Creek, Sullivan Creek (including Sullivan Lake and tributaries), Slate Creek, Calispell Creek, Tacoma Creek, Ruby Creek, and the Le Clerc Creek complex (including the East and West Forks of Le Clerc creek, and Fourth of July Creek). Designation of local populations is based on survey data and the professional judgement of Northeast Washington Recovery Unit Team members. Further genetic studies are needed in order to more accurately delineate local populations, quantify spawning site fidelity, and determine straying rates. The complete distribution of resident local populations in the recovery unit is unknown. The Northeast Washington Recovery Unit Team recommends that further studies be conducted on the current and recovered distribution of resident bull trout in the recovery unit. Additional local populations may be added to this total as additional information is gathered in areas outside the currently designated core area for this recovery unit. Geographic distribution of resident local populations should be identified within three years and actions needed to implement re-introduction efforts will be incorporated in the five year review of the Northeast Washington Recovery Unit plan.

2. **Estimated abundance of bull trout among all local populations in the Northeast Washington Recovery Unit (Pend Oreille Core Area) is between 1,575 and 2,625 migratory adults.** Recovered abundance was derived using the professional judgement of the Team and estimation of productive capacity of identified local populations. Resident life history

forms are not included in this estimate, but are considered a research need. As more data is collected, recovered population estimates will be revised to more accurately reflect both the migratory and resident life history components.

3. **Adult bull trout exhibit a stable or increasing trend for at least 2 generations at or above the recovered abundance level within the Northeast Washington Recovery Unit (Pend Oreille Core Area).** The development of a standardized monitoring and evaluation program which would accurately describe trends in bull trout abundance is identified as a priority research need. As part of the overall recovery effort, the U.S. Fish and Wildlife Service will take the lead in addressing this research need by forming a multi-agency technical team to develop protocols necessary to evaluate trends in bull trout populations.

4. **Specific barriers to bull trout migration in the Northeast Washington Recovery Unit have been addressed.** The barriers that are identified as primary impediments to recovery and which must be addressed are Albeni Falls, Box Canyon, and Boundary Dams.

The Northeast Washington Recovery Unit team expects that the recovery process will be dynamic and will be refined as more information becomes available. Future adaptive management will play a major role in recovery implementation and refinement of recovery criteria. While removal of bull trout as a species under the Act (*i.e.*, delisting) can only occur for the entity that was listed (Columbia River Distinct Population Segment), the recovery unit criteria listed above will be used to determine when the Northeast Washington Recovery Unit is fully contributing to recovery of the population segment.

ACTIONS NEEDED

Recovery for bull trout will entail reducing threats to the long-term persistence of populations and their habitats, ensuring the security of multiple interacting groups of bull trout, and providing habitat conditions and access to them that allow for the expression of various life-history forms. Specific tasks

falling within seven categories will be necessary to initiate recovery. The seven categories of actions needed are discussed in Chapter 1; tasks specific to this recovery unit are provided in this chapter.

ESTIMATED COST OF RECOVERY

Total estimated cost of bull trout recovery in the Northeast Washington Recovery Unit for the Pend Oreille Core Area is $29.735 million. This estimate does not include areas outside the Pend Oreille Core Area which are considered a research need nor are do these costs include estimates for tasks that are normal agency responsibilities under existing authorities. In addition, this estimate does not include costs associated with capital improvements associated with recommended fish passage construction at Albeni Falls, Box Canyon, and Boundary Dams. Estimates for construction cost for passage at these facilities are an outcome of recommended actions. Successful recovery of bull trout in the Pend Oreille Core Area is contingent on removing barriers, improving habitat conditions, and removal of non-native species within the Pend Oreille River in Washington. Most importantly, reestablishing the historic connection with Lake Pend Oreille is viewed as essential. Total cost includes estimates of expenditures by local, Tribal, State, and Federal governments and by private business and individuals. These costs are attributed to bull trout conservation, but other aquatic species will also benefit.

ESTIMATED DATE OF RECOVERY

Recovery units are the basis on which bull trout recovery will be gauged. Expected times necessary to achieve recovery will vary among recovery units due to differences in bull trout status, factors affecting bull trout, implementation and effectiveness of recovery tasks, and responses to recovery tasks. A tremendous amount of work will be required to restore impaired habitat, reconnect habitat, and eliminate threats from nonnative species. Three to five bull trout generations (15 to 25 years), or possibly longer, may be necessary before identified threats to the species can be significantly reduced and bull trout can be considered eligible for delisting. In the Northeast Washington Recovery Unit (Pend Oreille Core Area) bull trout currently exist in very low numbers. Degradation and fragmentation of bull trout habitat have resulted populations that are at high risk. These threats must be addressed in the near future if recovery will be achieved.

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INTRODUCTION

Recovery Unit Designation

The Northeast Washington Recovery Unit is one of 22 recovery units designated for bull trout in the Columbia River Basin (Figure 1). In Washington, to facilitate the recovery planning process and avoid duplication of effort, the recovery team has adopted the logistical framework proposed in the 1999 draft statewide strategy to recover salmon entitled "Extinction Is Not An Option" (WGSRO 1999). Based on this draft strategy, bull trout recovery units overlap the state's salmon recovery regions. The use of recovery units will allow for better coordination during both salmon and bull trout recovery planning and implementation.

The Northeast Washington Recovery Unit encompasses the mainstem Columbia River and tributaries above Chief Joseph Dam up to the Canadian border (Figure 2). This recovery unit geographically overlaps ceded lands of the Colville, Kalispel, and Spokane tribes. When the Northeast Washington Recovery Unit has achieved its goal, the Washington Department of Fish and Wildlife and the aforementioned tribes will determine the location and level of bull trout harvest which can be sustained while maintaining healthy populations.

The Northeast Washington Recovery Unit includes bull trout above Chief Joseph Dam on the mainstem Columbia River. Major tributaries include the Sanpoil, Spokane, Kettle, Colville and Pend Oreille Rivers. Based on survey data and professional judgement, the Northeast Washington Recovery Unit Team identified one core area (Pend Oreille River) in the recovery unit (Figure 3). For the purposes of recovery, a core area represents the closest approximation of a biologically functioning unit. Core areas consist of both core habitat that could supply all the necessary elements for every lifestage of bull trout (*e.g.*, spawning, rearing, migratory, and adult), and have one or more groups of bull trout. Core areas are the basic units upon which to gauge recovery within a recovery unit.

Figure 1. Bull Trout Recovery Units in the United States.

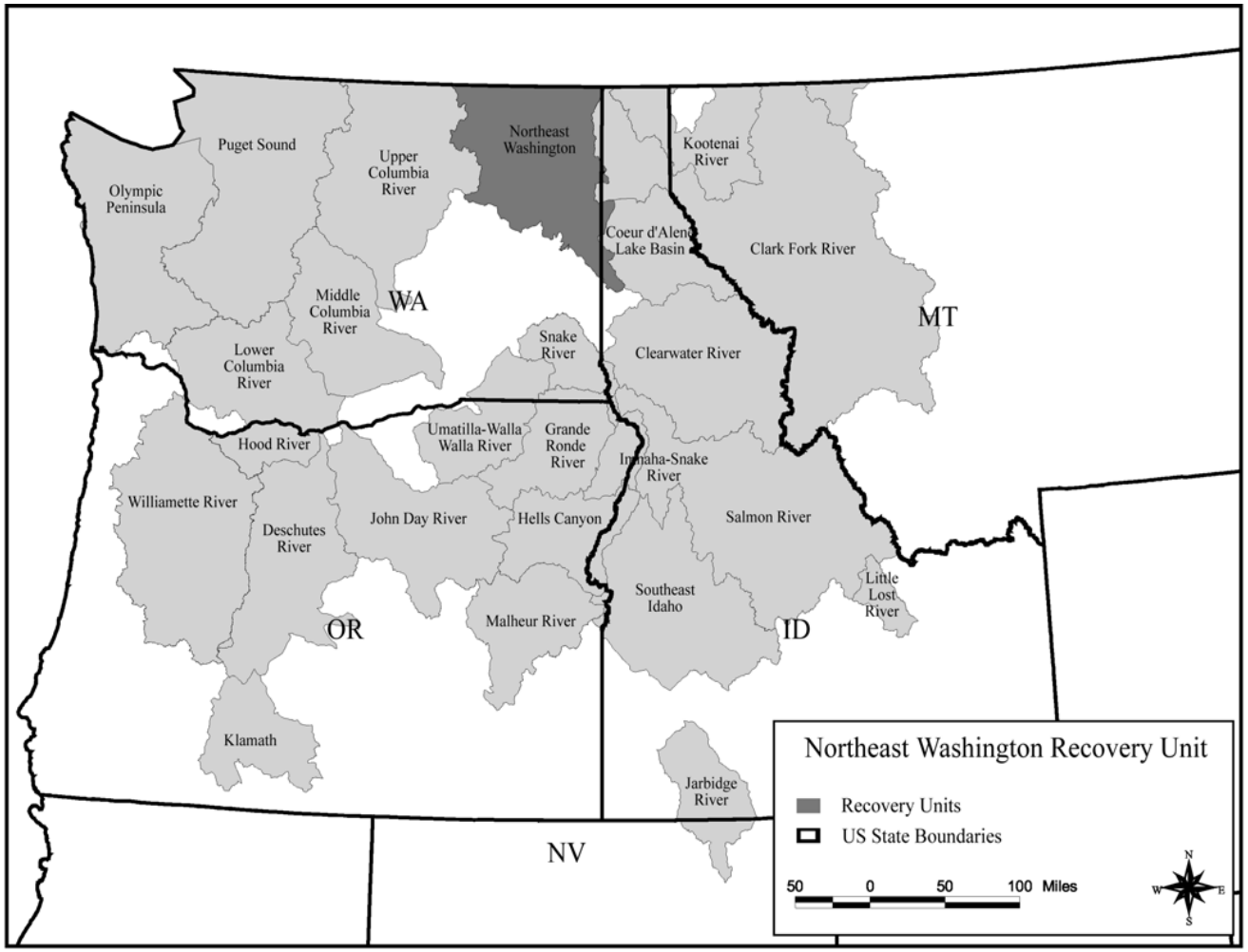


Figure 2. Northeast Washington Recovery Unit.

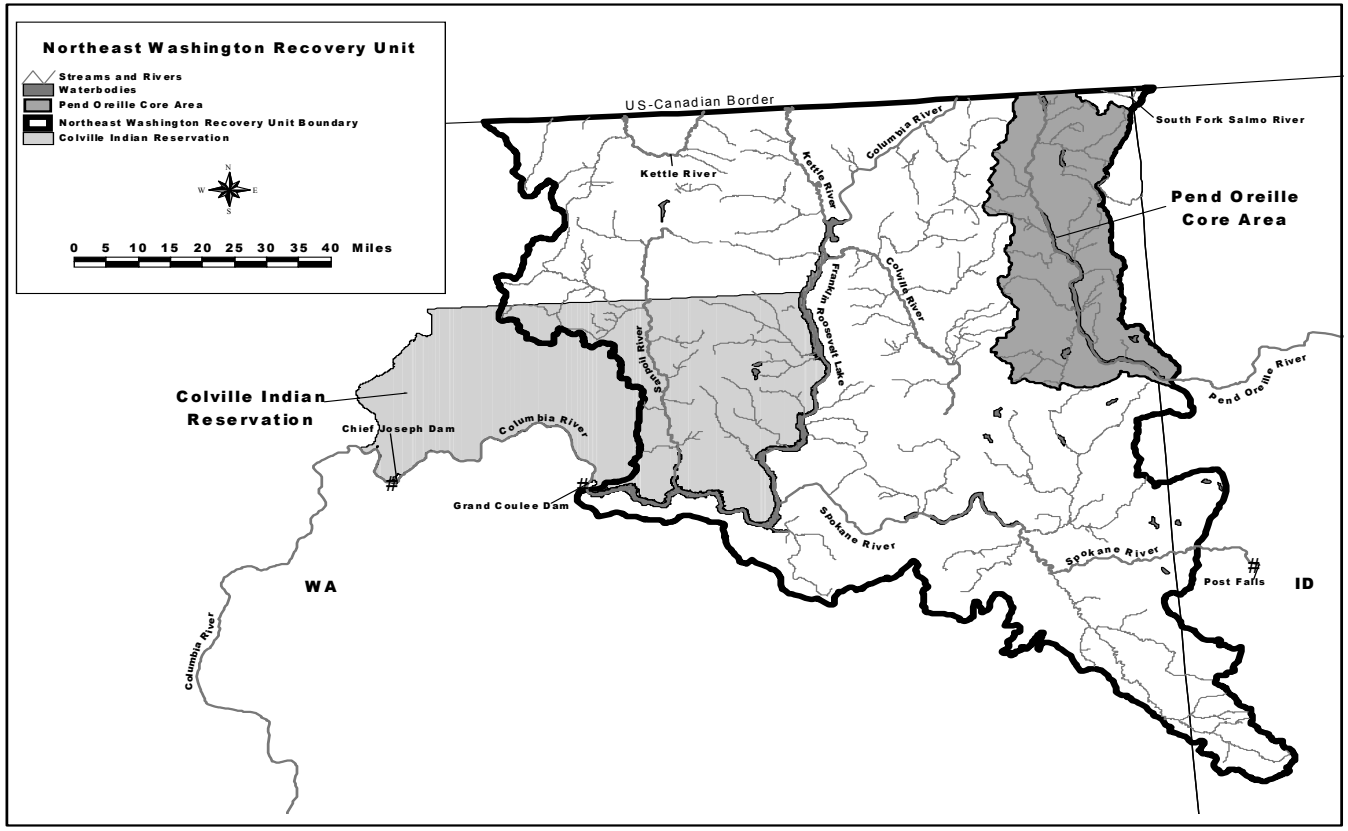
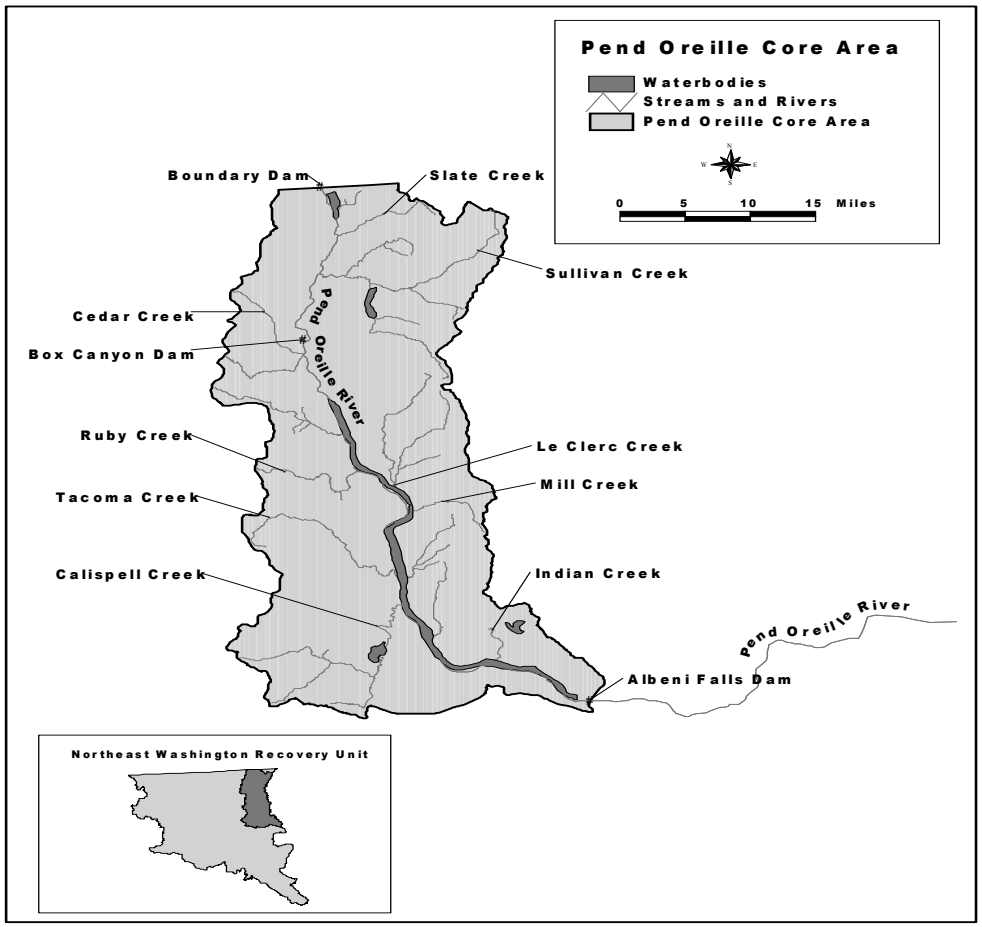


Figure 3. Pend Oreille Core Area and selected tributaries.



While sightings of individual bull trout have occurred within the Pend Oreille Core Area, only one local population (Le Clerc Creek complex) has been identified. A local population is defined as a group of bull trout that spawn within a particular stream or portion of a stream system. A local population is assumed to be the smallest group of fish that is known to represent an interacting reproductive unit. For most waters where specific information is lacking, a local population may be represented by a single headwater tributary or complex of headwater tributaries.

Geographic Description

In general, the Northeast Washington Recovery Unit encompasses a geologically distinct area known as the Okanogan Highlands. The highlands are more similar in terms of climate and vegetation to the Northern Rocky Mountains than to the Cascade Mountains to the west. Dominant geologic features in the area include the Kettle, Selkirk, Calispell, and Huckleberry mountain ranges (USDA 1978, USDA 1981, USDA 1995). In general, these mountain ranges are oriented in a north-south direction with elevations from 1,525 to 2,135 meters (5,000 to 7,000 feet). Major river valleys within the Northeast Washington Recovery Unit include the Spokane, Pend Oreille, Colville, Kettle, San Poil, and Columbia. The Spokane River flows in a general east-west direction and marks the boundary between the Okanogan Highlands to the north and the Spokane Plateau to the south. During the most recent ice age, the Cordilleran Ice Sheet extended south and covered a majority of the Northeast Washington Recovery Unit leaving only the higher peaks remaining exposed. As glaciers retreated, recessional lakes and associated deposition of glacial material was common.

The Pend Oreille River is characterized by recent alluvial sediments in low valley segments with bedrock and granitic rock outcrops dominating the canyon walls. The Pend Oreille River lies between the Selkirk Mountain to the east and the Chewelah Mountains to the west (NPPC 2001). These mountains are not more than 2,072 meters (6,798 feet) above sea level. The southern portion of the subbasin is mostly rural with large areas of forested mountains and valleys of open pasture. The surrounding topography of the northern portion of the subbasin is relatively abrupt, and the mountains are steep and rugged.

The climate of northeastern Washington is influenced by both continental and maritime air masses (NPPC 2001). Most of the weather systems affecting the northeastern portion of the state are controlled by prevailing westerly winds. Air from the Pacific Ocean has a moderating influence throughout the year and summertime temperatures are moderate with light precipitation levels. Due to continental influences, summers are warmer and winters are colder than in coastal areas. Daily temperatures range from -9 to -1 degrees Celsius (15 to 30 degrees

Fahrenheit) in the winter, and 8 to 24 degrees Celsius (46 to 76 degrees Fahrenheit) in the summer. Average annual precipitation at lower elevations is approximately 63.5 centimeters (25 inches), while at higher elevations, the average annual precipitation ranges from 89 to 140 centimeters (35 to 55 inches). The majority of precipitation falls in the winter and spring, with peak accumulations occurring from November through January. Total annual snowfall averages 127 to 152 centimeters (50 to 60 inches) in the Pend Oreille River valley and accounts for approximately 20 percent of the average annual precipitation.

The Pend Oreille River is the second largest river in Washington and flows for 249 kilometers (155 miles) from its headwaters at Lake Pend Oreille to the confluence with the Columbia River in British Columbia (NPPC 2001). Several hydroelectric facilities occur within the system. Albeni Falls Dam is located in Idaho approximately 3.5 kilometers (2 miles) upstream from Newport, Washington. Box Canyon Dam, owned and operated by Pend Oreille County Public Utility District Number 1, is located on the Pend Oreille River and forms a 2,983 hectare (7,371 acre) reservoir. Box Canyon Reservoir extends 89.8 kilometers (56 miles) from Albeni Falls Dam downstream to Box Canyon Dam. Owned and operated by Seattle City Light, Boundary Dam, is located approximately 1.6 kilometers upstream (one mile) from the U.S. - Canadian border. This reservoir is 28.1 kilometers (17.5 miles) long and has a surface area of about 664 hectares (1,641 acres) at full pool. Box Canyon Dam and Albeni Falls Dam are run-of-river projects while Boundary Dam is operated for power peaking generation.

Hydrologic records are maintained by the U.S. Geological Survey and gaging stations on the mainstem Pend Oreille River include: Box Canyon Reservoir near the town of Newport, at the town of Cusick (below Box Canyon Dam), downstream of Box Canyon Dam, and at the international boundary on the mainstem. In addition, there is also a U.S. Geological Survey gage on Calispell Creek.

DISTRIBUTION AND ABUNDANCE

Status of Bull Trout at the Time of Listing

At the time of listing, the U.S. Fish and Wildlife Service identified only one subpopulation (South Fork Salmo River) within the Northeast Washington Recovery Unit (USFWS 1998). The U.S. Fish and Wildlife Service considered bull trout in the lower Pend Oreille River to be at high risk of extirpation. The U.S. Fish and Wildlife Service identified that bull trout in the Nespelem, San Poil, and Kettle Rivers may have been extirpated. Although subpopulations were an appropriate unit upon which to base the 1998 listing decision, the recovery plan has revised the biological terminology to better reflect the current understanding of bull trout life history and conservation biology theory. Habitat and population terminology is found in Appendix 1.

Migratory Life History

Two distinctly different migration patterns for adfluvial bull trout have been documented. The most common migrational pattern is when adult bull trout move upstream from a lake into smaller tributaries to spawn. The second migrational pattern involves adult fish moving downstream from a lake system, and spawning in either a mainstem river, or in a smaller tributary stream. This second, and less common pattern is known to occur in the Lake Wenatchee (Washington) and Bull Lake (Montana) systems (Fredenberg, W. *in litt*. 2001; USFWS 2001). In addition, a similar but less pronounced downstream movement to spawning reaches has been documented in the Cline River, Alberta, and is thought to be occurring in the Chewuck River in Washington. In the Cline River, adult bull trout move downstream out of Pinto Lake and spawn primarily in the first 600 meters (1969 feet) of the outlet portion of the river (Herman 1997). Bull trout redds have also been found downstream of Black Lake in Lake Creek, a tributary to the Chewuck River (Delavergne, J. *in litt*. 2001).

This downstream migration pattern was also believed to have occurred in the Pend Oreille River basin in Idaho and Washington. Adult bull trout would migrate out of Pend Oreille Lake, down the Pend Oreille River and then into tributary streams to spawn, with the progeny eventually returning to the lake.

This is supported by ethnographic reports of large migratory bull trout (up to 25 pounds or approximately 11 kilograms) being harvested annually during the late summer and fall at weir sites near the mouths of many tributaries in Idaho and Washington (Smith, A. *in litt*.1936-38). There is some speculation that historically Albeni Falls was a barrier to fish passage. However, reports from Gilbert and Evermann (1895) state that these falls were scarcely more than pretty steep rapids during their visit in August, with a total decent of probably 3 meters (10 feet), but as a rapid and not as a vertical fall.

This migration pattern however was eliminated with the construction and operation of Albeni Falls Dam (1952), just upstream of the Idaho-Washington state-line. Albeni Falls Dam was constructed without any provision fish passage, and now only an occasional migratory bull trout entrained by the dam make the downstream migration, with no return migration possible. Evidence of this occurring was documented in 1999, when a large bull trout approximately 61 centimeters (24 inches) in length was captured in Indian Creek, a tributary to the lower Pend Oreille River, in the Box Canyon Reservoir reach. This marked fish is believed to have originated from Trestle Creek, a tributary stream to Pend Oreille Lake (Maroney, J. pers. comm. 2000).

Current Distribution and Abundance

Pend Oreille Core Area

Ethnographic data indicates that the Kalispel Tribe had an elaborate technology used for the exploitation of resident fishery resources. These resident fisheries were at least as, if not more, important to the Kalispel Tribe than their anadromous fishery (Bonga, D. *in litt*. 1978, Smith, A. H. *in litt*. 1985). Gilbert and Evermann (1895) reported that in 1894 bull trout were abundant in the Pend Oreille River and specimens as large as 66 centimeters (26 inches) long were in the possession of individual Kalispel Tribe members. The ethnographic data also identifies specific tributaries where individual Kalispel Tribe members would harvest "char". The ethnographic reports indicate that large migratory bull trout were harvested annually during the late summer and fall at weir sites near the mouths of many tributaries in Idaho and Washington (Smith, A. *in litt*.1936-38).

Bull trout and other salmonids still existed in the lower river after Albeni Falls Dam was built (West, K. pers. comm. 1997). These bull trout may have been using spawning and rearing habitat within Pend Oreille River tributaries, including lower Slate, Le Clerc, and Ruby creeks (Cole, R. pers. comm. 1998; Gray, L. pers. comm. 1999). In the early 1950s, during spawning seasons, heavy concentrations of whitefish and Dolly Varden could be found at the mouth of Le Clerc Creek (Cole, R. pers. comm. 1998). Large five to ten pound Dolly Varden could be caught in the Pend Oreille River at Charr Springs and around Indian Creek (Cole, R. pers. comm. 1998). Large Dolly Varden were caught off of log booms at Newport, Dalkena and Usk prior to Box Canyon and Albeni Falls dam construction (Pool, D. pers. comm. 2001).

Bull trout have been documented in other areas within the recovery unit outside the Pend Oreille Core Area (*e.g.*, Spokane River, Onion Creek, Big Sheep Creek, Deadman Creek, Boulder Creek, and in Lake Roosevelt) (Vale, C. *pers. comm.* 2001; LeCaire *in litt.* 2000; Scholz *in litt.* 2000). The Northeast

Washington Recovery Unit Team recommends that additional survey work be conducted in order to evaluate how these areas would contribute to recovery.

Recent sightings in the Pend Oreille Core Area include:

LeClerc Creek

In 1993, two juvenile bull trout were documented by Plum Creek Timber company (Toth, S. *in litt*.1993). In 1995, a juvenile bull trout was observed in the same reach where juvenile bull trout were documented in 1993. Cold ground water enters LeClerc Creek at both of the sites where the bull trout were captured in 1993, and it is believed that these bull trout are utilizing available micro-habitats. In August of 1998, a 15 centimeter (6 inch) juvenile bull trout was observed during a snorkeling survey at the confluence of Fourth of July Creek and the East Branch LeClerc Creek. Most recently, in the fall of 2001 a single 51 to 61 centimeter (20 to 24 inch) bull trout was observed on a redd in the West Branch of Le Clerc Creek (Shuhda, T. *pers. comm.* 2002a).

Mill Creek

In 1995, the Kalispel Tribe observed a single bull trout (Maroney, J. pers. comm. 2001).

Cedar Creek

In 1995, a 46 centimeter (18 inch) adult bull trout was observed above the municipal dam during surveys being conducted by the Kalispel Tribe (Maroney, J. pers. comm. 2001).

Indian Creek

In September of 1999, a 61 centimeter (24 inch) gravid adult female bull trout was captured in a trap on Indian Creek (Shuhda, T. pers. comm. 2001). This fish was migrating downstream and was previously marked with an adipose fin

clip and it is thought that this fish originated above Albeni Falls Dam in Trestle Creek (a tributary to Lake Pend Oreille tributary). In 1997, the Kalispel Tribe observed a single bull trout approximately 0.8 kilometers (0.5 miles) up from the mouth (Maroney, J. pers. comm. 2001).

Sullivan Creek

In September 1994, a dead adult female bull trout was found in Sullivan Creek below Mill Pond Dam during snorkel surveys (FERC 1998).

Sweet Creek

In 2000, a 30 centimeter (12 inch) bull trout was observed during a snorkeling survey. The fish was approximately 1 kilometer (0.62 miles) up from the mouth at the barrier falls (McLellan and O'Connor 2001). In 1980, the Washington Department of Fish and Wildlife reported catching a 51 centimeter (20 inch) bull trout while gill netting at the mouth of Sweet Creek, and reported observing the carcass of a 86 centimeter (34 inch) bull trout near the mouth of Sweet Creek (McLellan and O'Connor 2001).

Marshall Creek

In June of 2000, the same female bull trout that was captured in Indian Creek (as identified by the floy tag) was recaptured near the mouth of Marshall Creek (Maroney, J. pers. comm. 2000). Marshall Creek is spring fed and although it does not have suitable spawning habitat, the cooler water temperatures may provide refugia from warmer waters in Box Canyon Reservoir.

Slate Creek

Four bull trout were captured near the outlet of Slate Creek (two in July 1994 and two in August 1995) during hook-and-line surveys conducted by Washington Department of Fish and Wildlife and the U.S. Forest Service (Shuhda, T. *pers. comm.* 2001). In September of 1997, a 22 centimeter (9 inch)

bull trout was captured (marked with an adipose fin clip) in a live trap in the mouth of Slate Creek. On August, 25, 1999, a 51 centimeter (20 inch) adult bull trout was captured during hook-and-line sampling near the mouth (Shuhda, T. *pers. comm.* 2001). Slate Creek provides cold water well within the preferred range of bull trout with summer times high water temperatures of 10 degrees Celsius (50 degrees Fahrenheit) (USDA *in litt*. 1998).

Box Canyon Reservoir

In 1989, a singe bull trout was captured while electrofishing in the reservoir (Bennett and Liter 1991). During a three year Box Canyon Reservoir study (1989-91), four bull trout were captured during electrofishing (Ashe and Scholz 1992). These fish were reported to have been captured just downstream of Indian Creek at a location known as Char Springs.

Boundary Reservoir

It was reported that two anglers had each caught a bull trout, both weighing approximately 3.6 kilogram (8 pounds). However, when the anglers were questioned with respect to being able to identify lake trout, both indicated that they would not be able to distinguish a lake trout from a bull trout and were unaware that lake trout were present in the river (McLellan and O'Connor 2001).

South Fork Salmo

Bull trout have been found in the South Fork of the Salmo River within the Salmo-Priest Wilderness Area (WDFW 1998). In June 1976, four bull trout were caught in the South Fork of the Salmo near the confluence with Watch Creek (USDA, *in litt*. 1976). In addition, two larger bull trout, over 51 centimeters (20 inches) were caught in the same area in August of 1995. During 1999 and 2000, a radiotelemetry study was conducted on bull trout in the Salmo River in Canada (Baxter and Nellestijn. 2000). Ten adult bull trout were tagged in 1999, and subsequently two of these fish were captured in the U.S. portion of the South Fork of the Salmo near the Watch Creek confluence.

Twenty adult bull trout were tagged in 2000, and three fish migrated (two repeat captures) to a similar location in the South Fork. In both years, the migrations into the U.S. occurred during the expected spawning season, and these fish migrated back the mainstem Salmo River by the end of October (Baxter and Nellestijn. 2000). Radiotagged individuals from the Salmo River migrated into the South Fork in late summer to spawn and returned to main river in late fall (Baxter and Nellestijn. 2000).

Uncertainty surrounding the life history patterns of remaining bull trout in the South Fork Salmo River and the use, and reliance on habitat in British Columbia, precluded the delineation of a core area. The Northeast Washington Recovery Unit Team believes that further survey work is needed in order to determine distribution of bull trout in this system. Continued cooperation with the British Columbia Ministry of Fisheries will be needed in order to gain a better understanding of the current status and distribution of bull trout in the South Fork Salmo River.

REASONS FOR DECLINE

Dams

In 2000, the U.S. Fish and Wildlife Service issued a Biological Opinion on the Effects to Listed Species from Operations of the Federal Columbia River Power System (USFWS 2000). In general, effects of the Federal Columbia River Power System included: (1) fish passage barriers and entrainment, (2) inundation of fish spawning and rearing habitat, (3) modification of the streamflow and water temperature regime, (4) dewatering of shallow water zones during power operations, (5) reduced productivity in reservoirs, (6) gas supersaturation of waters downstream of dams, (7) loss of native riparian habitats, (8) water level fluctuations interfering with establishment of riparian vegetation along reaches affected by power peaking operations, and (9) establishment of non-native riparian vegetation along affected reaches.

Dams can affect bull trout by altering habitats; flow, sediment, and temperature regimes; migration corridors; and interspecific interactions, especially between bull trout and introduced species (WDW 1992; Craig and Wissmar 1993; Rieman and McIntyre 1993). In addition, hydroelectric facilities can directly impact bull trout via entrainment, and by direct injury or mortality by passing through turbines. Impassable dams have caused declines of bull trout primarily by preventing access of migratory fish to spawning and rearing areas in headwaters and precluding recolonization of areas where bull trout have been extirpated (Rieman and McIntyre 1993; MBTSG 1998).

For purposes of bull trout recovery planning, metapopulation theory is an important consideration in evaluating connectivity between local populations. A metapopulation is an interacting network of local populations with varying frequencies of migration and gene flow among them (Meffe and Carroll 1994). Multiple local populations distributed and interconnected throughout a watershed provide a mechanism for spreading risk from stochastic events (See Chapter 1). As defined, bull trout core areas reflect metapopulation theory, and a recovered condition for the Pend Oreille Core Area needs to include the reconnection of local populations. In addition, establishing interconnected local populations

within the Pend Oreille Core Area would assist in meeting effective population size criteria, and minimizing the deleterious effects of genetic variation due to drift (See Chapter 1).

The construction and operation of Albeni Falls, Box Canyon, and Boundary Dams on the Pend Oreille River have fragmented habitat in the system, and have negatively impacted migratory bull trout in Washington (NPPC 2001;WDFW 1992). Bull trout were once abundant in the Pend Oreille River and it's tributaries (Gilbert and Everman 1895; Smith, A. *in litt*. 1936-38). While entrainment at hydroelectric facilities has been identified as a potential threat to bull trout (USFWS 2000), specific studies designed to evaluate impacts at Albeni Falls, Box Canyon, and Boundary Dams have not been conducted. In 1999, a single tagged bull trout, which originated from Lake Pend Oreille was captured downstream of Albeni Falls Dam in Indian Creek (Maroney, J. pers. comm. 2000). The Northeast Washington Recovery Unit Team recommends that studies be conducted to quantify the entrainment impact at each facility, and corrective measures where appropriate be implemented. Other dams and diversions without fish passage facilities (*e.g.* Cedar Creek, Sullivan Creek, and Mill Pond Dams) were constructed in tributaries to the Pend Oreille River and have further fragmented native populations and reduced connectivity (NPPC 2001).

In addition to eliminating connectivity, dams within the system have significantly altered habitat characteristics in the Pend Oreille River (NPPC 2001). Operation of each facility continues to have a significant impact on bull trout habitat. Mainstem dams have changed the habitat from that of a cold water fast-moving river, to a warm and shallow reservoir (NPPC 2001). Surface water releases from Albeni Falls Dam exceed 20 degrees Celsius (68 degrees Fahrenheit) from early July through late September and is on the Washington State 303(d) list for temperature (NPPC 2001). Typical spawning, rearing, and overwintering habitat in a free flowing river with pools, glides, riffles and side habitat have been eliminated. Water temperatures have risen during the summer months and macrophytes and warm water fish species (including predators of bull trout) have proliferated in this changed environment (NPPC 2001). In addition,

total dissolved gas is a potential problem below each mainstem facility with levels reaching 139 percent saturation (NPPC 2001).

Albeni Falls Dam

Albeni Falls Dam was completed in 1955 (USACOE 1989), and effectively eliminated passage between Lake Pend Oreille and the Pend Oreille River. Fishing for large Dolly Varden (bull trout) was always good at the base of Albeni Falls during their spawning season prior to the dam construction (Pool, D. pers. comm. 2001). The falls at the dam site, prior to construction, were not considered a barrier to upstream fish passage (Gilbert and Everman 1895). This artificial blockage genetically isolated the lower river population from the Lake Pend Oreille population with the exception of any entrained fish entering the lower system.

Box Canyon Dam

Box Canyon Dam became operational in 1956 (USACOE 1989), and greatly changed the existing riverine habitat of riffles, pools, gravel bars and side channel habitat into a more uniform habitat of a reservoir (NPPC 2001). Box Canyon Reservoir now contains low velocity habitat (Falter *et al*. 1991), which is unsuitable for native salmonids. Non-native warmwater fish such as yellow perch, tench, and largemouth bass dominate the fish community of Box Canyon Reservoir.

Box Canyon was not considered a fish passage barrier prior to the construction of Box Canyon Dam at River Kilometer 55 (River Mile 34). Bull trout were able to move freely up-stream and downstream for at least 12 kilometers (7.5 miles) below Box Canyon Dam to the vicinity of Metaline Falls at River Kilometer 43 (River Mile 27) including access to Sullivan Creek. Metaline Falls was considered by biologists to be a significant obstacle for migratory fish, but not entirely impassable (Gilbert and Evermann 1895). With the construction of Boundary Dam and reservoir at River Kilometer 27 (River Mile 17.0) in 1967, there are no longer any significant passage barriers for native salmonids in the

Pend Oreille River between the Box Canyon and Boundary Dams. Therefore, if fish passage were provided at Box Canyon Dam, the Pend Oreille River would provide a 73 mile long corridor accessible to bull trout (and other native salmonids) from Albeni Falls Dam downstream to Boundary Dam.

Boundary Dam

Boundary Dam was completed in 1967 (USACOE 1989), and blocked intermittent upstream access to bull trout in Canada from the lower 27 kilometers (17 miles) of river in Washington. Bull trout in this portion of the river, and in the Salmo River, a major tributary of the lower Pend Oreille River in Canada, were effectively disconnected from spawning, rearing, foraging, and overwintering habitat above the dam. Any remaining bull trout in the new reservoir (Boundary) are now limited to 2.4 kilometers (1.5 miles) of spawning and rearing habitat.

Tributary Dams

Sullivan Lake and Mill Pond Dams were constructed between 1910 and 1913. There is no evidence that any natural blockages to fish passage existed at either dam site prior to dam construction. At the time, fish passage over these dams was provided in the form of fish ladders. It is unclear what specie(s) migrated to and from Sullivan Creek and Sullivan Lake and its tributaries to the Pend Oreille River. However, it is clear that bull trout, which have been documented in Sullivan Creek below Mill Pond as early as the 1930's (West, K. pers. comm. 1997) and as late as 1994, have been separated from additional spawning and rearing habitat in upper Sullivan Creek and Sullivan Lake tributaries since at least 1921. There was approximately 84 kilometers (52 miles) of suitable habitat lost to bull trout when fish passage was eliminated at these two dams (Shuhda *pers. comm.* 2002b) Cedar Creek dam was constructed in 1910 to provide a municipal water supply for the town of Ione. The 6 meter (19 foot) dam was reconstructed in 1950, and blocks approximately 15 kilometers (9 miles) of high quality bull trout habitat (Shuhda *pers. comm.* 2002b).

Forest Management Practices

Both direct and indirect impacts from timber harvest have altered habitat conditions in portions of the Northeast Washington Recovery Unit. Impacts from timber harvest management can include the removal of large woody debris, reduction in riparian areas, increases in water temperatures, increased erosion, and simplification of stream channels (Quigley and Arbelbide 1997). Past timber harvest practices include the use of heavy equipment in the channels, skidding logs across hillslopes, splash damming to transport logs downstream to mills, and road construction. Today the legacy of these activities still persists where the road conditions, channel changes, and compaction of hill slopes remain.

The aquatic assessment portion of the Interior Columbia Basin Ecosystem Management Project provided a detailed analysis of the relationship between road densities and bull trout status and distribution (Quigley and Arbelbide 1997). The assessment found that bull trout are less likely to use streams for spawning and rearing in highly roaded areas, and were typically absent at mean road densities above 1.1 kilometer per square kilometer (1.7 miles per square mile). Road construction and maintenance can lead to effects to bull trout habitat when sedimentation, channel connectivity, high erosion and slope hazards, culvert sizes, and access are not addressed concurrently with land management proposals. Roads can promote simplification and channelization, which reduces the connectivity of surface and ground waters. Road densities within Sullivan, Le Clerc, Mill, Indian, Tacoma, Ruby,Slate and Calispell creeks ranges from 1.4 to 2.4 kilometers per square kilometer (1.54 and 3.86 mile per square mile) (USFS *in litt.* 2002). The Northeast Washington Recovery Unit Team recommends that road densities within these watersheds be reduced in order to facilitate bull trout recovery.

Past and present forest management practices have adversely affected riparian and stream habitat (NPPC 2001). Past practices such as the unlimited clearcutting and thinning of riparian vegetation, the construction of splash dams utilizing the stream to transport logs, the construction of log flumes and diversion of streamflow from the creek, the destruction of riparian vegetation through the building of timber railroads and forest roads, the use of smaller side drainages as

skid trails and harvest-related wildfire have decreased the function of the existing riparian vegetation in many areas. Specific areas of concern within the Pend Oreille Core Area include portions Sullivan, Mill, Cedar, Ruby, Tacoma, Calispell, and Le Clerc creeks (USFS 1996a; USFS 1997; USFS 1998a; USFS 1999a; USFS 1999b; USFS 1999c; USFS 1999d; USFS 1999e).

Livestock Grazing

Improperly managed livestock grazing degrades bull trout habitat by removing riparian vegetation, destabilizing streambanks, widening stream channels, promoting incised channels and lowering water tables, reducing pool frequency, increasing soil erosion, and altering water quality (Howell and Buchanan 1992; Mullan *et al.* 1992; Overton *et al.* 1993). These effects can reduce overhead cover, increase summer water temperatures, and increase sediment in spawning and rearing habitats.

Livestock grazing has impacted both upland and riparian areas of most tributaries in the watershed on public and private land. There is an extensive grazing program operated by the USFS in many of the tributaries to the Pend Oreille River. The results of poor livestock management is the overgrazing of the riparian vegetation. This overutilization leads to the decline in vigor and/or disappearance of species that cover and stabilize streambanks with their root systems. The compacting and cutting action of the hooves of livestock on moist soils causes the sloughing of banks where localized use for feeding, watering and crossing occurs. The indirect effect is to increase bank erosion and embeddedness of the streambed substrate, widening of the stream channel and an increase in water temperature due to lack of overhanging vegetation. Livestock may also cause direct mortality of eggs or alevin if the redd (spawning bed) is trampled during watering or crossing. Specific areas of concern where grazing has impacted stream habitat include: LeClerc Creek (Middle and East branches), Ruby Creek, and Calispell Creek (USFS 1997; USFS1998b; USFS1999f; USFS 1999g).

Agricultural Practices

Agriculture is limited in the Pend Oreille watershed as a function of a limited base of land on which to farm. However, most available farm land has been or is being used. Agriculture has contributed impacts through stream channelization, sediment input and water quality problems (NPPC 2001).

Mining

Mining is limited in the Pend Oreille Core Area. Dredging and sluicing occurs primarily in Sullivan Creek during July and August and may have an effect on bull trout fry and juveniles if present in the system (USFS 1996b). This type of activity could push fry and juveniles out of side habitat into less desirable habitat and disrupt the habitat for the macroinvertebrate community. The Northeast Washington Recovery Unit Team recommends that all mining activities strictly follow State practices (WDFW 1999).

Residential Development and Urbanization

The mainstem Pend Oreille River has grown in popularity as a preferred area for home sites. As the population increases more impacts to riparian areas and water quality are likely (NPPC 2001). Future impacts may include increases in nutrient loading from septic systems, chemical applications, and additional road construction.

Fisheries Management

Non-Native Species

Native and non-native populations of salmonids and other species have been introduced in the Pend Oreille River and its tributaries since before the turn of the century (NPPC 2001). The introduction of the brook trout into northeastern Washington streams and rivers occurred at least as early as the 1920's and continued into the 1980's by the Washington Fish Commission, Washington

Department of Game and the Washington Department of Fish and Wildlife. Brook trout (*Salvelinus fontinalis),* which are abundant in a majority of the tributaries of the Pend Oreille River, have impacted bull trout populations through competition and hybridization (NPPC 2001).

Brown trout (*Salmo trutta)* were introduced to the Pend Oreille River via plantings in the 1890's (Ashe and Scholz 1992; NPPC 2001). Brown trout are effective predators and can reduce a bull trout population through mortality. Presently, both species are stocked only in lakes without outlets into stream systems. Both brook and brown trout can compete with bull trout for food and habitat at the adult, juvenile, and spawning life stages.

Other predatory fish species, such as northern pike *(Esox lucius*) have migrated downstream from the Clark Fork River, Montana. Walleye *(Stizostedion vitreu*m) were planted by Washington Department of Game in 1983 and 1984 (500,000 and 253,000, respectively) (Bennett and Liter 1991). The Washington Department of Game also planted 148 tagged adult walleye in 1987 (Ashe and Scholz 1992). Smallmouth bass (*Micropterus dolomieu*) were introduced into the Pend Oreille and upper Columbia river basins as early as the 1930's. (Pool, D. pers. comm. 2001). Largemouth bass (*Micropterus salmoides*) were widely introduced in Oregon and Washington in 1890 to 1895 by the U.S. Bureau of Fisheries, and have extended their range northward into British Columbia, probably via river systems (Wydoski and Whitney 1979). Largemouth bass have been in the Pend Oreille River at least the past 43 years, as they were present in Washington Department of Fish and Wildlife creel surveys. In 1997, the Kalispel Tribe constructed a largemouth bass hatchery to increase the harvestable number of largemouth bass in Box Canyon Reservoir (NPPC 2001). Predatory species such as largemouth bass can effect the survival rates of native salmonids including bull trout. Further research and evaluation on possible impacts of fish stocking programs would be useful (Pearsons and Hopley 1999; Ham and Pearsons 2001).

Harvest

It is unknown whether or not historic harvest of bull trout may have eliminated populations in small tributaries and contributed to the overall decline. Before 1992 bull trout angling was controlled by standard statewide seasons and limits for trout, except in the mainstem Pend Oreille River where the season was year-round (WDFW 1998). Since 1992, fishing for bull trout in the Pend Oreille system, including the South Fork of the Salmo river, has been closed. The Northeast Washington Recovery Unit Team recommends that a comprehensive fish management plan be developed for the Pend Oreille River in Washington. The plan should address possible incidental harvest of bull trout. Misidentification of bull trout by anglers may be a cause (Schmetterling and Long 1999).

Isolation and Habitat Fragmentation

Road culverts in watersheds with bull trout also pose a barrier or blockage to upstream passage (NPPC 2001). Culverts may preclude bull trout from entering a drainage during spawning migrations, out-migration of juveniles, foraging activities, and may also limit access to refuge habitat needed to escape high flows, sediment, or higher temperatures. Culverts have been identified as a potential limiting factor for salmonids in the Pend Oreille Core Area (NPPC 2001). There is a need for a specific limiting factors analysis in the Pend Oreille Core Area to identify culverts which would specifically impact bull trout recovery. Specific road culverts which have already been identified as possible passage barriers include U.S. Forest roads on Sullivan Creek (numbers 2220000, 2212200, 220000, 1935000, 1935030, and 1936000), and Saucon Creek (County Road 1935000) (USFS 2001). Impassable culverts within the Le Clerc Creek have also been identified as potential barriers (USFS 1997).

ONGOING RECOVERY UNIT CONSERVATION MEASURES

In 1995, the Kalispel Tribe in conjunction with the Washington Department of Fish and Wildlife initiated the Kalispel Resident Fish Project. This project consisted of conducting habitat and population surveys to determine existing habitat conditions and determine fish distribution and abundance. Habitat assessments were used to determine the types and quality of habitat that were limiting to native bull trout and westslope cutthroat trout. Data collected in these assessments were compiled to develop recommendations for enhancement measures. From 1996 to 1998, the Kalispel Tribe implemented those recommendations in Middle Branch LeClerc, Indian Creek, and Mill Creek. These recommendations included instream structures, exotic brook trout removal, small woody debris removal, and riparian planting and fencing. Monitoring and evaluation of these enhancement measures started in 1997 and will continue at least through 2001.

The Kalispel Tribe in cooperation with Pend Oreille County replaced a culvert on Mill Creek in 1997 with an arched bridge to improve fish passage. In addition, the Kalispel Tribe initiated an adfluvial trapping program in 1998 in conjunction with Pend Oreille County Public Utility District. The goal of this project is to determine which tributary streams may have adfluvial fish populations. To date, only one bull trout (large gravid female) has been captured in the downstream trap at Indian Creek.

The Colville National Forest in cooperation with the Kalispel Tribe, Pend Oreille County Roads Dept., Stimson Lumber Company and the Washington Department of Fish and Wildlife , have relocated 4 kilometers (2.5 miles) of road out of the riparian area of the East Branch Le Clerc Creek and are in the process of rehabilitating the existing road to a more natural condition. This includes riparian planting, culvert removal, channel reconstruction and stabilization, road obliteration and fencing. The U.S. Forest Service in cooperation with Stimson Lumber Company has also resurfaced an existing road within the riparian area of the Middle Branch Le Clerc Creek to reduce soil movement into the stream. In addition, livestock crossings have been hardened, fencing has been built to protect riparian vegetation from overgrazing and riparian planting to improve channel and riparian habitat conditions.

RELATIONSHIP TO OTHER CONSERVATION EFFORTS

State of Washington

Salmon Recovery Act

The Governor's office in Washington State has developed a statewide strategy (Washington Governor's Salmon Recovery Office 1999) that describes how state agencies and local governments will work together to address habitat, harvest, hatcheries, and hydropower as they relate to recovery of listed species. The Salmon Recovery Act, passed in 1998, provides the structure for salmonid protection and recovery at the local level (counties, cities, and watershed groups).

The Salmon Recovery Planning Act of 1998 directs the Washington State Conservation Commission, in consultation with local government and treaty tribes to invite private, federal, state, tribal, and local government personnel with appropriate expertise to convene as a Technical Advisory Group. The purpose of the Technical Advisory Group is to identify habitat limiting factors for salmonids. Limiting factors are defined as "conditions that limit the ability of habitat to fully sustain populations of salmon, including all species of the family Salmonidae." The bill further clarifies the definition by stating "These factors are primarily fish passage barriers and degraded estuarine areas, riparian corridors, stream channels, and wetlands." It is important to note that the responsibilities given to the Conservation Commission in ESHB 2496 do not constitute a full limiting factors analysis. This report is based on a combination of existing watershed studies and knowledge of the Technical Advisory Group participants. The Pend Oreille Conservation District is the lead entity for Water Resource Inventory Area 62, and will be developing a limiting factors analysis and coordinating salmonid recovery efforts. Coordination with these activities is essential for recovery of bull trout in the Pend Oreille Core Area.

Washington State Bull Trout Management Plan

The Washington Department of Fish and Wildlife has developed a bull trout management plan that addresses both bull trout and Dolly Varden (WDFW 2000). The Washington Department of Fish and Wildlife no longer stocks brook trout in streams or lakes connected to bull trout waters. Fishing regulations prohibit harvest of bull trout, except for a few areas where stocks are considered "healthy," within the State. The Washington Department of Fish and Wildlife is also currently involved in a mapping effort to update bull trout distribution data within the State of Washington, including all known occurrences, spawning and rearing areas, and potential habitats. The salmon and steelhead inventory and assessment program is currently updating their database to include the entire state, which consists of an inventory of stream reaches and associated habitat parameters important for the recovery of salmonid species and bull trout.

Forest Practices

In January 2000, the Washington Forest Practices Board (WFPB 2000) adopted new emergency forest practice rules based on the Forest and Fish Report. These rules address riparian areas, roads, steep slopes, and other elements of forest practices on non-federal lands. Some provisions of forest practice rules represent improvements over previous regulations, for other provisions the plan relies on an adaptive management program for assurance that the new rules will meet the conservation needs of bull trout. Research and monitoring being conducted to address areas of uncertainty for bull trout include protocols for detection of bull trout, habitat suitability, forestry effects on groundwater, field methods or models to identify areas influenced by groundwater, and forest practices influencing cold water temperatures. The Forest and Fish Report development process relied on broad stakeholder involvement and included state agencies, counties, tribes, forest industry and environmental groups. A similar process is also being used for agricultural communities in Washington and is known as Ag, Fish, and Wildlife. The U.S. Fish and Wildlife Service is considering the possible impacts and potential benefits from both of these State processes relative to bull trout recovery.

Subbasin Planning

As part of the Pacific Northwest Electric Power Planning and Conservation Act of 1980, the Bonneville Power Administration has the responsibility to protect, mitigate and enhance fish and wildlife resources affected by operation of Federal hydroelectric projects in the Columbia River and tributaries. The Northwest Power Planning Council develops and implements the Columbia River Basin Fish and Wildlife Program which is implemented by the BPA, COE, BOR, and FERC. Coordination of BPA's responsibilities for protection, enhancement, and mitigation and incorporation of recommendations by NPPC is in part done through the development of subbasin summaries which identify status of fish and wildlife resources, limiting factors, and recommended actions at the subbasin level.

The draft Pend Oreille subbasin summary (NPPC 2001), overlaps in part with the Northeast Washington Recovery Unit, and is consistent with bull trout recovery planning efforts to identify limiting factors. The draft Pend Oreille subbasin summary identifies degraded habitat, loss of connectivity, and non-native species introductions as contributing to the decline of bull trout. The overall fisheries goal of the draft Pend Oreille subbasin plan is "...to mitigate and compensate for resident and anadromous fish loses caused by the construction and operation of Federally operated and Federally regulated hydropower projects.". According to the subbasin plan this goal will be achieved by "...restoring sustainable, naturally producing populations of native fish to support tribal and non-tribal harvest...". The Northeast Washington Recovery Unit Team will continue to coordinate with these planning efforts through the development of subbasin plans.

Biological Opinion on the Federal Columbia River Power System

On December 20, 2000, the U.S. Fish and Wildlife Service issued a Biological Opinion on the "Effects to Listed Species from Operation of the Federal Columbia River Power System" (USFWS 2000). The opinion identifies Albeni Falls Dam as a major barrier for migratory bull trout and attributes the

decline of bull trout in the Pend Oreille River to the construction and operation of this facility. The opinion states that "In the absence of passage, migratory bull trout remaining the Pend Oreille River will continue to be harmed.". This conclusion is consistent with the Northeast Washington Recovery Unit Team's evaluation of the ongoing threats associated with Albeni Falls Dam. Recommended actions identified within the Biological Opinion highlight the need for research to investigate problems associated with passage, entrainment, spill, flow attraction, and water quality. As reflected in the Recovery Criteria (*i.e.*, barrier removal), passage at Albeni Falls, Box Canyon, and Boundary Dams is important for bull trout recovery. Reconnecting Lake Pend Oreille to the mainstem Pend Oreille River in Washington is of special importance and fish passage at this facility should be expedited.

STRATEGY FOR RECOVERY

A core area represents the closest approximation of a biologically functioning unit for bull trout (See Appendix 1). The combination of core habitat (*i.e.*, habitat that could supply all the necessary elements for the long-term security of bull trout, including both spawning and rearing as well as foraging, migrating, and overwintering) and a core population (*i.e.*, bull trout inhabiting a core habitat) constitutes the basic core area upon which to gauge recovery within a recovery unit. Within the core area, many local populations may exist. Local populations are a group of bull trout that spawn within a particular stream or portion of a stream system. The extent of historic and current migratory connectivity, with consideration of natural and manmade barriers, survey and movement data, and genetic analysis need to be considered when defining core areas. Except where supported by biological or geographic evidence, core areas are considered to be distinct and their boundaries do not overlap.

Current known distribution of bull trout in the Northeast Washington Recovery Unit is highly fragmented with only occasional sightings of bull trout. Distribution includes the Pend Oreille River and a portion of the South Fork of the Salmo River. Little information exists as to the historic distribution of migratory bull trout. Genetic information on bull trout in the recovery unit is lacking. It is likely that historic distribution of bull trout was more expansive than currently observed. Bull trout most likely migrated seasonally from Lake Pend Oreille downstream into the Pend Oreille River tributaries to spawn and rear. Use of the mainstem Pend Oreille River for feeding and overwintering was also likely. Historic distribution of bull trout in major tributaries of this recovery unit, including the San Poil, Kettle, and Spokane Rivers is either unavailable, or anecdotal. More detailed presence/absence surveys need to be conducted to justify inclusion of these, and other tributaries as part of the recovered distribution within the Northeast Washington Recovery Unit.

For purposes of recovery, the Northeast Washington Recovery Unit has one core area at this time and one extant local population (Le Clerc Creek complex). The Pend Oreille River downstream from Albeni Falls Dam including

all tributaries to the Canadian Border is considered a single core area. While in a separate recovery unit, the Northeast Washington Recovery Unit Team feels that complete recovery for the Pend Oreille River in Washington is contingent upon reconnection with the Lower Clark Fork subunit in Idaho. The Columbia River and all other tributaries (*e.g.* South Fork of the Salmo, Sanpoil, Kettle, Spokane, Colville) above Chief Joseph Dam are not considered as part of a core area, but are identified as a primary research need.

The exclusion of the South Fork of the Salmo at this time is based on the need for more information on Canadian bull trout populations in the Salmo River. Research needs apply to areas where the Team feels more information is needed in order to accurately determine full recovery in this recovery unit and implement recovery actions. It is likely that the essential elements for core habitat do not geographically exist in the U.S. portion of the Salmo River system. However, the result of research efforts may include the designation of an additional core and local populations. Increased coordination with British Columbia is needed to identify limiting factors, necessary actions, and recovery criteria. Collection of additional information regarding the current use and potential for re-establishment may also result in a revision of the identification of core areas.

Recovery Goals and Objectives

The goal of the bull trout 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.** To achieve this goal the following objectives have been identified for bull trout in the Northeast Washington Recovery Unit:

- Maintain current distribution of bull trout and restore distribution in previously occupied areas within the Northeast Washington Recovery Unit.

- Maintain stable or increasing trends 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.

Rieman and McIntyre (1993) and Rieman and Allendorf (2001) evaluated the bull trout population numbers and habitat thresholds necessary for long-term viability of the species. They identified four elements, and the characteristics of those elements, to consider when evaluating the viability of bull trout populations. These four elements are 1) number of local populations; 2) adult abundance (defined as the number of spawning fish present in a core area in a given year); 3) productivity, or the reproductive rate of the population (as measured by population trend and variability); and 4) connectivity (as represented by the migratory life history form and functional habitat). For each element, the Northeast Washington Recovery Unit Team classified bull trout into relative risk categories based on the best available data and the professional judgment of the team.

The Northeast Washington Recovery Unit Team also evaluated each element under a potential recovered condition to produce recovery criteria. Evaluation of these elements under a recovered condition assumed that actions identified within this chapter had been implemented. Recovery criteria for the Northeast Washington Recovery Unit reflect 1) the stated objectives for the recovery unit, 2) evaluation of each population element in both current and recovered conditions, and 3) consideration of current and recovered habitat characteristics within the recovery unit. Recovery criteria will probably be revised in the future as more detailed information on bull trout population dynamics becomes available. Given the limited information on bull trout, both the level of adult abundance and the number of local populations needed to lessen the risk of extinction should be viewed as a best estimate.

This approach to developing recovery criteria acknowledges that the status of populations in some core areas may remain short of ideals described by conservation biology theory. Some core areas may be limited by natural attributes

or by patch size and may always remain at a relatively high risk of extinction. Because of limited data within the Northeast Washington Recovery Unit, the recovery unit team relied heavily on the professional judgment of its members.

Local Populations

Metapopulation theory is important to consider in bull trout recovery. A metapopulation is an interacting network of local populations with varying frequencies of migration and gene flow among them (Meffe and Carroll 1994) (see Chapter 1). Multiple local populations distributed and interconnected throughout a watershed provide a mechanism for spreading risk from stochastic events. In part, distribution of local populations in such a manner is an indicator of a functioning core area. Based in part on guidance from Rieman and McIntyre (1993), bull trout core areas with fewer than 5 local populations are at increased risk, core areas with between 5 and 10 local populations are at intermediate risk, and core areas with more than 10 interconnected local populations are at diminished risk. While individual sightings of bull trout have been verified within the core area, only one extant local population (Le Clerc Creek complex) has been identified. Based on the aforementioned guidance, bull trout in the Pend Oreille Core Area are considered to be at increased risk. Resident bull trout are known to occur in each core area within the recovery unit. However, an accurate description of their current distribution is unknown, and the identification of resident local populations is considered a research need.

Adult Abundance

The recovered abundance levels in the Northeast Washington Recovery Unit were determined by considering theoretical estimates of effective population size, historical census information, and the professional judgment of recovery team members. In general, effective population size is a theoretical concept that allows us to predict potential future losses of genetic variation within a population due to small population sizes and genetic drift (see Chapter 1). For the purpose of recovery planning, effective population size is the number of adult bull trout that successfully spawn annually. Based on standardized theoretical equations (Crow and Kimura 1970), guidelines have been established for maintaining minimum effective population sizes for conservation purposes. Effective population sizes

of greater than 50 adults are necessary to prevent inbreeding depression and a potential decrease in viability or reproductive fitness of a population (Franklin 1980). To minimize the loss of genetic variation due to genetic drift and to maintain constant genetic variance within a population, an effective population size of at least 500 is recommended (Franklin 1980; Soule 1980; Lande 1988). Effective population sizes required to maintain long-term genetic variation that can serve as a reservoir for future adaptations in response to natural selection and changing environmental conditions are discussed in Chapter 1 of the recovery plan.

For bull trout, Rieman and Allendorf (2001) estimated that a minimum number of 50 to 100 spawners per year is needed to minimize potential inbreeding effects within local populations. In addition, a population size of between 500 and 1,000 adults in a core area is needed to minimize the deleterious effects of genetic variation from drift.

For the purposes of bull trout recovery planning, abundance levels were conservatively evaluated at the local population and core area levels. Local populations containing fewer than 100 spawning adults per year were classified as at risk from inbreeding depression. Bull trout core areas containing fewer than 1,000 spawning adults per year were classified as at risk from genetic drift.

Population estimate in the Pend Oreille Core Area are not currently available. However, due to the relatively few number of bull trout documented recently, abundance of bull trout in Le Clerc Creek local population is probably below 100 individuals per year and should be considered at risk from inbreeding depression. Similarly, bull trout in Pend Oreille Core Area most likely number fewer than 1,000 per year, and should be considered at risk from genetic drift.

Productivity

A stable or increasing population is a key criterion for recovery under the requirements of the Endangered Species Act. Measures of the trend of a population (the tendency to increase, decrease, or remain stable) include population growth rate or productivity. Estimates of population growth rate (*i.e.*,

productivity over the entire life cycle) that indicate a population is consistently failing to replace itself also indicate an increased risk of extinction. Therefore, the reproductive rate should indicate that the population is replacing itself, or growing.

Since estimates of the total population size are rarely available, the productivity or population growth rate is usually estimated from temporal trends in indices of abundance at a particular life stage. For example, redd counts are often used as an index of a spawning adult population. The direction and magnitude of a trend in the index can be used as a surrogate for the growth rate of the entire population. For instance, a downward trend in an abundance indicator may signal the need for increased protection, regardless of the actual size of the population. A population that is below recovered abundance levels, but that is moving toward recovery, would be expected to exhibit an increasing trend in the indicator.

The population growth rate is an indicator of probability of extinction. This probability cannot be measured directly, but it can be estimated as the consequence of the population growth rate and the variability in that rate. For a population to be considered viable, its natural productivity should be sufficient for the population to replace itself from generation to generation. Evaluations of population status will also have to take into account uncertainty in estimates of population growth rate or productivity. For a population to contribute to recovery, its growth rate must indicate that the population is stable or increasing for a period of time. In the Pend Oreille Core Area, bull trout were classified at an increased risk, due to the lack of long-term census information.

Connectivity

The presence of the migratory life history form within the Northeast Washington Recovery Unit was used as an indicator of the functional connectivity of the system. If the migratory life form was absent, or if the migratory form is present but local populations lack connectivity, the core area was considered to be at increased risk. If the migratory life form persists in at least some local populations, with partial ability to connect with other local populations, the core

area was judged to be at intermediate risk. Finally, if the migratory life form was present in all or nearly all local populations, and had the ability to connect with other local populations, the core area was considered to be at diminished risk. Fragmentation by mainstem and tributary dams places the Pend Oreille Core Area at increased risk.

Recovery Criteria

Recovery criteria identified for the Northeast Washington Recovery Unit are the following:

1. **Bull trout are distributed among at least nine local populations in the Northeast Washington Recovery Unit.** Local populations under a recovered condition include: Slate Creek, Indian Creek, Sullivan Creek (including Sullivan Lake and tributaries), Mill Creek, Cedar Creek(Pend Oreille County), Tacoma Creek, Ruby Creek, Calispell Creek, and the Le Clerc Creek complex (including Fourth of July Creek, East Branch Le Clerc Creek, and West Branch Le Clerc Creek). The identified recovered distribution places the Pend Oreille Core Area at an intermediate risk from stochastic events. The Northeast Washington Recovery Unit Team recognizes that natural habitat features within the Pend Oreille River may limit the expansion of bull trout distribution. Designation of local populations is based on survey data and the professional judgement of Northeast Washington Recovery Unit Team members. Further genetic studies are needed in order to more accurately delineate local populations, quantify spawning site fidelity, and straying rates. The complete distribution of resident local populations in the recovery unit is unknown. The Northeast Washington Recovery Unit Team recommends that further studies be conducted in the Pend Oreille Core Area to elucidate the current and recovered distribution of resident bull trout in the recovery unit. Additional local populations may be added to this total as additional information is gathered in areas outside the currently designated core area for this recovery unit. Geographic distribution of resident local populations should be identified within three years and actions needed to

implement re-introduction efforts will be incorporated in the five year review of the Northeast Washington Recovery Unit plan.

2. **Estimated abundance of bull trout among all local populations in the Northeast Washington Recovery Unit is between 1,575 and 2,625 migratory adults.** Recovered abundance for the Pend Oreille Core Area was derived using the professional judgement of the Team and estimation of productive capacity of identified local populations. Recovered population estimates for individual local population are: Indian Creek 50 to 100 adults, Slate Creek 25 to 75 adults, Mill Creek 50 to 150 adults, Cedar Creek 150 to 250 adults, Ruby Creek 100 to 200 adults, Tacoma Creek 150 to 350 adults, Calispell Creek 50 to 100 adults, Sullivan Creek (including Sullivan Lake and tributaries) 600 to 850 adults, and Le Clerc Creek 400 to 550 adults. Resident life history forms are not included in this estimate, but are considered a research need. As more data is collected, recovered population estimates will be revised to more accurately reflect both the migratory and resident life history components.

   The established recovered abundance levels assume that threats (including fragmentation of local populations) have been addressed and that each core area is a functioning metapopulation. While the recovered abundance for each core area fall short of long-term idealized estimates for effective population size (See Chapter 1), the Northeast Washington Recovery Team feels that the estimated ranges accurately reflect achievable recovered abundance levels. In the Pend Oreille Core Area, the identified recovered abundance levels should prevent inbreeding depression and minimize the loss of genetic variation due to genetic drift. The U.S. Fish and Wildlife Service will evaluate the identified abundance levels relative to the maintenance of long-term genetic variation which would provide the population the ability to adapt to natural selection and changing environmental conditions.

3. **Adult bull trout exhibit a stable or increasing trend for at least two generations at or above the recovered abundance level within the**

Pend Oreille Core Area. The development of a standardized monitoring and evaluation program which would accurately describe trends in bull trout abundance is identified as a priority research need. As part of the overall recovery effort, the U.S. Fish and Wildlife Service will take the lead in addressing this research need by forming a multi-agency technical team to develop protocols to evaluate trends in bull trout populations.

4. **Specific barriers to bull trout migration in the Northeast Washington Recovery Unit have been addressed.** The Northeast Washington Recovery Unit Team has identified that the primary impediment to bull trout recovery is the fragmentation of habitat within the system by hydroelectric facilities. The Northeast Washington Recovery Unit Team recommends that to achieve recovery in the Pend Oreille Core Area, connectivity needs to be restored at Albeni Falls, Box Canyon, and Boundary Dams.

Identification of these barriers does not imply that other actions associated with passage (*e.g.*, Sullivan Creek and Cedar Creeks), habitat degradation, or nonnative species control are not crucial for recovery to occur. To achieve recovery in the Northeast Washington Recovery Unit, all four recovery criteria (local populations, abundance, population trends, and barrier removal) must be achieved. It is likely that meeting all four recovery criteria will not be accomplished by only by addressing barriers.

Recovery criteria for the Northeast Washington Recovery Unit were established to assess whether recovery actions are resulting in the recovery of bull trout. The Northeast Washington Recovery Unit Team expects that the recovery process will be dynamic and will be refined as more information becomes available. While removal of bull trout as a species under the Endangered Species Act (*i.e.*, delisting) can only occur for the entity that was listed (Columbia River distinct population segment), the criteria listed above will be used to determine when the Northeast Washington Recovery Unit is fully contributing to recovery of the population segment.

Research Needs

Based on the best scientific information available, the Team has identified recovery criteria, and actions necessary for recovery of bull trout within the Northeast Washington Recovery Unit. However, the recovery unit Team recognizes that many uncertainties exist regarding bull trout population abundance, distribution, and actions needed. The recovery Team feels that if effective management and recovery are to occur, the recovery plan for the Northeast Washington Recovery Unit be viewed as a "living" document, which will be updated as new information becomes available. As part of this adaptive management approach, the Northeast Washington Recovery Unit Team has identified research needs which are essential within the recovery unit.

Monitoring and Evaluation

The Northeast Washington Recovery Unit Team realizes that recovery criteria will most likely be revised as recovery actions are implemented and bull trout populations begin to respond. In addition, the Northeast Washington Recovery Unit Team will rely on adaptive management to better refine both abundance and distribution criteria. Adaptive management is a continuing process of planning, monitoring, evaluating management actions, and research. This approach will involve a broad spectrum of user groups and will lay the framework for decision making relative to recovery implementation and ultimately, the possible revision of recovery criteria in this recovery unit.

This recovery unit chapter is the first step in the planning process for bull trout recovery in Northeast Washington Recovery Unit. Monitoring and evaluation of population levels and distribution will be an important component of any adaptive management approach. The U.S. Fish and Wildlife Service will take the lead in developing a comprehensive monitoring approach which will provide guidance and consistency in evaluating bull trout populations. Development and application of models which assess extinction risk relative to abundance and distribution parameters are critical in refining recovery criteria as

the recovery process proceeds. Application of agreed upon methods for evaluating recovery would benefit the scientific community and user groups alike.

Artificial Propagation

The Northeast Washington Recovery Unit Team has identified that reaching a recovered condition within the Pend Oreille Core Area within 25 years could require the use of artificial propagation. Artificial propagation could involve the transfer of bull trout into unoccupied habitat within the historic range (ODFW 1997). In addition, artificial propagation could involve the use of Federal or state hatcheries to assist in recovery efforts (MBTSG 1996). The Northeast Washington Recovery Team recommends that studies be initiated to determine the effectiveness and feasibility of using artificial propagation in bull trout recovery.

Any artificial propagation program instituted in the Northeast Washington Recovery Unit must follow the joint policy of the Fish and Wildlife Service and the National Marine Fisheries Service regarding controlled propagation of listed species (65 FR 56916). The overall guidance of the policy is that every effort should be made to recover a species in the wild before implementing a controlled propagation program. If necessary, an appropriate plan would need to be approved that considers the effects of transplantation on other species as well as the donor bull trout populations. Transplanting listed species must be authorized by the U.S. Fish and Wildlife Service and meet applicable State fish-handling and disease policies.

While artificial propagation has played an important role in the recovery of other listed fish species, where possible, the overall recovery strategy for bull trout in the Northeast Washington Recovery Unit will emphasize the removal of threats and habitat restoration. Recovery should emphasize identifying and correcting threats affecting bull trout and bull trout habitats. Artificial propagation programs should not be implemented unless reasons for decline have been addressed.

Genetic Studies

The Northeast Washington Recovery Unit Team recommends that studies be initiated to describe the genetic makeup of bull trout in the Pend Oreille Core Area. This information would be essential for a more complete understanding of bull trout interactions and population dynamics. In addition, a recovery unit wide evaluation of the current and potential threat of bull trout hybridization with brook trout is needed. The ability to evaluate the potential harm to specific local populations could be used in prioritizing management actions. Genetic baseline information would also be a necessity in the implementation of any artificial propagation program.

Bull Trout Distribution

A primary research need is a complete understanding of the current, and future, role that the mainstem Columbia and major tributary systems (*e.g.*, Sanpoil and Kettle Rivers) should play in the recovery of bull trout. It seems likely that fluvial bull trout occurred seasonally in the mainstem Columbia River and may have, and may still, reside in tributaries as isolated resident populations. It is essential to establish with certainty the current distribution of bull trout within the Northeast Washington Recovery Unit. To this end, the Team recommends the development and application of a scientifically accepted, statistically rigorous, standardized protocol for determining present distribution of bull trout. Application of such a protocol will improve the Team's ability to identify additional core areas and/or revise the recovery criteria for this recovery unit.

More detailed research is needed on the current status of resident bull trout within the Pend Oreille Core Area. Included in this information need is a greater understanding of the interaction between resident and migratory life history forms. The resident component could represent and important component for long term persistence, and a more complete understanding of the potential productive capacity of the Pend Oreille Core Area to support resident populations is needed.

The Northeast Washington Recovery Unit Team based estimates of recovered abundance levels and number of local populations on the best available information and professional judgement. Historic abundance levels and distribution of spawning populations is scarce, and most records are anecdotal. The Team realizes that recovery criteria will most likely be revised as recovery actions are implemented and bull trout populations begin to respond. The Team will rely on adaptive management to better refine both abundance and distribution criteria. Adaptive management is a continuing process of planning, monitoring, evaluating management actions, and research. This adaptive management approach will identify actions that maximize the ability to achieve recovery objectives. In addition, this approach will provide a better understanding of key uncertainties, crucial to long term management actions.

This recovery unit chapter is the first step in the planning process for bull trout recovery in Northeast Washington. Monitoring and evaluation of population levels and distribution will be an important component of any adaptive management approach. The U.S. Fish and Wildlife Service will take the lead in developing a comprehensive monitoring approach which will provide guidance and consistency in evaluating bull trout populations. An important component in recovery implementation and the use of adaptive management will be the evaluation of recommended actions.

The Northeast Washington Recovery Unit team has identified an urgent need for the development of a standardized monitoring and assessment program which would more accurately describe current status of bull trout within the recovery unit, as well as identify improvements in current sampling protocols which would allow for monitoring the effectiveness of recovery actions. Development and application of models which assess population trend and extinction risk will be useful in refining recovery criteria as the recovery process proceeds.

Connection with Canadian bull trout populations

Bull trout currently receives no legal protection in Canada, although legislation to protect wildlife species at risk has been introduced in the House of Commons. The province of British Columbia has developed a strategic plan for the recovery of bull trout. British Columbia has increased research and management efforts for the species in recent years and have implemented site-specific activities to improve bull trout habitat, increase migratory capabilities, and enforce stricter angling regulations.

In order to evaluate how the South Fork of the Salmo River will contribute to bull trout recovery in the Northeast Washington Recovery Unit, a coordinated monitoring effort must be adopted with British Columbia. It is likely that the South Fork of the Salmo represents a local population(s) within a larger core area extending across the Canadian border. Migratory and adult habitat necessary for fluvial components of a larger "Salmo River" core area are geographically located in Canada. Increased life history research and monitoring of bull trout in the South Fork of the Salmo and mainstem Salmo River are necessary in order to develop recovery criteria in the South Fork of the Salmo.

ACTIONS NEEDED

Recovery Measures Narrative

In this chapter and all other chapters of the bull trout recovery plan, the recovery measures narrative consists of a hierarchical listing of actions that follows a standard template. The first-tier entries are identical in all chapters and represent general recovery tasks under which specific (*e.g.*, third-tier) tasks appear when appropriate. Second-tier entries also represent general recovery tasks under which specific tasks appear. Second-tier tasks that do not include specific third-tier actions are usually programmatic activities that are applicable across the species' range; they appear in *italic type*. These tasks may or may not have third-tier tasks associated with them; see Chapter 1 for more explanation. Some second-tier tasks may not be sufficiently developed to apply to the recovery unit at this time; they appear in *a shaded italic type (as seen here)*. These tasks are included to preserve consistency in numbering tasks among recovery unit chapters and intended to assist in generating information during the comment period for the draft recovery plan, a period when additional tasks may be developed. Third-tier entries are tasks specific to the Northeast Washington Recovery Unit. They appear in the implementation schedule that follows this section and are identified by three numerals separated by periods.

The Northeast Washington Recovery Unit should be updated or revised as recovery tasks are accomplished, as environmental conditions change, and monitoring results or additional information become available. Revisions to the Northeast Washington Recovery Unit chapter will likely focus on priority streams or stream segments within core areas where restoration activities occurred, and habitat or bull trout populations have shown a positive response. The Northeast Washington Recovery Unit Team should meet annually to review annual monitoring reports and summaries, and make recommendations to the U.S. Fish and Wildlife Service.

1 Protect, restore, and maintain suitable habitat conditions for bull trout.

1.1 Maintain or improve water quality in bull trout core areas or potential core habitat.

1.1.5 **Investigate and improve water quality**. Coordinate and work with Federal, state, land local entities to improve water quality standards in the Pend Oreille Core Area. A specific limiting factors analysis should be conducted and actions recommended to improve water quality conditions (*e.g.*, temperature, pH, and fecal coliform).

1.2 Identify barriers or sites of entrainment for bull trout and implement tasks to provide passage and eliminate entrainment.

1.2.1 **Provide fish passage at Cedar Creek Dam.** Investigate options and design fish passage through the municipal dam (for the town of Ione) on Cedar Creek (Pend Oreille County).

1.2.2 **Provide fish passage at Albeni Falls Dam.** Investigate options and design fish passage (upstream and downstream) at Albeni Falls Dam.

1.2.3 **Provide fish passage at Box Canyon Dam.** Investigate options and design fish passage (upstream and downstream) at Box Canyon Dam.

1.2.4 **Provide fish passage at tributary dams and barriers.** Investigate options and design fish passage (upstream and downstream) at Calispell Creek Pumps, Mill Pond Dam, and Sullivan Lake Dam.

1.2.5 **Remove or replace culverts.** Monitor all road crossings for blockages to upstream passage and replace appropriate existing culverts with fish-friendly structures as opportunity arises. Specific areas of concern include the following culverts: Sullivan Creek (USFS Roads 2220000, 2212200, 220000, 1935000, 1935030, and 1936000), and Saucon Creek (County Road 1935000).

1.2.6 **After elimination of brook trout in the LeClerc Creek watershed, reposition or replace presently impassable culvert on U.S. Forest Service Road 1935080 crossing.**

1.2.7 **After non-native fish species are eliminated, remove historic water diversion on the upper West Branch of the LeClerc Creek system.** The historic water diversion is presently a barrier to fish passage.

1.2.8 **Reduce entrainment.** Reduce entrainment loss at all dams through the installation of devices adjacent to the forebays (*e.g.*, screens, fish friendly turbines)

1.2.9 **Provide fish passage at Boundary Dam.** Investigate options and design fish passage (upstream and downstream) at Boundary Dam.

1.3 Identify impaired stream channel and riparian areas and implement tasks to restore their appropriate functions.

1.3.1 **Repair roads.** Identify and repair, or remove, or relocate roads that are susceptible to mass wasting and bank failures, intercept surface or ground water, negatively impact riparian areas, and inhibit connectivity and natural stream functions Specific areas of concern: County Road 9345 (Sullivan Creek), USFS Road 1200000 (Mill Creek),

County Road 22 (Cedar Creek), USFS Roads 2700050, 2700054, 2700005, 27000423, 27000422, 2700186 (Ruby Creek), USFS Roads 2600629, 2600510, 9521000, 3116240, 3116454, 3116000, 3116205, 3116015 and 3116210, and County road. 2389 (Tacoma Creek), County Road 2110 (Tenmile/North Fork Calispell Creek), USFS Road 1935 (East Branch Le Clerc Creek), USFS Road 1935000 (Middle Branch Le Clerc Creek).

1.3.2 **Develop and implement adaptive management plans for areas impacted by livestock grazing.** Develop, implement, and revise when necessary, adaptive livestock grazing management plans which include performance standards and targets for habitat and water quality conditions that grazing practices must meet in specific watersheds. In areas where grazing has impacted bull trout habitat restoration activities should be implemented. Specific areas of concern include: LeClerc Creek (Middle and East branches), Ruby Creek, Tacoma Creek, and Calispell Creek.

1.3.3 **Improve riparian and instream habitat.** Identify areas within local populations which need habitat restoration. Implement projects to improve instream habitat by restoring recruitment of large woody debris and pool development. Revegetate streambanks to restore shade and canopy, riparian cover, and native vegetation.

1.3.4 **Improve compliance with riparian management guidelines.** Work with private landowners and personnel from Federal, State, county, and local agencies/organizations to improve compliance with guidelines concerning riparian management on all ownership in the Pend Oreille River watershed.

1.3.5 **Maintain roadless portions of bull trout watersheds in a roadless condition.**

1.3.6 **Minimize impacts of dredging and sluicing within streams containing bull trout (*i.e.* Sullivan Creek).**

1.3.7 **Develop habitat restoration/protection guidelines.** Develop and implement guidelines for bull trout that restore or maintain habitat elements (*e.g.*, sediment delivery, water temperature, normative hydrologic function) to provide for recovery.

1.3.8 **Reduce road densities.** Develop and implement strategies to reduce road density in Pend Oreille Core Area (*e.g.*, Sullivan, Le Clerc, Mill, Indian, Tacoma, Ruby, and Calispell creeks).

1.3.9 **Implement habitat restoration at Box Canyon Dam, Sullivan Creek, and Boundary Dam.** Fully implement restoration measures identified in the relicensing process for Box Canyon Dam (license expires 2002), Sullivan Creek (license expires 2008), and Boundary Dam (license expires 2011).

1.4 Operate dams to minimize negative effects on bull trout in reservoirs and downstream.

1.4.1 **Evaluate instream flow requirements of bull trout.** Evaluate instream flows requirements for bull trout downstream from Albeni Falls, Box Canyon, and Boundary, and Sullivan Lake Dams.

1.4.2 **Design and deploy gas abatement structures.** Design and deploy gas abatement structures to reduce gas supersaturation conditions detrimental to bull trout at Albeni Falls, Box Canyon and Boundary Dams.

1.5 *Identify upland conditions negatively affecting bull trout habitats and implement tasks to restore appropriate functions.*

2 Prevent and reduce negative effects of nonnative fishes and other nonnative taxa on bull trout.

2.1 *Develop, implement, and enforce public and private fish stocking policies to reduce stocking of nonnative fishes that affect bull trout.*

2.2 *Enforce policies for preventing illegal transport and introduction of nonnative fishes.*

2.3 *Provide information to the public about ecosystem concerns of illegal introductions of nonnative fishes.*

2.4 *Evaluate biological, economic, and social effects of control of nonnative fishes.*

2.5 Implement control of nonnative fishes where found to be feasible and appropriate.

2.5.1 **Reduce abundance and distribution of non-native species.** Reduce non-native brook and brown trout from all streams within the Pend Oreille River watershed through the use of chemicals and/or fishing regulations (*e.g.*, liberalized bag limits).

2.6 Develop tasks to reduce negative effects of nonnative taxa on bull trout.

2.6.1 **Liberalize harvest regulations to reduce non-natives where bull trout will benefit.**

2.6.2 **Evaluate presence/absence of introduced fishes in bull trout habitat and determine site specific biological, economic, and social impact.**

3 Establish fisheries management goals and objectives compatible with bull trout recovery, and implement practices to achieve goals.

3.1 Develop and implement state and tribal native fish management plans integrating adaptive research.

3.1.1 **Develop comprehensive fisheries management plans for Boundary and Box Canyon Reservoirs that incorporate bull trout recovery.**

3.2 Evaluate and prevent overharvest and incidental angling mortality of bull trout.

3.2.1 **Continue implementation and enforcement of restrictive fishing regulations.**

3.2.2 **Provide information to anglers.** Provide information to anglers about bull trout identification, special regulations, fisheries management of endangered species, and how to reduce hooking mortality of bull trout caught incidentally in recreational fisheries.

3.2.3 **Reduce angler pressure.** Reduce angler pressure in areas where incidental mortality of bull trout is detrimental to recovery.

3.3 Evaluate potential effects of introduced fishes and associated sport fisheries on bull trout recovery and implement tasks to minimize negative effects on bull trout.

3.3.1 **Evaluate impacts of stocking programs.** Evaluate impacts of Kalispel tribe largemouth bass stocking program on bull trout, including risks from competition and predation.

3.4 Evaluate effects of existing and proposed sport fishing regulations on bull trout.

3.4.1 **Evaluate the impact of scientific collection permits on bull trout local populations.** Ensure that permits issued for scientific collection in the Pend Oreille Core Area minimize impacts to bull trout.

4 Characterize, conserve, and monitor genetic diversity and gene flow among local populations of bull trout.

4.1 *Incorporate conservation of genetic and phenotypic attributes of bull trout into recovery and management plans.*

4.2 *Maintain existing opportunities for gene flow among bull trout populations.*

4.3 Develop genetic management plans and guidelines for appropriate use of transplantation and artificial propagation.

4.3.1 **Establish genetic protocols.** Establish genetic reserve protocols and standards for initiating, conducting, and evaluating artificial propagation programs.

4.3.2 **Establish genetic baselines.** Genetic baseline descriptions of bull trout in the Pend Oreille Core Area is essential for a complete understanding of bull trout interactions and population dynamics.

4.3.3 **Evaluate the threat of hybridization with brook trout.** Recovery Unit wide evaluation of the current and potential threat of bull trout hybridization with brook trout is needed. The ability to evaluate the potential harm to specific local populations can be used in prioritizing management actions.

4.3.4 **Evaluate the feasibility of an artificial propagation program.** Re-establishment of local populations within the Pend Oreille Core Area may require the use of artificial propagation. Studies should be initiated to determine the effectiveness and feasibility of using fish transfers and hatcheries to assist in any future re-introduction efforts.

5 Conduct research and monitoring to implement and evaluate bull trout recovery activities, consistent with an adaptive management approach using feedback from implemented, site-specific recovery tasks.

5.1 *Design and implement a standardized monitoring program to assess the effectiveness of recovery efforts affecting bull trout and their habitats.*

5.1.1 **Increase monitoring**. Increase monitoring of adfluvial populations to determine population status, distribution,

movement and seasonality of use of different habitat types by adult and sub-adult bull trout.

5.1.2 **Develop a comprehensive map of primary bull trout tributary reaches for focusing habitat protection and recovery efforts.**

5.2 Conduct research evaluating relationships among bull trout distribution and abundance, bull trout habitat, and recovery tasks.

5.2.1 **Identify threats that may be limiting bull trout in watersheds not already evaluated.**

5.3 *Conduct evaluations of the adequacy and effectiveness of current and past BMPs in maintaining or achieving habitat conditions conducive to bull trout recovery.*

5.4 *Evaluate effects of diseases and parasites on bull trout, and develop and implement strategies to minimize negative effects.*

5.5 *Develop and conduct research and monitoring studies to improve information concerning the distribution and status of bull trout.*

5.6 *Identify evaluations needed to improve understanding of relationships among genetic characteristics, phenotypic traits, and local populations of bull trout.*

6 Use all available conservation programs and regulations to protect and conserve bull trout and bull trout habitats.

6.1 Use partnerships and collaborative processes to protect, maintain, and restore functioning core areas for bull trout.

6.1.1 **Support collaborative efforts**. Support collaborative efforts by local watershed groups to accomplish site specific protection/restoration activities by implementing existing regulations.

6.1.2 **Provide long-term habitat protection**. Provide long-term habitat protection through purchase from willing sellers, land exchange, conservation easements, managements, etc. Initial emphasis should be on identified bull trout spawning and rearing streams.

6.2 *Use existing Federal authorities to conserve and restore bull trout.*

6.3 Enforce existing Federal and State habitat protection standards and regulations and evaluate their effectiveness for bull trout conservation.

6.3.1 **Review and implement Forest and Fish standards.** Ensure full compliance monitoring associated with Forest and Fish standards and modify rules through adaptive management when indicated by effectiveness monitoring.

6.3.2 **Monitor and enforce Hydraulic Permit Applications in the State of Washington.**

7 Assess the implementation of bull trout recovery by recovery units, and revise recovery unit plans based on evaluations.

7.1 *Convene annual meetings of each recovery unit team to generate progress reports on implementation of the recovery plan for the Fish and Wildlife Service.*

7.2 *Develop and implement a standardized monitoring program to evaluate the effectiveness of recovery efforts (coordinate with 5.1).*

7.3 Revise scope of recovery as suggested by new information.

7.3.1 **Periodically review progress toward recovery goals and assess recovery task priorities.** Annually review progress toward population and adult abundance criteria and recommend changes, as needed, to the Northeast Washington Recovery Unit chapter. In addition, review tasks, task priorities, completed tasks, budget, time frames, particular successes, and feasibility within the Northeast Washington Recovery Unit.

IMPLEMENTATION SCHEDULE

The Implementation Schedule that follows describes recovery task priorities, task numbers, task descriptions, duration of tasks, potential or participating responsible parties, total cost estimate and estimates for the next five years, if available, and comments. These tasks, when accomplished, will lead to recovery of bull trout in the Northeast Washington Recovery Unit. Cost estimates are not provided for tasks which are normal agency responsibility under existing authorities.

Parties with authority, responsibility, or expressed interest to implement a specific recovery task are identified in the Implementation Schedule. Lead party are designated in bold type. Listing a responsible party does not imply that prior approval has been given or require that party to participate or expend any funds. However, willing participants will benefit by demonstrating that their budget submission or funding request is for a recovery task identified in an approved recovery plan, and is therefore part of a coordinated recovery effort to recover bull trout. In addition, section 7 (a)(1) of the Endangered Species Act directs all Federal Agencies to use their authorities to further the purposes of the Act by implementing programs for the conservation of threatened or endangered species.

The following are definitions to column headings in the Implementation Schedule:

Priority Number: All priority 1 tasks are listed first, followed by priority 2 and priority 3 tasks.

Priority 1: All actions that must be taken to prevent extinction or to prevent the species from declining irreversibly in the foreseeable future.

Priority 2: All actions that must be taken to prevent a significant decline in species population or habitat quality or to prevent some other significant negative effect short of extinction.

Priority 3: All other actions necessary to provide for full recovery (or reclassification) of the species.

Task Number and Task Description: Recovery tasks as numbered in the recovery outline. Refer to the action narrative for task descriptions.

Task Duration: Expected number of years to complete the corresponding task. Study designs can incorporate more than one task, which when combined may reduce the time needed for task completion.

Responsible or Participating Party: The following organizations are those with responsibility or capability to fund, authorize, or carry out the corresponding recovery task. Additional identified agencies or parties are considered cooperators in restoration efforts. Identified parties include:

USFWS	U.S. Fish and Wildlife Service
WDFW	Washington Department of fish and Wildlife
KT	Kalispell Tribe
ST	Spokane Tribe
WDNR	Washington Department of Natural Resources
COE	U.S. Army Corp of Engineers
BPA	Bonneville Power Administration
SCL	Seattle City Light
POPUD	Pend Oreille Public Utilities District
FERC	Federal Energy Regulatory Commission
WDOE	Washington Department of Ecology
EPA	Environmental Protection Agency
USFS	U.S. Forest Service
WSCC	Washington State Conservation Commission
POCO	Pend Oreille County

Bold type indicates the agency or agencies that have the lead role for task implementation and coordination, though not necessarily sole responsibility.

Cost Estimates: Cost estimates are rough approximations and provided only for general guidance. Total costs are estimated for the duration of the task, are itemized annually for the next five years, and include estimates of expenditures by local, Tribal, State, and Federal governments and by private business and individuals.

An asterisk (*) in the total cost column indicates ongoing tasks that are currently being implemented as part of normal agency responsibilities under existing authorities. Because these tasks are not being done specifically or solely for bull trout conservation, they are not included in the cost estimates. Some of these efforts may be occurring at reduced funding levels and/or in only a small portion of the watershed.

Double asterisk (**) in the total cost column indicates that estimated costs for these tasks are not determinable at this time. Input is requested to help develop reasonable cost estimates for these tasks.

Triple asterisk (***) indicates costs are combined with or embedded within other related tasks.

NORTHEAST WASHINGTON RECOVERY UNIT - IMPLEMENTATION SCHEDULE											
Priority number	Task number	Task description	Task duration (years)	Responsible parties	Cost estimates ($1,000)						Comments
					Total cost	Year 1	Year 2	Year 3	Year 4	Year 5	
1	1.1.1	Investigate and improve water quality	3	**WDOE, EPA**, POCO, USFWS	150	50	50	50			
1	1.2.2	Provide fish passage at Albeni Falls Dam	2	**COE**, USFWS	400	200	200				
1	1.2.3	Provide fish passage at Box Canyon Dam	3	**POPUD**, USFWS, FERC	600	200	200	200			May not start until 2005 or later
1	1.2.7	After nonnative fish species are eliminated, remove historic water diversion on the upper West Branch of the LeClerc Creek system	3	**USFS**, KT, WDFW, USFWS	350	50	250	50			
1	1.2.8	Reduce entrainment	5	**SCL, COE, POPUD**, USFWS	2,500	500	500	500	500	500	
1	1.2.9	Provide fish passage at Boundary Dam	3	**SCL**, USFWS	600	200	200	200			

NORTHEAST WASHINGTON RECOVERY UNIT - IMPLEMENTATION SCHEDULE											
Priority number	Task number	Task description	Task duration (years)	Responsible parties	Cost estimates ($1,000)						Comments
					Total cost	Year 1	Year 2	Year 3	Year 4	Year 5	
1	1.3.7	Develop habitat restoration/protection guidelines	25	**WDNR, USFS, KT, ST, USFWS, WDFW**	*						
1	1.4.1	Evaluate instream flow requirements of bull trout	6	**COE, POPUD, SCL** USFWS	1000	200	400	300	100		
1	1.4.2	Design and deploy gas abatement structures	9	**COE, POPUD, SCL** USFWS	900	300	300	300			Cost for construction to be determined.
1	2.5.1	Reduce abundance and distribution of non-native species	25	**WDFW**, KT, ST, USFS	2,500	100	100	100	100	100	
1	2.6.1	Liberalize harvest regulations to reduce non-natives where bull trout will benefit	25	**WDFW**	*						
1	2.6.2	Evaluate presence/absence of introduced fishes in bull trout habitat and determine site specific biological, economic, and social impact	5	**WDFW, KT, ST**, USFWS	250	50	50	50	50	50	

NORTHEAST WASHINGTON RECOVERY UNIT - IMPLEMENTATION SCHEDULE											
Priority number	Task number	Task description	Task duration (years)	Responsible parties	Cost estimates ($1,000)						Comments
					Total cost	Year 1	Year 2	Year 3	Year 4	Year 5	
1	4.3.2	Establish genetic baselines	3	**WDFW**, **KT, ST,** USFWS	180	70	100	10			
1	5.2.1	Identify threats that may be limiting bull trout in watersheds not already evaluated	5	**WDFW, KT, ST USFS**, USFWS, WSCC	500	100	100	100	100	100	
1	1.3.9	Implement habitat restoration at Box Canyon Dam, Sullivan Creek, and Boundary Dam	10-25	**FERC, SCL, POPUD,** USFWS, USFS, WDFW, KT, ST	*						
2	1.2.1	Provide fish passage on Cedar Creek	2	**CITY OF IONE**, USFWS, USFS, KT, WDFW	200	100	100				
2	1.2.4	Provide fish passage at tributary dams and barriers	3	**POPUD** USFWS	600	200	200	200			
2	1.2.5	Remove or replace culverts	10	**USFS, WDNR,** WDFW, USFWS, KT	2,250	250	250	250	250	250	

NORTHEAST WASHINGTON RECOVERY UNIT - IMPLEMENTATION SCHEDULE											
Priority number	Task number	Task description	Task duration (years)	Responsible parties	Cost estimates ($1,000)						Comments
					Total cost	Year 1	Year 2	Year 3	Year 4	Year 5	
2	1.2.6	After elimination of brook trout in the LeClerc Creek watershed, reposition or replace presently impassable culvert on U.S. Forest Service Road 1935080 crossing	2	**USFS, WDFW**, USFWS, KT	700	200	500				
2	1.3.1	Repair roads	15	**USFS**, USFWS, WDNR, POCO,	2.250	150	150	150	150	150	
2	1.3.2	Develop and implement adaptive management plans for areas impacted by livestock grazing	5	**USFS, WDNR**, USFWS	500	100	100	100	100	100	
2	1.3.3	Improve riparian and instream habitat	20	**USFS**, USFWS, KT	4,000	200	200	200	200	200	
2	1.3.4	Improve compliance with riparian management guidelines	25	**WDNR**	*						
2	1.3.5	Maintain roadless portions of bull trout watersheds in a roadless condition	25	**USFS**	*						

NORTHEAST WASHINGTON RECOVERY UNIT - IMPLEMENTATION SCHEDULE											
Priority number	Task number	Task description	Task duration (years)	Responsible parties	Cost estimates ($1,000)						Comments
					Total cost	Year 1	Year 2	Year 3	Year 4	Year 5	
2	1.3.6	Minimize impacts of dredging and sluicing within streams containing bull trout (*i.e.* Sullivan Creek)	25	**WDNR**, USFWS	*						
2	1.3.8	Reduce road densities	5	**USFS, WDNR**, KT, POCO	1,700	100	100	500	500	500	
2	3.1.1	Develop comprehensive fisheries management plans for Boundary and Box Canyon Reservoirs that incorporate bull trout recovery	2	**WDFW,** KT, USFWS, USFS	200	100	100				
2	3.2.1	Continue implementation and enforcement of restrictive fishing regulations	25	**WDFW,** KT, ST	*						
2	3.2.2	Provide information to anglers	10	**WDFW, USFWS** KT, USFS	1,500	150	150	150	150	150	
2	3.2.3	Reduce angler pressure	25	**WDFW**, KT, ST	*						

NORTHEAST WASHINGTON RECOVERY UNIT - IMPLEMENTATION SCHEDULE											
Priority number	Task number	Task description	Task duration (years)	Responsible parties	Cost estimates ($1,000)						Comments
					Total cost	Year 1	Year 2	Year 3	Year 4	Year 5	
2	3.3.1	Evaluate impacts of stocking programs	3	**KT**, USFWS, WDFW	300	100	100	100			
2	3.4.1	Evaluate impact of scientific collection permits on bull trout local populations	25	**USFWS**, **WDFW**	*						
2	4.3.3	Evaluate threat of hybridization with brook trout	3	**WDFW**, **USFS** USFWS,	*						
2	4.3.4	Evaluate feasibility of an artificial propagation program	3	**USFWS,** WDFW, YN	30	10	20	10			
2	5.1.1	Increase monitoring	25	**KT, WDFW**, USFWS	2,500	100	100	100	100	100	
2	5.1.2	Develop a comprehensive map of primary bull trout tributary reaches for focusing habitat protection and recovery efforts	3	**USFWS**, KT, WDFW, USFS	75	25	25	25			
2	6.1.1	Support collaborative efforts.	20	**WDFW**, USFS, USFWS, KT, ST	2,000	100	100	100	100	100	

NORTHEAST WASHINGTON RECOVERY UNIT - IMPLEMENTATION SCHEDULE											
Priority number	Task number	Task description	Task duration (years)	Responsible parties	Cost estimates ($1,000)						Comments
					Total cost	Year 1	Year 2	Year 3	Year 4	Year 5	
2	6.1.2	Provide long-term habitat protection	10	**USFS, KT,** USFWS	1,000	100	100	100	100	100	
2	6.3.1	Review and implement Forest and Fish standards	25	**WDNR**, WDFW, USFWS	*						
3	4.3.1	Establish genetic protocols	3	**USFWS,** WDFW, KT, ST	*						
3	6.3.2	Monitor and enforce Hydraulic Permit Applications in the State of Washington	25	**WDNR**, WDFW	*						
3	7.3.1	Periodically review progress toward recovery goals and assess recovery task priorities	25	**USFWS**, USFS, WDFW	*						

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APPENDIX A