Chapter: 15

State(s): Idaho

Recovery Unit Name: Coeur d'Alene Lake Basin

Region 1
U S Fish and Wildlife Service
Portland, Oregon

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The following individuals contributed to the Coeur d'Alene Lake Basin Recovery Unit chapter:

Coeur d'Alene Lake Basin Recovery Unit Team

Dee Bailey, Coeur d'Alene Tribe of Indians
Scott Deeds, U.S. Fish and Wildlife Service
Joe DuPont, Idaho Department of Lands
Bob Hallock, U.S. Fish and Wildlife Service
Lisa Hawdon, U.S. Forest Service
Ray Hennekey, Idaho Department of Fish and Game
Ed Lider, U.S. Forest Service
Mike Mihelich, Kootenai Environmental Alliance
Dave Mosier, Idaho Department of Environmental Quality
Ron Peters, Coeur d'Alene Tribe of Indians
Kathy Stangl, Bureau of Land Management

Additional Contributors

Dan Audet, U.S. Fish and Wildlife Service
Chip Corsi, Idaho Department of Fish and Game
Terry Cundy, Potlatch Timber Company
Ned Horner, Idaho Department of Fish and Game
Cameron Heusser, Coeur d'Alene Tribe of Indians
Sam Lohr, U.S. Fish and Wildlife Service
Brett Roper, U.S. Forest Service
Mark Snyder, U.S. Fish and Wildlife Service

COEUR D' ALENE LAKE BASIN 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 population of bull trout as a threatened species on June 10, 1998 (63 FR 31647). The Coeur d'Alene Lake Basin Recovery Unit (often referred to in this chapter as the Coeur d'Alene Recovery Unit) forms part of the range of the Columbia River population. The Coeur d'Alene Recovery Unit encompasses 1) the Spokane River and its tributaries upstream of Post Falls Dam and 2) Coeur d'Alene Lake and its tributaries. The Coeur d'Alene Recovery Unit Team identified the Coeur d'Alene Lake Basin core area as the only core area within the Coeur d'Alene Recovery Unit. Current knowledge suggests that local populations within the Coeur d'Alene Recovery Unit consist primarily of the migratory form. Therefore, the core area encompasses the entire Coeur d'Alene Lake, the St. Joe and Coeur d'Alene River subbasins, and all associated tributaries as migratory bull trout may utilize all of these areas during some portion of their life history.

HABITAT REQUIREMENTS AND LIMITING FACTORS

The distribution and abundance of bull trout in the Coeur d'Alene Lake basin have been effectively limited by landscape-level changes that degraded physical and chemical habitat quality and resulted in fragmentation of habitat patches and isolation of populations. It is widely accepted that the persistence of the species is linked to the resilience of local populations as well as to the condition, structure, and interaction of populations and habitats at larger scales. Dramatic changes in riparian, wetland, stream, and forest ecosystems have resulted from several suppressing factors that include livestock grazing, dam construction, logging, mining, introduction of and management for exotic species, channelization, urbanization, construction of transportation networks, and irrigation withdrawals. In many instances, habitat degradation and consequent reduction in bull trout populations have resulted from the cumulative effects of

changes to terrestrial and aquatic ecosystems. Over time, these cumulative effects may be the most harmful to bull trout populations because of their potential to alter ecosystem processes that have defined bull trout existence.

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 the Coeur d'Alene Recovery Unit:

- Maintain current distribution of bull trout and restore distribution in previously occupied or depressed areas within the Coeur d'Alene Recovery Unit.

- Maintain stable or increasing trends in bull trout abundance.

- 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 Coeur d'Alene Recovery Unit were established to assess whether recovery actions result in the recovery of bull trout in the basin. The criteria developed for bull trout recovery address quantitative measurements of bull trout distribution and population characteristics on a recovery unit basis.

Because little is known about resident life history forms and their contribution to the status of local populations within the Coeur d'Alene Recovery Unit, the recovery criteria in this chapter will address only the migratory forms. As additional research and new knowledge becomes available relating to resident

bull trout and their contribution to each local population, refinement of criteria will be made as dictated by the new information.

1. **Distribution criteria will be met when the total number of stable local populations has been increased to 11 and when these populations occur broadly throughout the core area.**

Within the core area, population levels that represent a recovered status for migratory bull trout have been established for two subbasins. Delineation of subbasins will ensure that recovery of local populations will restore distribution within the Coeur d'Alene Recovery Unit and will improve management efficiency within each subbasin and throughout the Coeur d'Alene Recovery Unit. The subbasins are as follows:

- The St. Joe River subbasin will consist of at least 8 local populations that contribute to a total of an average of 800 annual adult spawners. However, within this subbasin, 5 local populations with an average of 500 annual adult spawners will occur above and/or in Red Ives Creek, and 3 local populations with an average of 300 annual adult spawners will occur from Red Ives Creek downstream to Big Creek.

- The Coeur d'Alene River subbasin, particularly the North Fork Coeur d'Alene River drainage, will consist of at least 3 local populations contributing to an average of 300 annual adult spawners.

2. **Trend criteria will be met when the overall bull trout population in the Coeur d'Alene Recovery Unit is accepted, under contemporary standards of the time, as being stable or increasing, based on at least 10 years of monitoring data.**

3. **Abundance criteria will be met when the core area hosts at least 11 stable local populations (8 in the St. Joe River and 3 in the North Fork**

Coeur d'Alene River), contributing to an average of 1,100 adults spawners per year.

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

ACTIONS NEEDED

Recovery for bull trout will entail reducing threats to the long-term persistence of local populations and their habitats, ensuring the security of multiple interacting groups of bull trout, and providing habitat conditions and access to conditions that allow for the expression of various life history forms. 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 cost of bull trout recovery in the Coeur d'Alene Recovery Unit is estimated at $3.9 million spread over a 25-year recovery period. Total costs include estimates of expenditures by local, Tribal, State, and Federal governments and by private business and individuals. Cost estimates are not provided for tasks which are normal agency responsibilities under existing authorities. These costs are attributed to bull trout conservation, but other aquatic species will also benefit.

ESTIMATED DATE OF RECOVERY

Time required to achieve recovery depends on 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.

For the North Fork Coeur d'Alene River drainage, however, two scenarios are possible for achieving recovery. Both must be considered for the estimated date of recovery:

1. Allow for natural recolonization to occur within the North Fork Coeur d'Alene River watershed and implement a controlled propagation program only if all other measures have been ineffective in improving bull trout status in the wild. With this scenario, an extended recovery duration would be expected, even if threats to bull trout and bull trout habitats are significantly reduced through implementing recovery tasks (20 to 25 years), because there are no known local populations to expand within the North Fork Coeur d'Alene River watershed and no source of bull trout within the Coeur d'Alene Recovery Unit large enough to support natural recolonization. As local populations within the St. Joe River subbasin expand 4 to 5 generations out, the opportunities for natural recolonization to occur within the North Fork Coeur d'Alene River drainage may increase. However, natural recolonization is expected to occur very slowly, if at all, in the North Fork Coeur d'Alene River watershed as recent behavioral and genetic studies of bull trout in other portions of their range suggest that the fish exhibit a high degree of fidelity to natal streams. Therefore, recovery may take an additional 4 to 5 generations (20 to 25 years), totaling 8 to 10 generations (40 to 50 years), for this subunit.

2. Accelerate recovery time by initiating a controlled propagation program. This program would only be initiated 1) upon completion of a feasibility study to identify a host of streams having the greatest potential to support local populations and 2) concurrent with reduction of threats to bull trout and bull trout habitats. With this scenario, recovery of bull trout within the

North Fork Coeur d'Alene River may be prolonged by only one or two generations (5 to 10 years) because the feasibility study and development of a controlled propagation program would take approximately five years. Under this scenario, recovery of bull trout for the Coeur d'Alene Recovery Unit is expected to occur within five to seven bull trout generations (25 to 35 years). Because the population of bull trout within the Coeur d'Alene Recovery Unit is seriously imperiled, initiating this program as quickly as possible may also be necessary to establish a genetic refugia. Currently, only one known local population in the St. Joe River may meet the level of 100 annual adult spawners that has been suggested by Rieman and Allendorf (2001) to minimize the risk of inbreeding depression. In addition, because of the risks related to stochastic and deterministic processes, the population of bull trout within the Coeur d'Alene Recovery Unit is a prime candidate for a propagation program.

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INTRODUCTION

Recovery Unit Designation

The Coeur d'Alene Lake basin is one of 22 recovery units designated for bull trout in the Columbia River basin (Figure 1). Bull trout in the basin have probably been isolated for more than 10,000 years from fish in the rest of the Columbia River basin by Spokane Falls. Genetic analyses of tissue samples collected from bull trout in Medicine Creek in 1994 by the U.S. Fish and Wildlife Service indicated that these fish comprise a relatively unique stock, having evolved in isolation from other Columbia River basin bull trout for approximately 15,000 years since the Lake Missoula Bretz floods (Williams *et al*. 1994).

The Coeur d'Alene Lake Basin Recovery Unit (often called the Coeur d'Alene Recovery Unit in this chapter) is found within the area designated as the Columbia River distinct population segment and includes the Spokane River from Post Falls Dam to Coeur d'Alene Lake, the lake, and the entire lake drainage area. Two subbasins occur within the Coeur d'Alene Recovery Unit: the Coeur d'Alene and St. Joe Rivers. The largest tributaries that occur within these subbasins include the North Fork Coeur d'Alene River and South Fork Coeur d'Alene River in the Coeur d'Alene River subbasin and the St. Maries River in the St. Joe River subbasin. The Coeur d'Alene Recovery Unit represents a distinct and unique portion of the range of the species. Bull trout in the Coeur d'Alene Lake basin were addressed in a single problem assessment (PBTTAT 1998) developed for the *State of Idaho Bull Trout Conservation Plan* (Batt 1996).

Geographic Description

The Coeur d'Alene Recovery Unit (Figure 2) is located in four northern Idaho counties: Shoshone, Kootenai, Benewah, and Latah. Coeur d'Alene Lake is the principle water body in the basin and serves as the base elevation for the principle streams and rivers in the area. The lake is the second largest in Idaho. The cities of Coeur d'Alene (Kootenai County) and St. Maries (Benewah County)

are the most populated areas in the Coeur d'Alene Recovery Unit. Coeur d'Alene is located on the northernmost shoreline of Coeur d'Alene Lake, and St. Maries lies about 19 kilometers (12 miles) upstream of Coeur d'Alene Lake on the St. Joe River. The basin is approximately 9,946 square kilometers (3,840 square miles) and extends from Coeur d'Alene Lake upstream to the Bitterroot Divide on the border of Idaho and Montana. Range in elevation is 646 meters (2,120 feet) to more than 2,134 meters (7,000 feet) along the divide (NPPC 2001).

The Spokane River, the only surface outlet of Coeur d'Alene Lake, flows westerly from the northern end of the lake to its confluence with the Columbia River, 160.9 kilometers (100 miles) to the southwest (NPPC 2001). A series of falls on the upper Spokane River formed barriers to the post-glacial dispersal of fishes, such as the Pacific salmon and steelhead trout, from the lower Columbia River to the Coeur d'Alene Lake basin (Simpson and Wallace 1982).

Figure 1. Bull trout recovery units in the United States. The Coeur d'Alene Lake Basin Recovery Unit is highlighted.

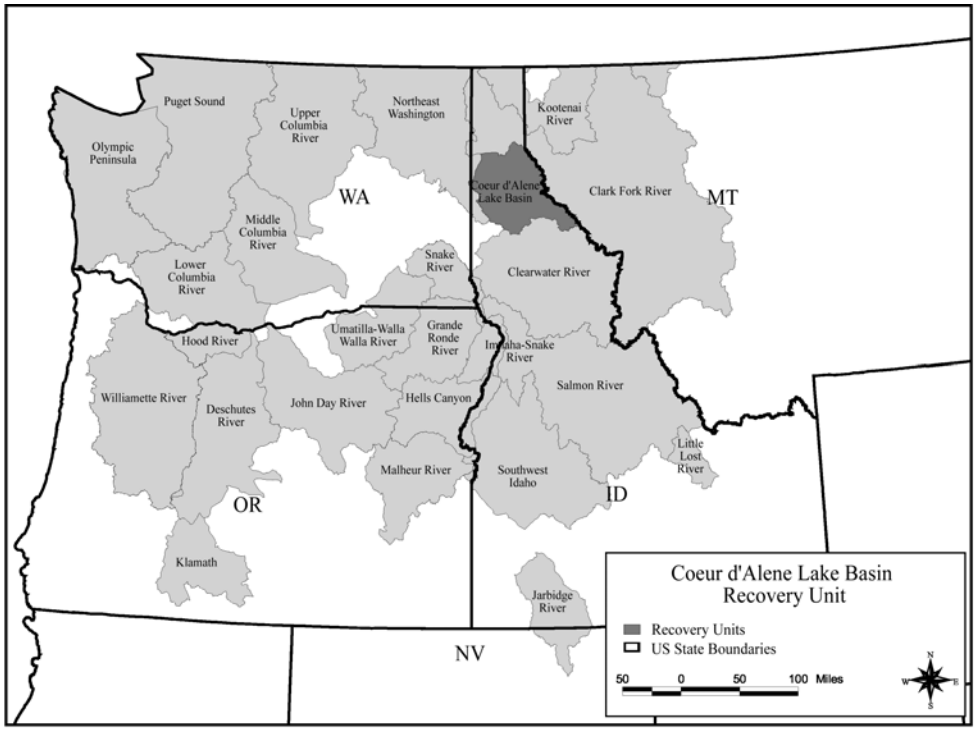
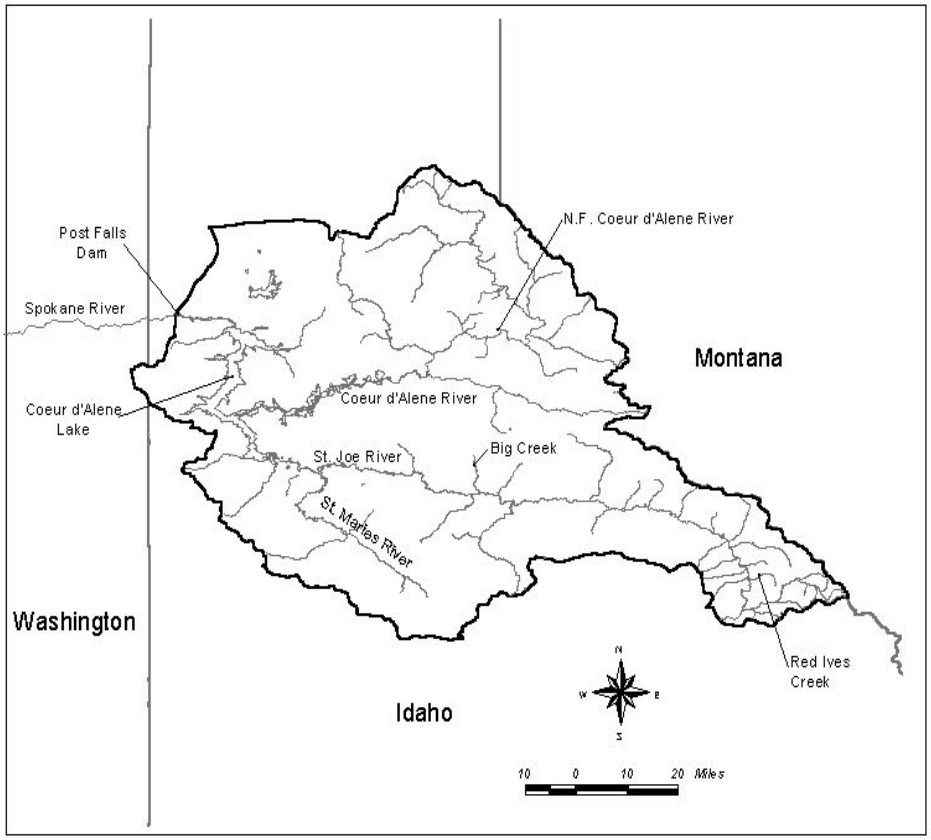


Figure 2. Map of the Coeur d'Alene Lake Basin Recovery Unit.



Major land managers within the basin include the U.S. Forest Service, Bureau of Land Management, State of Idaho, Coeur d'Alene Tribe, Louisiana Pacific Company, Crown Pacific International Corporation, and Potlatch Corporation. A portion of the basin lies within the boundaries of the Coeur d'Alene Indian Reservation. The U.S. Forest Service manages most of the land within the basin. The Idaho Department of Fish and Game and the Coeur d'Alene Tribe are managers of fish populations within the basin.

Northern Idaho is dominated by Pacific maritime air masses and prevailing westerly winds, modified by continental air masses from Canada (PBTTAT 1998). Annual precipitation in the Coeur d'Alene Recovery Unit

ranges from about 752 millimeters (30 inches) to more than 2,540 millimeters (100 inches), with over 90 percent of it occurring during fall through spring. Cyclonic storms consisting of a series of frontal systems moving west to east produce extended, low-intensity precipitation during this time. A seasonal snowpack generally exists at elevations greater than 1,372 meters (4,500 feet) during November to June. Snowpack under 914 meters (3,000 feet) tends to accumulate and melt several times during a given winter due to mild storms (USFS 1998a). Elevations of 914 to 1,372 meters (3,000 to 4,500 feet) are generally considered the "rain-on-snow zone" where watersheds are subject to floods caused by rapidly melting snow. High-intensity electrical storms are common during the summer months and frequently cause wildfires.

The underlying geology of much of the basin is primarily Belt meta-sediments, but the southern portion of the St. Joe River subbasin and the St. Maries River drainage have been modified or influenced by intrusions of the highly granitic Idaho Batholith (PBTTAT 1998). These intrusions have resulted in the formation of re-metamorphosed sedimentary rock that tends to be less stable than landforms based primarily on Belt meta-sediments.

The relatively rapid rate of mountain-forming uplifting, along with runoff associated with a moist climate, has resulted in larger streams and rivers adjusting by cutting deep canyons and valleys (PBTTAT 1998). Breaklands are a common land type in the St. Joe River and Coeur d'Alene River subbasins. Breaklands are typically steep and may be more susceptible to mass erosion in some areas. Alpine glaciation in the upper reaches of the St. Joe River and Coeur d'Alene River subbasins have resulted in alluvial valleys that may be important for bull trout. The St. Maries River drainage tends to be more rounded, and with less relief, than the reminder of the basin is. Streams in the drainage tend to be low gradient and meandering, with a high percentage of the bed and banks consisting of fine alluvial materials from ancient Lake Clarkia. The origins of Coeur d'Alene Lake are related to continental glaciation, and the lake provides the base elevation for the St. Joe River and Coeur d'Alene River subbasins. The lake was formed when a flooded river valley was impounded by deposits from the glacial Lake Missoula floods.

The lake lies in a naturally dammed river valley, and its outflow is currently controlled by Post Falls Dam. For part of the year, Post Falls Dam holds the lake level at higher elevations than would occur under natural conditions and creates a backwater effect in the lower Coeur d'Alene, St. Joe, and St. Maries Rivers. At full pool (lake elevation 648.7 meters, or 2128 feet) the lake covers 12,900 hectares (31,876 acres), and at minimum pool level (lake elevation of 646.2 meters, or 2120 feet) the lake covers 12,200 hectares (30,146 acres). The lake is 42 kilometers (26 miles) long and anywhere from 1.6 to 9.6 kilometers (1.0 to 6.0 miles) wide. The mean depth of the lake is 22 meters (72 feet), with a maximum depth of 63.7 meters (209 feet) (NPPC 2001).

Instream flows in the basin are typically low during late summer and early fall months and high in the spring and early summer. Runoff and peak discharge from Coeur d'Alene Lake generally occur from April to June, but the highest peak flows recorded are from mid-winter rain-on-snow events. Peak flows from the St. Joe and Coeur d'Alene Rivers have exceeded 1,415 cubic meters per second (50,000 cubic feet per second) and 1,982 cubic meters per second (70,000 cubic feet per second), respectively. Mean monthly discharges from both the St. Joe and Coeur d'Alene Rivers range from September lows of 11 to 14 cubic meters per second (400 to 500 cubic feet per second) to April and May highs of 198 to 227 cubic meters per second (7,000 to 8,000 cubic feet per second).

Many tributaries feed Coeur d'Alene Lake. The two principle tributaries are the Coeur d'Alene and St. Joe Rivers that drain the Coeur d'Alene and St. Joe mountains, respectively. The St. Joe River basin drains an area of approximately 4,470 square kilometers (1,726 square miles) and contains more than 1,189 kilometers (739 miles) of streams with over 78 principle tributaries. The Coeur d'Alene River basin drains an area of approximately 3,858 square kilometers (1,489 square miles) and contains an estimated 1,052 kilometers (654 miles) of stream with over 78 tributaries. In addition, over 27 tributaries encompassing more than 321 kilometers (over 200 miles) of streams feed directly into Coeur d'Alene Lake (NPPC 2001).

Water quality conditions vary widely in the Coeur d'Alene Lake basin. Water quality problems include high levels of heavy metals (lead, cadmium, and zinc) in the South Fork Coeur d'Alene River and many of its tributaries, high nutrient loading in portions of the lower St. Joe and St. Maries Rivers, and high sediment loads and temperatures in a number of streams throughout the basin (PBTTAT 1998). In total, over 85 water bodies that include streams, stream segments, rivers, and lakes within the Coeur d'Alene Recovery Unit are currently listed on the State of Idaho's 303(d) list of water quality impaired waters because of being water quality limited and not supporting their beneficial uses. However, many areas within the basin maintain good water quality conditions that fully support beneficial uses during the entire year or for major portions of the year. These areas include water bodies in the upper portions of the St. Joe and North Fork Coeur d'Alene Rivers, portions of the mainstem corridors in the St. Joe and North Fork Coeur d'Alene Rivers, and portions of Coeur d'Alene Lake.

Historical vegetation patterns were largely influenced by wildfire (PBTTAT 1998). Early accounts and photographs of the Coeur d'Alene Lake basin indicate that old growth stands of western red cedar (*Thuja plicates*) and other species were common in riparian areas and floodplains. Large cedar stumps are found in many riparian areas along streams in the Coeur d'Alene Lake basin. Uplands were more typically dominated by seral species in various stages of succession, with age and composition dependent largely on fire cycles and slope aspect.

Canopy tree cover varies along low-elevation riparian areas near tributary confluences (PBTTAT 1998). In areas with low or no canopy cover, vegetation includes shrubs and small trees such as thin-leaf alder (*Alnus sinuata*), willows (*Salix* species), snowberry (*Symphoricarpos albus*), mountain maple (*Acer glabrum*), red-osier dogwood (*Cornus stolonifera*), blue elderberry (*Sambucus cerulea*), and black hawthorn (*Crataegus douglasii*). Where tree canopy is present, tree species include black cottonwood (*Populus trichocarpa*) or water birch (*Betula occidentali*), quaking aspen (*Populus tremuloides*), and a mix of conifer species, such as western red cedar, western hemlock (*Tsuga heterophylla*), Douglas-fir (*Pseudotsuga menziesii*), grand fir (*Abies grandis*), and western white

pine (*Pinus monticola*). White pine stands have been greatly reduced by white pine blister rust, an introduced pathogen.

Conifer forests in the basin consist of mixed stands of western red cedar and western hemlock; codominant Douglas-fir and ponderosa pine (*Pinus ponderosa*); and Douglas-fir, western larch (*Larix occidentalis*), lodgepole pine (*Pinus contorta*), and western white pine. Dense stands of Douglas-fir, larch, and lodgepole are characteristic of slopes with north and east aspects. Relatively open stands of Douglas-fir and ponderosa pine are typical on the warmer and drier slopes having south and west aspects.

Representative species of upland shrubs include western serviceberry (*Amelachier alnifolia*), mountain maple, snowberry, mountain balm (*Ceanothus velutinus*), mallow ninebark (*Physocarpus malvaceus*), and huckleberry (*Vaccinium* species).

Twelve native fishes inhabit the Coeur d'Alene Lake basin: northern pikeminnow (*Ptychocheilus oregonensis*), redside shiner (*Richardsonius balteatus*), torrent sculpin (*Cottus rhotheus*), shorthead sculpin (*C. confusus*), speckled dace (*Rhinichthys osculus*), longnose dace (*R. cataractae*), longnose sucker (*Catastomus catastomus*), largescale sucker (*Ca. macrocheilus*), bridgelip sucker (*Ca. columbianus*), mountain whitefish (*Prosopium williamsoni*), westslope cutthroat trout (*Oncorhyncus clarki lewisi*), and bull trout.

Nonnative fishes in the basin include smallmouth bass (*Micropterus dolomieui*), largemouth bass (*M. salmoides*), crappie (*Pomoxis* species), sunfish (*Lepomis* species), yellow perch (*Perca flavescens*), brown bullhead (*Ameiurus nebulosus*), channel catfish (*Ictalurus punctata*), tench (*Tinca tinca*), northern pike (*Esox lucius*), tiger musky (*E. lucius x E. masquinogy*), brook trout (*Salvelinus fontinalis*), rainbow trout (*O. mykiss*), chinook salmon (*O. tshawytscha*), and kokanee (*O. nerka*). Many of these species can competitively exclude or replace bull trout in either stream or lake environments (Bond 1992; Ratliff and Howell 1992; Rieman and McIntyre 1993).

DISTRIBUTION AND ABUNDANCE

Status of Bull Trout at the Time of Listing

In the final listing rule (63 FR 31647), the U.S. Fish and Wildlife Service identified a single bull trout subpopulation in the Spokane River basin (USFWS 1998). The subpopulation contains migratory fish (fluvial and adfluvial) primarily spawning in tributaries of the upper St. Joe River. At the time of listing, the status of the subpopulation was considered depressed, and the trend was considered declining. The U.S. Fish and Wildlife Service considered nonnative species, grazing, roads, mining, residential development, water quality, and forestry to be threats to the bull trout subpopulation (USFWS 1998). The magnitude of threats was considered high and imminent. 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. Therefore, subpopulation terms will not be used in this chapter.

Current Distribution and Abundance

Bull trout are currently found primarily in the upper portions of the St. Joe River subbasin (PBTTAT 1998; USFWS 1998), which contains spawning and rearing habitats. Migratory bull trout also use the St. Joe River and Coeur d'Alene Lake for foraging, migrating, and overwintering habitat. The current distribution is substantially less than the historical distribution. For example, Fields (1935) and Maclay (1940) documented bull trout in over 30 streams and river reaches throughout the basin over 60 years ago. Bull trout have not been observed in many of these streams in recent years, and spawning and rearing appear to be concentrated in relatively few tributaries of the St. Joe River subbasin (USFWS 1998).

The North Fork Coeur d'Alene River and its tributaries encompass a relatively large portion of the Coeur d'Alene Recovery Unit. Within the North Fork Coeur d'Alene drainage, Maclay (1940) observed bull trout in eight creeks

(Grizzly, Brown, Beaver, Lost, Big, Downey, Yellow Dog, and West Fork Eagle Creeks), in addition to the North Fork Coeur d'Alene River. Bull trout were observed in Brown and Graham Creeks by Idaho Department of Fish and Game researchers from 1984 to 1987 (Apperson *et al.* 1988). In 1985, a single bull trout was caught in the main Coeur d'Alene River at the mouth of Cinnabar Creek (E. Lider, USFS, pers. comm., 2001). Anglers reported bull trout in Fall Creek in the early 1990's and in Prichard Creek in 1998 (D. Lowry, IDFG, pers. comm., 1998). However, neither additional surveys in these two streams (PBTTAT 1998), nor surveys of 73 other streams in the North Fork Coeur d'Alene River drainage from 1994 to 1995 (Dunnigan and Bennett 1997) confirmed the presence of bull trout. The origin of the bull trout observed in Prichard Creek may have been fish stocking in Revett Lake in the early 1990's; those fish may have moved downstream (PBTTAT 1998). In 1998, anglers caught two adult bull trout in Black Lake; the fish were verified through photo documentation (J. Fredericks, IDFG, pers. comm., 1998). Located in the lower portion of the Coeur d'Alene River subbasin, Black Lake is relatively small and deep and may provide coldwater refugia and a forage base for bull trout. In the 1970's, Laumeyer (1976) did not observe bull trout at 21 sites sampled within the North Fork Coeur d'Alene River drainage.

In the St. Joe River subbasin, the highest densities of bull trout are primarily found upstream of Heller Creek. Since 1992, redd surveys led by biologists from the Idaho Department of Fish and Game and the U.S. Forest Service, in up to 29 locations, has resulted in observations of redds in more than 20 stream and river reaches (Table 1). Overall, more than 70 percent of the bull trout redds were located upstream of Heller Creek, with over 50 percent occurring in a 3-kilometer (approximately 2-mile) reach of Medicine Creek (PBTTAT 1998). The Idaho Department of Fish and Game currently conducts annual bull trout redd surveys in three index streams within the St. Joe River subbasin (Medicine and Wisdom Creeks and the upper St. Joe River between Heller Creek and St. Joe Lake).

Table 1. Bull trout redds counted in the St. Joe River and tributaries from 1992 to 2001. (IDFG *in litt*. 1998, 2001; USFS *in litt*. 2001)

Stream	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Bean Creek	14	–	–	0	–	–	–	–	–	–
Beaver and Bad Bear Creeks	2	2	0	0	0	0	1	–	–	0
California Creek	2	4	0	2	3	0	–	–	0	0
Fly Creek	1	–	–	0	0	–	2	0	–	–
Gold Creek	–	2	–	0	1	1	0	0	–	1
Heller Creek	0	0	0	0	–	1	0	0	0	–
Medicine Creek	11	33	48	26	23	13	11	48	43	16
Mosquito Creek	0	–	0	0	4	0	2	–	–	–
North Fork Simmons Creek	–	0	1	0	–	–	–	–	–	–
Red Ives Creek	–	0	1	1	0	1	0	0	0	0
Ruby Creek	0	1	–	8	–	–	–	–	–	–
Sherlock Creek	0	3	0	2	1	1	0	–	0	–
Simmons Creek	–	7	5	0	0	0	1	–	0	0
Simmons Creek: Three Lakes Cr. to Washout Cr.	–	0	0	5	1	0	–	–	–	–
St. Joe River: Heller Cr. to St. Joe Lake	10	14	3	20	14	6	0	10	2	11
St. Joe River: Spruce Tree to Bean Creek	–	–	–	4	0	–	–	–	–	–
St. Joe River below Tento Creek	–	–	–	–	3	–	–	–	–	–
Timber Creek	–	0	1	0	–	–	–	–	–	–
Washout Creek	–	3	0	0	0	0	–	–	–	–
Wisdom Creek	1	1	4	5	1	0	4	11	3	13

Table 1. Bull trout redds counted in the St. Joe River and tributaries from 1992 to 2001. (IDFG *in litt*. 1998, 2001; USFS *in litt*. 2001)

Stream	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Yankee Bar Creek	1	0	–	–	–	0	–	–	1	0

Maclay (1940) documented bull trout in Sisters, Bluff, Boulder (a tributary of Marble Creek), Bruin, Quartz, and Mica Creeks. Recent surveys determined that spawning and rearing are unlikely in Bruin and Quartz Creeks and failed to document bull trout in Mica Creek during 1993 to 1994 (PBTTAT 1998). Two bull trout were observed during snorkel surveys conducted in summer 1974 in Mica Creek (Thurow and Bjornn 1978).

Although bull trout were not observed in Indian Creek by Maclay (1940) or during recent surveys, habitat conditions appear conducive to bull trout, and the creek's proximity to other spawning streams may encourage colonization (PBTTAT 1998). In 1997, two bull trout of about 140 millimeters (5.5 inches) in length were sampled in Eagle Creek (St. Joe River subbasin), suggesting occasional use or recruitment within the stream.

In the St. Maries River drainage, Fields (1935) and Maclay (1940) observed bull trout in Santa Creek. Recent surveys did not collect bull trout in any tributaries in the drainage (PBTTAT 1998; T. Cundy, Potlatch Timber Company, pers. comm., 2001). However, anecdotal reports from anglers indicate that bull trout may be present in the St. Maries River.

In 1996, the U.S. Forest Service completed aquatic habitat surveys in the federally managed portions of the North Fork St. Joe River drainage, and the Idaho Department of Environmental Quality and U.S. Forest Service conducted electrofishing surveys in selected areas (PBTTAT 1998). The U.S. Forest Service has also conducted infrequent bull trout redd surveys in the drainage since 1992. Given survey results, it is unlikely that the North Fork St. Joe River drainage presently supports bull trout. However, considering the relatively large size of the

drainage (29,203 hectares, or 72,160 acres) and its proximity to other spawning areas, bull trout may occasionally use the drainage.

While sampling error is likely during redd counts, Dunham *et al.* (2001) found that estimated adult escapement and redd counts were strongly correlated. Studies have shown that the number of bull trout per redd varies in different systems. Dunham *et al.* (2001) found a mean number of 2.8 adults per redd in Trestle Creek, Idaho, while Fraley *et al.* (1981) found an average of 3.9 adults per redd in the Flathead River basin, Montana. Using the results of these studies, with an average of 2.8 to 3.9 adult spawners per redd, along with data from redd counts conducted by the U.S. Forest Service and Idaho Department of Fish and Game from 1992 to 2001, the Coeur d'Alene Recovery Unit Team estimated the number of annual adult bull trout spawners in the St. Joe River and its tributaries at between 190 and 264. However, because comprehensive bull trout redd surveys on an annual basis are not being conducted in all tributary or river reaches where spawning activities have been previously documented and because some bull trout may exhibit alternate year spawning behavior (Shepard *et al.* 1984; Hvenegaard and Thera 2001), these population estimates may be low. Nonetheless, using the best available information to establish these estimates, using conclusions from theoretical models used by Rieman and Allendorf (2001) for maintaining genetic variability, and considering the risks related to stochastic and deterministic processes, the recovery unit team considers the population of bull trout within the Coeur d'Alene Recovery Unit to be seriously imperiled.

The Coeur d'Alene Recovery Unit Team maintains that occasional surveys do not demonstrate absence of bull trout in tributary streams. In most cases, such surveys are not rigorous and do not offer the best chances of observing low densities of bull trout. Therefore, even where occasional surveys have failed to document the presence of bull trout, if habitat parameters suitable for bull trout occupation are present, these areas may be considered candidates for restoration and at this time are considered essential for the recovery of bull trout within the Coeur d'Alene Recovery Unit. For these reasons, some streams may be added to or excluded from the list of priority streams when new information becomes available.

REASONS FOR DECLINE

Euro-Asian settlement of the basin has been accompanied by forest clearing, agricultural development, logging, introduction of nonnative species, mining and smelting, railroad construction, hydroelectric development, and urbanization (PBTTAT 1998). Forest products are an important commodity from timbered lands within the basin watershed. Present vegetation conditions have been influenced by all of these factors, as well as by natural and human-caused fires.

Forest fires have affected vegetation within the Coeur d'Alene Lake basin during the last century. A large fire in 1910 burned an estimated 1,214,100 hectares (3,000,000 acres) in western Montana and northern Idaho (PBTTAT 1998). The most severely burned areas were reportedly on the north and south slopes of the Bitterroot Mountains (Guth and Cohen 1991; Pratt and Huston 1993). Much of the Coeur d'Alene Lake basin lies within the Bitterroot Mountains.

Dams

Post Falls Dam, which was completed in the early 1900's, is operated by Avista Utilities (formerly Washington Water Power Company) and regulates water levels in Coeur d'Alene Lake (PBTTAT 1998). During most of the year, operation of Post Falls Dam also affects water levels in the lower reaches of the St. Joe and Coeur d'Alene Rivers. Regulation of water levels primarily influences aquatic habitat conditions at shoreline areas of the lake and lower reaches of lake tributaries and results in backwater areas.

The remnants of a historic structure for domestic water supply are still present in Red Ives Creek, a tributary of the St. Joe River (PBTTAT 1998). The structure may be inhibiting upstream fish movement, especially during base stream flows. A large bull trout was observed upstream of the structure during

snorkel surveys in 1993, indicating some bull trout may be able to pass above the structure. Modifying the structure may increase access of bull trout to Red Ives Creek.

In the past, splash dams were used in several streams (most notably Marble Creek in the St. Joe River basin) and created significant changes to stream channels and fish habitats by creating migration barriers and scouring channels with regular releases of large quantities of water and logs. Remnants of the Marble Creek splash dam are still present and continue to be a barrier to upstream migration (PBTTAT 1998).

Forest Management Practices

Forest management activities have altered aquatic and riparian habitats in the Coeur d'Alene Recovery Unit. Timber harvesting activities have included clear-cutting, partial cutting, thinning, fertilization, road construction, and prescribed burning (PBTTAT 1998). Removal of riparian vegetation has increased stream temperatures and contributed to elevated sediment levels in tributary streams. The legacy effects of forest management have resulted in streams having both low concentrations of large woody debris (for example, from riparian harvest and log skidding directly in streams) and low potential for recruitment of large woody debris. Early logging throughout the Coeur d'Alene Recovery Unit largely occurred in valleys where logs could be easily skidded or transported by flume to the river and ultimately floated to downstream mills. Splash dams were used in the North Fork Coeur d'Alene River, Little North Fork Coeur d'Alene River, and tributaries to the St. Joe River, such as Marble Creek. Current forest management practices have improved (for example, requiring that trees be left in riparian areas; prohibiting equipment in or near streams; and controlling erosion from roads, trails, and landings), so impacts have been lessened.

Roads for timber harvest and improved fire control have been built throughout most of this century and continue to be built in the Coeur d'Alene Lake basin (PBTTAT 1998). The effects on streams of roads built for timber

management and other development activities may include increases in sediment delivery because of surface runoff and landslides; barriers to fish passage at crossings; alteration of hydrologic regimes; and decreases in habitat complexity due to channelization, floodplain encroachment, and destruction of riparian vegetation. Areas with the highest density of roads occur in areas managed primarily for timber production, and roads paralleling tributary streams are common. Over half of the tributaries (second order streams and larger) in the St. Joe, St. Maries, and Coeur d'Alene River drainages have reaches that are affected by roads constructed in floodplains or adjacent to stream channels. Roads, many of which were initially constructed for timber harvest, run parallel to most tributary streams, with the exception of Independence Creek and portions of the upper North Fork Coeur d'Alene River (Dunnigan and Bennett 1997). Road densities in some Coeur d'Alene River watersheds exceed 11.8 kilometers per square kilometer (19.0 miles per square mile), with an average road density of 3.1 to 3.7 kilometers per square kilometer (5.0 to 6.0 miles per square mile) for many watersheds throughout the basin (PBTTAT 1998; USFS 1998a, 1998b). Many of the roads are not maintained (USFS 1998a) and contribute sediments to streams. Past timber harvest practices such as use of splash dams and log flumes, riparian timber harvest, and large clearcuts have altered stream channels and hydrologic regimes and have reduced recruitment of large woody debris.

Within the St. Joe River subbasin, effects of timber management practices on aquatic habitats are more prevalent in watersheds lower in the system than in watersheds in the upper portion, which currently supports bull trout. For example, legacy and current effects of timber management exist in the Sisters Creek, North Fork St. Joe River, Bluff Creek, and Boulder Creek watersheds. Bull trout were observed in these streams historically, but they have not been collected in recent surveys. In these watersheds there are private timberlands that have had extensive road construction and riparian timber harvest (PBTTAT 1998). Along the lower 6.4 kilometers (4 miles) of Bluff Creek, a road constructed adjacent to the stream has simplified stream channel habitats because of channelization and debris removal. Landslides related to poorly constructed roads in the 1970's have contributed to delivery of coarse and fine sediments, and a recently constructed road is responsible for substantial delivery of fine

sediments in Bad Luck Creek, a tributary in the Bluff Creek watershed (PBTTAT 1998).

Maclay (1940) observed bull trout in Beaver Creek, and relatively low numbers are known to presently spawn, rear, and overwinter in the creek (PBTTAT 1998). Recently, timber was harvested in areas consisting of sensitive soils, and roads constructed on unstable slopes are experiencing rotational slumps and hillslope failures. These slumps were first detected in 1997 and have increased sediment delivery. Areas of slope instability are expected to increase (PBTTAT 1998).

Livestock Grazing

Livestock grazing is generally confined to the valley bottoms of the lower rivers in the Coeur d'Alene Recovery Unit (PBTTAT 1998). After wildfires in 1910 and the 1930's, grazing allotments were established on portions of U.S. Forest Service lands. Large numbers of sheep were historically grazed in the basin, but the practice is presently infeasible due to plant succession. Cattle grazing allotments exist in portions of the Coeur d'Alene River subbasin and the St. Maries River drainage. The U.S. Forest Service and outfitters graze pack and saddle stock at localized areas within the Coeur d'Alene Recovery Unit. Grazing also occurs on private ranches that are found primarily in the valley bottoms. Livestock grazing may impair water quality; increase water temperatures; and reduce aquatic habitat complexity through stream widening, stream depth reductions, and bank sloughing (Armour *et al.* 1991; Platts 1991). Although grazing along the St. Maries River and some tributaries may be inhibiting succession of riparian vegetation that would improve stream shade and bank stability, livestock grazing is not thought to be a major factor contributing to decline of bull trout in the Coeur d'Alene Recovery Unit.

Agricultural Practices

Agricultural practices affecting aquatic habitats in the Coeur d'Alene Recovery Unit include row-crop cultivation, modification and removal of riparian

vegetation, and dike construction and establishment of drainage districts that modify floodplains (PBTTAT 1998). Agricultural activity occurs mainly in the valleys of the lower Coeur d'Alene, St. Joe, and St. Maries Rivers, as well as in the Palouse Region where streams draining from the southwest enter Coeur d'Alene Lake.

Agriculture practices such as crop production can affect water quality and aquatic habitats by increasing nutrient levels from fertilizers, chemical concentrations from pesticides, and sedimentation from bank and channel alterations and by reducing riparian vegetation (PBTTAT 1998). Drainage districts along the lower St. Joe and Coeur d'Alene Rivers have reduced floodplain capacity and habitats accessible to fish. The primary effect of crop production has been increased sedimentation.

Transportation Networks

The transportation network in the Coeur d'Alene Lake basin includes both railroad lines and roadways. Two major railroad lines were constructed along the South Fork Coeur d'Alene River, mainstem Coeur d'Alene River, and some tributaries in the late 1800's (PBTTAT 1998). Construction included channelization of streams along the lines. In the early 1900's, the Milwaukee Railroad was built along the mainstem St. Joe River and extended up the North Fork St. Joe River. A spur line to the Milwaukee Railroad was built along the St. Maries River. Construction of the line created several fish migration barriers, channelized streams, and placed large fill areas across tributaries. Today, only the St. Maries River Railroad, along the St. Maries River and lower St. Joe River, is in use. Although much of the railway system has been abandoned, legacy effects of the lines still exist, primarily in the form of unmaintained fill areas, channelized streams, and passage barriers. For example, a fill area for the Milwaukee Railroad on Loop Creek, a tributary to the North Fork St. Joe River, failed in 1995. An estimated 45,900 to 61,200 cubic meters (60,000 to 80,000 cubic yards) of both fine and course sediments were released into Loop Creek and the North Fork St. Joe River (PBTTAT 1998). Decades may be required before

equilibrium can be reestablished when large quantities of course sediment are released.

The road system in the Coeur d'Alene Recovery Unit includes Interstate 90, five State highways, numerous County and municipal roads, and an extensive road network that was initially constructed for forest management but that is now used primarily for access to recreational opportunities (PBTTAT 1998). The first major developed roadway was Mullan Road, which was constructed in the mid-1800's along the South Fork Coeur d'Alene River for military uses. Paved highways currently parallel large portions of the North Fork Coeur d'Alene, South Fork Coeur d'Alene, St. Joe, and St. Maries Rivers. The effects on aquatic habitats of roads directly adjacent to streams are similar to the effects of railroad lines: constrained channel meanders, reduced floodplain capacity, and reduced or eliminated riparian vegetation and recruitment of large woody debris. Streamside roads are also vulnerable to failure during high flows and are sources of sediment to stream channels.

In the St. Joe River subbasin, the construction of Highway 50 resulted in channelization of the mainstem St. Joe River, and numerous crossings at tributaries are barriers to fish migration (PBTTAT 1998). Road densities in upper portions of the watershed, such as upstream of the confluence with Heller Creek (less than 10 percent of the subbasin), are typically under 0.4 kilometers per square kilometer (0.6 miles per square mile). However, several U.S. Forest Service roads (for example, 320, 218, and 187) are adjacent to portions of tributary streams and may negatively affect aquatic habitats, form passage barriers, and provide angler access to bull trout spawning areas. Sediment generated by these roads are not presently considered a primary factor in the decline of bull trout because of their remote location and seasonal use restricted by snow levels.

Road densities vary in the mid and lower portions of the St. Joe River subbasin (PBTTAT 1998). Much of the North Fork St. Joe River watershed is roadless; however, other areas have relatively high road densities. Overall road density is 0.9 kilometers per square kilometer (1.5 miles per square mile)

throughout the entire watershed. In contrast, the St. Joe River subbasin from Bird Creek to Bruin Creek has a road density of 2.9 to 4.4 kilometers per square kilometer (4.7 to 7.1 miles per square mile). Additional road construction is planned in some watersheds, and road obliteration has been conducted or is planned in other areas.

Mining

Mining activities, primarily for precious metals, gemstones, and aggregates have contributed to aquatic and riparian habitat degradation and impaired water quality in Coeur d'Alene Lake and portions of the Coeur d'Alene River and St. Joe River subbasins (PBTTAT 1998). In addition, past and present mining activities inhibit growth of riparian vegetation, a condition that reduces stream shading and increases water temperature. In the Coeur d'Alene River subbasin, precious metals were discovered in the 1880's, and subsequent mining activities and associated development (for example, milling and smelting operations, riparian timber harvest, dam construction and stream channelization, and construction for transportation) substantially altered the floodplain and aquatic habitats. Aquatic conditions were and continue to be unsuitable for resident fishes and other aquatic life in the South Fork Coeur d'Alene River and mainstem Coeur d'Alene River downstream to Coeur d'Alene Lake, primarily because of mine pollution (Ellis 1932; Dixon 1999; Rahel 1999; Reiser 1999). In addition, Coeur d'Alene Lake currently exceeds ambient water quality criteria (AWQC) for lead, zinc, and cadmium at various times during a typical year and is not fully protective of aquatic life.

After review of all available data, Rahel (1999) concluded that fish populations downstream of Canyon Creek in the South Fork Coeur d'Alene River showed a clear spatial pattern of being reduced when compared with the population level further upstream, as well as population levels in a reference stream (the St. Regis River, Montana). This observation includes reduced abundance of trout and the absence of native sculpin species and mountain whitefish. Rahel also concluded that the alteration of the fish community is most closely associated with metals, rather than with changes in other habitat features.

He based this conclusion on the fact that no other water quality or physical habitat features can explain the spatial pattern of severely reduced fish abundance. Reiser (1999) found that wild trout populations in Nine Mile Creek, Canyon Creek, and the South Fork Coeur d'Alene River are controlled by elevated metal concentrations. Dixon (1999) concluded that there is clear evidence that metals are causing injury to fish in the Coeur d'Alene River subbasin. He also concluded that there is substantial evidence of direct lethal and sublethal toxicity to fish in the Coeur d'Alene River subbasin and that fish populations are reduced in areas of the basin exhibiting elevated levels of metals, consistent with exposure to those metals.

Degraded stream conditions persist in the Coeur d'Alene River subbasin, as evidenced by high bedload deposition, channel braiding, and intermittent flow in stream and river reaches. Toxic effects of heavy metals liberated during mining and from existing mine wastes probably formed barriers to bull trout migration between Coeur d'Alene Lake and spawning and rearing habitats in Coeur d'Alene River tributaries. The largest superfund site in the nation (Bunker Hill) is located in the South Fork Coeur d'Alene River drainage near Kellogg. Although some fishes are presently using previously uninhabitable reaches of the South Fork Coeur d'Alene River, heavy metal contamination continues to exclude fish in some reaches of the lower portion of the river.

Woodward (1999) concluded that the water column concentrations of cadmium and zinc in the Coeur d'Alene River will reduce survival, growth, and abundance of fish. He also concluded that fish feeding on invertebrates in the river below locations of mine waste release have a diet source with elevated metals and are therefore at risk of reduced fitness.

In the North Fork Coeur d'Alene River drainage, placer mining has substantially degraded stream channels and floodplains in the Prichard Creek and Beaver Creek watersheds (PBTTAT 1998). Maclay (1940) documented that mining pollution from the Jack Waite mine in the upper portion of East Fork Eagle Creek created conditions unsuitable for fish.

CH2M HILL and URS Corp. (2001) determined that, because bull trout and westslope cutthroat trout were evaluated on an individual level due to their coverage under the Endangered Species Act and because toxicity can occur at levels below the ambient water quality criteria, there may be areas where the ambient water quality criteria is not protective of these species. This situation is most likely in areas where water hardness is low. Researchers from the two companies also concluded that, based upon comparisons of metals concentrations and acute ambient water quality criteria, surface waters are commonly lethal to some aquatic life in the following areas: upper Beaver Creek; Big and Canyon Creeks; portions of Ninemile, Pine, and Prichard Creeks; the entire South Fork Coeur d'Alene River; and the Coeur d'Alene River downstream to Harrison. Using the chronic ambient water quality criteria, researchers determined that growth and reproduction of surviving aquatic life would be substantially reduced in the following areas: Big Creek; portions of Canyon, Ninemile, Pine, and Prichard Creeks; the entire South Fork Coeur d'Alene River; and the Coeur d'Alene River downstream to Harrison.

Several areas in the St. Joe River subbasin were historically mined, and activities continue in some areas. Habitats in some streams of the upper St. Joe River subbasin where bull trout currently occur are degraded by historical mining activities. For instance, habitat complexity has been reduced by stream channelization and loss of large woody debris in Sherlock Creek, a tributary to Heller Creek, and in the lower 0.8 kilometers (0.5 miles) of Heller Creek (PBTTAT 1998). The effects of historical mining (tailings and habitat degradation) continue to affect streams occupied by bull trout in tributaries to the St. Joe River in the reach upstream from Heller Creek (for example, Medicine, Wisdom, California, and Yankee Bar Creeks) and in the reach from Copper Creek to Bean Creek (for example, Bean, Ruby, and Timber Creeks). Mining activities continue in Sherlock Creek.

In the St. Maries River drainage, a large garnet placer mine operated since the 1940's has substantially altered habitats in Emerald and Carpenter Creeks (PBTTAT 1998). Mining operations continue in these tributaries, and a new mine for garnet has been proposed for a 5.1-kilometer (3.2-mile) reach of the St. Maries

River between the tributaries. Recreational garnet digging is also allowed on a tributary to the East Fork Emerald Creek at a U.S. Forest Service-managed dig site.

Stone, sand, and gravel (aggregates) are mined for local use, primarily for road construction and surfacing (PBTTAT 1998). Several aggregate sources are located within the basin, and in some cases, aggregate mining is used in conjunction with stream stabilization projects to reduce bedload transport and accumulation in low-gradient stream reaches.

Recreational suction dredging is conducted under permits issued by the Idaho Department of Water Resources with input from the Idaho Department of Fish and Game. Dredging seasons are established to minimize the risk to incubating trout eggs and recently hatched alevins and are specific to the water body. In tributaries known to be important for bull trout and westslope cutthroat trout spawning, an applicant must go through a more comprehensive permitting process before being allowed to operate a suction dredge.

Residential Development and Urbanization

Prior to the establishment of municipal waste treatment facilities in the Coeur d'Alene Lake basin, large quantities of phosphates and nitrogen contributed to nutrient enrichment of Coeur d'Alene Lake (PBTTAT 1998). Aquatic habitats in the Coeur d'Alene River subbasin have been negatively affected by residential development and transportation networks that were initially constructed to support mining operations. For example, the construction of dikes and transportation corridors in the South Fork Coeur d'Alene River and lower reach of the Coeur d'Alene River has altered the floodplain and prevented fish access to some tributaries. Negative effects of residential development on habitats in the North Fork Coeur d'Alene River are expected to increase as planned subdivisions are developed.

Fisheries Management

For over 50 years, the Idaho Department of Fish and Game has stocked and managed Coeur d'Alene Lake for nonnative species (PBTTAT 1998), with kokanee being introduced in 1937 and chinook salmon in 1982. Kokanee are relatively abundant in the lake and are probably an important forage item for adfluvial bull trout. Chinook salmon may be negatively affecting bull trout in Coeur d'Alene Lake directly through predation on young bull trout or indirectly through competition for food (*i.e.*, kokanee, westslope cutthroat trout, and whitefish). There are no data describing the interactions of these species in the lake.

Northern pike were introduced in the Coeur d'Alene Lake basin, probably during the 1970's (PBTTAT 1998). They have become established primarily in bays, smaller lakes, and slow-moving river reaches. Because northern pike are known to consume large numbers of migratory westslope cutthroat trout, they may also prey on bull trout that migrate into Coeur d'Alene Lake.

In the early 1900's, brook trout were introduced by management agencies throughout the Coeur d'Alene Recovery Unit (PBTTAT 1998). In the Coeur d'Alene River subbasin, brook trout are established in several tributaries, lakes, and reaches of the South Fork Coeur d'Alene River. Brook trout are also present in the North Fork Coeur d'Alene River drainage, but, generally, they are not abundant or widely distributed. In the St. Joe River subbasin, brook trout have been sampled at numerous sites throughout the North Fork St. Joe River drainage and are common in several tributaries of the lower St. Joe River (Apperson *et al.* 1989). Brook trout occur in most tributaries in the St. Maries River drainage.

Historically, overharvest of bull trout in the Columbia River basin probably contributed to their decline. Harvest may have included legal recreational angling, poaching, and State-sponsored eradication programs (Thomas 1992). Bull trout were often targeted for removal by anglers and government agencies through bounties because they preyed on salmon and other species desirable for sport fishing (Simpson and Wallace 1982; Bond 1992).

Recognizing the decline of bull trout, State management agencies in Idaho, Montana, Washington, and Oregon suspended harvest in the Columbia River basin except in a few limited locations. State fishing regulations still allow for the harvest of other salmonid species in most bull trout waters, as well as the incidental catch and release of bull trout by anglers fishing for other species.

Within the Coeur d'Alene Recovery Unit, bounties on bull trout were not known to have been prevalent and are not considered to have contributed to bull trout decline. However, the taking of bull trout of any size was encouraged by resource managers with a year-long open season (Fields 1935), and bull trout may have been considered an unfavorable species by anglers and targeted for removal for personal reasons. Current angler-related threats to bull trout can occur through harvest because of misidentification and poaching (PBTTAT 1998). For the Coeur d'Alene Lake basin, angling regulations were instituted in 1988 to prohibit harvest of bull trout; however, incidental hooking mortality may still occur while anglers fish for other species.

Isolation and Habitat Fragmentation

Barriers to bull trout migration that were created by transportation networks and mining operations are common in the Coeur d'Alene Lake basin (PBTTAT 1998). Culverts at road crossings of streams may pose barriers to bull trout passage. For example, construction of Highway 9 in the North Fork Coeur d'Alene River drainage created migration barriers at the mouths of several tributary streams. The Milwaukee Railroad line and Highway 50 have numerous crossings over lower St. Joe River tributaries that may be migration barriers to bull trout.

Primarily in the Coeur d'Alene River subbasin, tailing dams and waste discharges of chemicals from mining operations created barriers to bull trout migration in the past and may contribute to current seasonal migration barriers. Overall, the effects of these activities have been the fragmentation of some suitable bull trout habitats and isolation of bull trout within confined areas. However, the Comprehensive Environmental Response, Compensation, and

Liability Act (CERCLA) and other clean-up activities in the South Fork Coeur d'Alene River drainage and the mainstem Coeur d'Alene River are expected to improve water quality and habitat conditions within the lower Coeur d'Alene River migratory corridor.

Another factor that may have potentially fragmented suitable bull trout habitat is the near-eradication of beaver in the Coeur d'Alene Lake basin (PBTTAT 1998). Although there is no literature specifically relating bull trout to stream conditions created by beaver dams, bull trout evolved in the presence of beaver. Beaver dams have both positive and negative effects on stream salmonids. The relation between reductions in beaver and declines of bull trout in the Coeur d'Alene Lake basin is uncertain.

Currently, though no physical barriers exist and probably only seasonal or periodic instances occur when water quality potentially limits migration of bull trout through migratory corridors within the recovery unit, there is no evidence that bull trout from the St. Joe River subbasin readily access the Coeur d'Alene River subbasin to recolonize. Because bull trout exhibit a high degree of natal stream fidelity throughout their range (James *et al*., *in litt*., 1998; Spruell *et al.* 2000; Hvenegaard and Thera 2001) and because the current population size in the portion of the Coeur d'Alene Recovery Unit that is outside the lake and the St. Joe River is very small, the Coeur d'Alene River subbasin could be considered functionally fragmented from bull trout in the St. Joe River. This portion will probably not be recolonized naturally at any time during the expected time frames of the recovery plan.

ONGOING RECOVERY UNIT CONSERVATION MEASURES

The Idaho Department of Fish and Game is charged with "preserving, protecting, and perpetuating" Idaho's fish and wildlife resources for present and future generations and is the State agency responsible for managing fish and wildlife populations in the Coeur d'Alene Lake basin. The Idaho Department of Fish and Game developed and has updated a fisheries management plan for the basin on a five-year review cycle beginning in 1981. The fisheries management policies of the agency emphasize providing diverse sport fishing opportunities while also conserving wild, native fish stocks.

Portions of the upper St. Joe River subbasin and the North Fork Coeur d'Alene River drainage are managed as catch-and-release fisheries. A fishing regulation for single, barbless artificial fly and lure only is in effect in these portions of the basin. Bait fishing with limited harvest levels is allowed in other (middle to lower) portions of both river systems. In 1988, the harvest of bull trout was eliminated in the entire Coeur d'Alene Lake basin.

In 1996, the State of Idaho completed a bull trout conservation plan (Batt 1996). Coeur d'Alene Lake and its tributaries were designated as a key watershed for bull trout. The plan directed that problem assessments and conservation plans be developed for each of the key watersheds. In 1998, a bull trout Technical Advisory Team, consisting of State, Tribal, Federal, and private industry scientists, released the draft *Coeur d'Alene Lake Basin Bull Trout Problem Assessment* (PBTTAT 1998).

Since time immemorial, the Coeur d'Alene Tribe has protected, preserved, and managed the fish and wildlife resources in the Coeur d'Alene Lake basin. Currently, the Coeur d'Alene Tribe manages all fisheries within the Coeur d'Alene Reservation, including the southern third of Coeur d'Alene Lake, which is owned by the Coeur d'Alene Tribe. The Tribe has had a fisheries program since 1990 and has been conducting surveys, population estimates, and other

fisheries activities since 1992. In 1998, the Coeur d'Alene Tribe published updated fishing regulations for the Coeur d'Alene Reservation that are specific to the management goals of the Coeur d'Alene Tribe.

All streams on the Coeur d'Alene Reservation, as well as Coeur d'Alene Lake itself, are managed for native species through fishing regulations and habitat enhancement projects. Management emphasis is placed on westslope cutthroat trout and bull trout. In addition, the Coeur d'Alene Reservation has been closed to bull trout harvest since 1995. Since the early 1990's, the Coeur d'Alene Tribe Fisheries Program has been constructing sediment basins within various watersheds to decrease sediment loading to streams, planting riparian areas to improve cover and shading, installing instream habitat structures to improve the pool to riffle ratio, and installing structures for streambank realignment.

The Coeur d'Alene Tribe has developed a management plan to enhance resident fish resources within the Coeur d'Alene Reservation. This document summarizes all assessment information collected from studies in waters of the Coeur d'Alene Reservation and identifies goals, objectives, and strategies for the Coeur d'Alene Tribe's Fisheries Program. It outlines a conceptual approach for enhancement activities and provides uniform instructions for planning, implementing, monitoring, and evaluating these activities. The Coeur d'Alene Tribe works with private landowners and other agencies to implement riparian corridor enhancement activities. The Tribe also coordinates all of its natural resource programs to effectively manage all of its resources. For instance, one of the main goals of the Tribe's Wildlife Program is to acquire key pieces of wildlife habitat such as riparian corridors. These riparian corridors will also provide potential habitat for native fish species such as bull trout. A wildlife habitat management plan for the Coeur d'Alene Reservation is also currently under development within the Tribe's Wildlife Program. In addition, the Coeur d'Alene Tribe has adopted water quality standards to begin to address water quality impaired streams, as well as nonpoint source and point source pollution problems, on the Coeur d'Alene Reservation.

The Bonneville Power Administration has committed to protecting and enhancing native fish and wildlife habitats within the Coeur d'Alene Lake basin as a means of partially mitigating the impacts of the Columbia River Hydroelectric System (NPPC 2001). Wildlife mitigation efforts in the Coeur d' Alene Lake basin are intended to 1) provide partial mitigation for the extirpation of anadromous fish resources from the upper Columbia River basin and 2) provide partial mitigation for wildlife habitat losses attributable to the construction and operation of Albeni Falls Dam.

Partial mitigation for extirpated anadromous fisheries will be accomplished through continued implementation, operation, and maintenance of protection, mitigation, and enhancement efforts targeting key fish and wildlife habitats throughout the Coeur d' Alene Lake basin.

The Bureau of Land Management administers several small, isolated tracts in northern Idaho, and management emphasis is directed at water-based recreation. Conservation involvement in the basin includes 1) continued work with cooperating agencies and the public to eliminate undue degradation of existing and/or potential bull trout populations and habitats, 2) cooperative work to improve bull trout habitat on public lands, and 3) continued efforts to remove mining waste within the South Fork and North Fork Coeur d'Alene River systems to improve water quality.

A Conservation Partnership consisting of the local Soil and Water Conservation Districts, the Idaho Soil Conservation Commission, and the Natural Resources Conservation Service has been established to assist private landowners with the management of their natural resources. As a whole, the focus of the Conservation Partnership is to reduce nonpoint source pollution from agricultural lands by increasing the voluntary implementation of agricultural best management practices on various agricultural lands. The goal of best management practices is to reduce the amount of sediment, nutrients, pesticides, and bacteria reaching Coeur d'Alene Lake and its tributaries.

The Natural Resources Conservation Service has a number of programs within the Coeur d'Alene Lake basin that assist landowners with conservation improvements that focus on soil erosion control, water quality improvements, and wildlife habitat development. These include Conservation Technical Assistance, Wetlands Reserve Program, Environmental Quality Incentives Program, Wildlife Habitat Improvement Program, and Forestry Incentives Program. In addition, the Farm Services Agency administers the Conservation Reserve Program in the basin.

The Kootenai-Shoshone Soil and Water Conservation District has an updated five year plan (NPPC 2001). This plan lays out the goals, objectives, and actions that the Soil and Water Conservation District intends to undertake during the next five years. Water quality improvements are a top-priority goal, with an objective of accelerating the implementation of best management practices. The focus will be on assisting private landowners with controlling soil erosion on highly erodible croplands, streambanks, and other critical areas. Specific targets include the Lake Creek watershed, the lower Coeur d'Alene River, Latour Creek, and stream segments on the 303(d) list that have agricultural impacts. Efforts will be made to provide direct technical assistance to private landowners to help them improve natural resource management on their private lands. The Soil and Water Conservation District carries out its programs through the efforts of its own staff and also through cooperative agreements with other State and Federal agencies.

The U.S. Fish and Wildlife Service has responsibility for the protection of migratory birds and threatened and endangered species of fish, wildlife, plants, and their habitats within the Coeur d'Alene River subbasin. As a participant in the Coeur d'Alene Basin Natural Resource Damage Assessment, the U.S. Fish and Wildlife Service has been responsible for determining and documenting injury to fish, wildlife, plants, and their habitats from heavy metal-laden sediments. The U.S. Fish and Wildlife Service has, and continues to be, a participant in restoration planning and implementation activities based on injury documentation.

The Environmental Protection Agency is responsible for completing remedial activities associated with the Bunker Hill Superfund Site in the South Fork Coeur d'Alene River drainage. This responsibility includes removing contaminated sediments from the site to create conditions protective to the environment and its inhabitants. The Environmental Protection Agency is also in the process of developing a Proposed Plan for the clean up of all contaminants within the Coeur d'Alene Lake basin.

The U.S. Forest Service manages over half of the Coeur d'Alene Lake basin as part of the Idaho Panhandle National Forests. The 1987 *Forest Plan* (USFS 1987) for the Idaho Panhandle National Forests is the primary document that guides Federal forest management in the basin. The Inland Native Fish (INFISH) interim strategy was adopted in 1996 by the U.S. Forest Service to protect habitat for bull trout, westslope cutthroat trout, and other species associated with streams and riparian areas. All projects on the Idaho Panhandle National Forests are required to comply with INFISH guidelines, which include mandatory setbacks from streams unless site-specific management criteria for improving these habitats are met. Watershed restoration projects have been completed in both the Coeur d'Alene and St. Joe River subbasins. Efforts have also been undertaken to reduce mining impacts on U.S. Forest Service lands. Specifically, work has been done on the Silver Crescent Mine and Mill Complex located on East Fork Moon Creek in the South Fork Coeur d'Alene River drainage to reduce the release, and threat of release, of hazardous substances from this site (Ridolfi Engineers and Associates, Inc., 1996). The U.S. Forest Service has also worked to improve spawning habitat for fish in Prichard Creek on the North Fork Coeur d'Alene River.

The Idaho Department of Lands enforces the Idaho Forest Practices Act, which regulates commercial timber production and harvest on State and private lands within the basin. The Idaho Forest Practices Act contains guidelines to protect fish-bearing streams during logging and other forest management activities. The guidelines address stream buffers and riparian management, road maintenance and construction standards, as well as other topics. The Idaho Department of Lands assists private landowners in developing timber

management plans so that they comply with site-specific best management practices. In addition, the Idaho Department of Lands is responsible for administering mining laws and the State of Idaho Lake Protection Act and holds regulatory authority for lake shoreline developments for the northern portion of Coeur d'Alene Lake.

The Idaho Department of Environmental Quality has been developing subbasin assessments of water quality and total maximum daily loads (TMDL), where appropriate, for each of the stream segments of fourth hydrologic unit code (HUC) in the Coeur d' Alene Lake basin. The water pollutants addressed in these assessments and total maximum daily loads are trace (heavy) metals, plant growth nutrients, bacteria, and sediment. The Idaho Department of Environmental Quality, along with other agency representatives, has put together and is implementing the Lake Management Plan. This plan includes efforts to improve the aquatic habitat for fish species, including bull trout. The focus of the plan is nutrient management.

The Idaho Department of Environmental Quality administers several Federal Clean Water Act programs designed to monitor, protect, and restore water quality and aquatic life uses. These programs include the Beneficial Use Reconnaissance Program monitoring; 305(b) water quality assessments; 303(d) reports of impaired waters and pollutants; total maximum daily load assessments, pollutant reduction allocations, and implementation plans; 319 nonpoint source pollution management; antidegradation policy; water quality certifications; municipal wastewater grants and loans; National Pollutant Discharge Elimination System inspections; water quality standards promulgation and enforcement; general ground water monitoring and protection; source water assessments; and specific watershed management plans identified by the legislature. The Idaho Board of Environmental Quality oversees direction of the agency to meet responsibilities mandated through Idaho Code, Executive Orders, court orders, and agreements with other parties.

Efforts to treat mine waste and sewage began in the 1960's and 1970's, and treatment of heavy metals and other toxic waste began in the 1990's. Water

quality has improved in many reaches of the South Fork Coeur d'Alene River and its tributaries, but heavy metal concentrations are high enough to prevent establishment of a fishery in some areas. Concentrations of heavy metals may be inhibiting fish colonization in some areas (Woodward *et al.* 1997).

STRATEGY FOR RECOVERY

A core area represents the closest approximation of a biologically functioning unit for bull trout. The combination of core habitat (*i.e.*, habitat that could supply all the necessary elements for the long-term security of bull trout, including for both spawning and rearing, as well as for 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 a core area, many local populations may exist.

The Coeur d'Alene Recovery Unit contains one core area, the Coeur d'Alene Lake Basin Core Area, which encompasses the entire Coeur d'Alene Lake, the St. Joe and Coeur d'Alene River subbasins, and all tributaries within these systems.

The Coeur d'Alene Recovery Unit Team has identified priority streams within the core area (Appendix A) that either currently supply habitat elements necessary for long-term security or have a reasonable potential to be restored and supply elements for long-term security of bull trout. Using the criteria below and the best professional judgment of its members, the recovery unit team identified priority streams to focus the implementation of recovery activities to areas having the greatest potential for supporting bull trout. The priority streams include 1) known bull trout spawning streams; 2) other streams with evidence of bull trout recruitment and early life stage rearing; and 3) streams with habitat that may potentially support some level of recruitment, or local populations, since current habitat conditions have elements necessary for bull trout occupancy. Selected priority streams are considered the best of the best-remaining habitat for bull trout.

While many streams in the core area do not conform to the criteria established by the Coeur d'Alene Recovery Unit Team at this time, the recovery unit team recognizes that other streams in the core area may provide elements necessary for healthy local populations and will be included in recovery efforts if deemed appropriate in the future. The Coeur d'Alene Recovery Unit Team also

acknowledges that there are stream segments that have not been identified as priorities for the reestablishment of local populations but that provide necessary components to the long-term security of a local population; for example, Shoshone Creek is important as a migratory corridor and possibly for rearing during certain times of the year for a local population upstream in Falls Creek.

Factors for selecting priority streams that either currently or may potentially support local populations in the Coeur d'Alene Recovery Unit include the following:

1. Current or historic distribution
2. Sightings within the last 10 years
3. Water temperatures
4. Amount of public versus private land
5. Current habitat conditions
6. Restoration potential/"quick fix"
7. Poaching threats/accessibility
8. Exotic fish species presence/absence

Assessment of these factors was also used to prioritize streams and local populations (Appendices B and C) within the Coeur d'Alene Recovery Unit and may be used during recovery task implementation by management agencies to determine which streams will be the first for restoration and recovery activities.

In addition to delineating priority streams, the Coeur d'Alene Recovery Unit Team has identified the mainstem reaches of the Coeur d'Alene River, North Fork Coeur d'Alene River, St. Joe River, and Coeur d'Alene Lake as priority water bodies. Mainstem reaches serve as critical migratory corridors and probably as overwintering areas for juvenile, subadult, and adult bull trout, and the lake provides critical habitat for foraging, rearing, and overwintering for juvenile, subadult, and adult bull trout. Restoration and recovery activities in these areas should also receive a high priority during implementation of recovery tasks.

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 the Coeur d'Alene Recovery Unit:

- Maintain current distribution of bull trout and restore distribution in previously occupied or depressed areas within the Coeur d'Alene Recovery Unit.

- Maintain stable or increasing trends in bull trout abundance.

- 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 Coeur d'Alene Recovery Unit Team classified bull trout into relative risk categories based on the best available data and the professional judgment of the team.

The Coeur d'Alene 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 Coeur d'Alene 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 Coeur d'Alene Recovery Unit, the recovery unit team relied heavily on the professional judgment of its members.

Local Populations

Metapopulation theory is an important consideration 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.

There are currently three known local populations in the Coeur d'Alene Recovery Unit including Medicine Creek, Wisdom Creek, and the St. Joe River between Heller Creek and St Joe Lake. Using the above guidance, the Coeur

d'Alene Recovery Unit Team believes that bull trout in the Coeur d'Alene Recovery Unit are currently at increasing risk. An accurate description of current distribution is unknown, and the identification of resident local populations is considered a research need.

Adult Abundance

The recovered abundance levels in the Coeur d'Alene Recovery Unit were determined by considering theoretical estimates of effective population size, historical census information, and the professional judgment of recovery unit 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 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.

Overall, bull trout in the Coeur d'Alene Recovery Unit persist at low numbers in fragmented local populations. Adult abundance was estimated (based on 10 years of redd counts) at 119 to 166 adult spawners per year in the 3 known local populations. Abundance for all streams in the core area was estimated at 190 to 264 adult spawners per year. Using the guidance on abundance described above, the Coeur d'Alene Recovery Unit Team believes that bull trout in the recovery unit are at increasing risk of inbreeding depression.

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 indicate increased extinction risk. 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 moving toward recovery would be expected to exhibit an increasing trend in the indicator.

The population growth rate is an indicator of extinction probability. The probability of going extinct cannot be measured directly; it can, however, 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. The growth rate must indicate a stable or increasing population for a period of time for the population to contribute to recovery. Given the overall lack of long-term population census information in the Coeur d'Alene Recovery Unit, the recovery unit team believes that bull trout are currently at increased risk.

Connectivity

The presence or absence of the migratory life history form within the Coeur d'Alene Recovery Unit was used as an indicator of the functional connectivity of the core area. If the migratory life form was absent, or if the migratory form was present but local populations lacked connectivity, the core area was considered to be at increased risk. If the migratory life form persisted 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. Or, 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.

Migratory bull trout persist in all local populations in the Coeur d'Alene Recovery Unit. The Coeur d'Alene Recovery Unit Team considers bull trout in the core area to be at diminishing risk.

<u>Recovery Criteria</u>

Recovery criteria for bull trout in the Coeur d'Alene Recovery Unit are the following:

1. **Distribution criteria will be met when the total number of stable local populations has been increased to 11 and these populations are broadly distributed throughout the core area.**

Within the core area, population levels of migratory bull trout representing a recovered status have been established for two subbasins: the St. Joe River and Coeur d'Alene River subbasins. Subbasins were developed to ensure that recovered local populations are well distributed within the Coeur d'Alene Recovery Unit and to improve management efficiency within each subbasin and throughout the Coeur d'Alene Recovery Unit. Annual adult spawner levels for each subunit and for each local population within the subunits will be based on trend data using contemporary monitoring standards and will be based on at least 10 years of monitoring data. The subunits are as follows:

- St. Joe River: Consisting of at least 8 local populations contributing to a total of an average of 800 annual adult spawners. However, within this subunit, 5 local populations with an average of 500 annual adult spawners will occur above and/or in Red Ives Creek, and 3 local populations with an average of 300 annual adult spawners will occur from Red Ives Creek downstream to Big Creek.

- Coeur d'Alene River (North Fork Coeur d'Alene River drainage): Consisting of at least 3 local populations contributing to an average of 300 annual adult spawners.

2. **Trend criteria will be met when the overall bull trout population in the Coeur d'Alene Recovery Unit is accepted, under contemporary standards of the time, as stable or increasing, based on at least 10 years of monitoring data.**

3. **Abundance criteria will be met when the core area hosts at least 11 stable local populations (a minimum of 8 in the St. Joe River subbasin and 3 in the North Fork Coeur d'Alene River watershed), contributing to an average of 1,100 adult spawners per year.**

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

Recovery criteria for the Coeur d'Alene Recovery Unit were established to assess whether recovery actions are resulting in the recovery of bull trout. The Coeur d'Alene 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 listed 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 Coeur d'Alene Recovery Unit is fully contributing to recovery of the population segment.

Research Needs

Using the best scientific information available, the Coeur d'Alene Recovery Unit Team has described recovery criteria and actions necessary for recovery of bull trout within the Coeur d'Alene Recovery Unit. However, the recovery unit team recognizes that many uncertainties exist regarding bull trout population abundance, distribution, limiting factors and about actions needed to recover bull trout in the Coeur d'Alene Recovery Unit. Therefore, if effective management and recovery are to occur within the Coeur d'Alene Recovery Unit, this recovery chapter should be viewed as a "working" document, which will be updated as new information becomes available. As part of this adaptive management approach, the Coeur d'Alene Recovery Unit Team has identified the need to complete feasibility studies and research, which are essential within the Coeur d'Alene Recovery Unit.

A primary research need is a complete understanding of the current, and future, roles of the Coeur d'Alene River subbasin, Coeur d'Alene Lake (and lake tributaries), and the St. Maries River drainage in the continued recovery of bull trout within the Coeur d'Alene Recovery Unit. Many local populations of

migratory bull trout occurred throughout the Coeur d'Alene Lake basin, including those areas in which bull trout now are believed extirpated, occur only on an infrequent basis, or occur in very low densities. Therefore, it is essential to establish with certainty the current distribution of bull trout within the Coeur d'Alene Recovery Unit. To this end, the recovery unit team recommends applying a scientifically accepted protocol, such as the "Protocol for Determining Bull Trout Presence" being developed by the Western Division of the American Fisheries Society (AFS) or any other that is scientifically accepted. The protocol should be statistically rigorous and standardized for determining present distribution of bull trout. Applying such a protocol would improve the various resource agencies' ability to identify additional local populations in the Coeur d'Alene Recovery Unit and provide a basis for revising the current condition of bull trout within the basin.

Specifically, tributaries mentioned in isolated or anecdotal reports of bull trout capture or tributaries having good-quality habitat but limited fish surveys should be targeted to verify bull trout distribution within the Coeur d'Alene Recovery Unit. These areas include California, Yankee Bar, Heller/Sherlock, Bean, Bacon/Pass, Ruby, Timber, Red Ives, Copper, Beaver, Fly, Simmons, Gold, Mosquito, Eagle, Prichard, Falls, Trail, Teepee, Big Elk, and Independence Creeks and associated tributaries.

The Coeur d'Alene Recovery Unit Team has also identified an urgent need to implement a standardized monitoring and assessment program that would more accurately describe the current status of bull trout within the Coeur d'Alene Recovery Unit, as well as identify improvements in current sampling protocols that would allow for monitoring the effectiveness of recovery actions. Developing and applying models that assess population trend and extinction risk would be useful in refining recovery criteria as the recovery process proceeds. (See Chapter 1 for further discussion of monitoring and evaluation.)

To ensure that restoration activities to recover bull trout focus on the critical limiting factors, conducting survival studies on the various life stages of bull trout will be necessary. Without information on where the critical limiting

factors occur, resources and funding could be expended in areas that may result in little or no improvements in bull trout abundance or distribution. Currently, it is unclear whether continuing declines in bull trout abundance are related to the lake environment, stream conditions, migratory corridors, or a combination of the three. Using initial resources on these kinds of studies will help ensure the greatest benefit on future restoration projects. At a minimum, these studies should focus on egg-to-fry survival, survival of rearing juveniles, and survival within the lake.

Throughout the Coeur d'Alene Recovery Unit, continuing efforts (feasibility study) should be conducted to determine which tributaries have the greatest potential to support bull trout in the future. This work could evaluate stream habitat characteristics such as water temperature, groundwater contributions, metals concentrations, substrate size and movement, bed and bank stability, pool frequency, and amount of large woody debris. This type of information can be used to prioritize restoration efforts and to identify streams where expediting recovery through artificial propagation or transplanting may be feasible.

The Role of Artificial Propagation and Transplantation

As described in Chapter 1, section 3(3) of the Endangered Species Act lists artificial propagation and transplantation as methods that may be used for the conservation of listed species. While artificial propagation has played an important role in the recovery of other listed fish species, the overall recovery strategy for bull trout in the Coeur d'Alene Recovery Unit will emphasize identifying and correcting threats affecting bull trout and bull trout habitats, where possible. If artificial propagation is determined to be necessary for bull trout recovery within the Coeur d'Alene Recovery Unit and if a feasibility study identifies a host of streams capable of supporting bull trout, the joint policy of the U.S. Fish and Wildlife Service and the National Marine Fisheries Service regarding controlled propagation of listed species will be followed (65 FR 56916).

Also, an appropriate plan would need to be approved to consider the effects of transplantation on other species as well as on the donor bull trout populations. Transplanting listed species must be authorized by the U.S. Fish and Wildlife Service through a 10(a)(1)(A) recovery permit and must meet applicable State fish-handling and disease policies.

Though every effort should be made to recover a species in the wild before implementing a controlled propagation program, in the Coeur d'Alene Recovery Unit, local populations of bull trout within the North Fork Coeur d'Alene River drainage and portions of the St. Joe River subbasin are thought to be extirpated. And because there are limited numbers of bull trout in the upper portion of the St. Joe River subbasin to act as a source for recolonization, natural refounding would be expected to occur slowly in these areas. Also, difficulty of recolonizing in such circumstances is supported by recent behavioral and genetic studies that suggest that bull trout exhibit a high degree of fidelity to natal streams (James *et al*., *in litt*., 1998; Spruell *et al.* 2000; Hvenegaard and Thera 2001). In addition, the recovery unit team is unaware of any instances of natural refounding occurring for a local population of bull trout after a complete life cycle has been extirpated.

The findings of the Montana Bull Trout Scientific Group support the possible use of artificial propagation and transplantation. The group concluded that hatcheries are one of many potential tools that could be used in bull trout recovery and that hatcheries are appropriate for establishing genetic reserves for declining populations and some research strategies (MBTSG 1996). The Montana Bull Trout Scientific Group identified seven strategies for using artificially propagated fish, evaluated the strategies relative to recovery criteria and objectives, and provided recommendations. The group also concluded that transplantation into areas where bull trout have been extirpated should be considered only after the causes of extirpation have been identified and corrected.

To achieve the time frame for recovery as specified in Chapter 1 and in this Coeur d'Alene Recovery Unit chapter, some form of artificial propagation or transplantation may be anticipated in the Coeur d'Alene Recovery Unit. Such

strategies may also be necessary to establish a genetic refugia since the population within this recovery unit is seriously imperiled. Currently, only one known local population in the St. Joe River might meet the level of 100 annual adult spawners that is suggested by Rieman and Allendorf (2001) to minimize the risk of inbreeding depression. Before the implementation of any artificial propagation or transplant program, a feasibility study would be completed to identify streams (either the priority streams or any new streams) having the greatest potential to support local populations of bull trout.

The Coeur d'Alene Recovery Unit Team recommends the following: 1) identify and correct threats in the St. Joe River subbasin to increase bull trout densities and allow for natural recolonization to occur within streams that have evidence of recruitment and consider an artificial propagation program only if a feasibility study indicates that such a program is the best option for recovery or to establish a genetic reserve and 2) recognize that, even if threats are identified and corrected in the North Fork Coeur d'Alene River watershed, recolonization in the near future is unlikely and that supplementation or transplanting may be the best option. For this option, a feasibility study would need to be completed to identify streams with the greatest potential to support local populations. Supplementation or transplanting would then occur concurrently with other restoration and recovery activities.

Estimated Date of Recovery

For the St. Joe River subbasin, population indices within each local population are expected to expand concurrently with recovery activities, and recovery criteria are expected to be achieved within three to five generations (15 to 25 years).

For the North Fork Coeur d'Alene River drainage of the Coeur d'Alene River subbasin, two scenarios are considered for the estimated date of recovery:

1. Allow for natural recolonization to occur within the North Fork Coeur d'Alene River drainage and implement a controlled propagation program

only if all other measures have been ineffective in improving bull trout status in the wild. With this scenario, an extended recovery duration would be expected, even if threats to bull trout and bull trout habitats were significantly reduced through implementing recovery tasks (20 to 25 years), because there are no known local populations to expand within the North Fork Coeur d'Alene River watershed and no source of bull trout within the Coeur d'Alene Recovery Unit large enough to support natural recolonization. As local populations within the St. Joe River subbasin expand 4 to 5 generations out, the opportunities for natural recolonization to occur within the North Fork Coeur d'Alene River drainage may increase. However, natural recolonization is expected to occur very slowly, if at all, in the North Fork Coeur d'Alene River drainage as recent behavioral and genetic studies of bull trout in other portions of their range suggest that the fish exhibit a high degree of fidelity to natal streams. Therefore, recovery may take an additional 4 to 5 generations (20 to 25 years), totaling 8 to 10 generations (40 to 50 years), for this subunit.

2. Accelerate recovery time by initiating a controlled propagation program. This program would only be initiated 1) upon completion of a feasibility study to identify a host of streams having the greatest potential to support local populations and 2) concurrent with reduction of threats to bull trout and bull trout habitats. With this scenario, recovery of bull trout within the North Fork Coeur d'Alene drainage may be prolonged by only one or two generations (5 to 10 years) because the feasibility study and development of a controlled propagation program would take approximately five years. Under this scenario, recovery of bull trout for the Coeur d'Alene Recovery Unit is expected to occur within five to seven bull trout generations (25 to 35 years). Because the population of bull trout within the Coeur d'Alene Recovery Unit is seriously imperiled, initiating this program as quickly as possible may also be necessary to establish a genetic refugia. Currently, only one known local population in the St. Joe River may meet the level of 100 annual adult spawners that has been suggested by Rieman and Allendorf (2001) to minimize the risk of inbreeding depression. In addition, because of the risks related to

stochastic and deterministic processes, the population of bull trout within the Coeur d'Alene Recovery Unit is a prime candidate for a propagation program.

In both scenarios, the Comprehensive Environmental Response, Compensation, and Liability Act and other clean-up activities in the South Fork Coeur d'Alene River drainage and the mainstem Coeur d'Alene River are expected to improve water quality and habitat conditions within the lower Coeur d'Alene River migratory corridor. Continued implementation of the Lake Management Plan for Coeur d'Alene Lake will improve ambient water quality conditions and will also assist in recovery efforts.

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 follow 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 Coeur d'Alene Recovery Unit. They appear in the Implementation Schedule that follows this section and are identified by three numerals separated by periods.

The Coeur d'Alene Recovery Unit chapter should be updated or revised as recovery tasks are accomplished, as environmental conditions change, and as monitoring results or significant new information becomes available. Revisions would probably focus on priority streams or on areas within the core area that the Coeur d'Alene Recovery Unit Team has determined offer the greatest opportunity for recovery and would not focus on the entire core area. The Coeur d'Alene Recovery Unit Team should meet annually to review annual monitoring reports and summaries and to make recommendations to the U.S. Fish and Wildlife Service.

During the development of recovery tasks for the Coeur d'Alene Recovery Unit, site-specific information was not readily available for many of the tasks identified within the third-tier of the recovery measures narrative. Therefore, the Coeur d'Alene Recovery Unit Team prioritized streams (see Appendices B and C), using the previously discussed criteria to assist in the implementation of recovery activities. Where a task or activity does not apply to the highest priority streams or local populations within these streams, subsequently lower-rated streams should be considered. This system is only meant to be a tool to assist or guide resource managers in implementing recovery tasks in the highest priority bull trout habitat or potential habitat. If using the priority stream guidance is inappropriate, the best available information and expertise of local biologists should be used to implement recovery tasks, where and when appropriate. In some instances, recovery tasks are not focused within priority streams but in priority water bodies such as migratory corridors or overwintering habitat. Once again, the best available information and expertise of local biologists should be used when determining in which priority water bodies to implement tasks.

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.

1.1.1 Identify problem roads that cause sediment delivery. Develop strategies that identify roads that are problems or high risk for sediment delivery at stream crossings, culverts, slopes, and unstable road sections in priority streams and priority water bodies.

1.1.2 Reduce general sediment sources. Implement actions to limit or prevent sediment delivery from problem or high risk roads in priority streams and priority water bodies.

1.1.3 Gauge sediment from roads. Estimate the extent of sediment input from road networks or other sources

throughout priority streams and priority water bodies by gathering and reviewing baseline data.

1.1.4 Upgrade problem roads. Insure compliance on and implementation of road maintenance for roads throughout watersheds that contain priority streams and priority water bodies to minimize erosion and sediment delivery.

1.1.5 Assess impacts from trail systems. Assess the extent of impacts to bull trout from motorized and nonmotorized use of the access trails to the St. Joe River subbasin and the North Fork Coeur d'Alene River drainage of the Coeur d'Alene River subbasin during certain times of the year.

1.1.6 Develop sediment monitoring plan. Coordinate with land owners and land managers on sediment monitoring plans in the mainstem of the St. Joe River and North Fork Coeur d'Alene River drainages.

1.1.7 Identify water quality problems. Investigate the extent of water quality problems associated with private residences along the St. Joe River and North Fork Coeur d'Alene River drainages.

1.1.8 Identify sources of water temperature increases. Identify significant sources of thermal increases in priority streams and priority water bodies, for example, effluent inflows or loss of riparian canopy.

1.1.9 Assess grazing impacts. Identify and reduce impacts of grazing with current proven technology within the core area, for example, fencing, changes in timing and use of riparian pastures, off-site watering, and salting.

1.1.10 Identify trespass grazing. Determine whether trespass grazing on National Forest lands is contributing to water quality problems and, if necessary, increase enforcement efforts to address this issue.

1.1.11 Identify the need for gauging stations. Determine whether permanent stream gauging stations are needed to provide information necessary for assisting in the recovery of bull trout and request funding for installing and monitoring such stations.

1.1.12 Identify cold groundwater sources. Identify and protect groundwater sources in support of local populations or priority streams.

1.1.13 Provide literature on proper road management. Coordinate with and provide County road crews (and others) with information on proper road maintenance to reduce sediment inputs to streams.

1.1.14 Complete an assessment of "leave tree" requisites. Review requirements for leaving trees within priority streams, identify where the requirements are inadequate, and provide recommendations where necessary.

1.1.15 Enforce and evaluate existing mining regulations. Continue enforcing mining regulations, increase inspections of operations, and alter seasons of operations; but also determine effectiveness of current regulations on bull trout habitat and revise regulations, if needed, to reduce threat of habitat degradation to bull trout.

1.1.16 Contribute to development of total maximum daily loads. Review total maximum daily loads for adequacy in protecting bull trout and bull trout habitat and provide recommendations as appropriate.

1.1.17 Identify sources of mining contamination. Identify tailings piles, waste rock, and other sources of mining impacts or contaminants for Comprehensive Environmental Response, Compensation, and Liability Act restoration activities.

1.1.18 Implement Comprehensive Environmental Response, Compensation, and Liability Act activities. Implement Comprehensive Environmental Response, Compensation, and Liability Act activities in an effort to remediate or restore areas impacted by mining. Clean up mine waste at active, inactive, and orphan sites. Control mining runoff from roads, dumps, processing facilities, and ponds by removing and stabilizing mine tailings and waste rock deposited in the stream channel and floodplains and by restoring stream channel function. Activities should focus on actions that will have the greatest benefit to downstream mainstem reaches that act as migratory corridors for bull trout.

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

1.2.1 Identify barriers to fish passage. Identify complete or seasonal barriers at stream crossings that inhibit or prevent bull trout from using habitat upstream, for example, at culverts.

1.2.2 Remedy fish passage barriers. Remove or modify constructed fish passage barriers to improve bull trout access to habitat upstream of barriers.

1.2.3 Monitor success of barrier removal activities. Monitor all road crossings or barriers that have been modified for upstream passage and further modify them, if necessary, throughout the core area.

1.2.4 Eliminate entrainment risks. Identify fish screen needs and priorities for actions throughout the core area and implement screen projects at sites determined to potentially take bull trout.

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

1.3.1 Conduct watershed analyses. Identify specific tasks for recovery actions appropriate for individual watersheds. Watershed analysis is intended to generate a holistic understanding of land use and stream conditions within a watershed. It should identify historic conditions that can be used to develop restoration actions and to prioritize problems within a watershed. At a minimum, a complete watershed analysis should contain assessments for roads, riparian areas, streams (including fish resources), and landslides.

1.3.2 Identify stream channel degradation. Identify streambanks that are susceptible to excessive mass wasting and bank failures, that negatively impact riparian areas, or that inhibit natural stream functions.

1.3.3 Repair streambanks. Repair areas that have been identified as being susceptible to excessive mass wasting and bank failures, negatively impacting riparian areas, or inhibiting natural stream functions.

1.3.4 Reduce campsite impacts. Identify and manage dispersed (undeveloped) and developed recreation sites and relocate, when necessary, to avoid impacts to bull trout habitat.

1.3.5 Improve grazing practices. Develop, implement, and revise, when necessary, adaptive livestock grazing management plans that include mid-season performance standards to maintain stream channel conditions to maintain quality bull trout spawning and rearing habitat.

1.3.6 Revegetate denuded riparian areas. Identify denuded sites and revegetate them to restore shade and canopy, riparian cover, and native vegetation to improve or maintain bull trout habitat.

1.3.7 Evaluate current and legacy effects. Determine how timber management, roads, mining, and increases in peak flow have affected bull trout habitats and identify actions to eliminate negative effects or improve conditions.

1.3.8 Reduce current and legacy effects. Where feasible, improve conditions of bull trout habitat or implement actions to eliminate negative effects that result from the current and legacy effects of timber management, roads, mining, and increases in peak flows.

1.3.9 Implement appropriate riparian management guidelines. Meet Federal, State, Tribal, County, and local guidelines

concerning riparian management guidelines on all ownership in the Coeur d'Alene Recovery Unit, as appropriate.

1.3.10 Protect roadless condition. Maintain roadless conditions in designated roadless areas that occur in portions of watersheds that contain priority streams and minimize activities in areas that are not designated as roadless but that are otherwise in a roadless condition.

1.3.11 Provide information on stream and riparian function. Provide information to urban and semi-rural landowners on river dynamics and biological populations, to remove dikes where possible, and, where removal is not feasible, to plant riparian cover as appropriate.

1.3.12 Provide for incentives to restore proper stream function. Identify and promote incentives and programs to restore floodplain and channel function.

1.3.13 Conduct stream surveys. Identify, or better define, problems and possible solutions for restoring channel stability, function, and complexity and for reducing coarse bedload movement.

1.3.14 Implement buy-out programs. Identify and, where appropriate, implement buy-out programs to protect bull trout areas from redevelopment and initiate activities to restore riparian and channel function, when appropriate, to protect bull trout habitat.

1.3.15 Manage beaver dams. Monitor beaver dams on an annual basis within bull trout migratory corridors and modify

dams determined to be blocking passage to or from spawning areas, for example, by placing passage tubes through the dam or by structurally modifying the dam.

1.3.16 Evaluate overwintering habitat. Within the mainstem rivers, identify overwintering habitat and then determine whether overwintering habitat is being adversely affected by sediment accumulation or through bedload movement.

1.3.17 Improve overwintering habitat. Implement restoration activities to improve overwintering habitat in any mainstem river reaches determined to be limited as a result of sediment accumulation or bedload movement.

1.3.18 Improve instream habitat. Increase or improve instream habitat by adding large woody debris and by encouraging pool development in the near term. In the long term, revegetate to restore large woody debris and pool development.

1.4 Operate dams to minimize negative effects on bull trout in the lake and in tributary streams.

1.4.1 Reduce impacts from Post Falls Dam. Review Post Falls Dam operation concerning water level manipulation, entrainment, and other factors. Evaluate effects of the project and methods to optimize lake operations.

1.4.2 Conduct limiting factors analyses for dam operations. Analyze existing biological information and determine whether, for example, there are limiting factors to bull trout that can be addressed through dam operation.

1.4.3 Identify research needs related to Post Falls Dam. Determine research needs associated with the operation of Post Falls Dam and any related adverse effects to or limiting factors on bull trout, their habitat, or their prey species.

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

1.5.1 Identify sediment sources in upland areas. Identify problem areas, such as erosional areas or landslides, from all roads within the bull trout watersheds for which actions will be developed and applied to reduce sediment delivery to streams. Examples of actions are road obliteration, road reconstruction, and adequate drainage.

1.5.2 Investigate impacts from development. Investigate impacts associated with urbanization and industrialization and, based on findings, make recommendations to agencies, organizations, and municipalities to address issues.

1.5.3 Conduct watershed assessments. Complete assessments within known occupied watersheds and watersheds containing priority streams to identify extent of use by bull trout.

1.5.4 Determine changes to the hydrograph. Assess current and historic effects of upland management on changes to the hydrograph, for example, timing and magnitude of peak flows.

1.5.5 Determine need for prescribed fires. Investigate use of prescribed fire to mimic natural disturbance to reinvigorate

forests and emphasize continued fire suppression efforts to reduce risk of catastrophic fire, while not putting bull trout watersheds at risk.

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 Evaluate enforcement of policies for preventing illegal transport and introduction of nonnative fishes.

2.3 Educate the public about ecosystem concerns of illegal introductions of nonnative fishes.

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

2.4.1 Develop protocols for suppressing nonnative fishes. Evaluate and provide recommendations for experimental removal of brook trout or other competing nonnative species from priority streams.

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

2.5.1 Control nonnative fishes in migratory corridors. Implement removal of or reduction efforts for nonnative species (northern pike, largemouth bass, smallmouth bass, chinook salmon) wherever feasible and biologically,

economically, and socially supportable in Coeur d'Alene Lake and migratory corridors.

2.5.2 Experimentally remove nonnative fishes in spawning and rearing streams. Implement experimental removal of brook trout or other competing nonnative species from priority streams.

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

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.

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

3.2.1 Provide educational opportunities. Reduce unintentional harvest of bull trout and catch-and-release mortality by making public education materials available and establishing interpretive signs at fishing access points in bull trout and potential bull trout waters. Information concerning fish identification, fishing regulations, agency contacts, and appropriate handling of fish should be included. Continue cooperation on education projects with the Coeur d'Alene Tribe, U.S. Forest Service, Bureau of Land Management, Idaho Department of Fish and Game, U.S. Fish and Wildlife Service, anglers, other recreational organizations, and local newspapers.

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

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

4.1.1 Conduct genetic inventory. Collect samples for genetic analyses to contribute to establishing a program to understand genetic baseline and monitor genetic changes throughout the range of bull trout (see Chapter 1). Include assessment of the extent of bull trout and brook trout hybridization within the core area.

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

4.2.1 Determine where barriers to migration exist. Research connectivity between and among bull trout populations in the Coeur d'Alene Recovery Unit. Consider both water quality and physical barriers.

4.3 Develop genetic management plans and guidelines for appropriate use of transplantation and artificial propagation (see discussion of transplantation and propagation in Chapter 1).

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.

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

5.2.1 Conduct limiting factors analyses. Determine what and where critical limiting factors are preventing the recovery of bull trout within the Coeur d'Alene River subbasin and restricting recovery within the St. Joe River subbasin by assessing the survival of different life history stages of bull trout.

5.2.2 Conduct feasibility studies. Within the Coeur d'Alene and St. Joe River subbasins, conduct studies to verify which tributaries have the greatest potential to support bull trout local populations. Use results to focus recovery tasks or direct implementation of a controlled propagation program

5.3 Conduct evaluations of the adequacy and effectiveness of current and past best management practices 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 Use the Lake Management Plan. Coordinate with the State of Idaho, Coeur d'Alene Tribe, and local agencies in developing and implementing the Lake Management Plan.

6.1.2 Use the proposed Coeur d'Alene Basin Plan. Coordinate with the U.S. Environmental Protection Agency in implementing activities of the proposed Coeur d'Alene Basin Plan in an effort to improve bull trout habitats.

6.1.3 Conduct long-term monitoring of clean-up activities. Develop and implement long-term monitoring to assess the clean up and restoration of areas within the Coeur d'Alene River subbasin that are impacted by mining, as well as bull trout response to these clean-up measures.

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 Fully implement State habitat protection laws. Fully implement State habitat protection laws. Continue

enforcing the Idaho Forest Practices Act and increase inspection and pre-inspection of forest operations specifically in priority watersheds.

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 U.S. Fish and Wildlife Service.

7.1.1 Develop an Implementation Plan. Develop a Participation Plan for all involved State, Federal, Tribal, industry, and private entities to support implementation in the Coeur d'Alene Recovery Unit.

7.2 Develop and implement a standardized monitoring program to evaluate the effectiveness of recovery efforts.

7.3 Revise scope of recovery as suggested by new information.

7.3.1 Conduct annual meetings. Periodically assess (at a minimum, annual meetings) progress and determine needs for changes in the Coeur d'Alene Recovery Plan, as well as assess the priority of actions in the context of how to emphasize actions in the Coeur d'Alene Recovery Unit.

IMPLEMENTATION SCHEDULE

The Implementation Schedule that follows lists 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 coterminous United States as discussed in Part II of this recovery plan.

The Coeur d'Alene Recovery Unit Team envisions most recovery measures for bull trout and bull trout habitat as falling under the two primary categories of "protection" and "restoration" and perceives that the emphasis in implementing recovery measures should first be in the protection of existing bull trout local populations, their habitat, and priority water bodies vital to their survival. Resources required to protect high-quality habitat and local populations would, in general, be less than what is required for restoration activities. The Coeur d'Alene Recovery Unit Team does acknowledge, however, that many restoration activities will be necessary to recover bull trout throughout the Coeur d'Alene Recovery Unit. Therefore, recovery unit team developed the above criteria for selecting streams that should receive the highest priority for restoration and recovery activities. In addition, the recovery unit team identified Coeur d'Alene Lake and the mainstem reaches of the Coeur d'Alene, North Fork Coeur d'Alene, and St. Joe Rivers as priority water bodies that should also receive the highest priority for restoration and recovery activities. It is important to note that some restoration activities may take many years to complete and that even more time (10 to 20 years) may be required for results to be realized. Therefore, these activities need to be accomplished early in the implementation of recovery measures.

Parties with authority, responsibility, or expressed interest in implementing a specific recovery task are identified in the Implementation Schedule. 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 may be able to increase their funding opportunities 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 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.

Following are definitions to column headings and keys to abbreviations and acronyms used 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 multiple tasks, which, when combined, may reduce the time needed for completion.

Responsible or Participating Party: The following organizations are those with responsibility or capability to fund, authorize, or carry out the corresponding recovery task.

Federal agencies:

BLM	Bureau of Land Management
EPA	United States Environmental Protection Agency
FEMA	Federal Emergency Management Agency
FERC	Federal Energy Regulatory Commission
NRCS	National Resources Conservation Service
USCOE	U.S. Corps of Engineers
USDOT	U.S. Department of Transportation
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey

State agencies:

IDEQ	Idaho Department of Environmental Quality
IDFG	Idaho Department of Fish and Game
IDL	Idaho Department of Lands
ITD	Idaho Transportation Department

Others:

Counties	Shoshone, Kootenai, Benewah, and Latah Counties
SWCD	Soil and Water Conservation Districts
Tribe	Coeur d"Alene Tribe

Boldface 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 includes 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.

Implementation schedule for the bull trout recovery plan: Coeur d'Alene Lake Basin Recovery Unit											
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	Identify problem roads that cause sediment delivery	25	**USFS, IDEQ, IDL, ITD**, Tribe	*	-	-	-	-	-	Funding covered by another program or agencies
1	1.1.2	Reduce general sediment sources	25	**IDL, USFS, BLM**, Tribe, IDEQ	*	-	-	-	-	-	Funding covered by another program or agencies
1	1.1.8	Identify sources of water temperature increases	2	**IDEQ, EPA**, USFS, Tribe, BLM	150	100	50	-	-	-	Some cost overlap with stream habitat surveys
1	1.1.12	Identify cold groundwater sources	2	**IDEQ, USFS, BLM**, Tribe	75	50	25	-	-	-	Preservation activities, no restoration
1	1.1.14	Complete an assessment of "leave tree" requisites	1	**IDL, USFS, BLM,** IDEQ, USFWS, Tribe	*	-	-	-	-	-	Funding covered by another program or agencies

Implementation schedule for the bull trout recovery plan: Coeur d'Alene Lake Basin Recovery Unit											
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	1.1.16	Contribute to development of total maximum daily loads	25	**IDEQ**, EPA, Tribe	*	-	-	-	-	-	Funding covered by another program or agencies
1	1.2.1	Identify barriers to fish passage	3	**IDL, USFS, BLM**, Tribe	50	-	30	20	-	-	Funding covered by another program or agencies
1	1.2.2	Remedy fish passage barriers	5	**USFS, IDL**, IDFG, **BLM**, Tribe	*	-	-	-	-	-	Funding covered by another program or agencies
1	1.3.1	Conduct watershed analyses	10	**USFS**, IDL, **BLM**, Tribe	*	-	-	-	-	-	Funding covered by another program or agencies
1	1.3.2	Identify stream channel degradation	25	**IDEQ, USFS, BLM,** Tribe	500	100	50	50	50	50	Repeat in selected problem areas every 5th year, after year 5

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Implementation schedule for the bull trout recovery plan: Coeur d'Alene Lake Basin Recovery Unit											
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	1.3.3	Repair streambanks	25	**USFS**, IDEQ, **BLM, NRCS**, Tribe, SWCD	*	-	-	-	-	-	Funding covered by another program or agencies
1	1.3.6	Revegetate denuded riparian areas	10	**USFS**, IDEQ, **BLM, NRCS**, Tribe, SWCD, USFWS	*	-	-	-	-	-	Funding covered by another program or agencies
1	1.3.9	Implement appropriate riparian management guidelines	25	**USFS**, IDEQ, **BLM, NRCS**, Tribe, SWCD	*	-	-	-	-	-	Funding covered by another program or agencies
1	1.3.15	Manage beaver dams	25	**USFS, IDFG, BLM**, Tribe	25	1	1	1	1	1	Funding covered by another program or agencies

Implementation schedule for the bull trout recovery plan: Coeur d'Alene Lake Basin Recovery Unit											
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	1.3.16	Evaluate overwintering habitat	5	USFS, **IDFG**, BLM, Tribe	250	-	100	100	50	-	Possible graduate student project
1	1.3.17	Improve overwintering habitat	25	**USFS, BLM, IDL,** Tribe,	*	-	-	-	-	-	Funding covered by another program or agencies
1	1.5.3	Conduct watershed assessments	5	**USFS,** IDFG, IDL, IDEQ, **BLM,** Tribe	1,000	200	200	200	200	200	Other tasks included under this funding
1	4.1.1	Conduct genetic inventory	25	**USFWS**, USFS, IDFG, IDL, IDEQ, BLM, Tribe	*	-	-	-	-	-	Costs covered in Chapter 1
1	5.2.1	Conduct limiting factors analyses	5	IDFG, USFS, EPA, **USFWS**, Tribe	100	-	50	50	-	-	Possible graduate student project

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Implementation schedule for the bull trout recovery plan: Coeur d'Alene Lake Basin Recovery Unit											
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	5.2.2	Conduct feasibility studies	5	IDFG, Tribe, USFWS, IDL, IDEQ, BLM, USFS	200	60	60	40	20	20	Possible graduate student project; funding covered by another program or agencies
1	6.3.1	Fully implement State habitat protection laws	25	IDL	*	-	-	-	-	-	Funding covered by another program or agencies
1	7.1.1	Develop an Implementation Plan	2	**USFWS**, USFS, EPA, IDFG, BLM, Tribe, IDEQ, NRCS	25	20	5	-	-	-	
2	1.1.3	Gauge sediment from roads	2	**IDL, USFS, BLM,** Tribe	200	-	100	100	-	-	Some funding covered by another program or agencies

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Implementation schedule for the bull trout recovery plan: Coeur d'Alene Lake Basin Recovery Unit											
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	1.1.4	Upgrade problem roads	5	USFS, IDL, Counties, ITD, BLM, Tribe	*	-	-	-	-	-	Funding covered by another program or agencies
2	1.1.13	Provide literature on proper road management	25	USFS, USFWS, BLM, Tribe	10	2	-	-	-	-	Provide information every 5 years
2	1.1.15	Enforce and evaluate existing mining regulations	25	**IDEQ, BLM, USFS,** USFWS, **EPA**, IDFG, Tribe, IDWR	*	-	-	-	-	-	Funding covered by another program or agencies
2	1.1.17	Identify sources of mining contamination	25	**EPA, IDEQ,** BLM, USFS, Tribe, USFWS	*	-	-	-	-	-	Funding covered by another program or agencies

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Implementation schedule for the bull trout recovery plan: Coeur d'Alene Lake Basin Recovery Unit											
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	1.1.18	Implement Comprehensive Environmental Response, Compensation, and Liability Act activities	25	USFS, BLM, **EPA**, IDEQ, USFWS, Tribe	*	-	-	-	-	-	Costs associated with other cleanup activities
2	1.3.4	Reduce campsite impacts	25	USFS, BLM	*	-	-	-	-	-	Funding covered by another program or agencies
2	1.3.7	Evaluate current and legacy effects	10	USFS, IDL, BLM, Tribe	100	-	50	50	-	-	Some funding covered by another program or agencies
2	1.3.8	Reduce current and legacy effects	25	USFS, BLM, IDL, Tribe	*	-	-	-	-	-	Funding covered by another program or agencies

Implementation schedule for the bull trout recovery plan: Coeur d'Alene Lake Basin Recovery Unit											
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	1.3.10	Protect roadless condition	25	**USFS**, Tribe	*	-	-	-	-	-	Funding covered by another program or agencies
2	1.3.12	Provide for incentives to restore proper stream function	5	**NRCS**, SWCD, Counties, Tribe, **USFWS**	58	30	7	7	7	7	Some funding covered by another program or agencies
2	1.3.13	Conduct stream surveys	5	**USFS, IDL, BLM, IDEQ**, Tribe, USFWS	200	100	100	-	-	-	Some funding covered by another program or agencies
2	1.3.14	Implement buyout programs	25	USFWS, **FEMA**, Counties	*	-	-	-	-	-	Establish a bank of funds for these types of activities

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Implementation schedule for the bull trout recovery plan: Coeur d'Alene Lake Basin Recovery Unit											
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	1.3.18	Improve instream habitat	25	**USFS, BLM**, Tribe	100	-	-	50	50	-	Some funding covered by another program or agencies
2	1.4.1	Reduce impacts of Post Falls Dam	25	USFWS, Tribe, IDFG, IDEQ, **FERC**, EPA	*	-	-	-	-	-	
2	1.4.2	Conduct limiting factors analyses for dam operations	5	USFWS, Tribe, **IDFG**, IDEQ	*	-	-	-	-	-	
2	1.4.3	Identify research needs related to Post Falls Dam	5	USFWS, Tribe, **IDFG**, IDEQ	*	-	-	-	-	-	
2	1.5.1	Identify sediment sources in upland areas	25	**USFS, IDL**, IDEQ, **BLM**, Tribe	*	-	-	-	-	-	Funding covered by another program or agencies

Implementation schedule for the bull trout recovery plan: Coeur d'Alene Lake Basin Recovery Unit											
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	1.5.5	Determine need for prescribed fires	25	USFS, IDL, BLM, Tribe	*	-	-	-	-	-	Funding covered by another program or agencies
2	2.4.1	Develop protocols for suppressing nonnative fishes	3	**IDFG**, Tribe, USFS, USFWS	40	-	20	20	-	-	Some funding covered by another program or agencies
2	2.5.1	Control nonnative fishes in migratory corridors	5	**IDFG**, Tribe, USFWS	150	-	-	50	50	50	Some funding covered by another program or agencies
2	2.5.2	Experimentally remove nonnative fishes in spawning and rearing streams	1	**IDFG,** USFS, Tribe, USFWS,	150	-	-	50	50	50	Some funding covered by another program or agencies
2	4.2.1	Determine where barriers to migration exist	5	**IDFG**, USFS, BLM, Tribe, USFWS	*	-	-	-	-	-	Funding covered by another program or agencies

Implementation schedule for the bull trout recovery plan: Coeur d'Alene Lake Basin Recovery Unit											
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	6.1.1	Use the Lake Management Plan	25	IDEQ*, IDFG, Tribe, USFWS	*	-	-	-	-	-	Funding covered by another program or agencies
2	6.1.2	Use the proposed Coeur d'Alene Basin Plan	25	**EPA**, IDEQ, IDFG, USFWS, Tribe	*	-	-	-	-	-	Funding covered by another program or agencies
3	1.1.5	Assess impacts from trail systems	5	**USFS,** USFWS	50	-	25	25	-	-	Some funding covered by another program or agencies
3	1.1.6	Develop sediment monitoring plan	5	**IDEQ**, IDL, USFS, NRCS	*	-	-	-	-	-	Funding covered by another program or agencies
3	1.1.7	Identify water quality problems	25	**IDEQ**, Tribe	*	-	-	-	-	-	Funding covered by another program or agencies

Implementation schedule for the bull trout recovery plan: Coeur d'Alene Lake Basin Recovery Unit											
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	
3	1.1.9	Assess grazing impacts	25	USFS, BLM, NRCS, Tribe, IDL	*	-	-	-	-	-	Funding covered by another program or agencies
3	1.1.10	Identify trespass grazing	25	USFS	20	10	-	-	-	10	Funding covered by another program or agencies
3	1.1.11	Identify the need for gauging stations	5	**USGS**, USFWS	5	5	-	-	-	-	Funding covered by another program or agencies
3	1.2.3	Monitor success of barrier removal activities	25	USFS, IDL, IDEQ, BLM, Tribe	*	-	-	-	-	-	Funding covered by another program or agencies
3	1.2.4	Eliminate entrainment risks	3	USFS, Tribe, BLM, IDFG	5	-	-	5	-	-	Some funding covered by another program or agencies

Implementation schedule for the bull trout recovery plan: Coeur d'Alene Lake Basin Recovery Unit											
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	
3	1.3.5	Improve grazing practices	25	USFS, IDL, BLM, Tribe	*	-	-	-	-	-	Funding covered by another program or agencies
3	1.3.11	Provide information about stream and riparian function	25	IDEQ, USFWS, FEMA, Tribe, NRCS	40	-	20	20	-	-	Some funding covered by another program or agencies
3	1.5.2	Investigate impacts from development	10	IDEQ, USFWS, Tribe	*	-	-	-	-	-	Funding covered by another program or agencies
3	1.5.4	Determine changes to the hydrograph	10	USFS, IDL, Tribe, BLM	*	-	-	-	-	-	Funding covered by another program or agencies
3	3.2.1	Provide educational opportunities	25	**IDFG,** USFWS, Tribe, USFS	*	-	-	-	-	-	

Chapter 15 - Coeur d'Alene

Implementation schedule for the bull trout recovery plan: Coeur d'Alene Lake Basin Recovery Unit											
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	
3	6.1.3	Conduct long-term monitoring of clean-up activities	25	**EPA, IDEQ**, IDFG, USFWS, USFS, Tribe	*	-	-	-	-	-	Funding covered by another program or agencies
3	7.3.1	Conduct annual meetings	25	**USFWS,** Tribe, IDFG, IDEQ, USFS, BLM, conservation groups, industry	*	-	-	-	-	-	Costs covered under 7.3.1

Estimated cost is $ 3.9 million over 25 years.

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APPENDIX A. List of priority streams within each subbasin of the Coeur d'Alene Lake Basin Recovery Unit. Includes streams with current or recent observations of bull trout or bull trout redds and streams (with no recent observations of bull trout) that may provide suitable habitat for recolonization.

Subbasin	Stream	Recent Observation
St. Joe River	St. Joe River above Heller Creek	yes - recruitment/redds
	Wisdom Creek	yes - recruitment/redds
	Medicine Creek	yes - recruitment/redds
	California Creek	yes - recruitment/redds
	Yankee Bar Creek	yes - recruitment/redds
	Heller/Sherlock Creeks	yes - recruitment/redds
	Bean Creek	yes - redds
	Bacon/Pass Creeks	no
	Ruby Creek	yes - redds
	Timber Creek	yes - redds
	Red Ives Creek	yes - redds
	Copper Creek	no
	Beaver Creek	yes - redds
	Indian Creek	no
	Fly Creek	yes - redds
	Tento Creek	no
	Simmons Creek	yes - redds
	Gold Creek	yes - redds
	Mosquito	yes - redds
	Tumble Down Creek	no
	Quartz Creek	no
	Eagle Creek	yes - juveniles
	Bird Creek	no

Subbasin	Stream	Recent Observation
	Skookum Creek	no
	Siwash Creek	no
	Marble/Boulder Creek	no
	Black Prince Creek	no
	Big Creek	no
Coeur d'Alene River (North Fork)	Cougar Creek	no
	Steamboat Creek	no
	Grizzly/Brown Creeks	no
	Independence	no
	Upper Coeur d'Alene River - Buckskin Creek	no
	West Fork Eagle Creek	no
	Yellow Dog Creek	no
	Downey Creek	no
	Falls Creek	yes
	Teepee Creek	no
	Big Elk Creek	no
	Trail Creek	no

APPENDIX B. Prioritized streams for the St. Joe River subbasin. Developed by the Coeur d'Alene Recovery Unit Team for implementing recovery tasks.

Priority	Stream	Priority	Stream
01	Medicine Creek	15	Eagle Creek
02	Wisdom Creek	16	Beaver Creek
03	St. Joe River above Heller Cr.	17	Timber Creek
04	Simmons Creek	18	Bacon/Pass Creeks
05	Yankee Bar Creek	19	Indian Creek
06	Ruby Creek	20	Tento Creek
07	Gold Creek	21	Tumble Down Creek
08	Mosquito	22	Quartz Creek
09	Heller/Sherlock Creeks	23	Bird Creek
10	Fly Creek	24	Skookum Creek
11	California Creek	25	Siwash Creek
12	Copper Creek	26	Marble/Boulder Creek
13	Bean Creek	27	Black Prince Creek
14	Red Ives Creek	28	Big Creek

Appendix C. Prioritized streams for the Coeur d'Alene River subbasin. Developed by the Coeur d'Alene Recovery Unit Team for implementing recovery tasks.

Priority	Stream	Priority	Stream
01	Falls Creek	08	Big Elk Creek
02	W.F. Eagle Creek	09	Trail Creek
03	Independence Creek	10	Yellow Dog Creek
04	Upper Coeur d'Alene River/Buckskin Creek	11	Downey Creek
05	Cougar Creek	12	Grizzly Creek
06	Steamboat Creek	13	Brown Creek
07	Teepee Creek		

APPENDIX D. List of chapters.