INTRODUCTION

Recovery Unit Designation

Chapter 1 of the bull trout recovery plan (USFWS 2002) delineates the recovery areas and defines units upon which recovery will be based such as core areas and local populations. Twenty-two recovery units exist in the Columbia Basin Distinct Population Segment (Figure 1). The Salmon River Recovery Unit is one of the 22 recovery units designated for bull trout in the Columbia River basin (Figure 1). The recovery unit includes the entire Salmon River basin in Idaho upstream from its confluence with the Snake River to the headwaters in the Sawtooth Valley. This mountainous basin covers one of the largest areas in the Columbia River basin. The Salmon River basin is considered a recovery unit because bull trout likely functioned as a unit historically with the large mainstem rivers providing connectivity between subbasins and their associated bull trout populations. Core areas and the associated bull trout local populations, and selected potential local populations are essential for the recovery of bull trout in the Salmon River Recovery Unit (Figure 2, Table 1).

In the Salmon River Recovery Unit there are two recovery teams, the Upper Salmon River Recovery Team and the Lower Salmon River Recovery Team. These teams are composed of biologists from agencies, Tribes, conservation organizations, and private companies. Two teams were established because of the large size of the recovery unit and the associated difficulties of meeting with all members in one centrally located place.

Geographic Description

The Salmon River Recovery Unit for bull trout encompasses the entire Salmon River basin and lies in central Idaho. The area extends from the Idaho/Montana border on the east to the Snake River on the Idaho/Washington border on the west. The Salmon River flows north and west through central Idaho to join the Snake River in lower Hells Canyon. Major tributaries to the Salmon

Figure 1. The Salmon River Bull Trout Recovery Unit and other the Bull Trout Recovery Units.

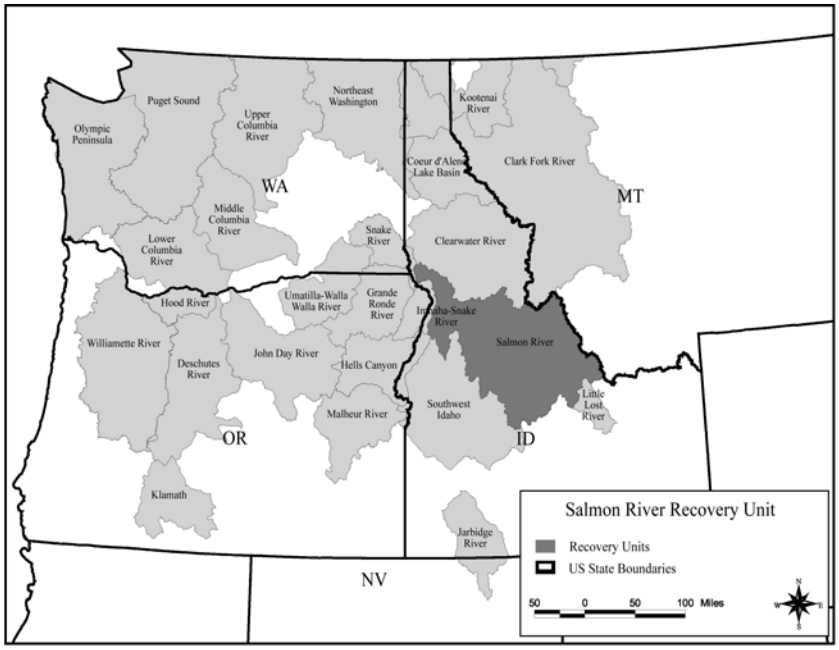

Figure 2. Salmon River Recovery Unit Core Areas for bull trout.

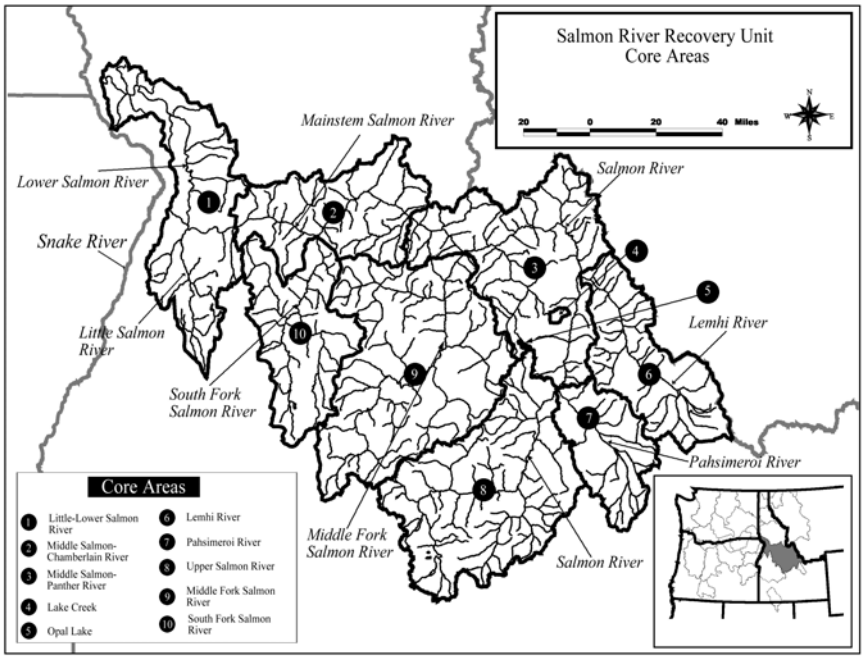

Table 1. Salmon River Recovery Unit, bull trout core areas and local populations.

Upper Salmon River Core Area Local populations Alturas Lake Creek, Fourth of July Creek, Redfish Lake Creek, Valley Creek, Basin Creek, Yankee Fork Creek, Warm Springs Creek, Slate Creek, Thompson Creek, Squaw Creek, East Fork Salmon River, Germania Creek, Garden Creek, Challis Creek, Morgan Creek, Yellowbelly Creek, Pettit Lake, Upper Salmon River[1] Potential local population Kinnikinic Creek
Pahsimeroi River Core Area Local populations Upper Pahsimeroi River, Big Creek, Patterson Creek, Falls Creek, Morse Creek, Morgan Creek (includes the lower Pahsimeroi River), Tater Creek, Ditch Creek
Lake Creek Core Area Local populations Williams Lake and Lake Creek (upstream of the lake)
Lemhi River Core Area Local populations Hayden Creek, Pattee Creek, Upper Lemhi River, Geertson Creek, Kenny Creek, Bohannon Creek Potential local populations Withington, Sandy, and Agency Creeks
Middle Salmon River-Panther Core Area Local Populations Cow Creek, Hat Creek, McKim Creek, Iron Creek, Williams Creek , Carmen Creek, Fourth of July Creek, Jesse Creek, Twelve Mile Creek, North Fork Salmon River, Indian Creek, Squaw Creek, Spring Creek, Owl Creek, Boulder Creek, Pine Creek, Horse Creek, Panther Creek, Napias Creek, Allison Creek

[1] This area was designated a local population based on discussions with the Sawtooth National Forest (Moulton, pers. comm., 2002).

Table 1. Salmon River Recovery Unit, bull trout core areas and local populations.

Opal Lake Core Area[2] Local Populations Opal Lake and Opal Creek
Middle Fork Salmon River Core Area Local populations Bear Valley Creek, Marsh Creek, Upper Middle Fork Salmon River 1, 2 (2 local populations), Mayfield Creek, Rapid Creek, Pistol Creek, Little Loon Creek, Warm Spring Creek, Loon Creek, Camas Creek, Lower Middle Fork Salmon River 1,2,3 (3 local populations), Marble Creek, Monumental Creek, Big Raney Creek, Big Creek 1,2,3,4 (4 local populations), Beaver Creek, Rush Creek, Silver Creek, Yellowjacket Creek, Wilson Creek, Indian Creek, Sulphur Creek
Middle Salmon River-Chamberlain Core Area Local populations Bargamin Creek, Warren Creek, Fall Creek, California Creek[3], Wind River, Sheep Creek, Big Squaw Creek, Sabe Creek, Chamberlain Creek Potential local Population Crooked Creek[4]

2

Two new core areas, Lake Creek and Opal Lake, were delineated by th U.S. Fish and Wildlife Service and Upper Salmon River Recovery Team members in 2002 with input from local biologists (USFWS, *in litt*., 2001a, USFWS, *in litt*., 2002c).

3

California Creek in the Middle Salmon River-Chamberlain Core Area, based on the expertise of the Payette National Forest biologists (USFWS, *in litt.*, 2002a, USFS 2002a).

4

This potential local population was delineated with biologists from the Nez Perce National Forest and Cottonwood Bureau of Land Management (USFWS *in litt*., 2002b).

Table 1. Salmon River Recovery Unit, bull trout core areas and local populations.

South Fork Salmon River Core Area[5]
Local populations
Upper Lake Creek, Grouse-Flat Creek, Ruby Creek, Summit Creek, Victor Creek, Loon Creek, Lick Creek, Zena Creek, Fitsum Creek, Buckhorn Creek, Cougar Creek, Fourmile Creek, Blackmare Creek, Dollar-Six Bit Creeks, Warm Lake, Curtis Creek, Upper South Fork Salmon River, Burntlog Creek, Trapper Creek, Riordan Lake, Upper East Fork South Fork Salmon River, Sugar Creek, Tamarack Creek, Profile Creek, Quartz Creek, Elk Creek, Pony Creek
Potential local populations
Upper Johnson Creek, Bear Creek , Camp/Pheobe, Porphyry Creeks and Sheep/South Fork Salmon River
Little-Lower Salmon River Core Area
Local populations
Slate Creek, John Day Creek, Rapid River, Boulder Creek, Hard Creek, Lake/Lower Salmon, Partridge Creek
Potential local populations
Hazard, Elkhorn and French Creeks

River include the Yankee Fork of the Salmon River, East Fork Salmon River, Lemhi River, Pahsimeroi River, North Fork Salmon River, Panther Creek, Middle Fork Salmon River, South Fork Salmon River, and the Little Salmon River. The Salmon River Recovery Unit covers approximately 36,278 square kilometers (14,007 square miles) (Servheen 2001). Elevations range from 3,862 meters (12,662 feet) on the Summit of Mount Borah to 274 meters (900 feet) at the mouth of the Salmon River at the Snake River. The area has approximately 28,730 kilometers (17,000 miles) of streams with 2,720 kilometers (1,700 miles) of these streams named.

Climate. The climate in the western portion of the Salmon River Recovery Unit is influenced by maritime air masses, whereas the eastern portion is influenced

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5

Pony, Summit, Victor, Loon, Lick, Zena, Cougar, Sugar, Tamarack, Profile, Quartz, Dollar-Six Bit, and Elk creeks, Upper Johnson, Bear, Camp/Phoebe, Porphyry, Sheep/South Fork Salmon River in the South Fork Salmon River Core Area were delineated based on the expertise of the Payette and Boise National Forest biologists (USFWS, *in litt,.* 2002a, USFS 2002a, USFS 2002b).

primarily by a continental climate regime (Servheen 2001). In the western portion of the recovery unit, cool and moist Pacific maritime air in the late fall and early spring is interrupted by cold and dry continental air from Canada. Across much of the area, summers are comparatively dry as most precipitation occurs as snow during winter months. Occasionally, throughout the entire recovery unit, lengthy frontal rain storms can produce as much as 10 inches of precipitation which can lead to flooding and landslides during winter and spring. Above 1,228 meters (4,000 feet) in elevation most of the annual precipitation occurs as snow with maximum accumulation occurring by about the first week of March.

Geomorphology. The recovery unit includes a wide variety of geologic formations from the intrusive rocks of the Columbia River basalt, the Idaho Batholith, the Challis volcanics, and the alluvial deposits of the Lemhi and Pashimeroi valleys (Servheen 2001). Soils derived from some of these parent materials are highly erodible. Alpine glaciation occurred primarily on the high elevation peaks. Stream erosion, however, is the predominant physiographic influence in the recovery unit. The topography of this area is typified by fairly narrow V-shaped valleys, steep valley side slopes, and narrow ridge systems.

Hydrology. The mean annual flow of the Salmon River at White Bird, measured at the U.S. Geological Survey gaging station closest to the mouth, is 11,300 cubic feet per second (Servheen 2001). The drainage area upstream from this station is 350,945 square kilometers (13,550 square miles) which includes 97 percent of the entire area of the Salmon River Recovery Unit.

Seasonal patterns of streamflow, for the periods of record at selected gauging stations within the subbasin, peak in April, May, and June and recede to low levels in summer (Servheen 2001). The highest peak flows, when normalized to the drainage area, were recorded on the South Fork of the Salmon River at the mouth: 4.5 cubic feet per second per square mile of drainage area (0.017 cubic feet per second per hectare of drainage area). The hydrologic patterns have been altered due to land management practices in the watersheds in the subbasin (Upper Salmon River Interagency Technical Advisory Team 1998).

Spring-time flows in the lower river reaches of the Lemhi and Pahsimeroi Rivers on the eastern edge of the recovery area stand out as somewhat different than those found in other portions of this recovery unit (Servheen 2001). Much of the streamflow in these valleys comes from snowmelt, however, the interaction of these flows with the high ground water levels in the valley produce a more constant hydrograph than most mountain streams (Loucks 2000). This area also has a high rate of water diversion for irrigation proposes as well as differences in geology and levels of precipitation that set it apart from drainages in the rest of the recovery unit.

Vegetation. The Salmon River bull trout recovery unit contains a diverse mix of vegetation with the most abundant being evergreen coniferous forest and evergreen shrublands (Servheen 2001). Major groups of forest plant associations include grand fir (*Abies grandis*) forest, subalpine fir (*Abies lasiocarpa*) forest, whitepark pine-limber pine (*Pinus albicaulis* and *pinus flexilis* respectively) forest, ponderosa pine (*Pinus ponderosa*) and mountain hemlock (*Tsuga mertensiana*). Historic low-intensity fires had a major influence on maintaining open canopies for many of the forest types in the recovery unit, especially in the ponderosa pine woodland plant association which is the most predominant forest association in the Little Salmon River and Lower Salmon River drainages (Servheen 2001).

Upper Salmon River Core Area. This area encompasses the fourth field Hydrologic Unit that extends from the mouth of the Pahsimeroi River to the headwaters in the Sawtooth Mountains, including the mainstem Salmon River and tributaries (Figure 3). The area covers 6,242 square kilometers (2,410 square miles) and contains 5,230 kilometers (3,251 miles) of streams (Servheen 2001). Eighty-nine percent of this core area is in public ownership, and most of this public land is managed by the Federal government (Table 2). Eighteen local populations and one potential local population have been identified in this core area (Figure 3). One of these local populations, Germania Creek encompasses an isolated population of bull trout in the Upper East Fork Salmon River. This population is isolated by a natural barrier.

Pahsimeroi River Core Area. This core area includes the entire fourth field Hydrologic Unit including the Pahsimeroi River and its tributaries. The Pahsimeroi

River watershed is located on the east side of the Salmon River, and includes the west slope of the Lemhi Mountain Range and the east slope of the Pahsimeroi Mountains in the Lost River Range. The valley floor has a low elevation of 1,418 meters (4,648 feet) and is characterized by well developed alluvial fans that extend from the mountain fronts to near the center of the valley floor. The boulder, cobble, and gravel fans cover a large underground reservoir which provides the majority of the water that emerges as springs along the valley floor. The main Pahsimeroi River switches to subterranean flow during the late summer and winter (BLM and USFS 2001b).

Ninety-one percent of the Pahsimeroi River Core Area is in public ownership (Table 2). This core area has the highest percentage of land managed by the Bureau of Land Management (41.8 percent) of any of the core areas in this recovery unit. The drainage area of the Pahsimeroi River Core Area covers 2,137 square kilometers (825 square miles) and includes 1,430 kilometers (889 miles) of streams (Servheen 2001). The eight bull trout local populations in the core area are displayed in Figure 4.

Lake Creek Core Area. This core area includes an isolated bull trout population in Williams Lake and Lake Creek (Figure 5). The core area is located on the west side of the Salmon River between the mouth of the Pahsimeroi and Lemhi rivers, approximately 19 kilometers (12 miles) south of Salmon, Idaho. Williams Lake was formed 8,000 to 10,000 years ago when a massive landslide dammed a creek in the steep-sided canyon and created a uniform basin. No surface outlet exists to the lake. At the base of the landslide area that created the lake, a spring-fed stream is apparently connected to the lake. The elevation of the lake is 1,601 meters (5,250 feet) and the watershed of 4,554 hectares (11,245 acres, 17.5 square miles) that surrounds the lake is 98 percent Federal land managed by the U.S. Forest Service and the Bureau of Land Management (Barnes, Sytsma, and Gibbons 1994).

Lemhi River Core Area. This core area includes the Lemhi River and is bordered by the rugged Bitteroot Range of the Beaverhead Mountains to the north and east and the Lemhi Mountain Range to the west. The Lemhi River valley is influenced by high water tables with vegetation dominated by willows (*Salix spp.*)

and sedges (*Carex spp.*) (USRITAT 1998). The Lemhi River begins at the confluence of Texas Creek and Eighteenmile Creek, near the town of Leadore, and flows northwest through the Lemhi River valley. The river is a low gradient, stream-fed system that flows through fertile valley bottoms and the average streamflow is 270 cubic feet per second (USFWS 1999a). The drainage area is 3,289 square kilometers (1,270 square miles) and the area contains 2,140 kilometers (1,330 miles) of streams (Servheen 2001). Federally-managed land is divided equally between the U.S. Forest Service (39 percent) and the Bureau of Land Management (39 percent); 18 percent is privately managed (Table 2). Bull trout are distributed in six local populations (Figure 6). Three important potential local populations have been identified by the Upper Salmon River Recovery Team (USFWS, *in litt.*, 2002a).

Figure 3. Upper Salmon River Core Area for bull trout.

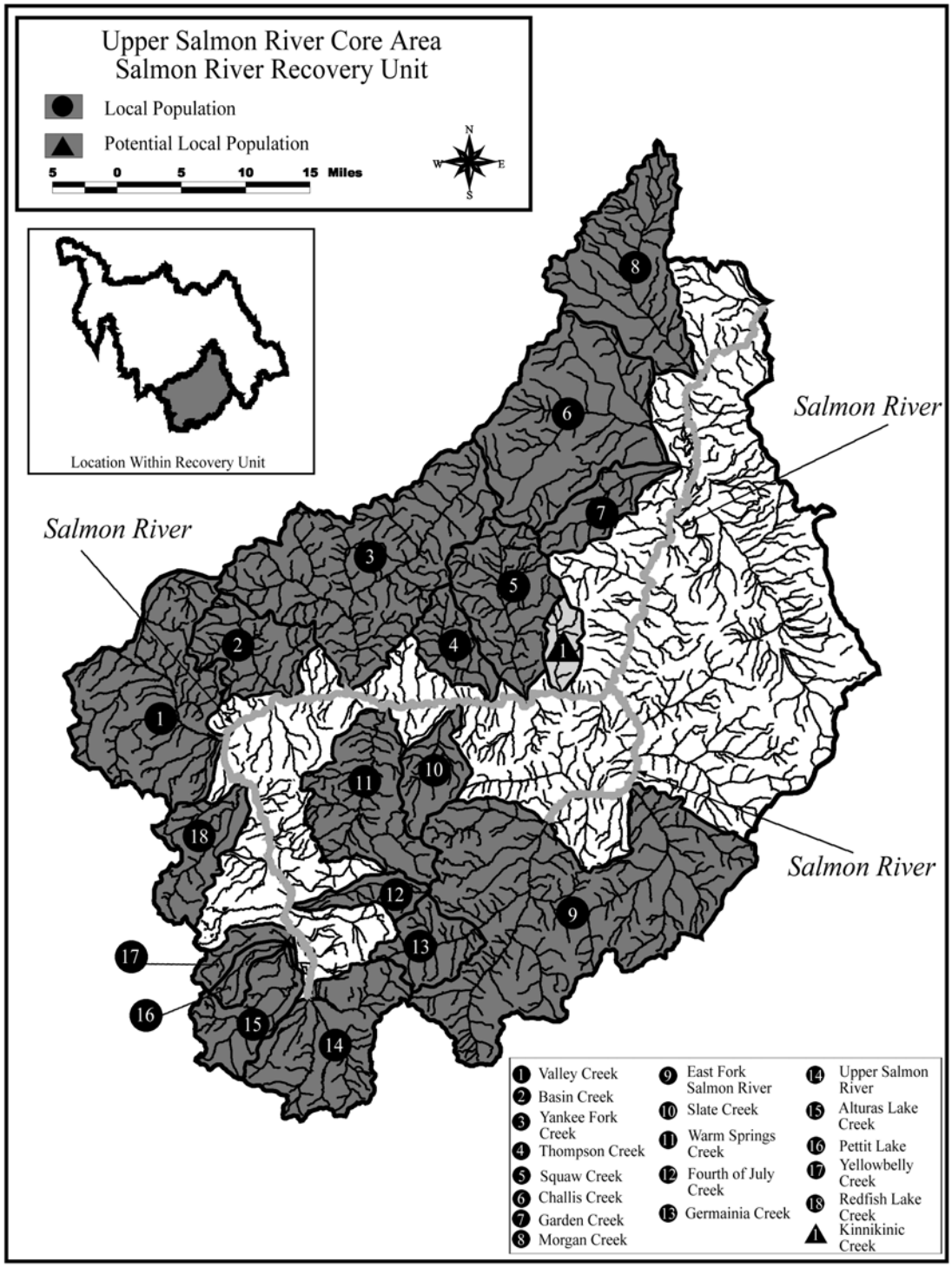


Table 2. Land ownership status in the fourth field Hydrologic Units in the Salmon River Recovery Unit (Servheen 2001). The numbers below are the percentage of land in each ownership category for each fourth field Hydrologic Unit class. The core areas are represented by the entire fourth field Hydrologic Unit, with the exception of four fourth field Hydrologic Units: MFU and the MFL are included in the Middle Fork Salmon River core area, and the Little-Lower Salmon River core area includes the LOS and LSA.

Landowner	Major hydrologic unit (watershed)										Entire subbasin
	UPS	PAH	MSP	LEM	MFU	MFL	MSC	SFS	LOS	LSA	
Forest Service	68.9	45.9	83.7	39.5	99.4	99.2	98.5	98.3	42.0	61.0	76.6
Bureau of Land Management	24.7	41.8	10.4	39.0	-	-	0.8	0.1	7.3	4.4	12.6
National Park Service	-	-	-	-	-	-	-	-	0.2	-	0.0
State of Idaho	1.4	3.6	0.3	3.0	0.2	0.3	0.1	0.8	4.7	3.3	1.5
Private	4.6	8.7	5.4	18.4	0.4	0.5	0.6	0.7	45.4	31.0	9.1
Open water	0.4	0.0	0.2	0.0	0.0	0.0	0.1	0.1	0.3	0.3	0.2

UPS - Upper Salmon River Core Area
PAH - Pahsimeroi River Core Area
MSP - Middle Salmon Panther Core Area
LEM - Lemhi River Core Area
MFU and MFL - Middle Fork Salmon River Core Area
MSC - Middle Salmon River-Chamberlain Core Area
SFS - South Fork Salmon River Core Area
LOS and LSA - Little-Lower Salmon River Core Area

Figure 4. Pahsimeroi River Core Area for bull trout.

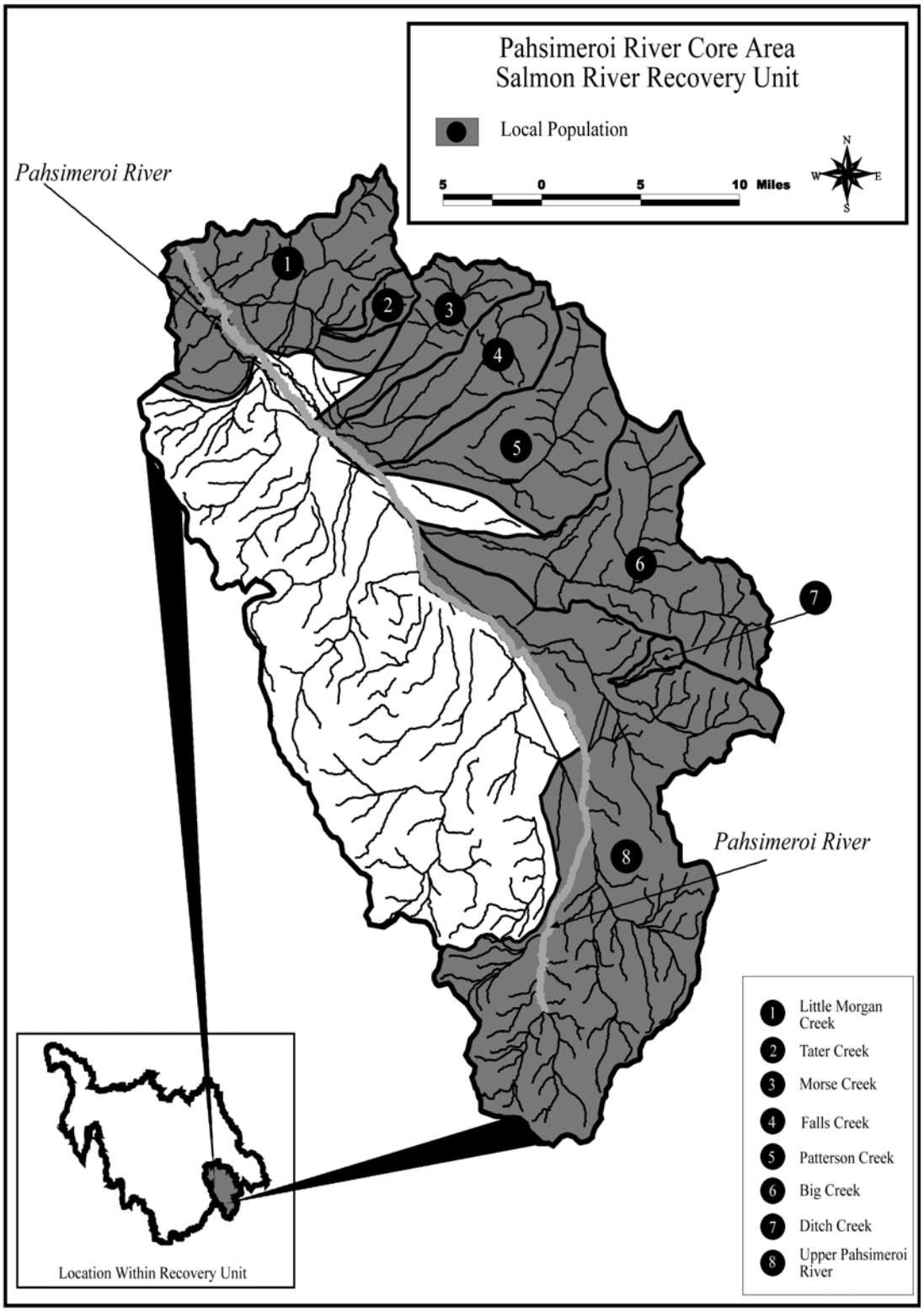
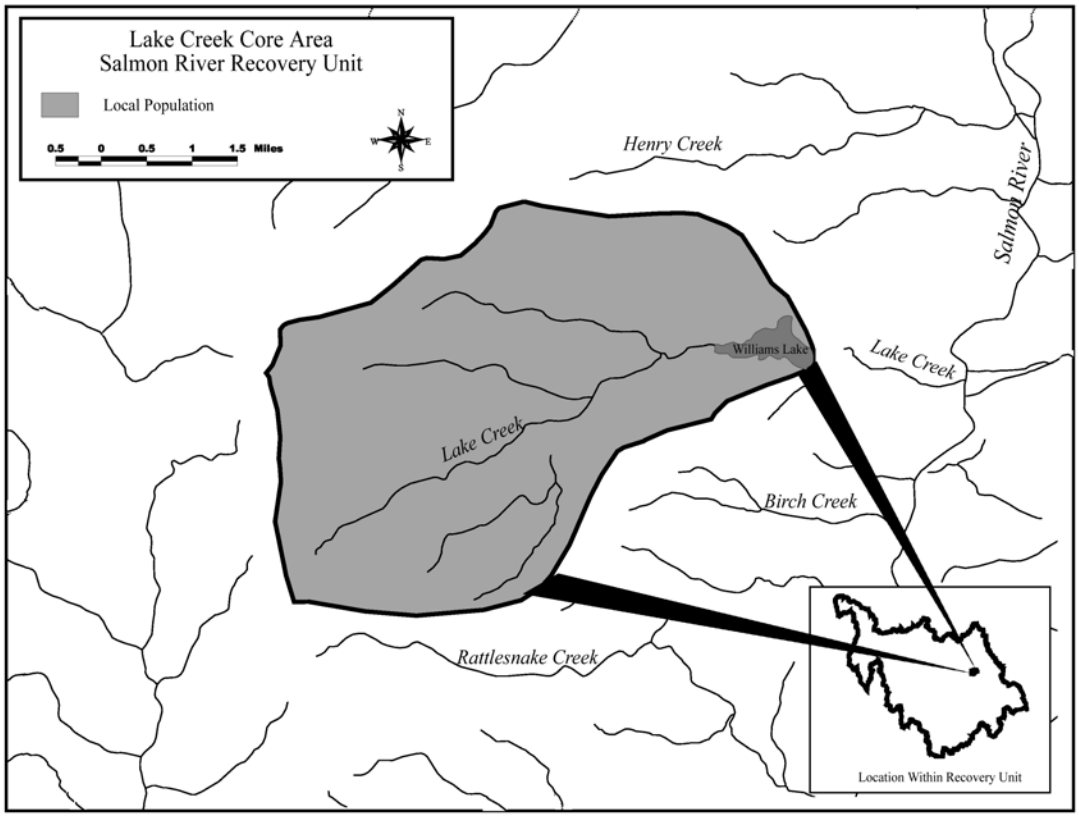


Figure 5. Lake Creek Core Area for bull trout.



Middle Salmon River-Panther Core Area. This area includes the Salmon River and Panther Creek drainages which are defined by a fourth field Hydrologic Unit that extends from the confluence of the Main Salmon River with the Lemhi River, to its confluence with the Middle Fork Salmon River. This area is bordered on the west by the mountains west of Panther Creek, the Bighorn Crags and Quartzite Mountain; the southeast boundary is the Lemhi Mountain Range; and the northeast boundary is the Bitteroot Mountain Range. The northern boundary is in the headwaters of the North Fork of the Salmon River at Lost Trail Pass. The drainage area is 4,688 square kilometers (1,810 square miles) and the area contains 3,150 kilometers (1,958 miles) of streams (Servheen 2001). Land ownership status is summarized in Table 2. Twenty local populations of bull trout have been identified in this core area (Figure 7).

Figure 6. Lemhi River Core Area for bull trout.

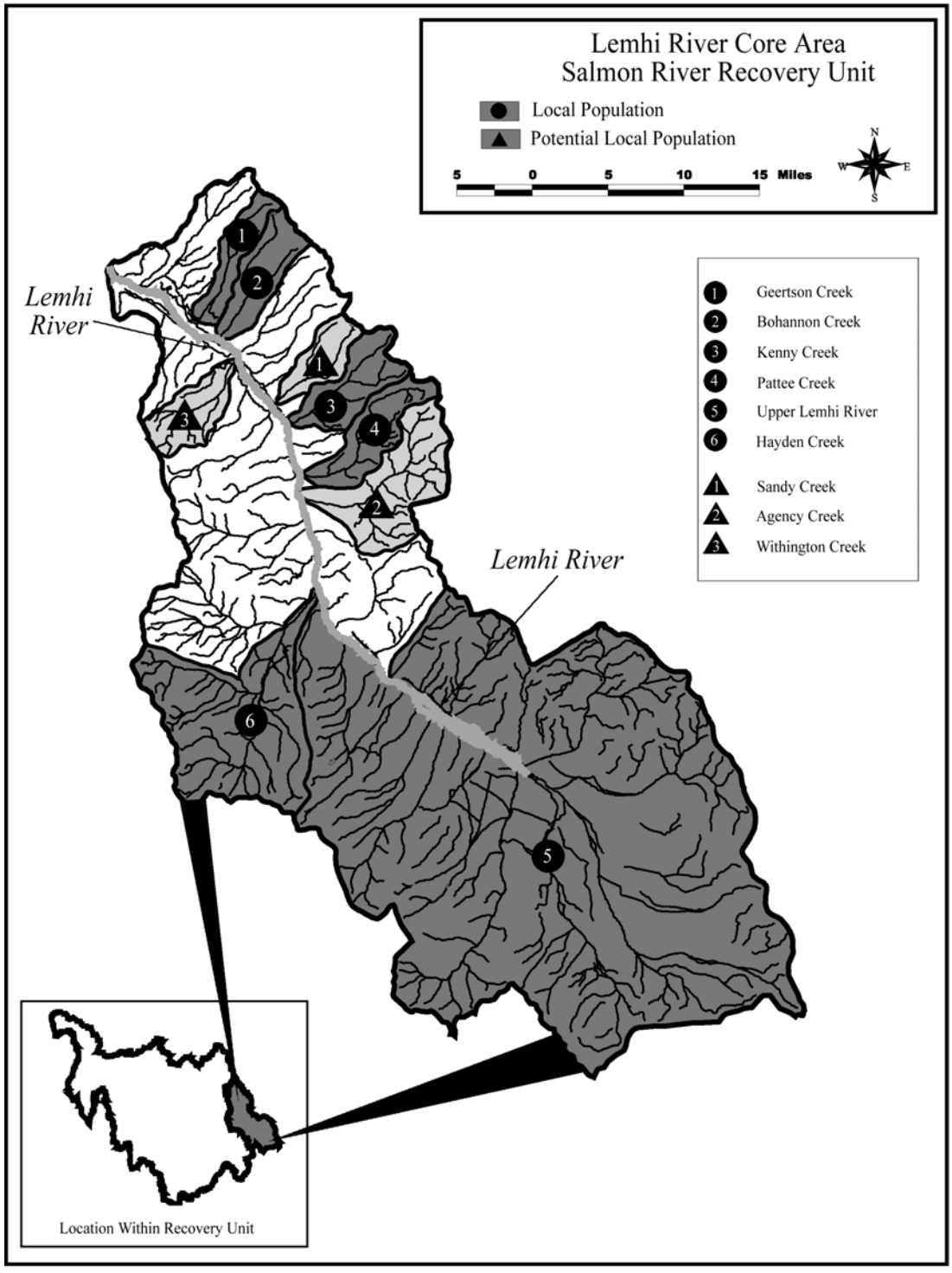
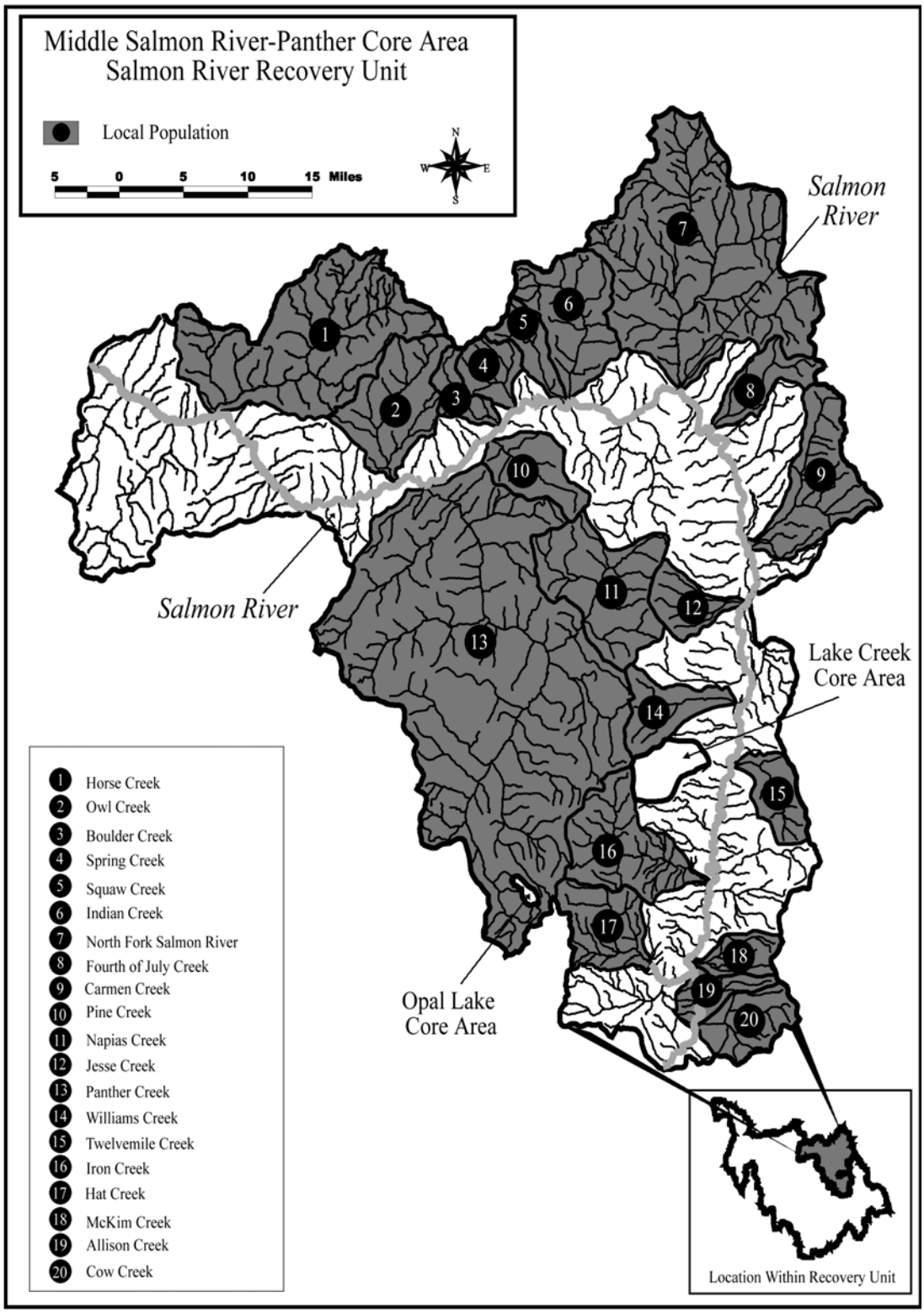
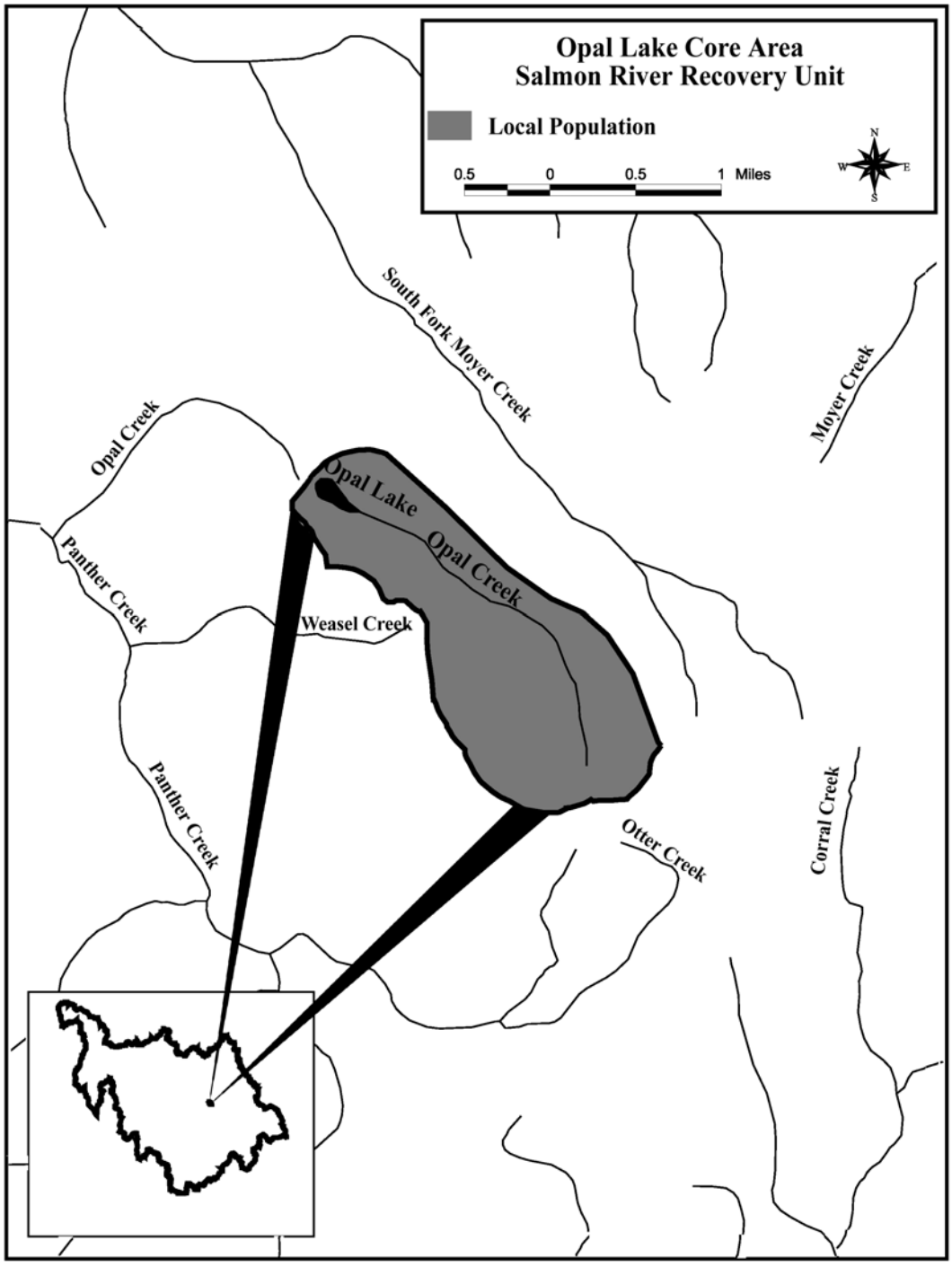


Figure 7. Middle Salmon River-Panther Core Area for bull trout.



Middle Fork Salmon Core Area. This core area includes the entire Middle

Figure 8. Opal Lake Core Area for bull trout.



Opal Lake Core Area. This core area encompasses a small, isolated bull trout population in Opal Lake and upstream of the lake in Opal Creek (Figure 8). The area is located in the headwaters of the Panther Creek watershed and is encompassed by the Middle Salmon River-Panther Core Area. This natural lake has no outlet. The elevation of the lake is 2,300 meters (7,546 feet) and the watershed contains 518 hectares (1,280 acres, 1.9 square miles). The entire area is managed by the Forest Service. Fork Salmon River drainage, including two fourth field Hydrologic Units, most of which is located in the Frank Church River of No Return Wilderness. The southern boundary is in the headwaters of Bear Valley Creek and the mountains to the north of Big Creek form the northern boundary. The eastern boundary follows the ridgeline of the high peaks west of Panther Creek the Main Salmon River, and McElney Mountain and Twin Peaks. This area encompasses 7,404 square kilometers (2,860 square miles) and includes 5,712 kilometers (3,550 miles) of streams (Servheen 2001). Ninety-nine percent of this area is managed by the U.S. Forest Service (Table 2). The Boise National Forest manages the headwaters in Bear Valley Creek, the Payette National Forest manages the headwaters of Big, Monumental, Chamberlain, and Beaver creeks, and the Salmon Challis National Forest manages the remainder of the area. There are 28 local populations in this core area, one in each of the fifth field Hydrologic Units (Figure 9).

Middle Salmon River-Chamberlain Core Area. This area includes the Salmon River from its confluence with the Middle Fork Salmon River downstream to French Creek on the western boundary. The northern boundary is comprised of the peaks that separate the Salmon River basin from the Clearwater basin. The southern boundary follows the ridges between Farrow Mountain and Mosquito Peak and then continues to the mouth of the South Fork Salmon River. The core area covers 4,403 square kilometers (1,700 square miles) and includes 3,248 kilometers (2,019 miles) of streams (Servheen 2001). Ninety-nine percent of this area is managed by the Federal government (Table 2). Nine local populations and one potential local population are located in the core area (Figure 10).

Figure 9. Middle Fork Salmon River Core Area for bull trout.

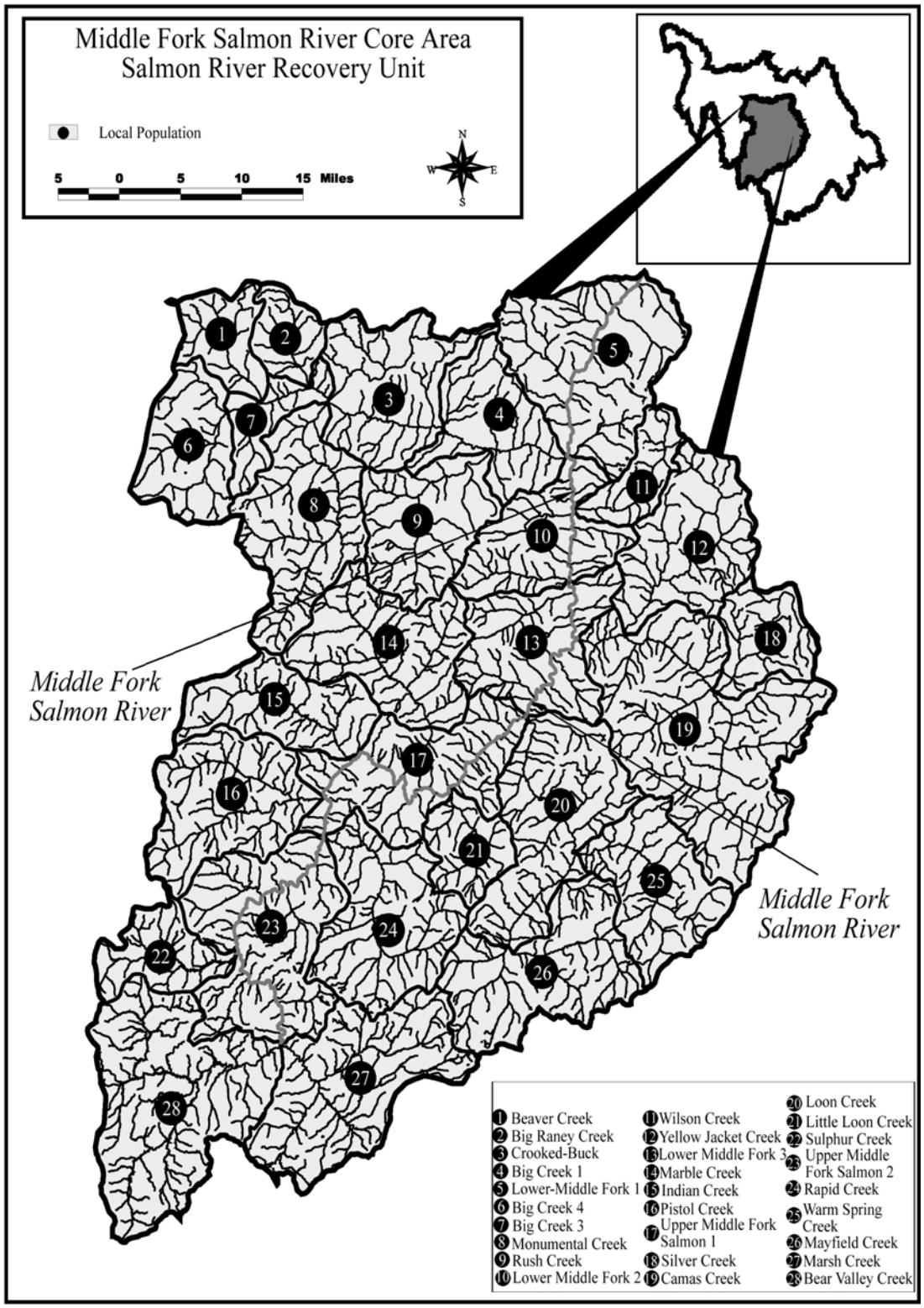
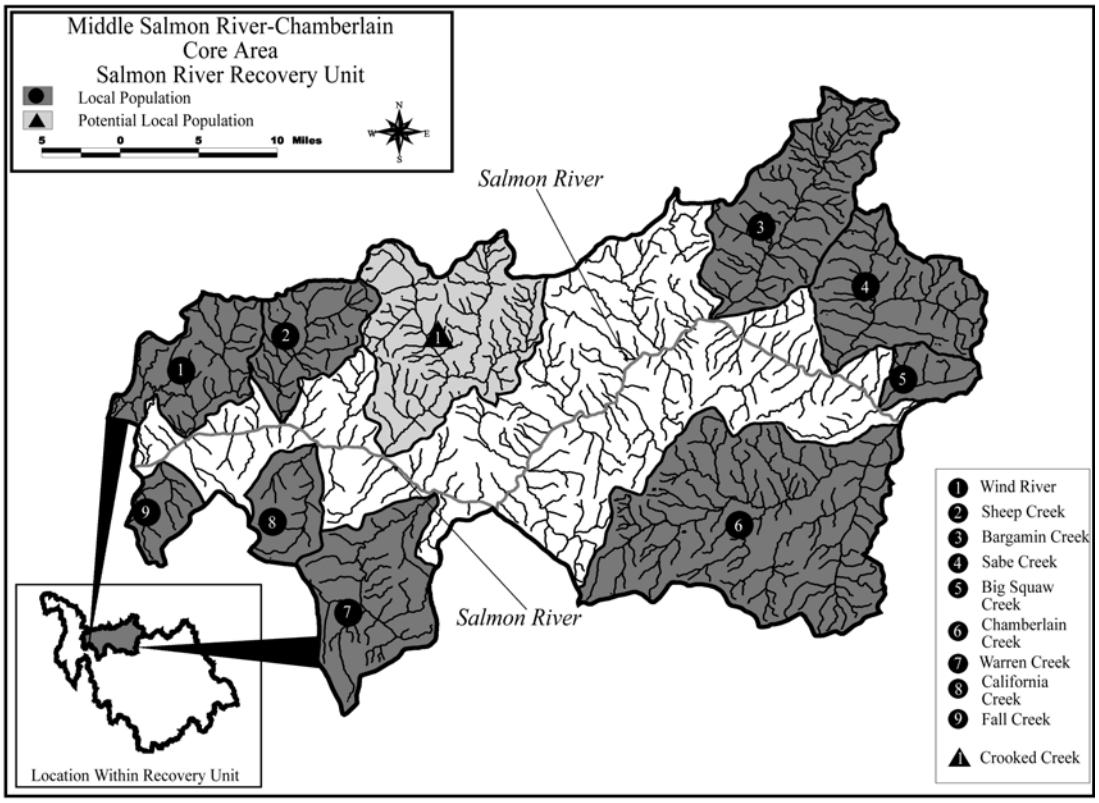


Figure 10. Middle Salmon River-Chamberlain Core Area for bull trout.



South Fork Salmon River Core Area. This area covers the entire South Fork Salmon River fourth field Hydrologic Unit. This tributary enters the Mainstem Salmon River east of French Creek and extends south to its headwaters upstream of Warm Lake (SBNFTG 1998b). The ridges that form the eastern boundary of this relatively narrow, north-south oriented area lie in the headwaters of the Middle Fork Salmon River and Big Creek. The western boundary is the divide between the upper North Fork Payette River and the South Fork Salmon River. The area drains 3,393 square kilometers (1,310 square miles) and 2,616 kilometers (1,626 miles) of streams are found in the area (Servheen 2001). The U.S. Forest Service manages 98.3 percent of the land in this core area (Table 2). The Lower Salmon Recovery Team members identified 27 local populations of bull trout and 5 potential local populations (1 of which is essential) in this core area (Figure 11). The mainstem Salmon River downstream of the mouth of the South Fork Salmon River is used by bull trout in this core area, even though it is not displayed in Figure 11.

Little-Lower Salmon River Core Area. This area extends from the watersheds of the confluence of the mainstem Salmon River with the Snake River, upstream to the confluence with French Creek. In addition, the Little Salmon River watershed is included, which flows into the Salmon River at River kilometer 139 (River Mile 86.7) (CBBTTAT 1998b). The western boundary is formed by Hells Canyon on the north and by the Seven Devils Mountains on the south. The eastern boundary starting from the south is the watershed crest at the headwaters of the North Fork Payette River and it continues north and crosses the Salmon River below Burgdorf Summit. This boundary continues north to the headwaters of Little Slate Creek and White Bird Creek and curves to the west around the east side of the Craig Mountains. This core area contains seven local populations and three important potential local populations (Figure 12). The core area drains 4,719 square kilometers (1,822 square miles) and includes 3,786 kilometers (2,354 miles) of streams (Servheen 2001). The land ownership in this core area differs from other core areas in that it contains a larger amount (approximately 38.2 percent) of private land (Table 2).

Figure 11. South Fork Salmon River Core Area for bull trout.

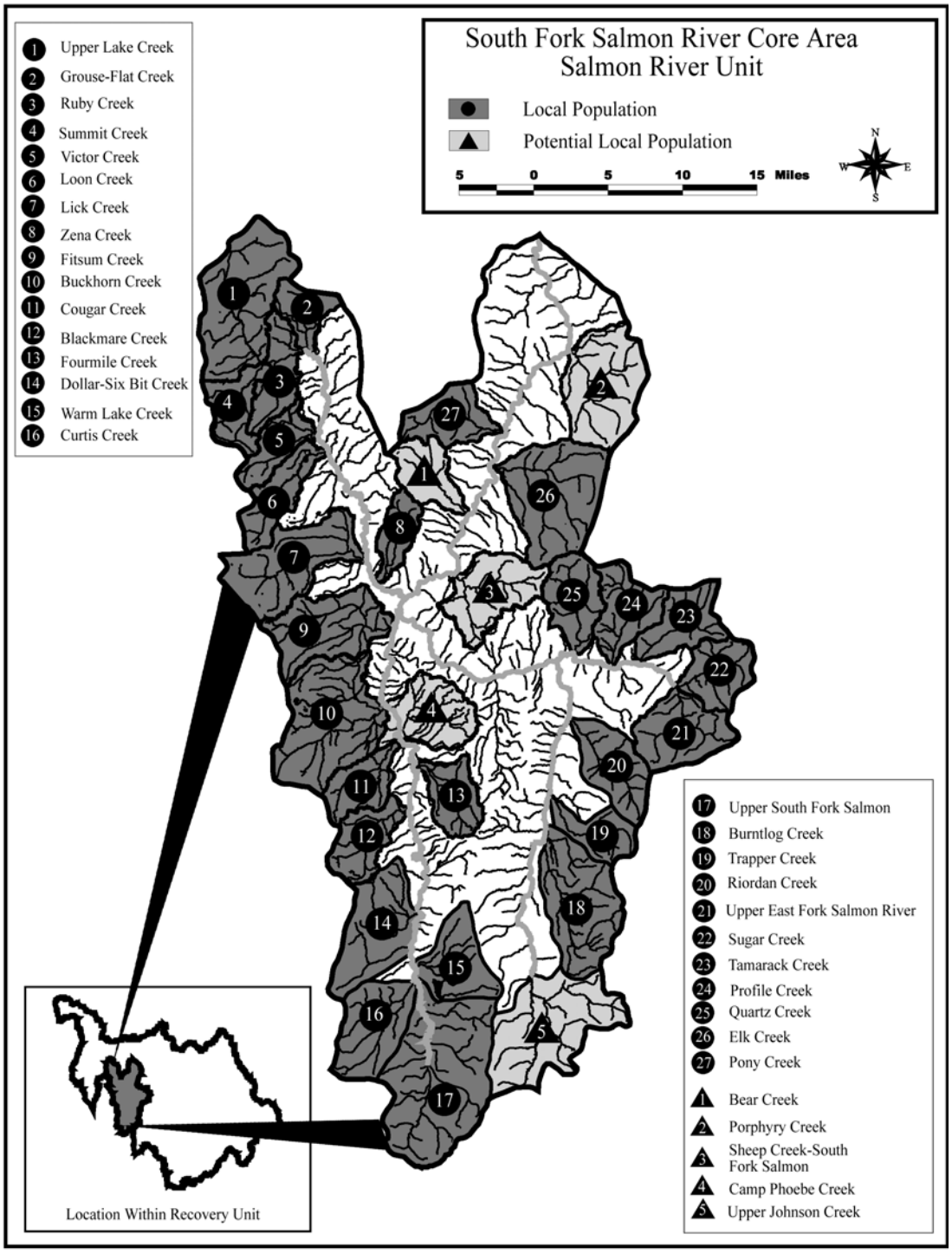
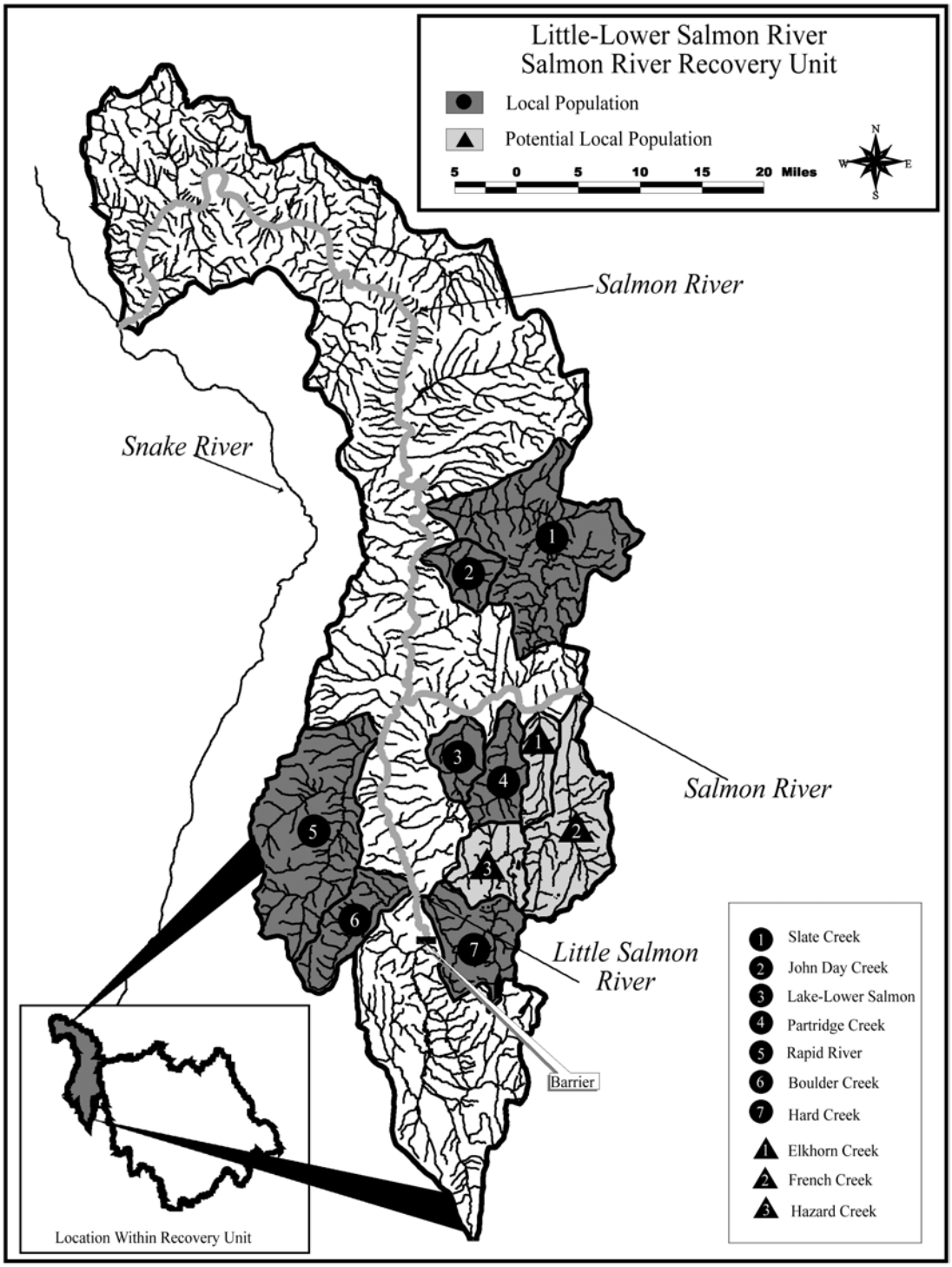


Figure 12. Little-Lower Salmon River Core Area for bull trout.



DISTRIBUTION AND ABUNDANCE

Status of Bull Trout at the Time of Listing

In the final rule listing bull trout as threatened in the Columbia River Distinct Population Segment (63 FR 31647), the U.S. Fish and Wildlife Service identified two bull trout subpopulations in the Salmon River basin (Salmon River and Little Salmon-Rapid River). At the time of listing, the status of the Salmon River subpopulation was unknown and the status was considered depressed in the Little Salmon River (USFWS 1998a). The Service considered a subpopulation "depressed" if less than 5,000 individuals or 500 spawners likely occur in the subpopulation, abundance appears to be declining, or a life history form historically present has been lost. The abundance trends were listed as decreasing in both subpopulations in the status review. Neither subpopulation was listed at the time as at risk of stochastic extirpation.

The U.S. Fish and Wildlife Service listing team considered forestry, grazing, agricultural practices, water quality, and introduced species to be the greatest threats to bull trout in both subpopulations in the Salmon River basin (USFWS 1998a). Mining was considered a threat for the Salmon River subpopulation. The magnitude of these imminent threats was considered low for both subpopulations. The subpopulation designation was the basic unit of analysis used in listing bull trout, but is not used in this recovery planning process.

Current Distribution and Abundance

Bull trout are distributed throughout much of the mainstem Salmon River and associated tributary systems within the Salmon River Recovery Unit (Servheen 2001). This recovery unit lacks large dams on the mainstem rivers so there may be connectivity between core areas. Bull trout spawning occurs in the higher elevation stream reaches throughout this unit.

Appendix A summarizes existing bull trout distribution within each core area and local population. This Appendix only includes data supplied by recovery team

members and assembled by the U.S. Fish and Wildlife Service at this time. Redd count data that are repeated over more than 1 year are sparse in the Salmon River recovery Unit and these data are available for only two of the local populations listed below. Appendix A is not comprehensive because some areas lack inventories, especially in the wilderness areas. Some data obtained by Idaho Department of Fish and Game during their parr monitoring for anadromous fish and other permitted fish inventories contain incidental sightings of bull trout (IDFG 2002). Anadromous fish and bull trout distributions overlap throughout much of this recovery unit, but areas exist where populations of bull trout exist upstream of barriers for anadromous fish. For example, in Germania and Hard creeks, bull trout utilize habitats upstream of parr monitoring sites and these surveys would not detect bull trout in headwater streams.

Upper Salmon River Core Area Distribution and Abundance Summary. Existing information on bull trout distribution in each local population is summarized in Appendix A. Migratory bull trout in the mainstem Salmon River have been incidently captured while trapping chinook salmon since 1986 (Servheen 2001).

Both resident and migratory or fluvial bull trout are present in the Sawtooth Valley (USFS 1999e). The inlet of Alturas Lake has adfluvial bull trout and is one of the largest local populations in the Sawtooth Valley (USRITAT 1998). Adfluvial bull trout are present in Redfish Lake (USRITAT 1998, USFS 1999e). Bull trout were observed in the lower and middle reaches of Fourth of July Creek (USFS 1999e). A reconnaissance survey in 1978 found many bull trout in upper Warm Springs Creek (USFS 1999e). Bull trout are found in the Valley Creek areas and are most persistent in headwater segments of several drainages (USFS 1999a). A migratory form of bull trout may have existed upstream in Stanley Lake Creek but it is not currently present (USFS 1999a). Bull trout snorkel inventories conducted by the U.S. Forest Service in the Yankee Fork of the Salmon River detected the greatest densities of fish in slow water habitat types near headwater reaches (USRITAT 1998). High densities of bull trout have been documented in tributaries to the East Fork Salmon River in Big Boulder, Herd and Warms Spring creeks (Anderson, Bacon, and Denny 2002). Mainstem Challis Creek contains bull trout, however, bull

trout occupancy is unknown in its tributaries (USRITAT 1998). The West Fork of Morgan Creek is the only creek with known presence of bull trout out of the 12 perennial streams in the Morgan Creek drainage (USRITAT 1998). Bull trout generally move into spawning tributaries beginning in August and spawn in mid-to late-September and October within the Upper Salmon River Core Area. However, in the headwaters of the Salmon River, spawning has been documented in early August (USRITAT 1998).

Pahsimeroi River Core Area Distribution and Abundance Summary. Bull trout in the Pashimeroi Core Area are found in most of the tributaries that drain the eastern, southern and southwestern portion of the area (BLM and USFS 2001a). These include the Pashimeroi River above and below Big Creek and Little Morgan, Tater, Morse, Falls, Patterson, Falls, Big, Meadow, Big Ditch, Goldburg, Big Gulch, Burnt, Inyo, and Mahogany creeks (Servheen 2001, IDFG 2002). The creeks in Upper Pahsimeroi River were considered a population stronghold in the Pahsimeroi River Core Area during the Subbasin Review process. The mainstem Pahsimeroi River serves as a migratory corridor for fish access to the mainstem Salmon River (BLM and USFS 2001b). Patterson Creek is called Big Springs Creek when it runs parallel to the mainstem Pahsimeroi River and is used for overwintering by bull trout (USFWS *in litt*., 2002c). Anadromous bull trout are lacking from Ditch Creek and Tater Creek. Existing information on bull trout distribution in each local population area is summarized in Appendix A.

Lake Creek Core Area Distribution and Abundance Summary. Bull trout are located in Williams Lake and upstream of the lake in Lake Creek. Bull trout comprise approximately 20 percent of the fish population in Williams Lake and their numbers appear to be stable (Curet, pers. comm., 2001).

Lemhi River Core Area Distribution and Abundance Summary. Bull trout are present in the Lemhi River, Big Eightmile, Little Eightmile, Big Timber, Little Timber, Eighteenmile, Geerston, Hawley, Hayden, Deer, Cooper, McGinty, Short, Wright, Big Bear, Big Springs, Reservoir, Wildcat, Frank Hall, Canyon, Dairy, Deer, Little Bear, Kenny, Bohannon, Kirtley, Kadletz, Little Eighteenmile, Mill, Patte, Cooper, Stoud, Bray, Sandy and Texas creeks and their tributaries

(Servheen 2001, IDFG 2002, Feldhausen, pers. comm., 2002, BLM 1998a). Most bull trout are found in isolated resident populations (USFWS 1999a). In Geertson Creek, large numbers of stunted bull trout have been noted by local residents; no fluvial population was found (USRITAT 1998). The mainstem Lemhi River contains fluvial bull trout, although connectivity between the tributaries and the Lemhi River is reduced because of migration barriers (BLM and USFS 1998a). Hayden Creek has year-round connectivity to the Lemhi River and contains a fluvial population (BLM and USFS 1998a). A fluvial population is present in Kenny Creek and the Upper Lemhi River (USFWS 1999a). Existing information on bull trout distribution in each core area is summarized in Appendix A.

Middle Salmon River-Panther Core Area Distribution and Abundance Summary. Bull trout have been documented in Allison, Poison, McKim, Cow, Iron, Twelvemile, Lake, Williams, Carmen, Freeman, Moose, Sheep, Twin Boulder, East Boulder, Pine, Spring, Indian, Corral, McConn, Squaw, Hat, Owl, and other creeks included in Appendix A (Servheen 2001; USFWS, *in litt.,* 2002c, USFS 1998a, D. Garcia, *in litt*., 2002). They are also present in the Mainstem Salmon and North Fork Salmon rivers and in multiple streams in the Panther Creek drainage (USFS 1998b). Existing information on bull trout distribution in each local population is summarized in Appendix A.

A low number of bull trout exist in the Panther Creek drainage (USFWS 1999c). Connectivity to Panther Creek and interactions between resident populations in Napias Creek and Upper Deep Creek have been reduced or eliminated by migration barriers. Redd counts in six reaches of upper Napias Creek show 36, 14 and 3 redds counted in 1999, 2000 and 2001 respectively (Roberts *in litt* 1999b; Roberts *in litt.*, 2000b; Roberts *in litt.,* 2001); anadromous individuals appear lacking from this creek. Connectivity among resident populations is unobstructed in other portions of the Panther Creek drainage including Woodtick, Porphyry, and Moyer creeks, and the headwaters of Panther Creek (USFWS 1999c).

Opal Lake Core Area Distribution and Abundance Summary. Bull trout have been located by Idaho Department of Fish and Game in Opal Lake. The lake is oligotrophic and has no outlet. Good spawning habitat is located upstream of the

lake; however, no positive identification of redds has been made to date (Roberts *in litt.*, 2000a).

Middle Fork Salmon Core Area Distribution and Abundance Summary. Abundance information is incomplete in this core area. However, the Upper Salmon River Recovery Unit Team agreed that each fifth field Hydrologic Unit would constitute a local population (USFWS, *in litt*., 2000b; IDFG 2002; IDL, IDFG, and DEQ 1998). The streams in every fifth field Hydrologic Unit contain spawning bull trout in the Middle Fork Salmon River (Jadlowski, pers. comm. 2001). One local population, Camus Creek is composed of the streams in three fifth field Hydrologic Units (USFWS *in litt*., 2002c). A total of 28 local populations exist in this core area. Existing information on bull trout distribution in the core area is summarized in Appendix A.

In Bear Valley Creek near the Middle Fork Salmon River headwaters, the local populations were considered strong in Cache Creek and Elk Creek; suppressed in Bearskin Creek; and weak in Upper and Lower Bear Creek (Southwest Basin Native Fish Technical Group 1998a). Dan Schill with Idaho Department of Fish and Game estimate that this core area contains some of the strongest bull trout local populations in the Pacific Northwest (Servheen 2001). Bull trout have been documented in Upper Camas, Marble and Upper Wilson creeks in 1980 to 1983 (Thurow 1985). In the Big and Marble creek drainages the Payette National Forest provided documentation of bull trout in Marble, Big, Rush, Cabin, Monumental, Crooked, Beaver, Hand, Boulder, Smith, Logan, and Belvidere creeks (Wagoner and Burns 1998, Wagoner and Burns 2001a).

Middle Salmon River-Chamberlain Core Area Distribution and Abundance Summary. Spawning bull trout are found in Chamberlain, Sabe, Bargamin, Warren, and East Fork Fall creeks (Servheen 2001; Clearwater Basin Bull Trout Technical Advisory Team 1998b), Wind River, California, Big Squaw, and Sheep creeks (USFS 2002a, USFWS, *in litt*., 2002c). Bull trout spawning and rearing occurs in the upper reaches of the creeks, and subadult and adult rearing occurs in the remainder of the drainages. Some of the rivers in this core area may not have documented spawning and rearing; however, the mouth of the river on the

mainstem Salmon River up to a barrier (*e.g.* Big Mallard, Little Mallard and Rhett creek) is used by bull trout for foraging and rearing (CBBTTAT 1998b). Existing information on bull trout distribution in each local population is summarized in Appendix A.

The East Fork of Fall Creek contains a resident population upstream of a barrier 0.3 mile (0.19 kilometer) above its confluence with the Salmon River. Bull trout were documented in 1995 by Idaho Department of Fish and Game in Fall Creek in 1995. The Warren Creek drainage contains bull trout isolated from the mainstem Salmon River. Bull trout have also been found in the dredge mining ponds located along Warren Creek (USFWS, *in litt.*, 2002a).

South Fork Salmon River Core Area Distribution and Abundance Summary. Both resident and fluvial populations of bull trout were documented in the mainstem South Fork Salmon River and in 18 of the tributaries in the 1980's (SBNFTG 1998). The South Fork Salmon River bull trout numbers are the highest in the East Fork of the South Fork Salmon River and the Secesh River (Servheen 2001). Warm Lake supports low numbers of bull trout (SBNFTG 1998b). Hogen documented spawning in Quartz, Profile, Tamarack and Sugar creeks and their tributaries from August 28 to September 15 (2001) . Overwintering fluvial bull trout were observed in the lower South Fork Salmon River from the Sheep Creek confluence dowstream to the mouth of the South Fork Salmon River. Bull trout also overwintered in the mainstem Salmon River from the Elkhorn Creek confluence upstream to Big Mallard Creek (Hogen 2001). This study documented that bull trout utilize mainstem Salmon River habitat that is accessible to bull trout from other core areas in this recovery unit. Studies conducted in association with salmon and steelhead spawning reported bull trout in Nethker, Threemile, and Willow creeks within the Lake Creek local population (NMFS 2000). Existing information on bull trout distribution in each local population is summarized in Appendix A.

Little-Lower Salmon River Core Area Distribution and Abundance Summary. Slate, John Day, Partridge, Hard, Lake, and Boulder creeks, and Rapid River contain spawning and rearing bull trout (CBBTTAT 1998a, USFS 2002a). The mainstem Salmon River provides for migration, and adult and sub adult

foraging, rearing and wintering habitat. The Little Salmon River also provides for foraging/adult rearing habitat and connectivity between local populations in the core area (Olson and Burns 2001). Existing information on bull trout distribution in each local population is summarized in Appendix A.

Occupied resident bull trout habitat in Lower John Day Creek is located upstream from a barrier at stream kilometer 3.8 (Steam Mile 2.3)(CBBTTAT 1998a). Currently, bull trout occupy the upper portion of the main John Day Creek from Stream kilometer 3.7 (mile 2.3) to Stream kilometer 6.4 (mile 4.0). The lower portion of the East Fork John Day Creek from Stream kilometer 0.0 to Stream kilometer 0.8 (stream mile 0.5) and the lower portion of the Middle Fork John Day Creek from Stream kilometer 0.0 to Stream kilometer 2.7 (Stream Mile 1.7) (CBBTTAT 1998a). During 1991, the U.S. Forest Service Intermountain Station snorkeled all reaches of Boulder Creek (CBBTTAT 1998a). This inventory found 69 percent of all bull trout (64 fish) in the middle stream reach near Yellow Jacket Creek at approximately stream kilometer 16.1 (Stream Mile 10) (CBBTTAT 1998a).

Annual runs of fluvial bull trout in the Rapid River drainage have been monitored since 1973. Bull trout abundance data has been collected since 1992 in Rapid River. The number of redds located in the headwaters of Rapid River were the greatest in 1994 with 33, and in 1993 the lowest numbers were found, 13 redds (Figure 13). The number of adults passing upstream of a trap near the mouth of Rapid River were the largest in 2001 with 359 adults, and the lowest in 1998 with 112 adults (R. Thurow and J. Guzevich, *in litt.*, 2001) (Figure 14).

Figure 13. Number of redds located the headwaters of Rapid River from 1992 to 2001 (R. Thurow, J. Guzevich, *in litt.,* 2001).

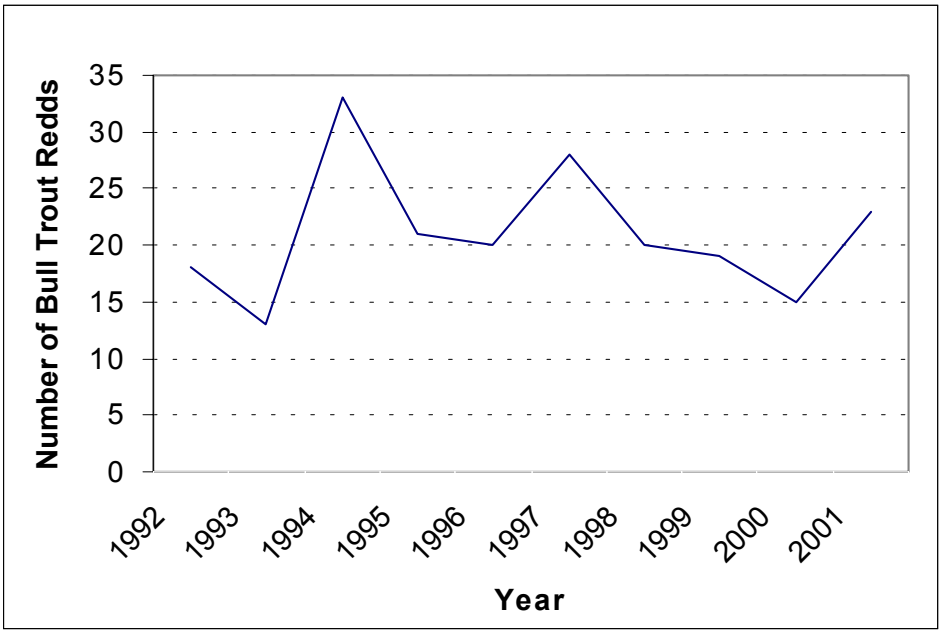
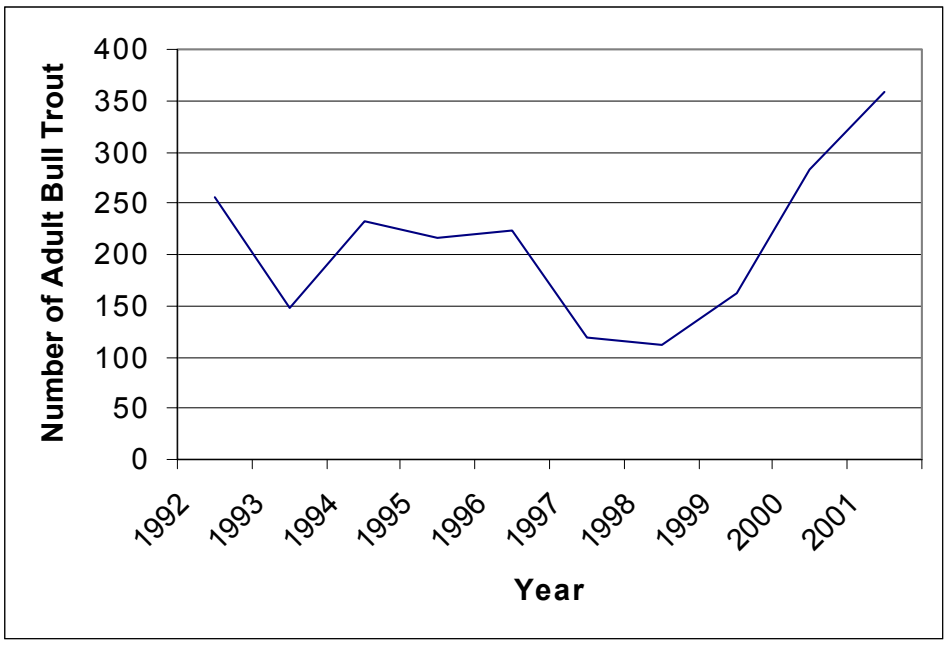


Figure 14. Number of adult bull trout moving past the upstream fish trap in Rapid River 1992 to 2001 (Thurow and Guzevich, *in litt*., 2001).



REASONS FOR BULL TROUT DECLINE

Bull trout distribution, abundance, and habitat quality have declined rangewide (63 FR 31647; 63 FR 31647; 64 FR 58910). Within the coterminous United States, these declines have resulted from the combined effects of habitat degradation and fragmentation, the blockage of migratory corridors, poor water quality, angler harvest and poaching, entrainment (process by which aquatic organisms are pulled through a diversion or other device) into diversion channels and dams, and introduced nonnative species. Land and water management activities that depress bull trout populations and degrade habitat include dams and other diversion structures, forest management practices, road construction, road maintenance and use, livestock grazing, agriculture, agricultural diversions, road construction and maintenance, mining, and urban and rural development.

Dams

There are no major dams in the Salmon River Recovery Unit.

Forestry Management Practices

Forestry activities that adversely affect bull trout and its habitat are primarily logging and road construction, especially where these activities involve riparian areas (USFWS 1998b). These activities, when conducted without adequate protective measures, alter bull trout habitat by increasing sedimentation, reducing habitat complexity, increasing water temperature, and promoting channel instability. Although certain forestry practices have been prohibited or altered in recent years to improve protection of aquatic habitats, the consequences of historical activities continue to affect bull trout and their habitat.

Current impacts of timber harvest on bull trout have been reduced with implementation of forest practice rules and forestry Best Management Practices on private and State lands that require streamside buffers in riparian areas, prohibiting equipment in or near streams, and controlling erosion from roads, trails, and landings (CBBTTAT 1998b). However, Sullivan *et al*. (1990 *in* CBBTTAT 1998b) stated the

current leave tree requirement may not adequately protect stream temperature in all cases. Zaroban *et al*. (1997) found that forest practice rules were implemented 97 percent of the time, and when applied, they were 99 percent effective at preventing pollutants from reaching a stream. However, sediment was not monitored as a part of the study and half of the timber sales audited resulted in contributions of sediment to streams, largely from inadequately maintained roads. Even with high implementation rates, Idaho's forestry Best Management Practices have been ineffective at maintaining beneficial uses, including cold water biota (McIntyre, 1993 *in* USFWS 1998b). These findings illustrate the need to adequately implement all applicable rules since the misapplication of just one rule, out of many, can result in sediment delivery. Federal lands which encompass 89 percent of the Salmon River Recovery Unit have adopted the Interim Strategy for Managing Anadromous Fish-producing Watersheds in Eastern Oregon and Washington, Idaho, and Portions of California (PACFISH)(USFS and BLM 1995a) and Inland Native Fish Strategy (INFISH)(USFS and BLM 1995b) management guidelines that exceed Idaho rules and were designed to protect native fish populations. Therefore impacts on Federal lands have very likely been declining since the mid 1990's.

South Fork Salmon River Core Area. The effects of past timber management activities on aquatic habitats is illustrated by conditions in the South Fork Salmon River. The watershed was first logged in the 1940's and logging activity peaked in 1961. Two extreme weather events with heavy rain falling on snow occurred in the winter of 1964 and 1965. They led to severe erosion on some hillsides, some of which were destabilized by logging roads. The main channel of the South Fork Salmon River and the lower reaches of the Secesh River were blanketed with fine sediments (USFWS 1998b). In addition, the impoundment dam above the town of Stibnite failed in June of 1965. High levels of fine sediment, primarily surface fines, limits spawning success of bull trout in areas of all subwatersheds (SBNFTG 1998b). A program of road closures and restriction of ground disturbing activities was enacted by the Payette National Forest at that time and continues until today (USFS, *in litt*., 1995).

Long-term sediment monitoring by the Payette National Forest indicates that trends are improving in the sites measured. The Payette National Forest believes the

rehabilitative and mitigation measures for actions in both the South Fork Salmon River and Secesh watershed have been effective in restoring resiliency to those systems (Nelson 2001), however, stream conditions prior to land management actions have not been fully restored (USFWS 1998b)(NMFS 1998).

Fire Management. Fire is also a component of the Salmon River Recovery Unit conditions affecting bull trout in the Columbia River Distinct Population Segment (USFWS 1998b). The 1998 Land and Resource Management Plan Biological Assessment for bull trout provided an analysis of the baseline conditions for fire. Models were used to estimate the relations among various management activities, fire, vegetation groups, and bull trout (USFWS 1998b). They noted that in forested areas of the Interior Columbia Basin (ICBEMP area), departures from natural disturbance and successional processes due to human-related activities have resulted in substantive changes to vegetation structure and seral stage composition. These broad-scale changes in vegetative conditions have increased the probability that catastrophic wildfires will occur due to higher incidence/prevalence of decadent/senile vegetation.

Fire suppression activities such as building fire lines to contain fires, the use of retardant, and water withdrawals all have the potential to negatively impact bull trout (USFWS 1998b). Standards have been developed by individual forests to avoid many impacts to bull trout (USFS 1999a, Wagoner and Burns 2001b); however, human safety has priority for wildfire suppression (50 CFR 402.05). It is the policy of the U.S. Fish and Wildlife Service not to interfere with emergency suppression activities that may endanger human health when carrying out section 7 consultation on wildfire activities.

Livestock Grazing

Occupied bull trout habitat is negatively affected by improper livestock grazing. Evidence of these adverse effects is discussed in formal consultations conducted by the U.S. Fish and Wildlife Service, Snake River Basin Office in the Salmon River Recovery Unit (USFWS 1998d, USFWS 1999a, USFWS 1999b, USFWS 1999c, USFWS 1999d, USFWS 2000a). Livestock grazing can degrade

aquatic habitat by removing riparian vegetation, destabilizing streambanks, widening stream channels, promoting incised channels and lower water tables, reducing pool frequency, increasing soil erosion in upland and riparian areas, and altering water quality (USFWS 1998b; Belsky, Maike, and Uselman 1999). These effects increase summer water temperatures, reduce cover, promote formation of anchor ice in winter, and increase sediment delivery to bull trout spawning and rearing habitats (USFWS 1998b). In areas under heavy long-term grazing, less palatable plant species become more prevalent and native species such as bunch grasses can be eliminated (Vallentine 1990). A major vegetation change that has taken place in mountain riparian systems of the Pacific Northwest is replacement of native sedges and reeds with Kentucky bluegrass (*Poa pratensis*) which has established itself as a dominant species in native riparian meadows as a result of overgrazing and subsequent habitat deterioration (Volland 1978). Livestock grazing impacts riparian vegetation and bull trout habitat in most core areas in the Salmon River Recovery Unit, with the most prevalent impacts occurring in the Upper Salmon River, Middle Salmon River-Panther, Upper Salmon River and Pahsimeroi River core areas (USFWS 1998d, USFWS 1999a, USFWS 1999b, USFWS 1999c, USFWS 1999d, USFWS 1999e, USFWS 2000a.).

Livestock grazing on federally managed lands is linked to agricultural practices on private lands throughout the Salmon River Recovery Unit. Public land grazing permits are tied to a land base in private lands. Many times these private lands use water from Federal lands to irrigate crops used to sustain livestock during the winter months when there is little public land grazing.

Upper Salmon River Core Area. Livestock use of riparian areas has resulted in streambank instability, stream widening and increased sediment delivery in the East Fork Salmon River along Bowery Creek and its tributaries and other areas (USFWS 1999b). French, East Fork, and West Pass creeks show evidence of impaired riparian functioning. Bull trout foraging and migration habitat has been degraded by stream bank alteration by livestock in Lower East Fork Salmon River (BLM and USFS 1998).

Pahsimeroi River Core Area. Livestock grazing along reaches of the Pahsimeroi River, and Mahogany and Burnt creeks not armored by woody vegetation show extensive bank shearing, bank trampling, and vegetative community alteration (USFWS 2000a). The areas with high livestock use did not overlap with local populations of bull trout (Table 2 and 4, BLM and USFS 2001b). Livestock grazing combined with water diversions are the most significant threats to bull trout in this core area (Servheen 2001). Non-compliance with grazing standards is a problem and is closely monitored in the Pahsimeroi Core Area (Evans, pers. comm., 2002).

Middle Salmon River-Panther Core Area. Non-compliance with grazing standards including stubble height and streambank shearing has been a problem and is being closely monitored on Opal Creek in the headwaters of Panther Creek downstream of Opal Lake, Morgan Creek, and other creeks in this core area (Evans, pers. comm., 2002).

Middle Fork Salmon River Core Area. Past livestock grazing continues to affect bull trout spawning, rearing, and migration habitat in Bear Valley Creek and its tributaries (USFWS 1998b). Monitoring in 1992 by the U.S. Forest Service showed that bank stability in the Bear Valley riparian pasture was 50 percent before grazing began, but decreased to 40 percent by the end of the 3-week grazing period. Similar declines were seen in all the Bear Valley and Elk Creek allotments (SBNFTG 1998a). Three reference sites were not grazed over the period and did not show declines in bank stability. Burton *et al.* (1992 as cited *in* SBNFTG 1998a) found that bank stability decreased 12 percent in the Bear Valley Allotment and 8 to 26 percent in the Elk Creek Allotment during the 1992 grazing season. Monitoring of the same areas in 1995 showed similar results. Considerable modifications in livestock grazing have recently been put in place by the Boise National Forest to address this threat and monitoring will show the results of these changes to bull trout habitat.

The majority of the core area is in the Frank Church River of No Return Wilderness, where livestock grazing is not currently an issue with bull trout

recovery. Grazing is occurring in Camus Creek and Silver Creek drainages outside of the wilderness.

South Fork Salmon Core Area. Intense historical livestock grazing occurred in the South Fork Salmon River and Johnson Creek drainages prior to the establishment of the National Forest in the Thunder Mountain District. In 1912, a Forest Service report indicated Johnson Creek drainage was denuded by overgrazing of livestock. Pen Basin, an area that had seen up to 300,000 sheep annually before the Forest was established, was heavily overgrazed. The South Fork of the Salmon River suffered similar impacts from grazing because it was on the main trail to the large meadow area at the upper end of Johnson Creek. Stolle Meadows was heavily impacted by trailing up to 100,000 sheep over this route. Since the establishment of the National Forest in the Thunder Mountain District, reductions in grazing have improved the areas; however, the area has not fully recovered (USFS, *in litt*., 1995).

Little-Lower Salmon Core Area. Livestock use of riparian areas upstream of the barrier for bull trout and anadromous fish at River kilometer 38.6 (River Mile 24) in the upper meadows area of the Little Salmon River have resulted in adverse impacts to riparian vegetation and stream bank stability, which contribute to elevated summer water temperatures and increased sediment (BLM 2000a). These grazing effects in combination with irrigation diversions for livestock pastures and hay production in the upper meadows area of the Little Salmon River drainage contribute to adverse summer water temperatures and sediment effects in down river segments of the Little Salmon River occupied by listed spring/summer chinook salmon, steelhead, and bull trout (BLM 2000a).

Agricultural Practices

Bull trout may enter unscreened irrigation diversions and become stranded in ditches and agricultural fields (USFWS 1998b). Streams are also channelized in some agricultural areas, reducing stream length and area of aquatic habitat, alteringstream channel morphology, and diminishing aquatic habitat complexity. These practices also alter stream water flow, sediment inputs and temperature

Under sections 303 and 304 of the Clean Water Act, the states or the Environmental Protection Agency set water quality standards, which combine designated beneficial uses and criteria established to protect those uses (USFWS 1998b). Current conditions of Idaho's waters are based upon data acquired during chemical, physical, and biological monitoring studies. Waters identified as "water quality limited" or identified as not meeting water quality criteria are included on the 303(d) list of the Clean Water Act, and reported in the 305 (b) report, both submitted to the Environmental Protection Agency biennially. For each "water quality limited" segment on the 303 (d) list, the Division of Environmental Quality must develop a Total Maximum Daily Load. All contribution sources, both point and nonpoint, are identified and addressed in this assessment which will lead to attainment of applicable water quality standards. (Burch, pers. comm., 2001a). Only point source discharges are regulated under the National Pollution Discharge System and within Idaho are issued by the Environmental Protection Agency. However, implementation of the Total Maximum Daily Load is up to Idaho's Watershed Advisory Groups. Appendix C lists streams and lakes that were included on the 303(d) list of waterbodies with impaired water quality in the Salmon River Subbasin Summary (http://www/cbfwf.org/files/province/mtnsnake/salmon/AppendixC.htm). The State of Idaho is preparing recommendations for changing 303(d) designations on streams in the Salmon River Recovery Unit. The Idaho Department of Water Quality web site (http://www2state.id.us/deq/water/water/water1.htm) contains copies of those subbasin reviews and Total Maximum Daily Load documents in the Salmon River recovery Unit.

Upper Salmon River Core Area. Irrigation diversions are widespread on private and public land particularly on the east side of the Sawtooth Valley (USFS 1999e). The Sawtooth National Forest recently submitted documentation requesting section 7 consultation under the Endangered Species Act on 25 private water diversions on public lands in the Sawtooth Valley (USFS 2001). The impacts to bull trout and their habitat from these diversions have not been eliminated. Private diversions on private and public land dewater the following creeks during most years with low snowpack or low annual precipitation: Frenchman, Smiley, Beaver, Champion, Alturas Lake creeks (Cabin Vat, Warm and Taylor creeks). Three major diversions incrementally remove water and create a dry stream reach below the last

diversion in Fourth of July Creek. A diversion on Pole Creek for power generation continues to dewater 2 miles of this creek during low water years (USFS 1999e). Many small diversions in small tributaries such as Hanna, McGown, Thompson and Park creeks capture the entire steam flow and place it into irrigation systems impacting bull trout in the Valley Creek area (USFS 1999a). Private irrigation diversions also render flows insufficient in East Fork Salmon River, Meadow, Goat, and Iron creeks, Morgan, and Challis creeks. Diversions at the mouth of Herd Creek in the East Fork of the Salmon River drainage alter stream flow or entirely block stream flow during some years. Morgan Creek is disconnected from the Salmon River by diversions. The Mosquito Flat dam and irrigation diversions block migration of fluvial bull trout in the Challis Creek local population (USRITAT 1998).

Pahsimeroi River Core Area. From a historical perspective, many tributary streams to the Pahsimeroi River (especially on the east side of the drainage) probably reached the mainstem Pahsimeroi River on a regular and frequent basis prior to the establishment of water diversions (USRITAT 1998). The water diversions are used for agricultural irrigation, livestock watering and the transfer of water to other drainages to enhance flows for other purposes (BLM and USFS 2001b). The Bureau of Land Management and U.S. Forest Service have jurisdiction to alter diversions of streams in 8 of the 11 sixth field Hydrologic Units (72 percent) in the Pahsimeroi subbasin. Currently, 24 streams are partially or completely dewatered and approximately one-half are diverted at or near the point where the stream exits in the National Forest (BLM and USFS 2001a). These diversions have contributed to the limited number of streams that are occupied by fluvial bull trout in the Lemhi River area (USRITAT 1998).

Lemhi River Core Area. Numerous diversions limit water flows in the Lemhi River tributaries and mainstem (Servheen 2001). Many of the summer use rights exceed summer stream flows in the Lemhi River. Geertson Creek is permanently diverted into a lateral irrigation ditch and does not reach the Lemhi River. In the mid-1980's, a water district was created to deal with these issues (Loucks 2000). A fluvial bull trout population in Geertson Creek has likely been eliminated by these irrigation practices (USRITAT 1998). These diversions have

regimes. Low water level leads to high water temperatures that can kill fish, disrupt connectivity, and prevent migration of fluvial fish (63 **FR** 31647).

Water diversions, primarily for agriculture, are one of the most prevalent impacts to bull trout in the Lemhi River, Pahsimeroi River, Upper Salmon River and Middle Salmon River-Panther core areas in this recovery unit. Dewatered streams exist in the remaining core areas in the recovery unit, but they impact a smaller number of streams in each core area. Idaho Department of Fish and Game estimated that 773 known diversions exist in the Salmon River basin (USRITAT 1998; Servheen 2001, Apperson, *in litt*., 2002). Appendix B lists the streams in the upper eastern four core areas that would be priority for restoring connectivity because of water diversions. Additional information is needed to provide a complete list of those streams for the entire recovery unit. Diversion of water from streams is a significant threat for bull trout wherever it overlaps with existing or historic bull trout populations in the Salmon River Recovery Unit.

Approximately 75 percent of the surface water rights in the Salmon River Recovery Unit are associated with irrigation (Servheen 2001). Water rights currently authorized by the State of Idaho in this recovery unit have the potential to allow water diversions from streams totaling 7,860 cubic feet per second. Diversion of this water from streams causes significant negative effects on bull trout habitat (instream and riparian) and kills individual bull trout. These impacts to bull trout habitat include increased water temperatures and reduced riparian vegetation because the diversions may deplete the surface flow of the stream (63 FR 31647).

Agricultural practices, such as cultivation, irrigation, and chemical application can also release sediment, nutrients, pesticides and herbicides into streams, and reduce riparian vegetation. The resulting poor water quality reduces the quality of bull trout habitat. Most sediment releases from irrigation ditches or from agricultural fields into bull trout habitat are nonpoint sediment releases. In 1988, the Idaho Department of Environmental Quality conducted an assessment of nonpoint source pollution of the Salmon River basin. Of 4,080 kilometers (2,550 miles) of streams assessed, 1,374 kilometers (859 miles) were negatively affected by agricultural practices (USFWS 1998b).

contributed to the limited number of streams that are occupied by fluvial bull trout in the Lemhi River area (USRITAT 1998).

Middle Salmon - Panther Core Area. The Mainstem Salmon River from the North Fork to Corn Creek has been significantly altered by agricultural practices, water withdrawals, and diking associated with private land activities (USFS 1998a).

Little-Lower Salmon River Core Area. Irrigation for livestock pastures and hay production primarily occurs in the upper meadows of the Little Salmon River drainage. This area is located upstream from a falls which is a barrier for migratory bull trout in the Little Salmon River at River kilometer 38.6 (River Mile 24) (BLM 2000a). The majority of the irrigation in the Little Salmon Drainage is accomplished using gravity systems which divert water into a canal or ditch, where several lateral ditches may divert water into small ditches. These water diversions contribute to decreased mainstem river flows and contribute to elevated summer water temperatures which may affect down river segments occupied by bull trout downstream of kilometer 38.6 (River Mile 24)(BLM 2000a).

Transportation Networks

Dunham and Rieman (1999) determined that the density of roads at the landscape level was negatively correlated to bull trout occurrence. Roads not only facilitate impacts of adverse amounts of fine sediment, reduce large woody debris recruitment, (and contribute to habitat degradation in streams), they also increase human access which may induce angling mortality and introductions of nonnative fishes. In the Interior Columbia River basin, the lack of roads is the strongest predictor of high aquatic ecosystem integrity. Road densities in the Salmon River basin are relatively low in comparison to the rest of the Interior Columbia Riverbasin; however, localized areas exhibit high road densities. Road densities exceeding 0.62 kilometers per square kilometer (1 mile per square mile) are considered high enough to render an area as at risk for bull trout (Lee *et al*. 1997). Approximate road density figures for the Salmon River Recovery Unit are as follows: 11 percent of the area has high road density, greater than 1.05 kilometers per square kilometer (1.7 miles per square mile); 25 percent of the area has moderate

road density, 0.4 to 1.05 kilometers per square kilometer (0.7 to 1.7 miles per square mile); 37 percent of the area has low road density, less than 0.24 kilometers per square kilometer (0.4 miles per square mile); and 27 percent of the area has no roads (Servheen 2001).

Roads are influencing bull trout habitat in all core areas except those habitats in the Frank Church River of No Return Wilderness, the Gospel Hump Wilderness, and other roadless areas (portions of the Middle Fork Salmon and Middle Salmon River-Chamberlain, and Middle Salmon-Panther core areas). Most valley bottom roads that are major transportation arteries are affecting bull trout habitat.

Activities on U.S. Forest Service, Bureau of Land Management, and other publically managed lands involve access to dispersed and developed recreation sites throughout the Salmon River basin. Many sites are established directly adjacent to the Mainstem Salmon River and its tributaries for access to float boating, camping, and picnicking (USFS 2001, Servheen 2001). Settergen (1977) identified six possible effects on soils from recreation along rivers: compaction, root exposure, destruction of the soil profile through loss of vegetation, reduction in organic matter, increased bulk density, and decreased soil moisture. This study concluded that the greatest compaction occurs immediately after an area is opened for use, after which the soil tends to stabilize. As soil compaction and vegetation loss occurs, erosion may accelerate. This can decrease the depth of soil profiles and expose roots. Settergen (1977) also described five types of vegetation changes due to recreation. These include mortality of overstory, loss of tree vigor, mechanical injury, root kill, and loss of ground cover. Settergen (1977) also concluded that mechanical injury to riparian plants resulting from recreational use is common, and increases the likelihood of disease and possible subsequent mortality. Decline in tree vigor is sometimes associated with soil degradation, and reduced ground cover and is one of the first signs of recreational use. The impacts from the recreation sites and the roads and trails that access them are significant; however, these impacts are not as prevalent as other more widespread land management actions such as grazing, mining (and their road networks), and agricultural practices in the recovery unit.

Upper Salmon River Core Area. Valley bottom roads and historical mining and forestry roads continue to adversely impact bull trout habitat in this area (USRITAT 1998). Stream fords may be adversely impacting bull trout spawning habitat in the Yankee Fork Creek (USFS 1999d). The road in Big Boulder Creek produces large quantities of sediment into bull trout habitat (BLM and USFS 1999).

Middle Salmon River-Panther Core Area. Roads are encroaching on the floodplains of Deep, Copper, and Prophyry creeks and the mainstem Panther Creek. This is causing increased peak flows, reduced off-channel habitat, and elevated sediment loads, which in turn have degraded bull trout habitat (USFWS 1999c). Highway 93 and the Pine and Indian creeks roads similarly impact the floodplain of the Salmon River and its associated creeks (USFS 1999b).

Middle Salmon River-Chamberlain Core Area. Sediment input from historic mining roads is a concern for the Warren Creek local population (CBBTTAT 1998b). Stream crossings on private land may be causing adverse impacts to bull trout spawning habitat where mining roads ford streams in Warren Creek (USFWS, *in litt*., 2002a). Over 113 kilometers (70 miles) of roads occur in the watershed. Overall road density of U.S. Forest Service system roads is low at 0.62 to 1.24 kilometers per square kilometer (1 to 2 miles per square mile); however, local sediment inputs occur from some of these roads. High road densities of 1.4 kilometers per square kilometer (2.3 miles per square mile) resulting from past mining and timber harvest are a concern for the Fall Creek local population (CBBTTAT 1998b).

South Fork Salmon River Core Area. The East Fork South Fork Salmon River has a high number of human caused landslides. The most significant human-caused activities influencing channels in the East Fork South Fork Salmon River are road activities and direct channel alterations. Human caused sediment may be highly significant to channels and habitat closer to the sediment sources, particularly near Sugar Creek and Profile Creek (SBNFTG 1998b). Sugar Creek is currently a 303(d) listed stream because of excessive sediment (Servheen 2001). Other issues related to the road network in this core area are discussed above under Forestry

Practices. All-terrain vehicle trail use and stream crossings by recreationists are impacting wet areas near Hennessey Meadows and Riordan Lake (USFS 2000b).

Little-Lower Salmon River Core Area. The quality of bull trout habitat in the mainstem of the Little Salmon River has been reduced by Highway 95 construction and private land development on the floodplain and the removal of riparian habitat. Human-related development along the tributaries and unstable geology has also exacerbated habitat damage during recent flooding events. Rock structures such as rip-rap and other stream stabilization projects following the 1997 flood in the Little Salmon River further constricted the stream channel and may reduce instream habitat quality for rearing and migrating bull trout. The cumulative effect of the projects resulted in lining the channel with rocks instead of vegetation and this lack of vegetation can contribute to higher summer stream temperatures (ITD1998). The Little Salmon River is a 303 (d) listed impaired stream (Servheen 2001).

During the January 1, 1997, storm event numerous road failures and debris torrents occurred in the lower portions of Hazard and Hard creek drainages (BLM 2000a). Large amounts of debris and sediment were delivered to stream channels which resulted in adverse effects to bull trout habitat in the lower reaches of these drainages (BLM 2000a).

During March 1982, a landslide caused a large input of sediment into the Middle Fork of John Day Creek (CBBTTAT 1998a). This landslide was caused by a road failure. Larger debris torrents occurred during May 1995, which originated from roads located in upper East Fork John Day Creek. The 1995 debris torrents caused severe channel scouring and bank erosion in East Fork John Day Creek. Sediment contribution from the 1995 event adversely affected all downstream fish habitats (*i.e.,* East Fork John Day and John Day creeks (CBBTTAT 1998a).

An intensive road network is found throughout the upper and lower Boulder Creek watershed. Road densities in the upper and lower subwatersheds range from 1.7 to 2.6 kilometers per square kilometer (2.8 to 4.2 miles per square mile). This road network has reduced habitat connectivity at some locations by eliminating fish

passage. Past and recent landslides have also reduced instream habitat quality. The Hillman Creek drainage experienced significant debris torrents during a January 1, 1997, storm event (CBBTTAT 1998a).

Mining

Mining in this area consists of two broad categories based on the method of extraction. Surface mining includes open pit mining, dredging and dispersed gold panning while underground pit mining utilizes tunnels or shafts to extract minerals. Activities associated with mining include construction and maintenance of roads and supporting infrastructure, transportation and use of hazardous chemicals and petroleum products, as well as water use, contamination, and treatment. Although active mining operations are less abundant than they were in the past, mining in the Salmon River basin is widespread and impacts to tributary streams are significant. Mining operations can contribute contaminants to streams and have toxicity effects (sublethal and lethal) on all life stages of bull trout (USFS 1999d). Increased concentrations of heavy metals in the water can create additive and synergistic physiological reaction in developing eggs or fry with potentially lethal and sublethal results. Acid mine drainage exists in the Salmon basin in the Thompson Creek drainage (from the Scheelite Jim Mill site to Thompson Creek) (Thompson Creek Mine Interagency Task Force, *in litt*., 2001), and in Big Deer and Blackbird creeks in the Panther Creek drainage (Idaho Division of Environmental Quality 1998). Mine related landslides or debris slides and sediment delivery from unvegetated soils contribute excessive amounts of sediment to the stream system. There is also the potential for disruption in surface and subsurface hydrologic function by water withdrawals. Small scale mining including suction dredging can also deliver sediment to streams, destabilize stream substrates, and disrupt migration, rearing, and spawning (USFS 1999d).

Upper Salmon River Core Area. Historical patented mining and associated roads continue to deliver sediment to upper Salmon River headwater streams (USFS 1999e). Historic dredge mining has left unconsolidated dredge tailings in the lower Yankee Fork River (USRITAT 1998; USFS 1999d). Pool habitat, cover, and spawning gravel quality and quantity are limiting factors for bull

trout as a result of this mining. Private land development associated with patented mining claims is currently occurring. A total of 70.7 cubic feet per second are diverted from the Yankee Fork, as well as Jordan, Adair, and Rammey creeks (USFS 1999d). The Grouse Creek mining project has altered habitats on Jordan Creek and the Yankee Fork (USRITAT 1998). Seeps and springs in the Jordan/Pinyon Creek area contained elevated levels of weak acid dissociable cyanide exceeding chronic and acute Idaho Water Quality Criteria in 1998 and 1999 (USFWS, *in litt.,* 1999). The Hecla Mining Company, owner of Grouse Creek Mine is working with the U.S. Forest Service and the Environmental Protection Agency to treat and dewater their 450 million gallon tailings pond. This contamination has the potential to significantly impact bull trout in the Yankee Fork and downstream (Burch, pers. comm., 2001b).

Debris torrents in 1940, 1963, and 1998 have changed the Slate Creek watershed. It is not known if historic and present land uses, including mining, contributed to the these floods. The historic Hoodo Mine may emit toxins into Slate Creek. Just downstream of the Slate Creek bull trout local population, the historic Clayton Silver Mine and Mill dewatered Kinnikinic Creek; however, cleanup efforts have been completed by the Environmental Protection Agency (USRITAT 1998).

The Thompson Creek Mine, covering 996 hectares (2,460 acres), straddles the hydrographic divide between Thompson Creek and Squaw Creek (USRITAT 1998). Waste dumps are in the headwaters of Pat Hughes and Buckskin creeks. The historic tungsten mill site and its associated Scheelite Jim Mine are on Thompson Creek. Water quality in the watershed is impacted from the acid mine drainage from the Scheelite Jim Mill site. Current concentrations of selenium exceed water quality criteria that are protective of aquatic biota. There have been recurring problems with spills from trucks hauling materials for the mine (*e.g.*, molybdenum ore spills on July 14, 2000, and October 18, 2001) (Burch, pers. comm., 2001b; Evans, pers. comm., 2001). If a rain on snow event or earthquake destabilizes the tailings pond dam that is on private land, the resulting spill into the Salmon River could cause catastrophic loss of bull trout in the Salmon River Recovery Unit. Existing studies indicate the likelihood of this happening is remote (USFWS, *in litt*., 2002c). Continued monitoring of this site should reaffirm this finding.

In the East Fork Salmon River drainage, the Livingston Mine on Big Boulder Creek has affected the river channel (USRITAT 1998). The mine continues to deliver sediment to the East Fork Salmon River.

Lemhi River and Pahsimeroi River Core Areas. Kritly and Bohannon creeks were dredged in the past to mine gold and dredge piles remain (Loucks 2000). Patterson Creek may have degraded water quality from zinc leaking downstream of the IMA Mine, an abandoned tungsten mine. Bull trout are present in this stream and may be impacted by this current effluent or by future development in the drainage (BLM and USFS 2001a).

Middle Salmon River-Panther Creek Core Area. The Blackbird Mine is continuing to release contaminants into Blackbird, Big Deer, and the South Fork of Big Deer creeks, and Panther Creek including copper, arsenic, cobalt, and iron (Burch, pers. comm., 2001b). Downstream of the discharge, there is an absence of aquatic life including bull trout in Blackbird Creek for many miles. In the West Fork of Blackbird Creek, upstream of the mine, bull trout have been documented (Smith, pers. comm., 2002). In Panther Creek dowstream of the mouth of Blackbird Creek, Big Deer Creek, and the South Fork of Big Deer creeks water quality standards were exceeded in 66, 27, and 5 percent, respectively, of the 33 samples taken for cobalt. The hardness-based chronic Copper Standard was exceeded in 63, 82, and 100 percent of the samples taken (69 samples), respectively USFWS, *in litt*., 2002c). Water quality continues to be a problem with very low numbers of fish occupying the Mainstem Panther Creek downstream of Blackbird Creek. Trout are just starting to reoccupy Big Deer Creek dowstream of the South Fork of Big Deer Creek as cleanup efforts continue (B. Roberts, *in litt*., 1999a; USFWS, *in litt.,* 2002c). This site has been designated a superfund site by the Environmental Protection Agency. The National Oceanic and Atmospheric Administration recently received $80 million in a Natural Resource Damage Assessment settlement for the mine (Burch, pers. comm., 2001b).

Bear Track Mine on Napias Creek is an inactive, open-pit gold and silver cyanide heap leach mine. In addition, historic mining operations in Napias Creek have degraded channel conditions (USFWS 1999c).

Middle Fork Salmon Core Area. Historic dredge mining had a significant influence on fish habitat in Bear Valley Creek and this mining area has continued to contribute sediment to the creek since active mining ceased (SBNFTG 1998a). Primbs (1987 *as cited in* SBNFTG 1998a) estimated that the mine contributed approximately 35 percent of the fine sediment present in upper Bear Valley Creek. As of 1993, 50 percent of the sedimentation (which is 115 percent above natural levels) was attributed to past erosion at the mine (Vollmer *et al.* 1992 *as cited in* SBNFTG 1998a). Past mining actions have also contributed low levels of chemical contamination into Upper Marble Creek (Wagoner and Burns 1998).

Middle Salmon River-Chamberlain Core Area. Both historical and current mining affects water quality in Warren Creek. Water withdrawals for mining and the related hydroelectric power production still occur. Segments of Warren Creek have been dredged in the past and ore and tailings piles border streams. Runoff from these piles results in contaminant contributions to the creek. Active mining exists on private land and on lands administered by the Payette National Forest. Legacy effects of mining still exist in Fall Creek from altered stream channel conditions (CBBTTAT 1998b). Numerous historical mines exist in the Crooked Creek drainage. The upper watershed contained the most activity in the past and most of the private patented mining claims are now recreational property. The area around the town of Dixie was dredge mined and both riparian and aquatic habitat have been moderately to severely impacted. Water quality in Crooked Creek has been and is currently impacted by mining activity, including the use of mercury at older mining sites (CBBTTAT 1998b).

South Fork Salmon River Core Area. The Cinnabar Mine, an old remote, abandoned mercury mine on Cinnibar Creek, a tributary to Sugar Creek, continues to degrade water quality; heavy metals continue to leach from mine sites into the East Fork of the South Fork of the Salmon River and into groundwater (USFWS 1998b, SBNFTG 1998b). Stibnite Mine, an open-pit mine in the Meadow Creek drainage that uses cyanide leach pads, has been proposed by the State of Idaho as a superfund site (66 FR 47612). Stibnite has been the subject of cleanup actions by the U.S. Forest Service for many years, especially since the issuance of biological opinions for Snake River spring/summer chinook salmon by the National Marine Fisheries

Service in 1995 (Garnet Pit Mining) and 1996 Stibnite Mining commercial use permits (Wagoner and Burns 2001b). Arsenic and antimony concentrations exceeded acute state water quality criteria in the upper East Fork South Fork Salmon River from 1978 to 1996. These amount of contaminants were considered stressful to salmonid populations in this river in 1997 (Wagoner and Burns 2001b). Sublethal effects of arsenic exposure to salmonids include anemia, gallbladder inflammation, and liver degeneration in salmonids (EPA 1999). Rainbow trout embryos may experience some mortality at arsenic concentrations less than those established by the chronic arsenic aquatic life criteria used by Idaho. These impacts also apply to bull trout (EPA 1999). Until the cleaning process is complete, threats from chemical contamination from past mining activities still exist for bull trout in this area (Burch, pers. comm., 2001b).

Despite mitigation measures placed on the haul road in 1997 by the U.S. Forest Service, fuel hauling throughout the watershed on narrow roads within riparian areas still risks chemical contamination of the Secesh River and Pony Creek. The Dewy and the Thunder Mountain mines are currently inactive; however, if gold prices escalate, they could become active again and potentially impact bull trout in their associated streams (Burch, pers. comm., 2001b).

Little-Lower Salmon River Core Area. The legacy of past mining activity has been significant near Florence in the upper Slate Creek drainage and areas along the Salmon River (CBBTTAT 1998a).

Residential Development and Urbanization

Residential development in the Salmon River Recovery Unit exists along the major river corridors and in private meadow areas adjacent to tributary streams. This development is primarily associated with recreation properties and their associated recreational facilities along the mainstem Salmon River and its tributaries. In the Upper Salmon River Core Area, for example, heavy recreational and residential development associated with Redfish Lake has released chemical and nutrient pollutants and degraded bull trout habitat (USFS 1999e). Other residential development in the Sawtooth Valley continues to impact bull trout habitat by filling

flood channels and by diverting water from bull trout streams (USRITAT 1998). Along the Mainstem Salmon River in the Upper Salmon River and Middle Salmon River-Chamberlain core areas, residences are being built in the 50 and 100-year floodplain. Many of these homes adjacent to the river have requested U.S. Army Corps of Engineers permits to install fill in the river channel. These structures are often devoid of riparian vegetation and can inhibit bull trout passage at low river flows (Evans, pers. comm., 2001). Secesh Meadows, a private inholding in the Payette National Forest in the South Fork Salmon River Core Area, is currently being developed and this could impact local populations of bull trout (Finn, pers. comm., 2001). Other private inholdings along lower Johnson Creek and upper East Fork South Fork Salmon River near Stibnite could impact bull trout in these streams (Hogen, *in litt*., 2002).

Water withdrawals related to private inholdings surrounded by public land exist in the Middle Salmon River-Chamberlain Core Area and Little-Lower Salmon River core area (USFWS, *in litt*., 2002b). However, residential development and associated water withdrawals occur throughout the recovery unit, which impact bull trout habitat by reducing water flow.

Water quality in Williams Lake in the Lake Creek Core Area upstream of Salmon, Idaho, is impacted by recreational residential development surrounding the lake. Since this lake has no outlet, water quality has declined in recent years and may be impacting bull trout (Barnes, Sytsma, and Gibbons 1994).

Fisheries Management

Large hatchery programs for anadromous species exist today and have been carried out in the past in the Salmon River basin (Servheen 2001). A list of species planted in the Salmon River basin is located in the Salmon Subbasin summary in Table 24 and 25 (http://www.cbfwf.org/files/province/mtnsnake/salmon/salmon.htm).

Fish handling/propagation facilities exist throughout the Salmon River basin (Servheen 2001). Opportunities for implementing recovery actions for bull trout in

association with fish weirs, fish acclimation facilities, etc. may exist in the Salmon River Recovery Unit at this time, however, they are not being pursued in a coordinated manner (D. Herrig, U.S. Fish and Wildlife Service, pers. comm 2002). Facilities in the Salmon River basin have localized impacts to bull trout habitats by diverting water temporarily and holding fish from passing upstream. These actions have been analyzed in section 7 consultations under the Endangered Species Act and as they cause impacts to bull trout (USFWS 1998c). The Reasonable and Prudent Measures and Terms and Conditions for these operations are being met by providing fish passage at weirs, documentation of all bull trout observed, guidelines for electrofishing and other sampling, and required reporting. Chinook salmon are currently being raised in fish ponds in Stolle Meadows on the South Fork Salmon River which is within bull trout spawning and rearing habitats (USFS 2000b). These projects may be benefitting bull trout by providing prey for migratory bull trout which are piscivorus. However, their cumulative impact on spreading disease and altering bull trout behavior has not been fully evaluated.

Little is known of the genetic makeup, population status and interactions with nonnative/planted species for isolated adfluvial populations of bull trout in the Salmon River basin. Little is know about bull trout populations in alpine lakes such as Opal, Williams, and Riordan and these areas may contain unique genetic strains of bull trout that are important for recovery of bull trout in the Salmon River Recovery Unit.

Although the final rule listing bull trout addressed concerns with State fisheries programs, information gathered since the listing indicates that problems with illegal harvest may still exist. Additionally, legal fishing, depending on the available fish population and the intensity of fishing, may also affect bull trout. Hooking, even if the fish are released, can result in injuries, disease, and death. Handling hooked fish before releasing them also contributes to mortality. Bull trout are also often misidentified by anglers (Schill, Lamansky, and Mamer 2001). The combination of effects on the fish from harvesting or hooking and releasing can influence the size and species composition in a given area.

Nonnative species. Competitive and predator-prey relations among bull trout, rainbow trout (*Oncorhynchus mykiss*), and cutthroat trout (*Oncorhynchus clarki*) and the resultant effects on bull trout populations in the recovery unit are not specifically known. However, declines in bull trout have been associated with introductions of nonnative fish such as brook trout (Rieman and McIntyre 1993). In the Salmon River basin, however, the decline in bull trout abundance accompanied by an increase in rainbow trout abundance is likely due to high stream temperatures and other aspects of habitat degradation selecting against bull trout rather than interspecific competition from rainbow trout. In isolated populations such as in Williams Lake this may not be the case. Further investigation is needed to determine whether stocking programs in the Williams Lake are affecting bull trout populations, either beneficially by introducing a prey base for mature fish, or negatively by introducing disease or competition for food and space during early life stages.

Brook trout (*Salvelinus fontinalis*) hybridization and brook trout competition for habitat are known threats to bull trout in the Salmon River Recovery Unit (Servheen 2001). Brook trout were stocked in the Salmon River Recovery Unit from 1913 to 1998 (Servheen 2001). The distribution of brook trout in the Salmon River Recovery Unit is summarized in Appendix A. Brook trout are known to occur in habitat occupied by 69 bull trout local populations out of the 125 local populations in the recovery unit. Brook trout are displacing bull trout in some areas in the Panther Creek Drainage including lower Deep Creek, portions of Porphyry Creek, Musgrove Creek, and in Napias Creek below Devlin Falls (USFS 1999b). In the Pahsimeroi River Core Area, bull trout-brook hybrids have been found in Big, Mahogany, Burnt and Goldburg creeks (BLM and USFS 2001a). In the Upper Salmon River these hybrids have been found in Valley Creek. In the Middle Fork Salmon Core Area brook trout are known to be sympatric with bull trout in the headwaters of Big Creek. Brook trout have also been found in Camas and Loon Creeks (63 FR 31647).

Lake trout (*Salvelinus namaycush*) were planted in the South Fork Salmon River basin from 1975 to 1983. The impact of this program has not been analyzed in this area, however lake trout planting programs have led to declines in bull trout in

other areas in the Columbia River Distinct Population Segment (63 FR 31647). Lake trout exist in Warm Lake and Thirty Three Lake (in a tributary to Fitsum Creek) and may be competing with bull trout, however, more information is needed to confirm impacts to bull trout in these areas (USFS 2000b).

Declines of anadromous fish populations. The piscivorus diet of fluvial and adfluvial bull trout makes them susceptible to fluctuations in the densities of other fish populations. Studies of bull trout diet in Pettit Lake in 1999 concluded that 99 percent of the diet by weight was salmonid (USFS 2000a). Ratliff and Howell (1992) found that abundance of bull trout in several watersheds declined as salmon declined. Chinook salmon populations in Bear Valley Creek and other drainages in the Salmon Basin are currently less than 10 percent of historic numbers (IDFG, *in litt.* 2002)., Sockeye salmon (*Oncorhynchus nerka*) were listed as endangered in December 1991 (56 FR 58619). Snake River spring/summer chinook salmon (*Oncorhynchus tschawytscha*) and Snake River fall chinook salmon were listed as threatened under the Endangered Species Act in 1992 (51 FR 14653); critical habitat was designated for these species in 1993 (58 FR 68543). Summer steelhead (*Oncorhynchus mykiss*) were listed as threatened in August 1997 (62 FR 43937). The impact of the decline of anadromous fish on large migratory bull trout is probably significant but it cannot be quantified at this time (SBNFTG 1998a).

The decline in abundance of juvenile chinook salmon has probably not affected the productivity of resident bull trout populations in headwater streams where they do not overlap with anadromous fish. In upper Bear Valley Creek bull trout may have shifted their prey base from salmon to whitefish (*Prosopium williamsoni*) and sculpin (*Cottus spp.*) which have increased in numbers since the 1970's (SBNFTG 1998a).

Isolation and Habitat Fragmentation

Numerous diversions for irrigation inhibit fish passage between the mainstem rivers and tributary streams in many core areas (discussed above under Agricultural Practices). Culverts, road placement in the river channel, mining alterations of streamchannels and other stream alterations or structures directly and indirectly

block fish passage (Servheen 2001). The result is that many of the tributary streams are not connected to mainstem rivers and this isolates populations of bull trout. This is a significant threat to bull trout in the Salmon River Recovery Unit.

Upper Salmon River Core Area. A culvert under Highway 75 blocks migration at the mouth of Kinnikinic Creek, a tributary to the Mainstem Salmon River in the Upper Salmon River Core Area just downstream of Squaw Creek watershed (USRITAT 1998). The outlet of Jimmy Smith Lake may also be a barrier to fish movement. Numerous diversions limit fluvial fish access to small tributaries from the mainstem Salmon River and its major tributaries (USRITAT 1998).

Lemhi River and Pahsimeroi River Core Areas. In the Pahsimeroi River Valley, no tributaries are connected throughout the entire year to the mainstem Pahsimeroi River because of water diversions (IDFG, *in litt.,* 2002). In the Lemhi Valley only 17 percent of the tributaries are connected to the mainstem Lemhi River (Curet, *in litt*., 2001). State Highway 28 channelized and realigned 4.1 kilometers (2.6 miles) of the Lemhi River, isolating 3.7 kilometers (2.3 miles) of former channel from the river by the roadbed (Loucks 2000). Floodplain development in the Lemhi River basin, is occurring in the 50 and 100-year floodplain, similar to the Upper Salmon River Core Area. New hydroelectric projects are proposed in the upper Lemhi River area that would fragment existing bull trout streams (Evans, pers. comm., 2001).

Middle Salmon-Panther Creek Core Area. Two culverts have been identified as migration barriers in the Panther Creek drainage and are being worked on in the next 2 years (USFWS, *in litt*., 2002c). Ditches on U.S. Forest Service land are seasonal barriers for bull trout, inhibiting passage on Otter Creek and Phelan Creek by the Panther Creek local population. The following creeks are separated from the mainstem Salmon River by seasonal dewatering: Fourth of July, Carmen, Jesse, Owl, Boulder, Spring, Squaw, Williams, Iron, Twelvemile, and Indian (Curet, *in litt.,* 2001).

Middle Fork Salmon Core Area. In the Silver Creek drainage (a tributary to Camas Creek), an earthen dam above Rams Creek is a barrier and isolates bull trout in upper Silver Creek (USFS 1999c). This isolation reduces habitat available for bull trout in this area and reduces genetic exchange with other local populations in the area.

South Fork Salmon River Core Area. Manmade barriers for bull trout passage are found in Goat, Tailholt, and Reegan creeks (SBNFTG 1998b). Artificial waterfalls exist above Glory Hole at Stibnite Mine and at the outlet of Warm Lake.

Little-Lower Salmon River Core Area. The upper 8 to 9.6 kilometers (5 to 6 miles) of Boulder Creek has been isolated from the rest of the stream due to installation of a culvert which created a velocity barrier (CBBTTAT 1998a). A small, low-gradient tributary, Bullhorn Creek, had no fish passage because of an improper culvert installation. Highway 95 fill altered accessibility by bull trout into Fiddle Creek (USFWS, *in. litt.,* 2002b). A culvert in the East Fork of John Day Creek at River kilometer 3.9 (Stream Mile 2.3) is restricting bull trout passage in the drainage (BLM 2000b).

ONGOING RECOVERY UNIT CONSERVATION MEASURES

General Conservation Measures - Basinwide

Conservation efforts in the recovery unit for resident and anadromous fish species are summarized in the Salmon Basin subbasin summary titled "Existing and Past Conservation Efforts" pages 81 to 97, which can be viewed at: Http:/www.cbfwf.org/files/province/mtnsnake/salmon/salmon.htm (Servheen 2001). Numerous public and private efforts to alleviate problems for listed fishes in the Salmon River basin are indicated. Many of these efforts are geared to anadromous species, but also these projects have benefited bull trout habitat, especially in mainstem rivers that bull trout use for migration and rearing.

The Bonneville Power Administration has funded fish restoration efforts implemented by the following agencies in the Salmon River basin: The Nez Perce Tribe, Shoshone Bannock Tribe, Idaho Department of Fish and Game, Upper Salmon Subbasin Project, and the Lemhi and Custer Soil and Water Conservation District. These funded projects are listed in Appendix K, Figure K-2 of Servheen (2001). Other agencies conducting restoration actions for aquatic habitats in the basin include the U.S. Forest Service, Bureau of Land Management, National Marine Fisheries Service, U.S. Fish and Wildlife Service, Bureau of Reclamation, Farm Services Administration, Natural Resources Conservation Service, Idaho Department of Fish and Game, the University of Idaho, Idaho Department of Transportation, Idaho Soil Conservation Commission, and Boise Cascade Corporation. Other agencies that are implementing programs that may relate to fish conservation include the Idaho Department of Water Resources, and the Idaho Association of Soil Conservation Districts.

The Upper Salmon Subbasin Watershed Project (formerly called the Idaho Model Watershed) is implementing numerous innovative projects that benefit bull trout. These projects and the associated project monitoring activities are summarized for each fourth field Hydrologic Unit in the upper portion of the Salmon River basin in Appendix K, Table K-1 in Servheen which can be viewed at: http:/www.cbfwf.org/files/province/mtnsnake/salmon/salmon.htm. Seventy-two projects have been conducted in the area since 1993. Thirty-nine of these projects were completed prior to the listing of bull trout. This group continues to meet and implement

projects cooperatively with private landowners in the Lemhi and Pahsimeroi valleys and along the Mainstem Salmon River Corridor upstream of the Middle Fork Salmon River (Koch, pers. comm., 2002).

2001 Conservation Agreement in the Lemhi River Basin

The 2001 Conservation Agreement was developed by multiple local, State and Federal agencies and water districts to minimize take of fish listed under the Endangered Species Act and sets the stage for implementing long-term conservation actions needed to minimize "take" of listed salmon, bull trout, and steelhead in the Lemhi River. Agencies involved include: The Idaho Office of Species Conservation, Department of Water Resources, Department of Fish and Game, Upper Salmon Basin Watershed Project, Lemhi Irrigation District and Water District 74, National Marine Fisheries Service and U.S. Fish and Wildlife Service. Three tiers of the plan address (1) past actions taken to conserve species, (2) actions taken in 2001 and actions needed to improve flow conditions in 2002 and 2003, and (3) prescribes actions that need to be included in the long-term plan for the area (IOSC, IDWR, IDFG, USBWP, LID, WD74, NMFS, USFWS 2001). This Conservation Agreement calls for reconnecting Patte and Canyon creeks to the Lemhi River and it also calls for reconnecting Agency Creek to its tributaries to provide passage and rearing habitat for use by resident and anadromous fish.

Little Salmon Conservation Agreement

The Natural Resources Conservation Service has acquired a conservation easement on 274 acres of private lands which includes 4 kilometers (2.5 miles) of the Little Salmon River in the upper meadows area upstream of river kilometer 38.4 (River Mile 24). The Natural Resources Conservation Service has entered into partnership with the landowner, Idaho Department of Fish and Game, U.S. Fish and Wildlife Service, and the Bureau of Land Management for the enhancement of wetlands, riparian areas and fish habitant in this area. Restoration actions include construction of riparian pasture fences to exclude livestock, development of off-site water tanks for livestock, riparian/wetland shrub and tree plantings, plugging numerous lateral surface drainages ditches, and construction of grade control structures in a 3,500 meter section of channelized stream channel to increase base stream flows in the mainstem Little Salmon River (NRCS, USFWS, and BLM 2000).

Section 7 Watershed Consultations Range-Wide

The U.S. Forest Service and Bureau of Land Management are currently implementing the proposed action, terms and conditions, and/or reasonable and prudent measures of the existing Land Resource Management Plans as amended by PACFISH and INFISH. These agencies are currently following through with implementing PACFISH and INFISH and the seven additional U.S. Forest Service and Bureau of Land Management commitments outlined in the existing Land and Resource Management Plan Biological Opinion (USFWS 1998b). These Federal land management agencies are currently monitoring resource land management activities on public land as a part of their implementation of these actions. They are conducting implementation monitoring according to protocols developed or under development by the Interagency Implementation Team Task Forces for grazing, vegetation management and other resource management activities. Effectiveness monitoring has not yet disclosed what effects on bull trout habitat have resulted from the project modifications implemented as a result of this consultation and the accompanying watershed section 7 consultations.

Section 7 Watershed Consultations in the Salmon River Recovery Unit

Approximately 40 watershed biological assessments had been completed by 2001 that address Federal land management actions in watersheds with bull trout in the Salmon River Recovery Unit (Servheen 2001, Appendix I-1). These assessments provide a description of baseline habitat and population conditions and effects of planned land management actions on bull trout necessary to complete section 7 consultation pursuant to the Endangered Species Act. These consultations have taken place in accordance with streamlining procedures required under a Memorandum of Understanding between the U.S. Fish and Wildlife Service, U.S. Forest Service, Bureau of Land Management and National Marine Fisheries Service (USFS, BLM, NMFS, USFWS 1999). Conservation recommendations listed in biological opinions, and conservation actions incorporated into Biological Assessments provide guidance on recovery actions needed in the recovery unit. Many actions were modified so that the effects of the actions on bull trout were insignificant or discountable; however effectiveness monitoring has not yet shown the effects these actions may have had on bull trout habitat.

Federal Land Road Issues

The U.S. Forest Service and the Bureau of land Management are continuing efforts to rehabilitate areas on individual administrative units where roads are contributing excess sediment to streams occupied by bull trout in the recovery unit. These rehabilitation activities are outlined in site-specific watershed analyses and biological assessments for ongoing and proposed activities in various watersheds. For example, during 1997 and 1998 the U.S. Forest Service removed and rehabilitated a total of 9.6 kilometers (6 miles) of road alone in the East Fork John Day Creek (CBBTTAT 1998a). During 1998, the Bureau of Land Management rehabilitated 2.4 kilometers (1.5 miles) of road; this action involved culvert removal, deep ripping, seeding, and partial obliteration. The U.S. Forest Service and Bureau of Land Management road rehabilitation areas occurred in sensitive/landslide prone land types that were often the site of past road failures, land slides, and debris torrents. The Bureau of Land Management has rehabilitated and repaired roads damaged by the January 1, 1997, flood event in the lower Hazard and Hard creek drainages. Damaged roads that were occurring on landslide prone sites were rehabilitated and/or decommissioned and converted to trails (*e.g.* culverts removed, ripped, outsloped, plantings, and placement of woody debris) (BLM 1998b). Since the 1970's the Payette National Forest has rehabilitated/closed hundreds of miles of roads in the South Fork Salmon River Core Area (USFWS, *in litt.* 2002a). Four culverts on the mainstem Panther Creek that were migration barriers for bull trout have been replaced by the U.S. Forest Service Salmon-Challis National Forest (USFWS, *in litt*., 2002c).

State of Idaho Programs

The Governor's Office in the State of Idaho developed a Statewide strategy that describes how State agencies and local governments will work together to address habitat and other needs as they relate to recovery of bull trout (Batt 1996). The Governor's Plan intended to provide the structure for salmonid protection and recovery at the local level (watershed groups). These groups have not, however, continued to fully function as was originally intended.

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 Salmon River basin. This department developed and has updated a fisheries management plan for the basin on a 5-year review cycle. The fisheries management policies emphasize providing diverse sport fishing opportunities while conserving wild, native fish stocks. They report yearly on bull trout recovery activities throughout the State as a part of the section 6 Agreement with the U.S. Fish and Wildlife Service and the associated authorizations under section 10 and section 7 of the Endangered Species Act.

The Idaho Department of Lands enforces the Idaho Forest Practices Act regulating 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 State of Idaho currently implements Best Management Practices by educating and providing technical assistance to private landowners. Enforcement of standards is persued if education and technical assistance have failed. Existing levels of State supervision of land management actions to implement and monitor existing State Best Management Practices and rules guiding land management on State and private lands may be limited by State budget allocations. In addition the Department administers mining laws and the State's Lake Protection Act.

The Idaho Division of Environmental Quality has been developing subbasin assessments of water quality and total maximum daily loads, where appropriate, for each of the fourth order Hydrologic Units in the Salmon River basin. The water pollutants addressed in these assessments and Total Maximum Daily Load's are trace (heavy) metals, plant growth nutrients, bacteria and sediment. This State agency administers several Federal Clean Water Act programs designed to monitor, protect, and restore water quality and aquatic life uses. These 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; anti-degradation policy; water quality certifications; municipal wastewater grants and loans; National Pollutant Discharge Elimination System inspections; water quality standards

promulgation; general groundwater monitoring and protection; source water assessments; and specific watershed management plans identified by the Idaho Legislature. (Currently the Environmental Protection Agency issues the National Pollutant Discharge Elimination System permits and conduct section 7 consultation with the Service on these permits.) The Idaho Board of Environmental Quality oversees direction of the agency to meet responsibilities mandated through the Idaho Code, Idaho Executive Order, Idaho court orders, and agreements with other parties.

The Idaho Office of Species Conservation is committed to facilitating collaborative efforts between State, Federal and private stakeholders to facilitate conservation of listed species in Idaho. This office was established by the Governor of Idaho.