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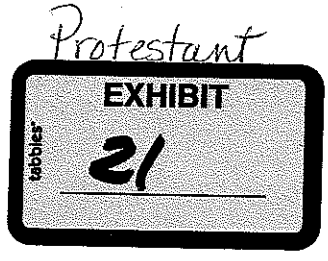
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Chapter: 17

State(s): Idaho

Recovery Unit Name: Salmon River

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



DISCLAIMER

Recovery plans delineate reasonable actions that are believed necessary to recover and/or protect the species. Recovery plans are prepared by the U.S. Fish and Wildlife Service and, in this case, with the assistance of recovery unit teams, State and Tribal agencies, and others. Objectives will be attained and any necessary funds made available subject to budgetary and other constraints affecting the parties involved, as well as the need to address other priorities. Recovery plans do not necessarily represent the views nor the official positions or approval of any individuals or agencies involved in the recovery plan formulation, other than the U.S. Fish and Wildlife Service. Recovery plans represent the official position of the U.S. Fish and Wildlife Service *only* after they have been signed by the Director or Regional Director as *approved*. Approved recovery plans are subject to modification as dictated by new findings, changes in species status, and the completion of recovery tasks.

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In the Salmon River Recovery Unit, the Upper and Lower recovery unit teams were established in 2000. However, those teams have not met since then because of limited staff and resources. Individuals on those original teams have assisted with the preparation of this chapter. The U.S. Fish and Wildlife Service plans to reconvene those teams to assist with the preparation of the final Salmon River Recovery Unit Chapter. The following people were contacted for their input to the contents of this recovery unit chapter during 2001. In July 2000, the many individuals listed below met to discuss the contents of the recovery unit chapter:

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SALMON RIVER RECOVERY UNIT CHAPTER OF THE BULL TROUT RECOVERY PLAN

EXECUTIVE SUMMARY

CURRENT SPECIES STATUS

The Salmon River Recovery Unit encompasses the entire Salmon River basin, an area of 36,278 square kilometers (14,000 square miles) which includes 28,730 kilometers (17,000 miles) of streams. Bull trout are well distributed throughout most of the unit in 125 identified local populations located within 10 core areas. This recovery unit is unique in that most of the core areas are connected by the Mainstem Salmon River or its tributaries. Major dams that otherwise may isolate core areas from each other are lacking. Fluvial and adfluvial populations are present in all core areas; however, threats limit the number of local populations with these migratory fish. Seasonal barriers for migration exist in the mainstem rivers and tributaries from a variety of different factors including water withdrawals and landscape-level changes that alter water flow. Many small populations of bull trout are isolated by seasonal barriers and these remaining bull trout populations are depressed. Populations in the Lemhi River such as Bohannon Creek are examples of these isolated populations. Other populations of bull trout that are not isolated may contain healthier populations of bull trout. These populations are located in the East Fork of the South Fork of the Salmon River and the Middle Fork Salmon River.

HABITAT REQUIREMENTS AND LIMITING FACTORS

A detailed discussion of bull trout biology and habitat requirements is provided in Chapter 1 of this recovery plan. The limiting factors discussed here are specific to The Salmon River Recovery Unit. Dramatic changes have occurred in riparian, wetland, stream, and forest ecosystems mostly outside wilderness areas in the recovery unit. These changes have resulted from several suppressing factors that include livestock grazing, logging, roads, mining, introduction and management for exotic species, and irrigation withdrawals. In many instances, habitat degradation and consequent reduction in bull trout populations outside of wilderness areas have

resulted in cumulative effects of change to terrestrial and aquatic ecosystems. Where reasons for decline of bull trout were identified in this chapter, it was done to establish a baseline so habitat restoration and recovery criteria can be achieved.

RECOVERY GOALS AND OBJECTIVES

The goal of the bull trout recovery plan is to **ensure the long-term persistence of self-sustaining, complex interacting groups of bull trout distributed across the species native range, so that the species can be delisted**. To achieve this goal the following objectives have been identified for bull trout in the Salmon River Idaho Recovery Unit:

- Maintain the current distribution of bull trout and restore the distribution in previously occupied areas within the Salmon River Recovery Unit.
- Maintain stable or increasing trends in abundance of bull trout.
- Restore and maintain suitable habitat conditions for all bull trout life history stages and strategies.
- Conserve genetic diversity and provide opportunity for genetic exchange.

RECOVERY CRITERIA

The goal for recovery of bull trout in this Salmon River Idaho Recovery Unit is to ensure the long-term persistence of self-sustaining, complex interacting groups of bull trout distributed throughout the Salmon River Idaho Recovery Unit such that the species can be delisted. To achieve this goal the following objectives have been identified for bull trout in the Salmon River Idaho Recovery Unit:

1. **Maintain the distribution of bull trout in the 125 identified local populations, and restore distribution in 8 important potential local populations in 10 of the core areas within the Salmon River Recovery Unit.** Potential local populations that are important for the recovery of bull trout were identified by biologists and the recovery unit teams as follows:

Kinnikinic, Withington, Sandy, Agency, Hazard, Elkhorn, Upper Johnson and French Creeks. These 8 populations contain core habitat or it is estimated based on professional judgement of local biologists, that the streams could contain core habitat when restored. These streams are located in core areas where recommendations call for more widespread distribution of local populations to allow for long term persistence. The remaining potential local populations where information is currently lacking on their ability to contribute to recovery include: Crooked, Camp/Phoebe, Bear, Porphyry, Sheep/South Fork Salmon River. These five potential local populations will be evaluated within five years to determine if core habitat is present and if the areas are needed for the recovery of bull trout.

2. **Estimated recovered abundance of adult bull trout in the Salmon River Recovery Unit is between 100 and 5,000 individuals in each of the 10 core areas, a total of 28,300.** The range of recovered abundance was derived using the best professional judgement of the Upper Salmon River and Lower Salmon River Recovery Unit teams (USFWS, *in litt.*, 2000a; and USFWS, *in litt.*, 2000b, USFWS, *in litt.*, 2002). The professional judgement of biologists is based on the estimated productive capacity of identified local populations and core area populations, on consideration of current habitat conditions and potential habitat conditions after threats have been addressed. Work is underway to develop a monitoring and evaluation approach or plan in an adaptive management context, that will provide feedback and a low periodic re-assessment of current recovery targets for bull trout abundance in this recovery unit (USFWS, *in litt.*, 2001b).

3. **For bull trout in the Salmon River Recovery Unit, trend criteria will be met when the overall bull trout population trend is accepted as stable in three core areas and increasing in five core areas, based on at least 15 years of monitoring data. Two core areas need additional information before trend criteria can be established. Where monitoring data does not currently exist, additional monitoring data may be needed.** The Upper Salmon River, Pahsimeroi River, Lemhi River, Middle Salmon River-Panther, South Fork Salmon River, and Little-Lower Salmon River core areas with the greatest amount of threats would need increasing trends. The

core areas that have fewer threats would need to maintain stable trends include the Middle Fork Salmon River and Middle Salmon River-Chamberlain. Insufficient data is available to establish trend criteria for the small populations in Lake Creek and Opal Lake core areas. For these two core areas, trends should remain stable until population monitoring and investigations of threats are completed within 5 years. At that time, the trend would be established based on new populations status information.

4. **Restore connectivity in specific streams by eliminating barriers that inhibit recovery.** To achieve this criterion, eliminate barriers within specific streams listed in Appendix B. It is not possible to identify any specific barrier (including barriers due to physical obstructions, unsuitable habitat, and water quality) on the streams in Appendix B at this time because collectively the small barriers inhibit connectivity for bull trout. Not any one specific barrier has been identified as the cause for this lack of connectivity in these streams. These specific streams will be reconnected to the mainstem rivers or other streams that allow for the migratory bull trout life history form to persist in the Pahsimeroi River, Lemhi River, Upper Salmon River, and Middle Salmon River-Panther core areas.

Based on the best scientific information available, the teams have identified recovery criteria and actions necessary for recovery of bull trout within the recovery unit. However, the recovery unit teams recognize that uncertainties exist regarding bull trout population abundance, distribution, and actions needed. The recovery teams feel that if effective management and recovery are to occur, the recovery plan for the Salmon River must be viewed as a "living" document, which will be updated as new information becomes available. As a part of adaptive management, the recovery teams will identify triggers or thresholds that will indicate when the recovery criteria need to be reviewed. In addition, the recovery unit team has identified research within the recovery unit that needs to be addressed to ensure recovery criteria are met. Research on bull trout population status is very important in this recovery unit because only a limited amount of information is available. For example, only in very few selected areas in the recovery unit are repeated bull trout redd counts being conducted on the vast amount of federally managed habitat that contain bull trout populations.

ACTIONS NEEDED

Recovery for bull trout will entail reducing threats to the long-term persistence of local populations and their habitat, ensuring the security of multiple interacting groups of bull trout, and providing access to habitat conditions that allows for the expression of various life history forms. The seven categories are listed in Chapter 1; tasks specific to this recovery unit are provided in this chapter.

ESTIMATED COST OF RECOVERY

Total cost of bull trout recovery in the Salmon River Recovery Unit is estimated at about $60 million over a 25-year recovery time-frame, or about $2.4 million per year. If the timeframe for recovery can be reduced, lower estimated costs would occur. Total costs include all funds expended, both public and private, and incorporate estimates of expenditures by local and State governments as well as Federal and private funds. These costs are attributed to bull trout conservation, but other aquatic species will also benefit. Costs were not included for activities that are part of Federal, State, or private operating obligations. Successful recovery of bull trout in the Salmon River Recovery Unit will represent, in large measure, the restoration of high quality coldwater fish habitat in areas that this does not already exist in central Idaho and will assist existing programs for restoration of anadromous fish in the basin.

ESTIMATED DATE OF RECOVERY

Time required to achieve recovery depends on bull trout status, factors affecting bull trout, implementation and effectiveness of recovery tasks, and responses to recovery tasks. A tremendous amount of work will be required to restore impaired habitat, reconnect habitat, and eliminate threats from nonnative species. Three to five bull trout generations (15 to 25 years), or possibly longer, may be necessary before identified threats to the species can be significantly reduced and bull trout can be considered eligible for delisting.

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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.

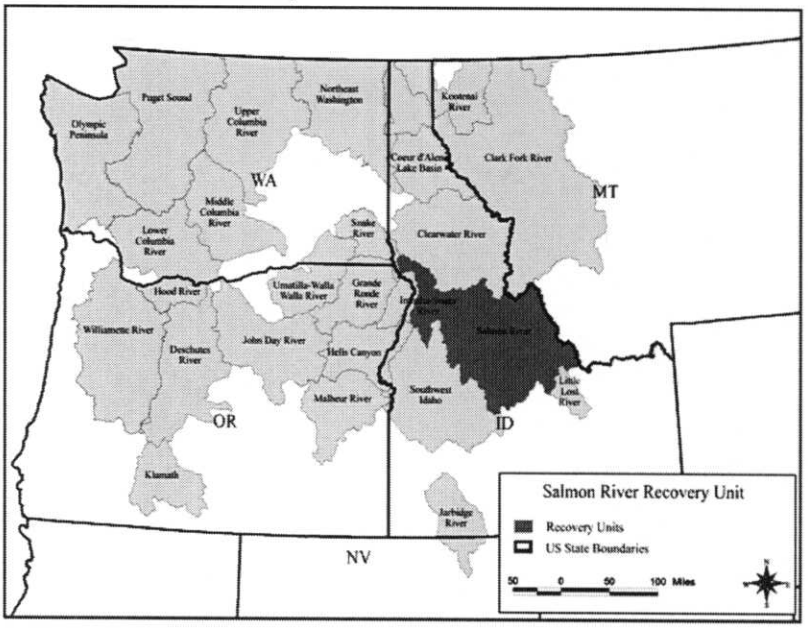


Figure 2. Salmon River Recovery Unit Core Areas for bull trout.

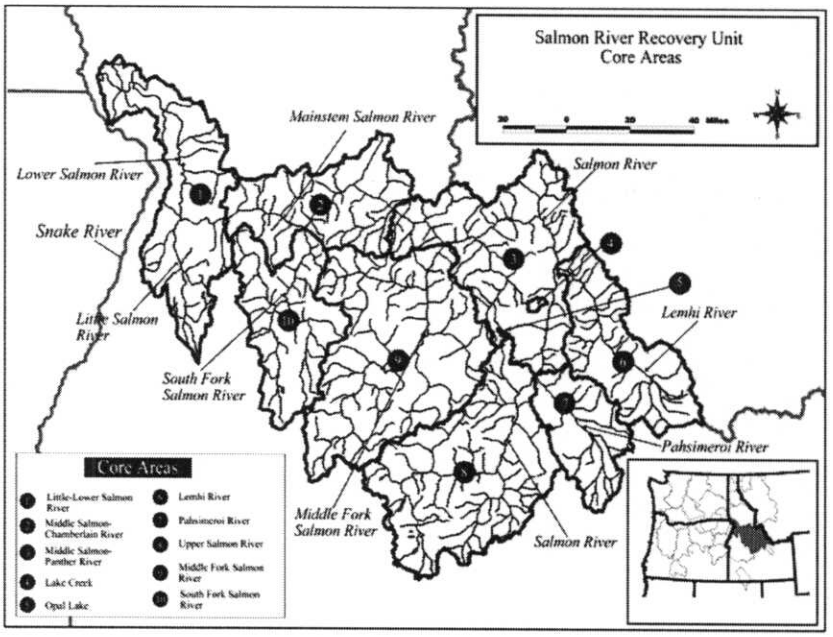


Table 1. Salmon River Recovery Unit, bull trout core areas and local populations.

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

---

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.

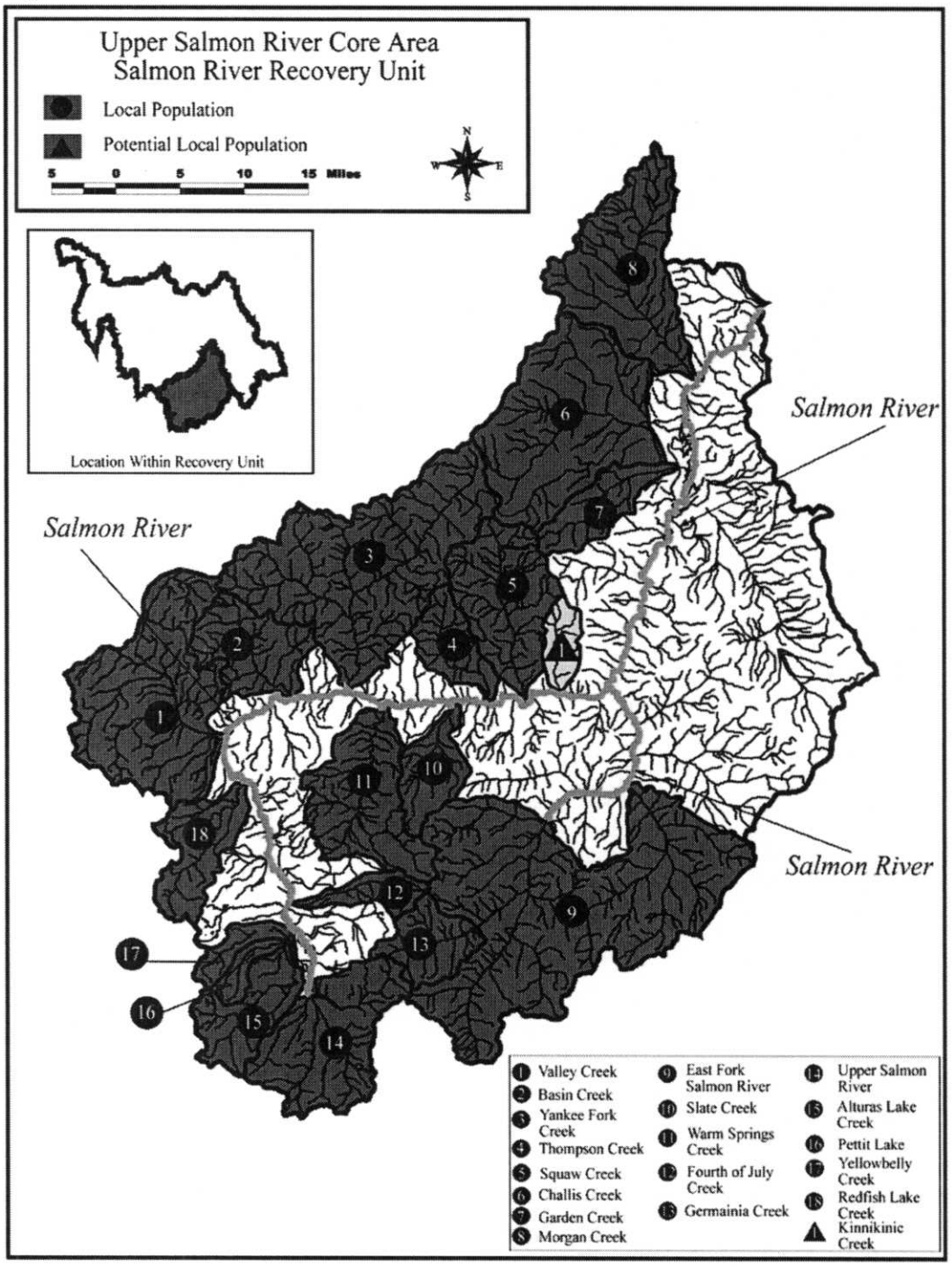


Table 2. Land ownership status in the fourth field Hydrologic Units in the Salmon River Recovery Unit (Servheen 2001). The numbers below are the percentage of land in each ownership category for each fourth field Hydrologic Unit class. The core areas are represented by the entire fourth field Hydrologic 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.

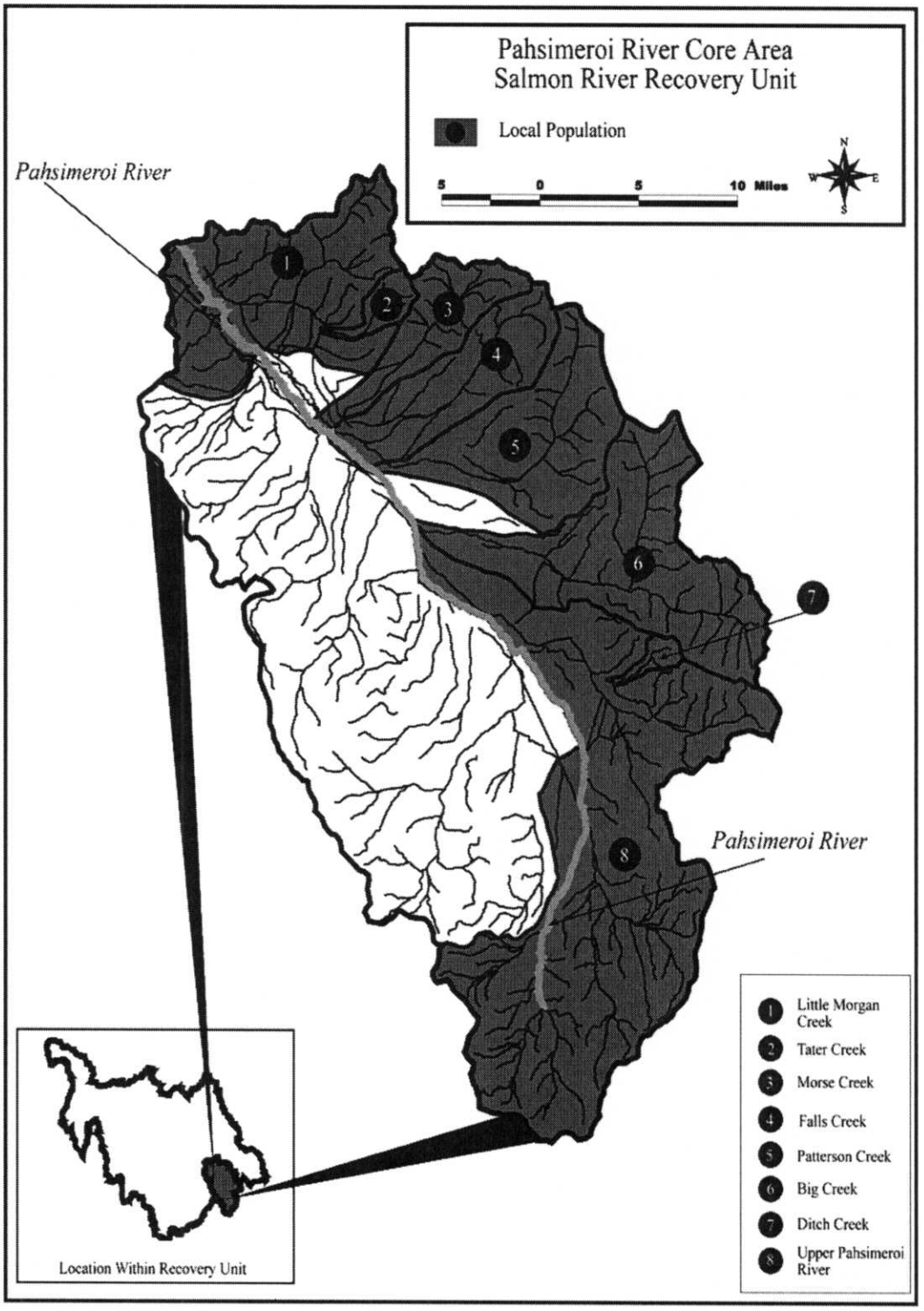
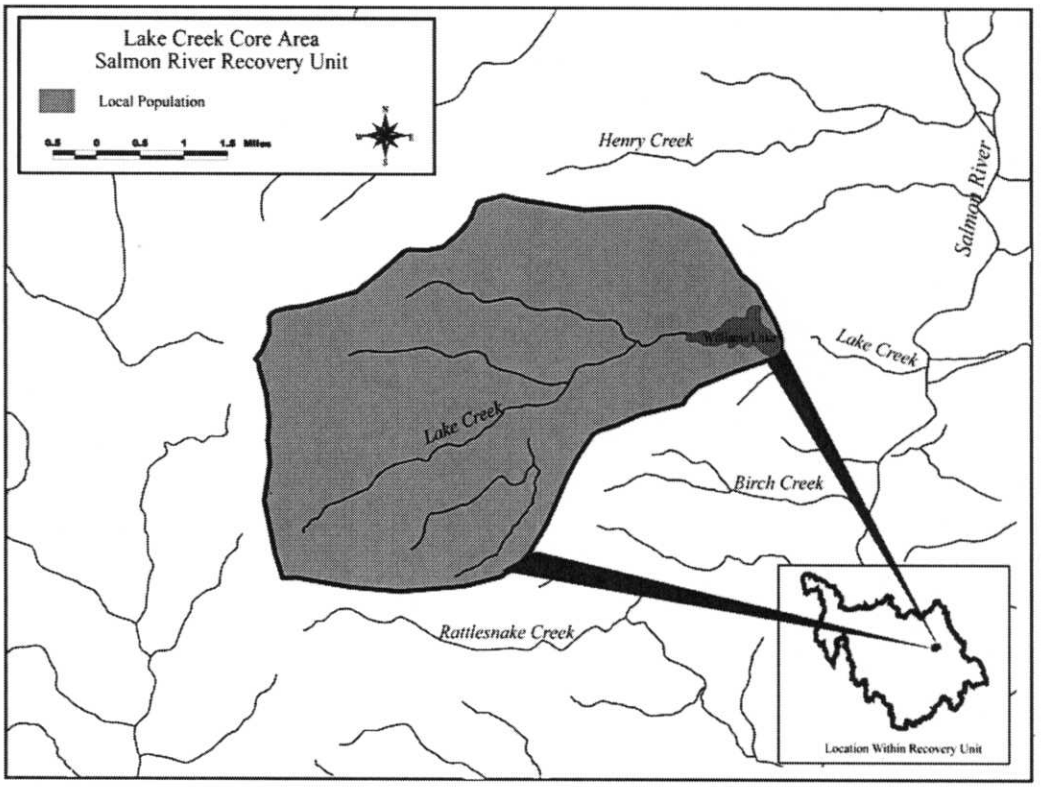


Figure 5. Lake Creek Core Area for bull trout.



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.

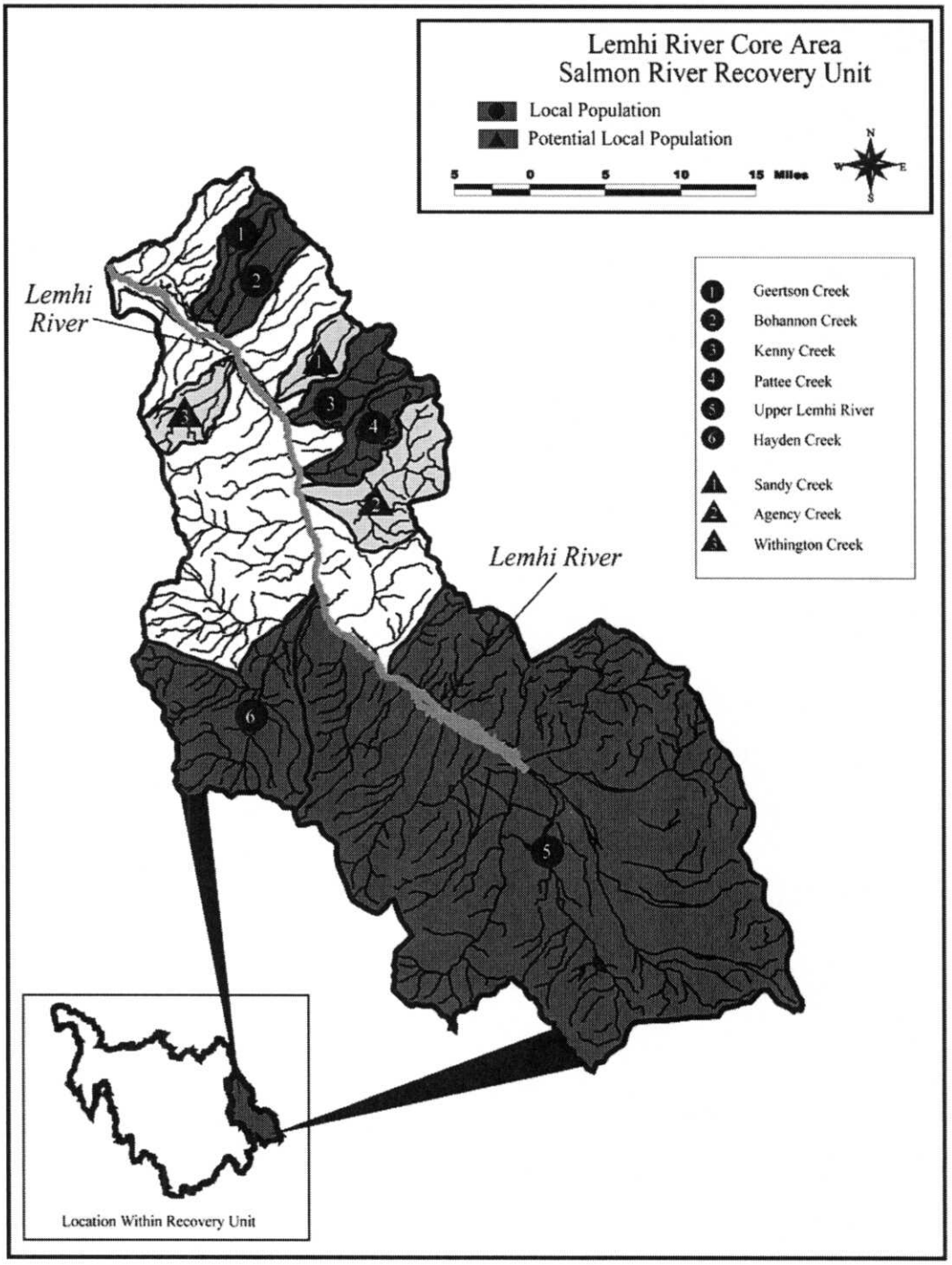
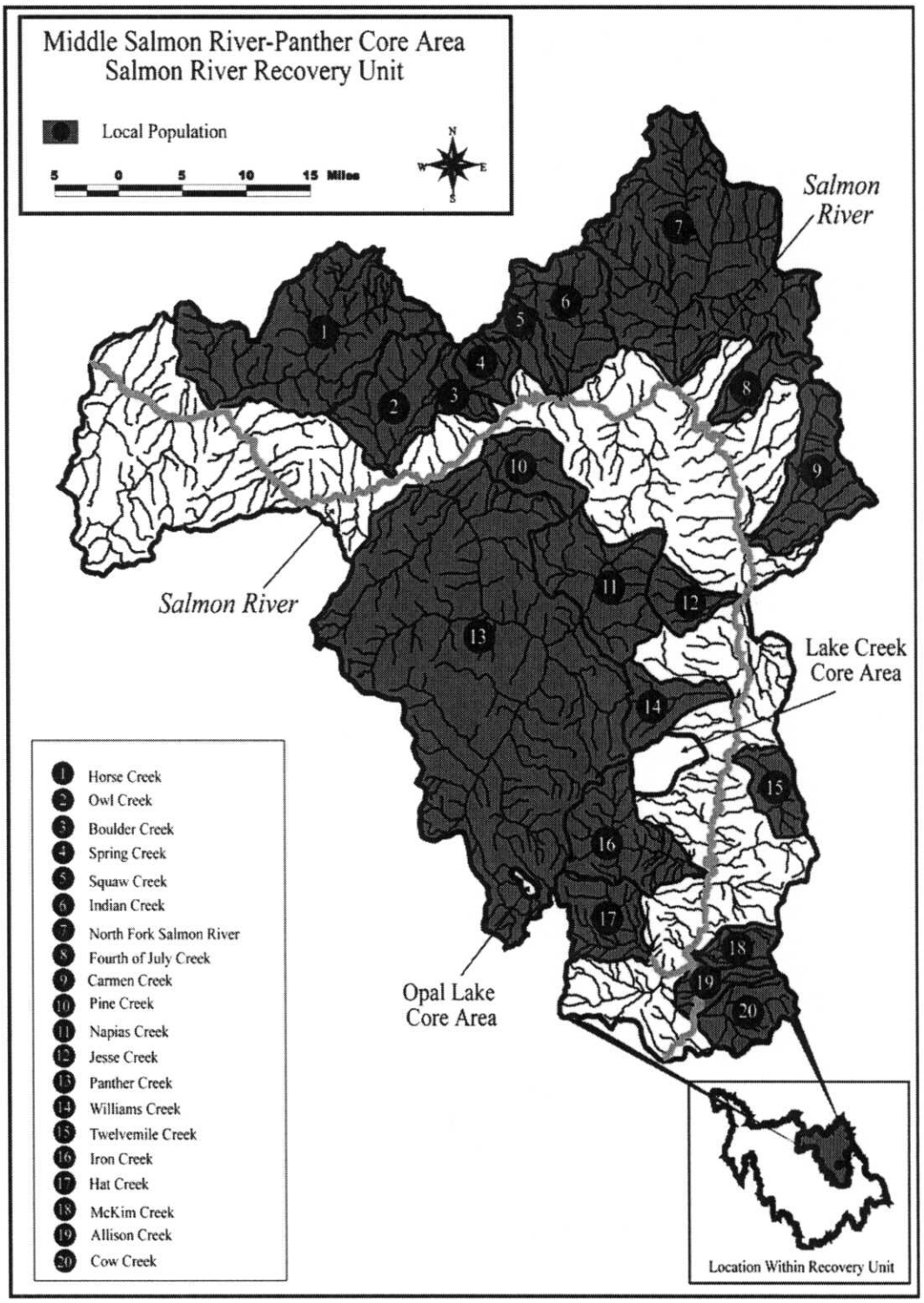
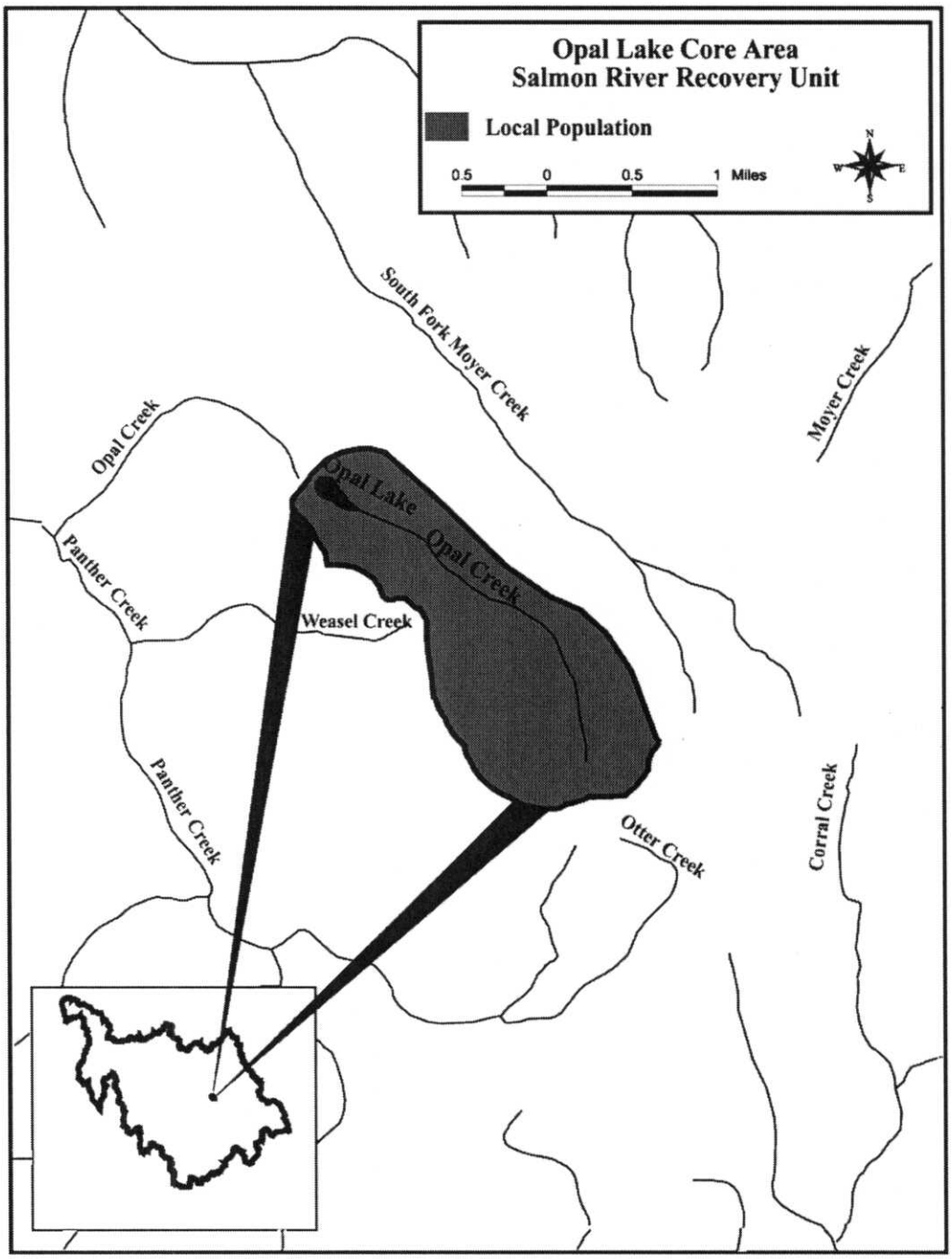


Figure 7. Middle Salmon River-Panther Core Area for bull trout.



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.

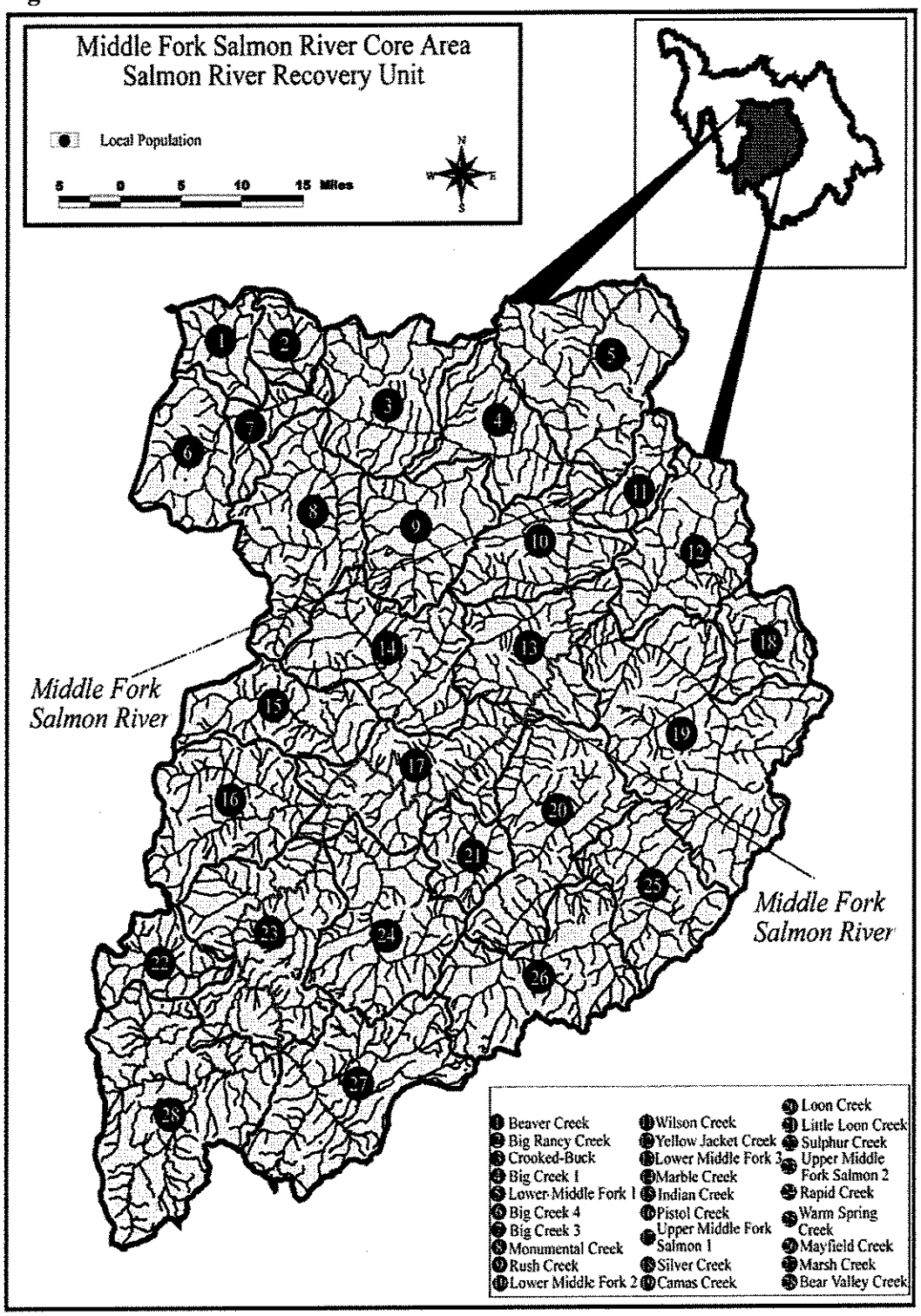
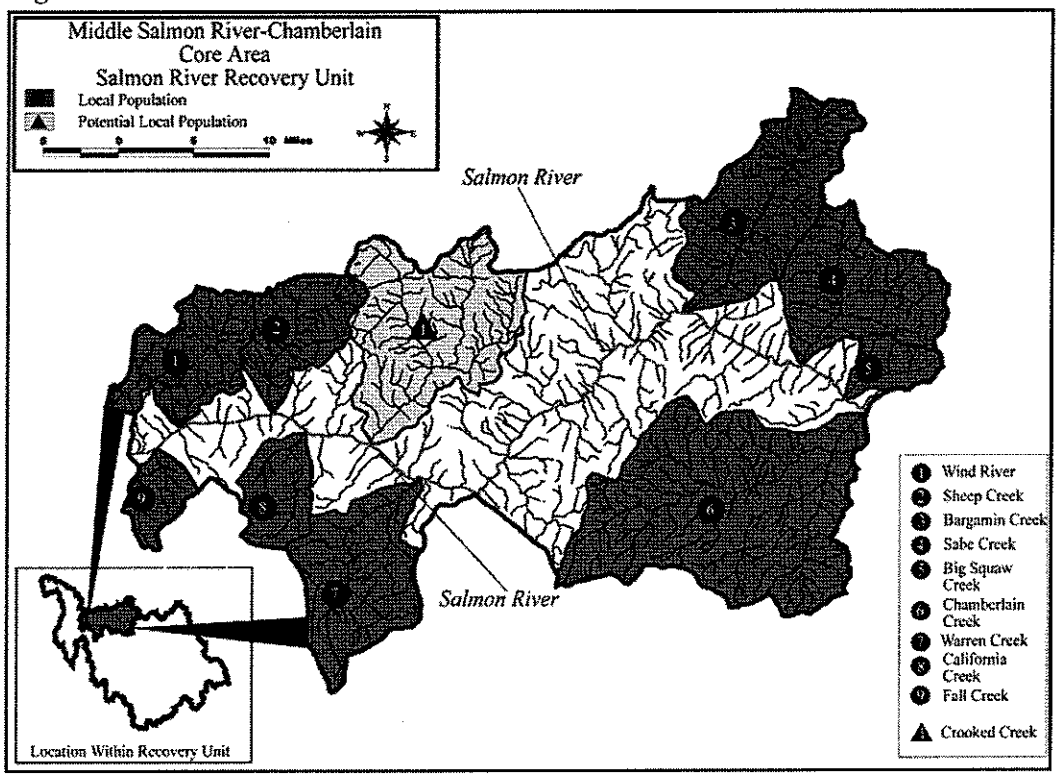


Figure 10. Middle Salmon River-Chamberlain Core Area for bull trout.



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 (SBNF TG 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.

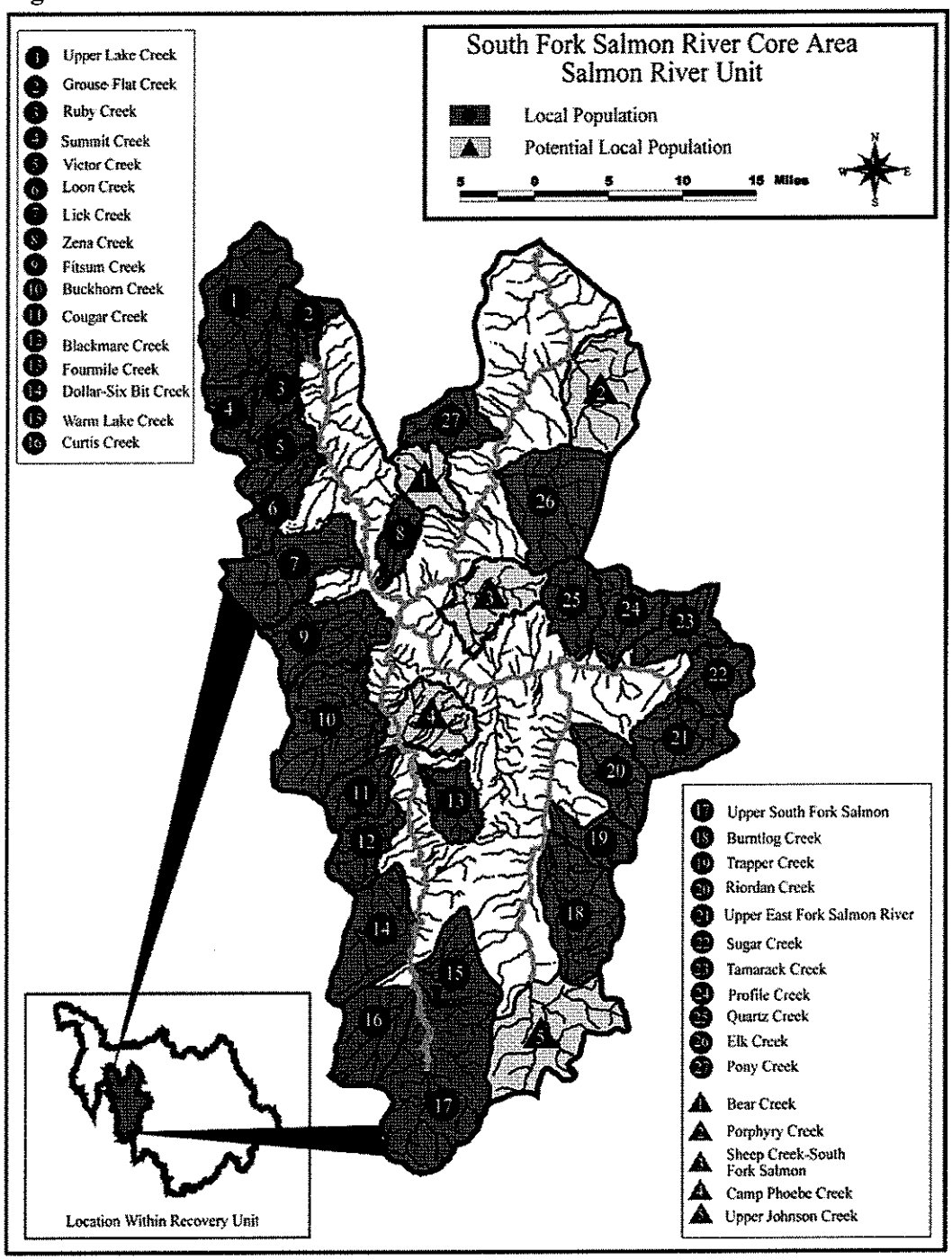
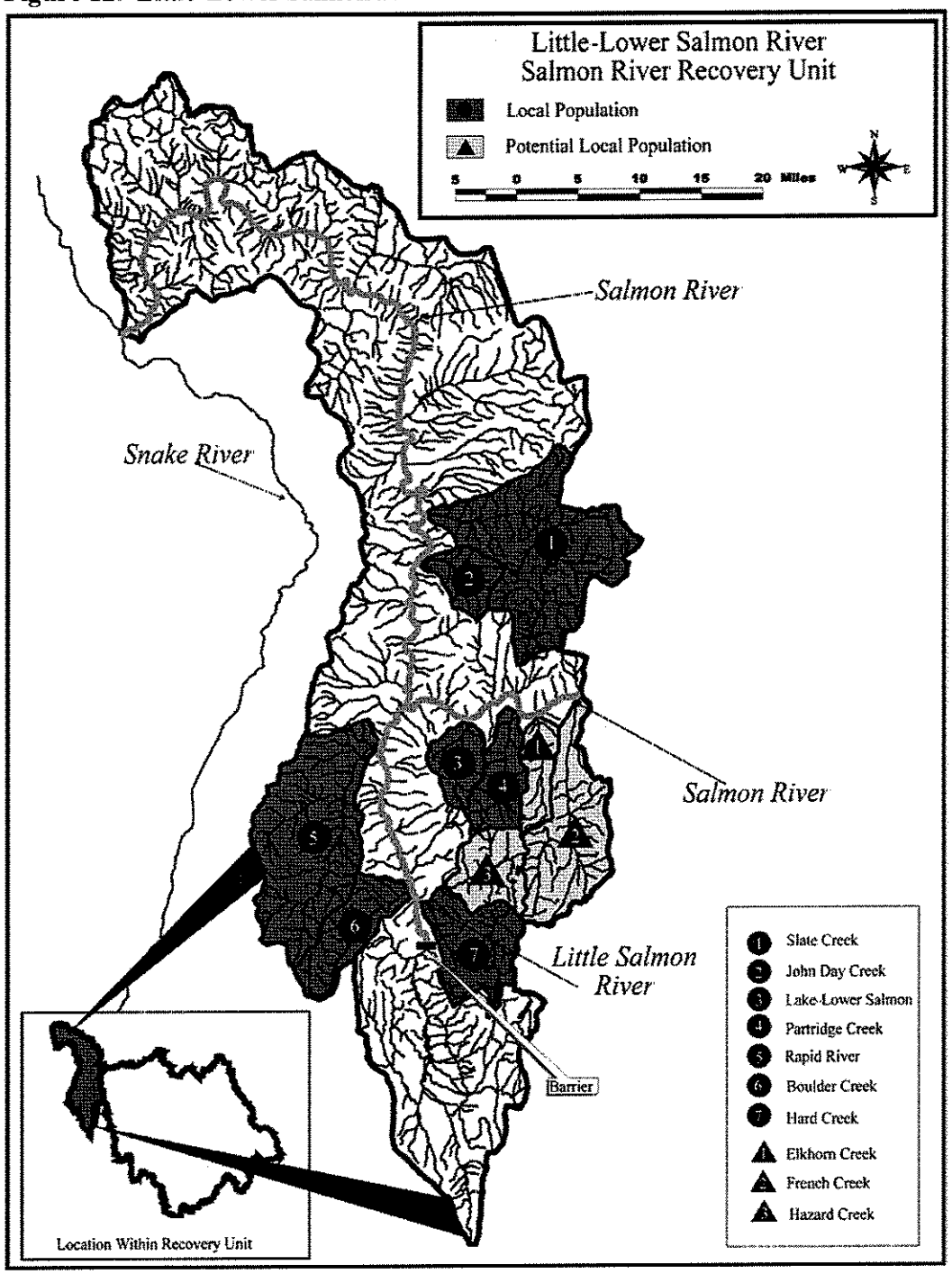


Figure 12. Little-Lower Salmon River Core Area for bull trout.



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).

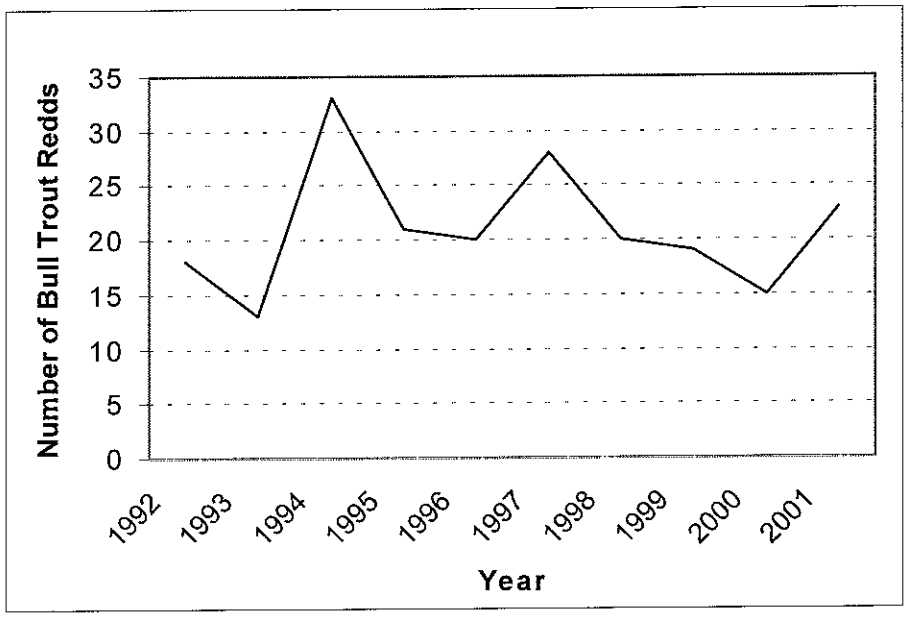
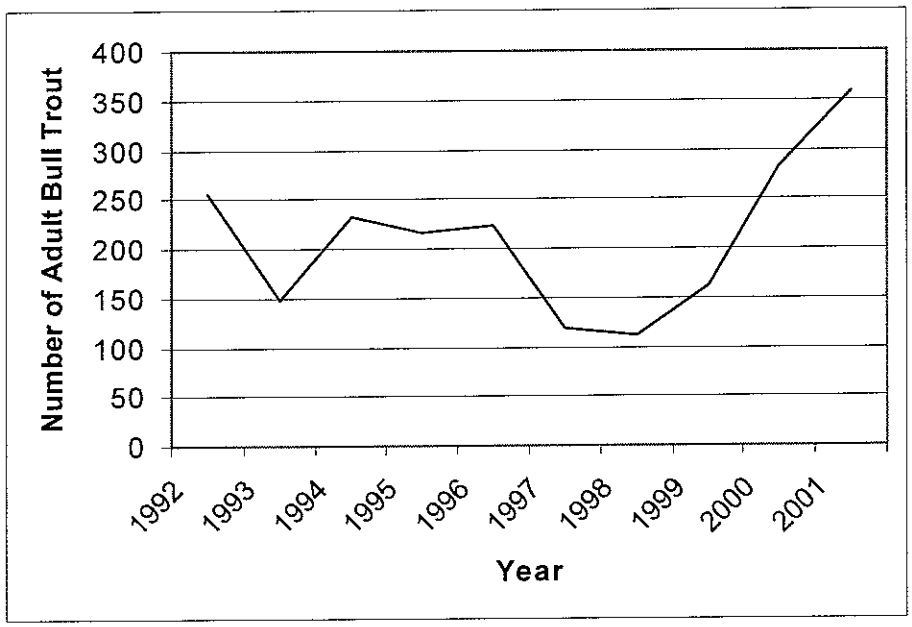


Figure 14. Number of adult bull trout moving past the upstream fish trap in Rapid River 1992 to 2001 (Thurow and Guzevich, *in litt.*, 2001).



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

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).

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

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.

STRATEGY FOR RECOVERY

A core area represents the closest approximation of a biologically functioning unit. The combination of core habitat (*i.e.*, habitat that could supply all the necessary elements for the long-term security of bull trout including both spawning and rearing as well as foraging, migrating, and overwintering) and a core population (*i.e.*, bull trout inhabiting a core habitat) constitutes the basic core area upon which to gauge recovery within a recovery unit. Within a core area, many local populations may exist. Streams that could support a local population of bull trout in the future are designated as potential local populations (USFWS, *in litt.*, 2000a, USFWS, *in litt.*, 2000b). The habitat may be suitable for bull trout in these areas, but a reproducing bull trout population has not been documented. Potential local populations may have threats such as water diversions or chemical contamination that, once alleviated, would allow bull trout to access the suitable habitat.

As outlined in detail in Chapter 1, the extent of historic and current migratory connectivity, with consideration of natural and manmade barriers, survey and movement data, and genetic analysis need to be considered when defining core areas. In this recovery unit all major river systems are connected, although not at all times of the year, therefore, the entire recovery unit is comprised of core areas that are connected to each other. Core areas require both habitat and bull trout to function, and the number (replication) and characteristics of local populations inhabiting a core area provide a relative indication of the likelihood of a core area to persist. A local population is a group of bull trout that spawn and also contain early/juvenile rearing within a particular stream or portion of a stream system.

Recovery Goals and Objectives

The goal of the bull trout recovery plan is to **ensure the long-term persistence of self-sustaining, complex interacting groups of bull trout distributed across the species native range, so that the species can be delisted**. To achieve this goal the following objectives have been identified for bull trout in the Salmon River Idaho Recovery Unit:

- Maintain the current distribution of bull trout and restore the distribution in previously occupied areas within the Salmon River Recovery Unit.
- Maintain stable or increasing trends in abundance of bull trout.
- Restore and maintain suitable habitat conditions for all bull trout life history stages and strategies.
- Conserve genetic diversity and provide opportunity for genetic exchange.

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

These guidelines are likely to be revised in the future as more detailed information on bull trout population dynamics becomes available. Given the limited information on bull trout, the level of adult abundance, and number of local populations needed to spread extinction risk should be viewed as a best estimate. Based on the best data available, and professional judgement, each element was then evaluated under a potential recovered condition resulting in recovery criteria. Evaluation of these elements under a recovered condition assumed that actions identified within this chapter had been implemented.

This approach acknowledges that, even when recovered, the status of bull trout populations in some core areas may remain short of ideals described by

conservation biology theory. Some core areas under recovered conditions may be limited by natural attributes or patch size, and may always remain at a relatively high risk of extirpation. Limited data within the Salmon River Recovery Unit meant that the team relied heavily on the professional judgement of recovery team members.

Local Populations. Metapopulation theory is an important consideration in bull trout recovery. A metapopulation is an interacting network of local populations with varying frequencies of migration and gene flow among them (Meffe and Carroll 1994) (See Chapter 1). Multiple local populations distributed and interconnected throughout a watershed provide a mechanism for spreading risk from stochastic events. Distribution of local populations in such a manner is, in part, an indicator of a functioning core area. Based in part on guidance from Rieman and McIntyre (1993), bull trout core areas with less than 5 local populations are at increased risk; core areas with between 5 and 10 local populations are at intermediate risk; and core areas which have more than 10 interconnected local populations are at diminished risk.

For the Upper Salmon River Core Area, there are currently 18 known local populations; for the Pahsimeroi River Core Area, there are nine known local populations; there is one local population in the Lake Creek Core Area; there are six local populations in the Lemhi River Core Area; there are 20 local populations in the Middle Salmon River-Panther Core Area; one local population in the Opal Lake Core Area, there are 28 local populations in the Middle Fork Salmon River Core Area; nine local populations are found in the Middle Salmon River-Chamberlain Core Area; 27 local populations are found in the South Fork Salmon River Core area, and there are seven local populations in the Little Lower Salmon River Core Area. Based on the above guidance, bull trout in the Lake Creek and Opal Lake core areas are in the increased risk category. Four core areas are in the intermediate risk category including the Pahsimeroi River, Lemhi River, Middle Salmon River-Chamberlain and Little-Lower Salmon River. The remaining core areas including the Upper Salmon River, Middle Salmon River-Panther Creek, Middle Fork Salmon River and South Fork Salmon River are in the diminished risk category.

Adult Abundance. The recovered abundance levels in the Salmon River Recovery Unit were evaluated by considering theoretical estimates of effective population size, and the professional judgement of recovery team members. In general, effective population size is a theoretical concept that allows one to predict potential future losses of genetic variation within a population, due to small population sizes and genetic drift (See Chapter 1). For the purpose of recovery planning, effective population size is the number of adult bull trout that successfully spawn annually. Based on standardized theoretical equations (Crow and Kimura 1970), guidelines have been established for maintaining minimum effective population sizes for conservation purposes. Effective population sizes greater than 50 adults are necessary to prevent inbreeding depression and a potential decrease in viability or reproductive fitness of a population (Franklin 1980). In order to minimize the loss of genetic variation due to genetic drift, and maintain constant genetic variance within a population, an effective population size of at least 500 is recommended (Franklin 1980; Soule 1980; Lande 1988). Effective population sizes required to maintain long-term genetic variation that can serve as a reservoir for future adaptations in response to natural selection and changing environmental conditions are discussed in Chapter 1 of the recovery plan.

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

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

Adult abundance is estimated to be greater than 5,000 individuals in each of three core areas (Upper Salmon River, Middle Fork Salmon River, South Fork Salmon River) in the Salmon River Recovery Unit. Adult abundance is estimated to be between 500 and 5,000 adult fish in the Pahsimeroi River, the Middle Salmon River-Panther, Middle Salmon River-Chamberlain, and Little Lower Salmon River core areas; and around 1,000 adult fish in the Lemhi River Core Area. Adult abundance in the Lake Creek and Opal Lake core areas are estimated at less than 500 fish. Based on the guidance above, therefore, bull trout may be at risk from genetic drift in 2 out of the 10 core areas in this recovery unit.

Productivity. A stable or increasing population is a key criterion for recovery under the requirements of the Endangered Species Act. Measures of the trend of a population (the tendency to increase, decrease, or remain stable) include population growth rate or productivity. Estimates of population growth rate (*i.e.*, productivity over the entire life cycle) that indicate a population is consistently failing to replace itself, indicate increased extinction risk. Therefore, the reproductive rate should indicate the population is replacing itself, or growing.

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

The population growth rate is an indicator of extinction probability. The probability of going extinct cannot be measured directly; it can, however, be estimated as the consequence of the population growth rate and the variability in that rate. For a population to be considered viable, its natural productivity should be sufficient to replace itself from generation to generation. Evaluations of population

status will also have to take into account uncertainty in estimates of population growth rate or productivity. The growth rate must indicate a stable or increasing population for a period of time for the population to contribute to recovery.

The Little-Lower Salmon Core area was the only core area with population trend data from redd counts for at least ten years and this area was considered in the intermediate threat category for productivity. All of the other core areas in the Salmon River Recovery Unit did not contain productivity data for at least ten years, therefore they were considered in the increased threat category.

Connectivity. The presence of the migratory life history form within the Salmon River Recovery Unit was used as an indicator of the functional connectivity of the recovery unit and both core areas. If the migratory life form was absent, or if the migratory form is present but local populations lack connectivity, the core area was considered to be at increased risk. If the migratory life form persists in at least some local populations, with partial ability to connect with other local populations, the core area was judged to be at intermediate risk. Finally, if the migratory life form was present in all or nearly all local populations, and had the ability to connect with other local populations, the core area was considered to be at diminished risk.

Migratory bull trout are present in all or nearly all local populations in the Middle Fork Salmon River, Upper Salmon, South Fork Salmon River and Little-Lower Salmon River core areas; therefore these populations are considered to be at diminished risk. Migratory bull trout may persist in some local populations in the Lemhi River, Middle Salmon River-Panther, and Middle Salmon River-Chamberlain core areas which therefore are considered at an intermediate risk. Migratory forms are believed to be absent or extremely limited in the Pahsimeroi River Core Area local population which is considered to be at increasing risk. The Lake Creek and Opal Lake core areas contain only one local population each and each of these populations are believed to be migratory.

Recovery Criteria

Recovery criteria identified for the Salmon River Recovery Unit are as follows:

1. **Distribution criteria will be met when the total number of stable local populations has increased from 125 identified local populations to 133 local populations in 10 of the core areas within the Salmon River Recovery Unit.** Potential local populations that are essential for the recovery of bull trout were identified by biologists and the recovery unit teams as follows: Kinnikinic, Withington, Sandy, Agency, Hazard, Elkhorn, Upper Johnson and French creeks. The streams in these areas are essential because they contain core habitat or it is estimated based on professional judgement by local biologists, that the streams could contain core habitat when restored. These streams are located in core areas that may need more widespread distribution of local populations to allow for long-term persistence of bull trout in that core area. The remaining potential local populations where information is currently lacking on their ability to contribute to recovery include: Crooked, Camp/Phoebe, Bear, Porphyry, Sheep/South Fork Salmon river. These five potential local populations will be evaluated within 5 years to determine if the streams in these areas are essential for the recovery of bull trout.

2. **Abundance criteria will be met when the estimated abundance of adult bull trout in the Salmon River Recovery Unit is between 100 and 5,000 individuals in each of the 10 core areas, a total of 27,200 (Table 3).** The range of recovered abundance was derived using the best professional judgement of the Upper Salmon River and Lower Salmon River Recovery Unit teams (USFWS, *in litt.*, 2000a; and USFWS, *in litt*, 2000b, USFWS, *in litt.*, 2002c). The professional judgement of biologists is based on the estimations of productive capacity of identified local populations and core area populations, on consideration of current habitat conditions and potential habitat conditions after threats have been addressed. Work is underway to

develop a monitoring and evaluation approach or plan in an adaptive management context, that will provide feedback and allow periodic reassessment of current recovery targets for bull trout abundance in this recovery unit (USFWS, *in litt.*, 2001b).

The U.S. Fish and Wildlife Service estimated that 100 adult fish exist at this time in the Opal Lake and Lake Creek core areas based on research done on other small adfluvial bull trout populations in the Clark Fork Recovery Unit in Montana (USFWS 2002). Estimated abundance for recovery is estimated at current levels; however, this target will need to be revisited in the future once further research is conducted on bull trout populations in these core areas.

3. **For bull trout in the Salmon River Recovery Unit, trend criteria will be met when the overall bull trout population trend is accepted as stable in two core areas and increasing in six core areas, based on at least 15 years of monitoring data. Two core areas need additional information before trend criteria can be established. Where monitoring data does not currently exist, 25 years of monitoring data may be needed.** The Upper Salmon River, Pahsimeroi River, Lemhi River, Middle Salmon River-Panther, South Fork Salmon River and Little-Lower Salmon River core areas with the greatest amount of threats would need increasing trends. The core areas that have fewer threats that would need to maintain stable trends include the Middle Fork Salmon River and Middle Salmon River-Chamberlain. Insufficient data is available to establish trend criteria for the small populations in Lake Creek and Opal Lake core areas. For these two core areas, trends should remain stable until population monitoring and investigations of threats are completed within 5 years. At that time, the trend would be established based on new populations status information.

4. **Connectivity criteria will be met when migratory forms are present in all local populations with intact migratory corridors providing opportunity for genetic exchange and diversity.** Achieving criteria 1 through 3 above is expected to depend on restoring connectivity by eliminating barriers in bull

trout streams in all core areas. Completion of tasks 1.2.3 and 1.2.5 will identify the remaining unknown barriers in all core areas. A list of such barriers and/or combined actions that restore connectivity should be prepared in the first 5 years of implementation. Connectivity must be restored at the majority of these barriers consistent with tasks 1.2.4, 1.2.6, 1.2.8 and 1.2.9 and consistent with the protection of upstream populations of westslope cutthroat trout and other native fishes. Appendix B lists streams fragmented by small barriers that inhibit connectivity for bull trout. These specific streams will be reconnected to the mainstem rivers or other streams that allow for the migratory bull trout life history form to persist in the Pahsimeroi River, Lemhi River, Upper Salmon River, and Middle Salmon River-Panther core areas.

Recovery criteria for the Salmon River Recovery Unit were established to assess whether recovery actions have resulted in the recovery of bull trout. The Salmon River Recovery Unit Team expects that the recovery process will be dynamic and require refinements as more information becomes available over time. While removal of bull trout as a species under the Endangered Species Act (*i.e.*, delisting) can only occur for the entity that was listed (Columbia River Distinct Population Segment), the criteria listed above will be used to determine when the Salmon River Recovery Unit is fully contributing to recovery of the population segment.

Estimated Date of Recovery

Recovery units are the basis on which bull trout recovery will be gauged. Expected times necessary to achieve recovery will vary among recovery units due to differences in bull trout status, factors affecting bull trout, implementation and effectiveness of recovery tasks, and bull trout and habitat responses to recovery tasks.

At a minimum, three bull trout generations (15 years) are expected to pass before the highest priority and most effective tasks necessary to significantly reduce identified threats to bull trout can be achieved or the results of these tasks are demonstrated throughout the Salmon River Recovery Unit. We expect full recovery to occur in 25 years when we have addressed the threats and fully documented population distribution, abundance and trend in areas that currently have limited information.

Table 3. Broad Scale Summary of the Recovery Criteria for the Salmon River Recovery Unit.

Core Area in the Salmon River Recovery Unit	Target for Number local populations and (essential potential local populations)	Target for the minimum recovered abundance of adult-sized bull trout	Target for trend in abundance (estimated)	Target for streams to be reconnected
Upper Salmon River	18+ (1)	5,000	Increasing	See Appendix B
Pahsimeroi River	9	3,000	Increasing	See Appendix B
Lake Creek	1	100	Not known	See Appendix B
Lemhi River	6 + (3)	2,000	Increasing	See Appendix B
Middle Salmon River-Panther	20	3,000	Increasing	See Appendix B
Opal Lake	1	100	Not known	identify barriers
Middle Fork Salmon River	28	5,000	Stable	identify barriers
Middle Salmon River-Chamberlain	9	2,000	Stable	identify barriers
South Fork Salmon River	27 + (1)	5,000	Increasing	identify barriers
Little-Lower Salmon River	7 + (3)	2,000	Increasing	identify barriers
Total Numbers	125 + (8)	27,200		

Research needs relative to abundance and monitoring

Based on the best scientific information available, the teams have identified recovery criteria and actions necessary for recovery of bull trout within the recovery unit. However, the recovery unit teams recognize that uncertainties exist regarding bull trout population abundance, distribution, and actions needed. The recovery teams feel that if effective management and recovery are to occur, the recovery plan for the Salmon River will be viewed as a "living" document, which will be updated as new information becomes available. In addition, the recovery unit team has identified research needs which are essential within the recovery unit.

A primary research need is a complete understanding of the current and future role that the mainstem Snake River should play in the recovery of bull trout. It seems likely that fluvial bull trout in the Salmon basin historically migrated to the mainstem Snake River to overwinter and feed. Uncertainty regarding the current use of the mainstem Snake River by fluvial bull trout that also use habitats in the recovery unit has led the recovery team to identify use of the Snake River by bull trout as a research need. Given that bull trout have recently been found in the Snake River in the Hells Canyon Complex and downstream of the mouth of the Grand Ronde River, a better understanding of migration patterns between basins would greatly enhance the opportunities for recovery. The recovery team believes that migrational studies for the Salmon River Recovery Unit should be coordinated with the Hells Canyon Complex, the Imnaha, and the Grand Ronde Recovery Units to provide a more complete understanding of adult bull trout habitat requirements.

This recovery unit chapter is the first step in the planning process for bull trout recovery in the Salmon River Recovery Unit. Monitoring and evaluation of population levels and distribution will be an important component of any adaptive management approach as will the evaluation of recommended actions. The Service will take the lead in developing a comprehensive monitoring approach which will provide guidance and consistency in evaluating bull trout populations.

The teams will rely on adaptive management to better refine both abundance and distribution criteria. Adaptive management is a continuing process of planning,

monitoring, evaluating management actions, and research. Adaptive management will involve a broad spectrum of user groups and will provide the framework for decision making relative to recovery implementation and ultimately the possible revision of recovery criteria for this recovery unit.

Monitoring Strategy. Effective monitoring of all 125 local populations (Table 1) currently identified in this recovery unit is not practical, logistically feasible, or necessary. To do so, would require shifting a disproportionate share of available resources for bull trout recovery activities to monitoring, exclusively. Therefore, the suggested monitoring strategy reflects a level of effort that is considered both practical and effective to monitor the populations and quantify achievement of the recovery criteria. This does not mean, nor should it be interpreted to mean, that unmonitored populations are unnecessary or expendable. Protection and restoration efforts will continue to be applied to all local populations of bull trout throughout the Salmon River basin in order to protect important genetic diversity; maintain healthy, viable populations; and secure or improve the existing widespread distribution. The ultimate goal is to meet the criteria and recover bull trout in the Salmon River Recovery Unit to a level that makes them eligible to contribute to delisting as rapidly and efficiently as possible.

Within the recovery criteria and this monitoring strategy there are several terms which have not been previously defined, requiring some elaboration:

Population monitoring to accepted standards: Refers to redd counts, juvenile electrofishing estimates, snorkel surveys, net catches, or other distribution and abundance indices that are agreed to by U.S. Fish and Wildlife Service and the management agencies as adequate to establish presence/absence or trend of local bull trout populations. These standards may vary from population to population but should, at a minimum, meet the established protocols for presence/absence adopted by the Western Division of the American Fisheries Society (in development).

Sufficient regularity: Refers to the frequency with which monitoring must occur. In order to establish statistically definable trends, annual monitoring will normally be required. But, for local populations where threats are minimal and

habitat is remote (*e g* , wilderness areas), or where a sufficient baseline already exists, it may be sufficient to monitor every other or even every third year. These decisions should be made on a case-by-case basis.

Contemporary standards: Refers to the use of modern analytical tools to decipher trends in local bull trout population abundance. This is currently an area of considerable research focus and it is expected that population models and other tools will be developed in the next few years that will improve upon existing methods for identifying and interpreting population response. It is recommended that evaluation and interpretation of the direction and magnitude of population trends should be based upon the most commonly accepted and scientifically supportable methods available at the time the analysis occurs, and not necessarily upon those currently in use.

With those terms in mind, it is the stated intention of this recovery plan that population monitoring to accepted standards occur, with sufficient regularity in a portion of identified local populations acceptable for statistical analysis and agreed to by the Upper and Lower Salmon River recovery unit teams, to verify continued distribution and enable assessment of bull trout population status under contemporary standards. The local populations to be monitored will be identified within 1 year of the issuance of the final recovery plan. Monitoring must be spatially distributed within core areas and must be intensified from previous levels, with particular emphasis on waters that are subject to threats from habitat degradation and/or nonnative fish species. Currently, only one local population, Rapid River has more than 5 years of redd counts. Twin Creek in the Panther Creek local population, and the Horse Creek local population are being regularly monitored (*i.e* , data existing for at least 3 of 5 latest years). Other monitoring may exist that is not available to the U.S. Fish and Wildlife Service at this time. Notable monitoring gaps currently occur throughout the recovery unit.

ACTIONS NEEDED

Recovery Measures Narrative

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

The Salmon River Recovery Unit Chapter should be updated at least every 5 years as recovery tasks are accomplished, or revised as environmental conditions change, and monitoring results or additional information become available. The Upper and Lower Salmon River recovery unit teams should meet annually to review annual monitoring reports and summaries, and make recommendations to the U.S. Fish and Wildlife Service to revise the recovery plan.

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

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

1.1.1 Assess roads and identify problem areas. Conduct an intensive inventory to identify roads that could be decommissioned and/or rehabilitated to reduce erosion and sediment delivery to streams.

1.1.2 Reduce general sediment production. Stabilize roads, road stream crossings, and other known sources of fine sediment delivery. Implement recommendations from U.S. Forest Service and Bureau of Land Management Watershed Analysis and other plans that are geared to remediation of sediment production. Where problems roads have been identified, increase maintenance of extensive U.S. Forest Service, Bureau of Land Management, private, and State lands secondary road systems by remediation of sediment producing hotspots, and maintenance of bridges, culverts, and crossings in all core areas. Decommission surplus roads; especially those that are chronic sources of fine sediment and/or those located in areas of highly erodible or unstable geological formations. Remove culverts and/or bridges on closed roads that are no longer maintained and or remove the road. Paving or graveling portions of major roads to reduce sediment delivery may be appropriate, but must be considered on a case-by-case basis with other factors such as the impacts of increased ease of angler access. Address impacts made by all terrain vehicles on roads and trails.

Priority areas include: (The priority areas in *italics* are names of watersheds identified in the Inland West Watershed Initiative at the fifth or sixth field Hydrologic Unit Code level, Table I-3, Appendix I of the Salmon Subbasin Summary [Servheen 2001]. Creeks were also included below that are on the 1998 303(d) list of waterbodies for sediment, and these are listed in **bold letters** [Servheen 2001, Table C-1]).

Upper Salmon River Core Area: *Morgan watershed,* Salmon Headwaters, Yellowbelly Lake, Redfish Lake and **Valley**

(Stanley to Salmon River, Challis, Garden, Thompson, Warm Springs, Big Lake, Boulder, and Warm Springs creeks, **Yankee Fork River** (Yankee Fork and Jordan Creek roads), and mainstem East Fork Salmon River.

Pahsimeroi River Core Area: **Pahsimeroi River, Big, Morse, Patterson creek (Forest boundary to Pahsimeroi River)**.

Lemhi River Core Area: **Big Eightmile, Big Timber, Eighteenmile, Hawley, Little Eightmile Creeks (all from the U.S. Forest Service boundary downstream to the Lemhi River); Bohannon, Geertson, Sandy, Wimpey, and Kenny creeks (all from the Bureau of Land Management boundary downstream to the Lemhi River)**.

Middle Salmon River-Panther Creek Core Area: ***Big Deer,*** **Hughes,** *McKim*, Upper Panther (*Musgrove), Moose, Hull, Hughes, Lick, and Moccasin creeks,* Upper Horse, Squaw, Pine, Opal (downstream of Opal Lake), Porphyry, Dahlonega creeks, and the mainstem Salmon River from North Fork to Corn Creek.

Middle Salmon River-Chamberlain Core Area: Warren (replace fords of Warren Creek and other actions), Upper Horse, *Wind, Big Mallard, Witsher, Upper Meadow, and Upper Crooked creeks*.

South Fork Salmon River Core Area: **South Fork Salmon River, Upper East Fork South for Salmon River, Secesh River (Lake Creek to Loon Creek), Sugar**, Krassel-Indian, Curtis, **Johnson (Headwaters to mouth)**, and Cow-Oompaul creeks. Repair the Elk Summit road, Davis/Wiesel road, and Lick Creek road.

Little-Lower Salmon River Core Area: *Middle Little Salmon River*, Slate Creek, **Little Slate Creek**, John Day, *White Bird, Howard, Skookumchuck, and Goose Creeks*.

Middle Fork Salmon River Core Area: **Elkhorn (Headwaters to Salmon River),** and **Monumental (Headwaters to Fall Creek), Bear Valley**, (Bear Valley and Bearskin Roads), Elk, and Lower Camas Creeks (*Lower Silver Creek*),

1.1.3 Continue to conduct implementation and effectiveness monitoring of projects designed to reduce sediment delivery to streams. Conduct implementation monitoring of recovery-based projects to reduce sediment delivery to streams. Continue existing long-term monitoring of sediment deposition delivery to streams in areas that are utilized by bull trout (*e.g.*, core, shovel, sampling, pebble counts etc.). Devise new sampling schemes in areas where existing monitoring is incomplete or lacking. Federal, State, county, and individual citizen efforts should be coordinated so that duplication of effort is avoided. Monitoring results should be compiled in a commonly shared, geospatial database.

1.1.4 Increase use of State Best Management Practices and rules guiding land management on State and private lands. Compliance checking and monitoring may improve Best Management Practices implementation on State And private lands.

1.1.5 Review Best Management Practices/laws/rules/standards for land management practices when those practices provide inadequate protection to bull trout on State and private lands. Work with State and private landholders and interested parties to revise forestry, grazing and mining standards. Ensure that standards are protective of bull trout habitat needs. For example, utilize

standards and guidelines similar to those described in Inland Native Fish Strategy (INFSH), http://www.fs.fed.us/r6/fish/9506-infish.pdf. Appendix A pages A-1 to A-16, to improve existing and design new Best Management Practices. Current streamside protection zones for forestry Best Management Practices on private and State lands may not adequately protect stream temperature and reduce sediment delivered to the streams in all cases.

1.1.6 Develop a long-term monitoring program to inventory sources and address acid mine drainage, heavy metals, and other pollutants delivered into streams, wetlands, ponds, springs, and groundwater associated with active, inactive, and orphaned mines. Existing programs need to be expanded and coordinated between responsible agencies and a comprehensive program adopted for each watershed area. Federal, State, county, Tribal, and individual citizens efforts should be coordinated so that duplication of effort is avoided. Monitoring results should be compiled in a commonly shared, geospatial database.

1.1.7 Clean up mine waste at active, inactive, and orphan sites. Control mining runoff from roads, dumps, processing facilities, and ponds by removing and stabilizing mine tailings and waste rock deposited in the stream channel and floodplains and restoring stream channel function. Implement remedial actions that are tied to monitoring plans implemented as a part of task 1.1.7. Continue existing cleanup programs. Other problem areas may exist in addition to the areas listed below, therefore recovery actions are not limited to these priority areas. Priority areas include the following:

Upper Salmon River Core Area: Upper Salmon River Headwaters, Yankee Fork, Slate Creek (Hoodo and Thompson

creek mines) and East Fork Salmon (Livingston Mine), Thompson Creek, Squaw Creek.

Lemhi River Core Area: Withington, Kirtly and Bohannon Creeks.

Pahsimeroi River Core Area: Patterson Creek (Historic Bluewing Mining District).

Middle Salmon-Panther Core Area: Blackbird Creek (Blackbird Mine), Napias (Bear Track Mine), Deer, Panther, and Big Deer Creeks.

Middle Fork Salmon Core Area: Bear Valley, Upper Monumental, Big, and Cabin creeks.

Middle Salmon River-Chamberlain Core Area: Warren, Falls, Lake, and Upper Crooked creeks.

South Fork Salmon River Core Area: East Fork South Fork Salmon River, and Sugar (Cinnibar Mine and Stibnite Mine), Meadow, and Blowout creeks.

Lower Salmon/Little Salmon Core Area: Upper Slate Creek and Mainstem Salmon River.

1.1.8 Continue to evaluate if a release of toxic material from the Thompson Mine tailings pond into the mainstem Salmon River and tributaries is possible. Continue existing studies by the Environmental Protection Agency to ensure that material from Thompson Creek Mine tailings ponds will not enter Thompson Creek or the Salmon River in the long-term or short-term in the event of a stochastic event. If an earthquake or watershed event

destabilizes the tailings pond dam, it would have catastrophic impact on bull trout in the Mainstem Salmon River corridor.

1.1.9 Assess and mitigate nonpoint thermal pollution. Assess and mitigate effects on bull trout from thermal increases (nonpoint sources) that negatively impact receiving waters and migratory corridors dowstream. Priority areas include the mainstem Salmon River from the headwaters to the North Fork, the Pahsimeroi and Lemhi rivers and their tributaries, and the Little Salmon River to its confluence with the Mainstem Salmon River.

1.1.10 Eliminate point and nonpoint source pollution from developed and dispersed recreation sites and the roads and trails that access these sites. Many problem areas in the mainstem rivers and areas adjacent to lakes have been addressed for anadromous fish and bull trout habitat concerns, however, problems may still exist. Priority areas include the Middle Fork Salmon River, mainstem Salmon River from the Sawtooth Valley to its confluence with the Snake River, Boulder Creek, and other sites. Dispersed and developed sites and their access roads/trails adjacent to spawning and early rearing streams need to be assessed for impacts, and projects implemented that remediate/improve water quality.

1.1.11 Minimize impacts from residential and summer home development in bull trout habitat. Private land development for recreational home and permanent residents is increasing in the Salmon River basin. Address impacts associated with this development including: chemical and nutrient pollutants, habitat degradation, direct habitat loss, and water diversions. Priority Areas are Stanley Basin, Secesh Meadows, mainstem Salmon River corridor from Alturas Lake to the North Fork, Warm Lake, Johnson Creek, Yellow Pine, Boulder Creek and Little Salmon River.

1.1.12 Evaluate water quality impacts and implement remediation in Williams Lake and its associated tributaries. Recommend remediation, implement remediation, and conduct effectiveness monitoring of projects. Examples of remediation that have been proposed include: reduce internally lake nutrient loading, reduce nutrient inputs into the lake, increase dissolved oxygen concentrations in the upper 20 meters of the lake to 6 milligrams/liter, prevent winter fish kills, decrease occurrence of blue-green algal blooms, protect riparian habitat concurrent with residential development and recreational use, lower mean phosphorus concentrations during summer in the epilimnion to below 20 ug/liter. A small, isolated local population of bull trout exists in this area.

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

1.2.1 Evaluate bull trout entrainment at water diversions. Where the entrainment status is unknown, conduct evaluations to identify if problems exist. Compile information in a database that is useable by all public and private parties. (Much of this work is already underway for anadromous fish.)

1.2.2 Eliminate bull trout loss (entrainment) at water diversions. Screen water diversions and irrigation ditches to reduce entrainment losses and/or eliminate unneeded diversions in streams listed in Appendix B and at newly identified sites (task 1.2.1). Evaluate the potential for voluntary and cooperative placement of fish screens. (Much of this work is already underway where anadromous fish and bull trout distribution overlap). Eliminate unauthorized/unpermitted fish losses and water diversions.

1.2.3 Inventory water diversions and other man-made instream structures and identify those indirectly or directly inhibiting fish passage. Identify barriers in all watersheds where bull trout currently exist and in watersheds that bull trout could potentially occupy. Indirect barriers render stream conditions unsuitable for passage either by creating thermal barriers or other types of barriers at low flows. Passage at other barriers such as reservoirs/dams, small hydroelectric dams, mining stream alterations, fish acclimation facilities, and others should be evaluated. Compile data into a commonly shared, geospatial database. Areas to initially focus efforts include: the Lemhi River, Pahsimeroi River, Upper Salmon River and Middle Salmon River-Panther Creek core areas.

1.2.4 Provide fish passage at water diversion and other instream structures. Modify, consolidate or eliminate unneeded water diversions to reduce impediments to fish passage at sites identified in Appendix B and other sites identified during completion of task 1.2.3. Provide passage at other barriers such as reservoirs/dams, small hydroelectric dams, mining stream alterations, and fish acclimation facilities. Modify all structures to facilitate instream passage of all life stages of bull trout. Eliminate unauthorized/unpermitted bull trout losses due to instream structures. Begin immediate remediation in Geertson Creek in the Lemhi River Core Area where local biologists have concerns about bull trout in these local populations persisting.

1.2.5 Inventory culverts and identify those inhibiting fish passage. Identify culvert barriers in all watersheds where bull trout currently exist and in watersheds that are adjacent to occupied habitat. Include the inventory of culverts in areas that have been uninventoried for bull trout that may contain suitable habitat that is essential for the recovery of bull trout.

1.2.6 Eliminate culvert barriers. Design and construct new culverts or modify existing ones to allow passage of all life stages of bull trout. Bridges, or other appropriately designed structures are recommended at stream crossings in habitats which may be used by all life stages of bull trout.

1.2.7 Evaluate natural "semi-permanent" fish passage barriers and determine if removal may be needed, then implement if necessary. Natural dams, such as slides and debris piles, may be blocking the migration of bull trout into reaches of several streams. The removal of the barriers should be evaluated to determine the effects and to determine the potential to increase the amount of habitat accessible to bull trout. The effects of removing the barriers should include impacts to all native aquatic biota.

1.2.8 Monitor actions to restore connectivity of streams. Utilize established protocols or develop new ones that can be used by Federal, State, and private entities to evaluate the success of actions taken to restore stream connectivity. Develop a common geospatial database that can be used by all agencies to access information.

1.2.9 Improve instream flows. Restore connectivity and opportunities for migration and other life history stages by securing or improving instream flows and/or acquiring water rights cooperatively from private landowners. Conduct instream flow assessment to determine the instream flow needs for bull trout.

1.2.10 Eliminate unauthorized/unpermitted bull trout losses due to instream structures and water diversions. Work with landowners or other parties to enter into agreements that would eliminate unpermitted fish loss with proactive measures.

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

1.3.1 Identify riparian areas where livestock grazing is impacting bull trout habitats. Identify problem areas cooperatively with land management agencies or private landowners. Existing evaluation techniques for riparian function such as "Proper Functioning Condition" assessments may need to be combined with instream evaluations and other riparian condition evaluations to identify problem areas in all core areas.

1.3.2 Implement actions necessary to accelerate recovery of riparian vegetation and streambanks and reduce negative effects from historic and current livestock grazing in identified problem areas. Implement management practices that contribute to native riparian vegetation integrity and increase streambank/channel stability throughout the Salmon River Recovery Unit. Core areas, areas with local populations, and streams or stream reaches where problems are known are listed below. Ideally, high/mid-seral stage riparian types should compromise greater than 80 percent of the riparian area. Improvements would be accomplished through changing stocking rates, season of use, grazing systems, grazing utilization standards and their application, and possible reductions in animal unit months. An animal unit month is a unit of measure for the amount of forage a cow and a calf consume in 1 month. (Many grazing modifications and improvements have already been made since the listing of anadromous fish species; however, stricter utilization standards and more intense monitoring is needed in problem areas for bull trout. For example, utilization standards for woody species may need to be modified so that recovery of woody vegetation and streambanks occurs at a higher rate than currently exists in some areas.) Modifications of grazing are needed for lands adjacent to perennial and intermittent streams

and in spring areas that may not currently have bull trout, but that influence watershed integrity and bull trout habitat in mainstem rivers and tributaries, especially in headwater streams. The areas in which remediation of grazing impacts are considered high priority are listed below. In *italics* below are those sixth field watersheds (with the creeks named below) where grazing was listed as the first cause of geomorphic change (IWWI 2001). Priority areas in regular type were found in other documents.

Upper Salmon River Core Area: East Fork Salmon (*Horse Basin, Road, Herd, Lake, McDonald/Pine, and East Pass creeks*), Morgan Creek (*Lower, West Fork, and Headwaters Morgan, and Van Horn creeks*), Squaw, Challis (*Eddy Basin, Darling, Ellis, and Garden creeks*), Grandview, (*Lime, Antelope Flat, Willow Creek Summit, and Lone Pine creeks*), and Slate Creek, headwaters of the Salmon River, Big Lake, Boulder, Squaw, and Valley creeks, (*many sixth field Hydrologic Units*).

Pahsimeroi River Core Area: Big Creek, Upper, Middle, and Lower Pahsimeroi River creeks (*most of the sixth field Hydrologic Units*). Upper Tater, Lawson, Falls, Sulphur, Upper Goldberg, Poison Springs, Burnt, Grouse, Meadow, Donkey, Rock, Mahogany, and Ditch creeks, Upper Pahsimeroi River headwaters and State land on Big Gulch.

Lemhi River Core Area: Hayden (*East Fork, Bear Valley*), *Little Eightmile, Canyon, Reservoir, Upper Texas, and Little Timber creeks*

Middle Salmon River-Chamberlain Core Area: None.

Middle Salmon - Panther Core Area: North Fork River, Red Rock (*Kirtley, Lower Carmen*), Twelve/Lake watershed (*Henry,*

Elk Bend subwatersheds), Hat Creek watershed (*Little, Lower and Upper Hat subwatersheds*), Napias (*Phelan*), Upper Panther watershed (Opal Creek downstream of Opal Lake, Cabin, Fourth of July, and Prophyry creeks and Ed's Meadow), Deep-Moyer watershed (Headwaters of Little Deep and Moyer creeks), Napias watershed (Phelan, Moccasin, and Upper Napias creeks, and Sawpit Meadows), *Sawpit, Warm Springs, Poison, McKim, and Cow watersheds*)

Middle Fork Salmon Core Area: Bear Valley Creek watershed (*Kelly-Thatcher, Cache, Upper Elk creeks*).

Lower Camus watershed (Silver, Furmare, Castle, and West Fork Camus creeks).

South Fork Salmon River Core Area: Upper Johnson Creek including headwaters.

Little-Lower Salmon River Core Area: Private lands along the Little Salmon River, tributary streams of the Little Salmon and Mainstem Salmon and the mainstem Little Salmon River upstream of the barrier at Stream kilometer 38.6 (Stream Mile 24).

1.3.3 Conduct implementation and effectiveness monitoring of livestock grazing impacts on federally-managed lands. Conduct site-specific monitoring that would differentiate the background baseline conditions from the habitat alteration resulting from grazing activities. This monitoring is to be conducted in conjunction with Interagency Implementation Team monitoring discussed below. This long-term monitoring should include gathering data on greenline, vegetation cross section, wood species presence and conditions, streambank stability, and/or photo points. Key areas chosen for monitoring should be

representative of what is happening on a larger scale as a result of land management activities. Annual reporting should disclose riparian conditions where livestock use has occurred and areas where grazing standards have not been met.

1.3.4. Revegetate denuded riparian areas. Restore native vegetation areas that have been denuded or where nonnative species dominate (*e.g.*, Kentucky bluegrass). Actions may include fencing of springs, seeps, and streams to exclude livestock, and planting woody shrubs. Areas should be prioritized with higher priority placed on areas with documented trampling, compaction, dredging or other habitat alteration.

1.3.5. Restore stream channels on private land and work with community groups/private citizens. Work with landowners to improve riparian habitat on private land through cooperative voluntary projects.

1.3.6. Improve instream habitat. Increase or improve instream habitat by restoring recruitment of large woody debris, pools, or other appropriate habitat, wherever the need is identified.

1.3.7 Minimize potential stream channel degradation from flood control actions. Ensure that, after a flood emergency, negative effects to bull trout from emergency flood control activities (*e.g.*, dredging, channel clearing, bank stabilization, bank barbs, and other structures or actions) are minimized. In addition, when planning proactive flood control actions such placement of dikes for other structures, include aquatic habitat needs in the project planning. Initial areas on which to focus include: the mainstem Salmon River, the Little-Lower Salmon River, the East Fork Salmon, and the South Fork Salmon River.

1.3.8. Maintain aquatic habitat conditions in current wilderness and roadless areas and/or areas with low road densities. Areas without roads or relatively low road densities typically have higher quality aquatic and riparian habitats than other areas. Existing high quality conditions of aquatic habitats should be maintained to benefit bull trout. Priority areas include, currently designated wilderness or roadless areas and roadless areas identified during land management planning.

1.3.9. Reduce campsite and other recreation impacts. Riparian vegetation should be restored by altering recreational activities in sites used for dispersed camping, boating/fishing access, developed campsites, summer home development, outfitter and guide facilities/camps, recreational suction dredging, and other activities. Encourage intense recreational use away from water bodies with bull trout while taking into account traditional uses of recreation sites by interested public. Revegetate sites with trampling damage. Work with community groups to recruit volunteers to help with habitat improvement projects.

1.3.10 Compensate for transportation corridor encroachment on streams. Avoid highway channel straightening, channel relocation, undersized bridges and railroad encroachment in stream channels for proposed highway projects. Final project designs will incorporate river morphology and river flow dynamics concepts and U.S. Fish and Wildlife Service assessment of fish habitat needs. Incorporation of innovative project design that allows for minimum floodplain and riparian habitat loss for streams adjacent to road construction projects. For example, avoid highway turnouts in areas that are needed for floodplain expansion of adjacent or tributary streams. When highway/railway improvement projects are planned where historical stream encroachments occurred, aim to mitigate for past impacts to streams. Initial areas to focus efforts include, the

Mainstem Salmon River corridor from Alturas Lake Creek to the North Fork (Highway 93), the Mainstem Salmon River downstream of Riggins (Highway 95), and along the Little Salmon River (Highway 95), and roads along Warren Creek, Pine and Indian creek.

1.3.11 Restore streams that are partially or completely dewatered. Streams identified in Appendix B and those identified in tasks above should be restored by working cooperatively with landowners and agencies. This task is meant to reduce significant threats from agriculture and fragmentation of bull trout habitat. This task is related to tasks 1.2.2, 1.2.3, 1.2.4, 1.2.9, 1.3.5, 1.3.6, and 6.6.4 above. This task is one of the most important issues for bull trout recovery in the Upper Salmon River, Lemhi River, Pahsimeroi River Middle Salmon River-Panther, and Little-Lower Salmon River core areas.

1.3.12 Prepare a management plan for the maintenance and reconstruction of Highway 95 for the Little Salmon, River kilometer 38.6 (River Mile 24) and mainstem Salmon River downstream to Whitebird. Include action plans that would address how to deal with landslides, floods, debris torrents, and other watershed events. Assure that actions to reconstruct or maintain the highway are compatible with and promote bull trout recovery. Designate disposal and quarry sites in advance of watershed events and protect/enhance riparian vegetation in the corridor.

1.3.13 Conduct watershed assessments in areas without completed assessments in the Salmon River Recovery Unit. The analysis should be conducted according to "Ecosystem Analysis at the Watershed Scale," (USFS, BLM, NPS, NMFS, EPA 1995). In general, a watershed assessment is not project-driven but undertaken to generate an information base and

recommendations for use in project planning. The recommendations of the watershed assessment are to be incorporated in project planning. Priority is to be placed on implementing actions that are targeted specifically for restoration of stream system functions.

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

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

1.5.1 Evaluate effects of wildfires and wildfire suppression on streams and restore where necessary. Look at impacts for the use of fire retardant, fire line construction, water withdrawal and other fire suppression efforts have on bull trout population. Mitigate for impacts where possible. Continue existing monitoring in the Middle Fork Salmon River and other areas. Focus upland and stream restoration where isolated bull trout populations are impacted by wildfire (*e.g.*, Germania Creek).

1.5.2 Restore upland vegetation in high livestock use areas. Target dry shrub plant communities that were impacted by current and historical grazing practices. Ensure that grazing practices implemented to improve riparian conditions allow for restoration of upland plant communities and soils.

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

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

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

2.2.1 Investigate the existence of brook trout or lake trout in ponds on private land. Work with Idaho Department of Fish and Game and private landowners to inventory their lands.

2.2.2 Prevent dispersal of nonnative fish species that compete with bull trout on private lands. If brook trout or other nonnative species are found, work with landowners to eliminate species to prevent them from becoming established elsewhere in the drainage.

2.2.3 Monitor any eradication activities. Monitoring would be conducted by established agency protocols, and the results of the monitoring would be compiled in a database that can be used by all entities.

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

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

2.4.1 Identify where bull trout and brook trout distribution overlap in all core areas. The first priority is to conduct investigations of local populations where brook trout presence is not listed in Appendix 1. The second priority is to inventory areas outside local populations or within potential local populations. Identify factors such as habitat quality that may be giving brook trout a competitive advantage over bull trout.

2.4.2 Evaluate bull trout and lake trout life history/populations in Warm Lake and Riordan Lake. These isolated bull trout populations may be impacted by the presence of lake trout.

2.4.3 Evaluate bull trout and introduced rainbow trout interactions in Williams Lake in the Lake Creek Core Area. Assess the status of the local population of bull trout and determine whether current and past fisheries management programs are impacting bull trout populations. Design fisheries management programs and research to benefit bull trout populations in this core area.

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

2.5.1 Reduce competition with brook trout where they are known to overlap with bull trout and there is a known species interaction that is adversely affecting bull trout in areas identified in 2.4.1. Evaluate opportunities for selectively or otherwise removing brook trout (*e g*, through liberalized angling and electrofishing) where a problem with competition with bull trout has been identified. Eradicate brook trout in selected areas identified in 2.4.1 (*e g*., Pahsimeroi River Core Area: Big Creek and Upper Pahsimeroi River).

2.5.2 Prevent brook trout from entering areas currently unoccupied by brook trout and bull trout, wherever possible. Evaluate the potential of liberalized brook trout harvest and eradication projects throughout the Salmon River Recovery Unit. Work with Idaho Department of Fish and Game to develop and implement programs.

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

2.6.1 Continue to monitor for brook trout expansion. Monitor sites upstream and downstream of the current limit of brook trout distribution. Monitor eradication or other activities to reduce competition between bull trout and brook trout.

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

3.1 Develop or update and implement State and Tribal native fish management plans integrating adaptive research.

3.1.1 Develop a comprehensive fishery management plan for the Salmon River Recovery Unit that incorporates bull trout recovery considerations. This may be accomplished by expanding existing individual fisheries management plans prepared for anadromous fish by Idaho Department of Fish and Game in the Salmon River in cooperation with the Bonneville Power Administration.

3.1.2 Incorporate bull trout recovery needs into existing and future Tribal fisheries plans. Include the Shoshone Bannock, Nez Perce and other Native American Tribes with trust responsibilities in planning and implementation efforts for the Salmon River Recovery Unit.

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

3.2.1 Evaluate the effects of fishing (*e.g.*, illegal harvest and hooking mortality) on bull trout in all core areas. Fishing may be negatively affecting bull trout through such factors as fish misidentification, mishandling, and noncompliance with regulations. Efforts should focus on areas in which mortality has been documented during the fishing seasons.

3.2.2 Continue providing information to the public about fishing regulations and bull trout identification. Expand the existing program to include the Salmon River basin. Display posters annually, particularly at angling access areas as is already being done on U.S. Forest Service managed lands. Produce information pamphlets and distribute using U.S. Forest Service, Idaho Department of Fish and Game, and Bureau of Land Management personnel and offices, local businesses, and tourism centers. Produce educational materials addressing fish identification and issues related to bull trout, and distribute to anglers.

3.2.3 Continue enforcement of current fishing regulations. Patrols should focus on identified staging (June to August) and wintering areas (November to March) for bull trout. Current fishing regulations prohibit the harvest of bull trout. However, incidental mortality of bull trout during the steelhead season in the Salmon River basin may be impacting fluvial bull trout that use large mainstem rivers during the winter and spring months.

3.2.4 Provide information to the public about fish ecology, fish management, and fish management issues. Current efforts to provide information to the public on bull trout and how bull trout are an important part of the aquatic ecosystem need additional effort. In areas with high recreation use opportunities exist to inform a broad spectrum of the public. In local communities education programs could be initiated in public schools and within the adult community.

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

3.3.1 Review anadromous fish stocking programs. Conduct investigations to determine where anadromous fish stocking programs are directly benefitting bull trout. Review annual fish stocking programs to assure those programs for anadromous fish described in the Salmon Subbasin Summary (Servheen 2001) (http://www/cbfwf.org/files/province/mtnsnake/salmon/salmon.htm pages 74 to 80, 83, 85, 90 and Appendix J) are not contributing fish diseases, introduction of exotic invertebrates or other problems that interfere with bull trout recovery. Develop research programs to address possible impacts/benefits to bull trout populations that overlap with existing anadromous hatchery programs. Provide summary reports that are easily accessible to all interested agencies and individuals. Assure that impacts to bull trout from fish propagation facilities are fully compensated for (*e.g.*, Stolle Meadows).

3.3.2 Investigate compliance with fishing regulations during the steelhead fishing season. Initiate new studies to document compliance with fishing regulations, especially during the fall, winter, and spring steelhead fishing seasons along the mainstem Salmon and Little Salmon rivers and their tributaries.

3.3.3 Investigate effects of resident fish stocking on bull trout, and implement actions to reduce adverse effects, if appropriate. Conduct research studies in areas with high resident fish stocking rates. For example, investigate the impacts of the Williams Lake fish stocking programs on the isolated adfluvial bull trout population in that drainage.

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

3.4.1 Investigate compliance with fishing regulations during the summer general fishing season. Continue existing studies concerning bull

trout identification during summer months currently conducted by Idaho Department of Fish and Game. Initiate new studies as needed.

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

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

4.1.1 Collect samples for genetic analysis to contribute to establishing a program to understand the genetic baseline and monitor genetic changes throughout the range of bull trout (see Chapter 1). This analysis is needed throughout the range of the Salmon River Recovery Unit.

4.1.2 Manage local populations (number and life form) to maintain long-term viability. This task relates to all of the tasks and threats in this recovery plan. Agencies and individuals should ensure that management practices and polices allow for the long-term viability of unique characteristics of bull trout local populations.

4.1.3 Investigate the genetic composition of isolated bull trout populations in Opal and Williams lakes. These isolated bull trout populations may contain unique genetic compositions that would be needed for the long-term viability of bull trout in the Salmon River Recovery Unit. Their genetic structure and content should be compared to genetic data obtained by studies carried out under task 4.1.1 above.

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

4.2.1 During project planning, ensure new projects provide for connectivity within the Salmon River Recovery Unit. Work with Federal and State agencies on proactive measures to ensure that no new projects will disconnect streams that are currently linked with other bull trout individuals or local populations.

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

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

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

5.1.1 Monitor and assess the biological responses to and changes in habitat from implementation of recovery tasks. Continue to conduct implementation and effectiveness monitoring prescribed by the Interagency Implementation Team and other rangewide and local monitoring throughout the Salmon River Recovery Unit.

5.1.2 Develop a map-based process to track recovery efforts and bull trout distribution and abundance in the Salmon River Recovery Unit. Develop the process and database and store information in a commonly shared database such as that managed by the Idaho Department of Fish and Game, Conservation Data Center. This database would require rigorous quality assurance/quality control protocols. This process has not yet been completed for the Salmon River Recovery Unit.

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

5.2.1 Determine distribution and abundance of, and habitat used by fluvial bull trout in the Salmon River Recovery Unit. Little information is available on fluvial bull trout movement in this recovery unit. Determine how far fluvial bull trout travel from spawning areas to wintering rearing areas within mainstem rivers. Track distances traveled during wintering and rearing in mainstem rivers. Conduct studies similar to those completed in the Rapid River and the East Fork of the South Fork Salmon River by Dave Hogan, Idaho Department of Fish and Game, Forest Service and University of Idaho (Hogen 2001). Studies have been proposed by Idaho Department of Fish and Game in the upper portion of the Salmon River basin that would partially accomplish this task. The lower portion of the basin is also in need of additional studies in addition to the work in Rapid River.

5.2.2 Map bull trout spawning habitat in all core areas within the Salmon River Recovery Unit. Develop a comprehensive map of primary bull trout spawning and rearing reaches for focusing habitat protection and recovery efforts.

5.2.3 Continue the implementation of existing bull trout population abundance studies. Conduct bull trout population abundance studies to accumulate successive years of data. Existing research may include: Rocky Mountain Research Station (Rapid River and John Day Creek), U.S. Forest Service (North Fork, Yankee Fork, and Cobalt Ranger districts). Continue to conduct general fish habitat assessment and monitoring as described on pages 160 to 173 of the Salmon Subbasin Summary (Servheen 2001).

5.2.4 Conduct presence/absence surveys in previously uninventoried areas, especially in wilderness areas in the Salmon River Recovery Unit. Areas of the Salmon River basin, particularly wilderness areas, have not yet been inventoried. Priority areas to survey include the headwater areas of the Sawtooth Wilderness, Frank

Church River of No Return Wilderness, Gospel Hump Wilderness, and priority areas designated by local biologists (*e.g.*, Idaho Department of Fish and Game, U.S. Forest Service and Bureau of Land Management biologists). Utilize a survey protocol that can assign confidence limits to survey results, such as the bull trout protocol developed by the American Fisheries Society, Western Division. Balance the need to have statistically significant survey results with the difficulty of accessing remote areas for the surveys.

5.2.5 Identify suitable unoccupied habitat in the Salmon River Recovery Unit. Identify streams that could support bull trout if threats were addressed.

5.2.6 Devise and implement a monitoring strategy to track abundance, distribution, and trends of bull trout in the Salmon River Recovery Unit. This is a key task to achieving recovery in the Salmon River Recovery Unit. The wilderness areas that may contain large populations of bull trout have few abundance studies. A systematic monitoring strategy to track recovery criteria 1, 2, and 3 is lacking in this recovery unit. Devise a strategy with guidance from this recovery plan and the overall recovery team (monitoring protocol team) that meets the logistical needs of conducting field work on streams in this large, mountainous area with terrain that is often difficult to access. Inventory work should be conducted in a coordinated manner across administrative units and should be coordinated among agencies.

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

5.3.1 Evaluate the effectiveness of habitat management practices on State and private lands. Evaluate effectiveness of State Best

Management Practices/guidance in areas with State and private lands. The highest priority areas are the Lemhi, Pahsimeroi and Little Salmon /Lower Salmon core areas. Provide a forum to exchange information with other State, Federal, and local agencies and landowners.

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

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

5.5.1 Continue to evaluate mountain lakes to identify potential bull trout habitat and distribution of fish stocked in lakes. Work with public agencies to inventory high mountain lakes in wilderness and nonwilderness areas. Share data collected during present and past surveys. The highest priority would be those areas planted in the early 1990's in the Little-Lower Salmon River core areas by Idaho Department of Fish and Game.

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

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

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

6.1.1 Coordinate bull trout recovery with listed anadromous fish species recovery in the Salmon River Recovery Unit. The Upper and Lower Salmon river recovery unit teams will coordinate the implementation of bull trout recovery actions with salmon and

steelhead measures to avoid duplication and maximize the use of available resources.

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

6.2.1 Ensure adequate temperature protection for bull trout at all life stages under Idaho Water Quality Standards. The completion of regional temperature criteria would allow for an implementation schedule for the time of year the standards are applied, and ensure adequate protection for all bull trout life stages.

6.3 Evaluate enforcement of existing Federal, State, and Tribal habitat protection standards and regulations and evaluate their effectiveness for bull trout conservation.

6.3.1 Avoid adverse effects to spawning and early rearing bull trout from suction dredging. Work with the Idaho Department of Water Resources to evaluate enforcement of the stream channel protection program when issuance of stream channel alteration permits involve suction dredging. Work with the State on protective regulations for suction dredging especially in bull trout spawning and early rearing habitat. Ensure the channel integrity and other essential habitat is protected.

6.3.2 Evaluate compliance with current large scale and small scale mining regulations. Evaluate compliance with mining regulations and evaluate the effectiveness of existing mining regulations in protecting bull trout habitats and modify them to improve effectiveness as necessary.

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

7.1 Convene annual meetings of each recovery unit team to review progress on recovery plan implementation.

7.2 Assess effectiveness of recovery efforts.

7.3 Revise scope of recovery as suggested by new information.

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

IMPLEMENTATION SCHEDULE

The implementation schedule that follows describes recovery task priorities, task numbers, task descriptions, duration of tasks, potential or participating responsible parties, total cost estimate and estimates for the next 5 years, if available, and comments. These tasks, when accomplished, will lead to recovery of bull trout in the Salmon River Recovery Unit.

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

Following are definitions to column headings in the Implementation Schedule:

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

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

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

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

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

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

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

Federal Agencies:

BLM	Bureau of Land Management
BOR	Bureau of Reclamation
BPA	Bonneville Power Administration
COE	Corps of Engineers
EPA	Environmental Protection Agency
FERC	Federal Energy regulatory Commission
FHWA	U.S. Department of Transportation, Federal Highway Administration
FSA	U.S. Department of Agriculture, Farm Services Administration
NMFS	National Marine Fisheries Service
NRCS	Natural Resources Conservation Service
USFWS	U.S. Fish and Wildlife Service
USFS	U.S. Forest Service

State Agencies:

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

OSC	Office of Species Conservation

Tribes:

NPT	Nez Perce Tribe
SBT	Shoshone Bannock Tribe

Others:

Counties **SWD**	County Soil and Water Conservation districts
LSRCP	Lower Snake River Compensation Plan
MCOs	mining companies
PVI	Private industry advocacy groups
USBWP	Upper Salmon Basin Watershed Project

Lead agencies are indicated in bold type. Additional identified agencies or parties are considered cooperators in conservation efforts.

Cost Estimates: Cost estimates are rough estimates and are only provided for general guidance. Total costs are estimated for both the duration of the task and also itemized annually for the next 5 years.

Many of the tasks necessary for bull trout recovery are related to restoration of the watershed(s), and as such are currently being implemented to some degree through existing programs and mandates. These tasks are designated in the "comments" column as "ongoing." However, current implementation is typically being carried out at limited funding levels and/or in only a portion of the watershed, and will need to be expanded to result in measurable gains toward the bull trout recovery goal and objectives. Most of these restoration tasks are strongly interrelated, and separate cost estimates in the accompanying implementation schedule represent rough approximation.

Total estimated cost of bull trout recovery in this large and complex recovery unit is estimated at about $60 million over a 25-year recovery timeframe, or about $2 million per year. If the time-frame for recovery can be reduced, lower estimated total costs would occur. Total costs include all funds expended, both private and public, and incorporate estimates of expenditures by local and State governments as well as Federal and private funds. Successful recovery of bull trout in the Salmon River Recovery Unit will represent in large measure the restoration of coldwater salmonid habitat in most of central Idaho and will tie closely to existing programs for restoration of anadromous fish.

Implementation Schedule for the Salmon River Recovery Unit Chapter of the Draft Bull Trout Recovery Plan											
Priority number	Task number	Task description	Task duration (years)	Responsible parties	Cost estimates ($1,000)**						Comments
					Total cost	Year 1	Year 2	Year 3	Year 4	Year 5	
1	1.1.1	Assess roads and identify problem roads	5	**USFS, BLM, ITD,** FHWA, COE, IDL, COUNTIES	250	50	50	50	50	50	Ongoing
1	1.1.2	Reduce general sediment production	25	**USFS, BLM, ITD,** FHWA, COE, IDL, COUNTIES	0						Ongoing admin. costs
1	1.1.6	Develop a long-term monitoring program to address acid mine drainage, heavy metals, and other pollutants delivered into streams, wetlands, ponds, springs and groundwater associated with active, inactive and orphaned mines	3	**EPA,** BLM, USFWS, DEQ, IDL, MCOs	150	50	50	50			Ongoing

Implementation Schedule for the Salmon River Recovery Unit Chapter of the Draft Bull Trout Recovery Plan											
Priority number	Task number	Task description	Task duration (years)	Responsible parties	Cost estimates ($1,000)**						Comments
					Total cost	Year 1	Year 2	Year 3	Year 4	Year 5	
1	1.1.7	Clean up mine waste at active, inactive, and orphan sites	25	**EPA,** BLM, USFWS, DEQ, IDL, MCOs	0						Ongoing admin. costs
1	1.1.12	Evaluate water quality issues and implement remediation in Williams Lake and its associated tributaries	25	**DEQ** , EPA **USFS**	500	20	20	20	20	20	Ongoing
1	1.2.1	Evaluate bull trout entrainment at water diversions	5	**BOR, IDFG,** USFS, BLM, NRCS, USFWS, FERC	250	50	50	50	50	50	Ongoing

Implementation Schedule for the Salmon River Recovery Unit Chapter of the Draft Bull Trout Recovery Plan											
Priority number	Task number	Task description	Task duration (years)	Responsible parties	Cost estimates ($1,000)**						Comments
					Total cost	Year 1	Year 2	Year 3	Year 4	Year 5	
1	1.2.2	Eliminate bull trout entrainment at water diversions	10	**BOR, IDFG,** USFS, BLM, NRCS, IDWR, FERC, NPT SBT, USFWS	5,000	500	500	500	500	500	Ongoing, Screening is part of Idaho State Law
1	1.2.3	Inventory water diversions and other manmade instream structures identify those indirectly or directly inhibiting fish passage	5	**BOR,** USFS, BLM, IDFG, USFWS, SBT, NPT	1,000	200	200	200	200	200	Estimate, Ongoing

Implementation Schedule for the Salmon River Recovery Unit Chapter of the Draft Bull Trout Recovery Plan											
Priority number	Task number	Task description	Task duration (years)	Responsible parties	Cost estimates ($1,000)**						Comments
					Total cost	Year 1	Year 2	Year 3	Year 4	Year 5	
1	1.2.4	Provide fish passage around diversions and other instream manmade structures	25	USFS, **IDFG,** BLM, BOR, NRCS, BPA, IDWR, USFWS, SBT, NPT, FERC	12,500	500	500	500	500	500	Ongoing, Related to task 1.2.9, 1.2.10
1	1.2.5	Inventory culverts and identify those inhibiting fish passage	5	**USFS, BLM, ITD,** FHWA, IDFG,	250	50	50	50	10	10	Ongoing
1	1.2.6	Eliminate culvert barriers	25	**USFS, BLM, ITD, FHWA**	0						Ongoing admin. costs
1	1.2.8	Monitor actions to restore connectivity of streams	25	**IDWR, IDFG,** USFS, NRCS, BOR, BLM, SBT, NPT	1,250	50	50	50	50	50	Ongoing

Implementation Schedule for the Salmon River Recovery Unit Chapter of the Draft Bull Trout Recovery Plan											
Priority number	Task number	Task description	Task duration (years)	Responsible parties	Cost estimates ($1,000)**						Comments
					Total cost	Year 1	Year 2	Year 3	Year 4	Year 5	
1	1.2.9	Improve instream flows	25	**IDWR** USFS, NRCS, BOR, BLM, IDFG, USFWS, SBT, NPT	5,000	200	200	200	200	200	Ongoing, related to task 1.2.4
1	1.2.10	Eliminate unauthorized unpermitted bull trout losses due to instream structures and water diversions	25	**USFWS**, IDFG, IDWR, OSC, NRCS, BOR	250	50	50	50	50	50	Related to task 1.2.2, 1.2.4, 1.2.9
1	1.3.1	Identify riparian areas where livestock grazing is impacting bull trout habitats	5	**USFS, BLM,** IDL, NRCS, DEQ	100	20	20	20	20	20	Ongoing

Implementation Schedule for the Salmon River Recovery Unit Chapter of the Draft Bull Trout Recovery Plan											
Priority number	Task number	Task description	Task duration (years)	Responsible parties	Cost estimates ($1,000)**						Comments
					Total cost	Year 1	Year 2	Year 3	Year 4	Year 5	
1	1.3.2	Implement actions necessary to accelerate recovery of riparian vegetation and streambanks and reduce negative effects from grazing in identified problem areas	25	**USFS, BLM,** IDL, IDFG, DEQ NRCS	0						Ongoing admin. costs
1	1.3.11	Restore streams that are partially or completely dewatered	25	**NRCS, IDL,** USFWS, IDFG, COUNTIES	400	16	16	16	16	16	Related to task 1.2.10
1	2.4.1	Identify where bull trout and brook trout distribution overlap in all core areas	5	**IDFG,** USFS, BLM, USFWS	500	50	50	50	50	50	Ongoing

Implementation Schedule for the Salmon River Recovery Unit Chapter of the Draft Bull Trout Recovery Plan											
Priority number	Task number	Task description	Task duration (years)	Responsible parties	Cost estimates ($1,000)**						Comments
					Total cost	Year 1	Year 2	Year 3	Year 4	Year 5	
1	2.5.1	Reduce competition with brook trout where they are known to overlap with bull trout and there is a known species interaction that is adversely affecting bull trout in areas identified in 2.4.1	25	**IDFG,** USFS, BLM, USFWS	250	20	20	20	20	20	Ongoing
1	2.5.2	Prevent brook trout from entering areas currently unoccupied by brook trout and bull trout, wherever possible	25	**IDFG**	0						Areas unknown
2	1.1.3	Continue to conduct implementation and effectiveness monitoring of projects designed to reduce sediment delivery to streams	25	**USFS, BLM, ITD,** FHWA, COE, IDL, COUNTIES	0						Ongoing admin. costs

Implementation Schedule for the Salmon River Recovery Unit Chapter of the Draft Bull Trout Recovery Plan											
Priority number	Task number	Task description	Task duration (years)	Responsible parties	Cost estimates ($1,000)**						Comments
					Total cost	Year 1	Year 2	Year 3	Year 4	Year 5	
2	1.1.4	Increase use of State Best Management Practices and rules guiding land management on State and private lands	25	**IDL,** USFWS, IDFG, DEQ, OSC	250	50	50	50	50	50	Ongoing
2	1.1.5	Review Best Management Practices/laws/rules/ standards for land management practices when those practices provide inadequate to protection to bull trout on State and private lands	5	**IDL,** USFWS, IDFG, DEQ,, OSC	200	40	40	40	40	40	Ongoing

Implementation Schedule for the Salmon River Recovery Unit Chapter of the Draft Bull Trout Recovery Plan											
Priority number	Task number	Task description	Task duration (years)	Responsible parties	Cost estimates ($1,000)**						Comments
					Total cost	Year 1	Year 2	Year 3	Year 4	Year 5	
2	1.1.8	Continue to conduct evaluations to determine if a release of toxic material from the Thompson Mine tailings pond into the mainstem Salmon River and tributaries is possible	25	**EPA**, USFS, BLM, DEQ, USGS, IDL, MCOs	125	5	5	5	5	5	Ongoing
2	1.1.9	Assess and mitigate nonpoint thermal pollution	25	**USFS,** BLM, IDFG, DEQ, IDWR, EPA, NRCS	0						CWA required costs
2	1.2.7	Evaluate natural "semi-permanent" fish passage barriers and determine if removal may be needed, then implement if necessary	5	**USFS, BLM,** IDFG, **ITD/FHWA**	50	10	10	10	10	10	Ongoing

Implementation Schedule for the Salmon River Recovery Unit Chapter of the Draft Bull Trout Recovery Plan											
Priority number	Task number	Task description	Task duration (years)	Responsible parties	Cost estimates ($1,000)**						Comments
					Total cost	Year 1	Year 2	Year 3	Year 4	Year 5	
2	1.3.3	Conduct implementation and effectiveness monitoring of livestock grazing impacts on Federal managed lands	25	**USFS, BLM**	0						Ongoing admin. costs
2	1.3.4	Revegetate denuded riparian areas	25	**USFS, BLM,** USFWS, IDFG, **NRCS,** NPT, USBWP, Counties, SWD	12,500	500	500	500	500	500	Ongoing
2	1.3.5	Restore stream channels on private land and work with community groups/private citizens	25	**IDFG** USFWS, **NRCS, OSC,** USBWP, COUNTIES, ISCC, LCSWCD	5,000	200	200	200	200	200	Ongoing

Implementation Schedule for the Salmon River Recovery Unit Chapter of the Draft Bull Trout Recovery Plan											
Priority number	Task number	Task description	Task duration (years)	Responsible parties	Cost estimates ($1,000)**						Comments
					Total cost	Year 1	Year 2	Year 3	Year 4	Year 5	
2	1.3.6	Improve instream habitat	25	**USFS, BLM, IDFG,** NRCS, DEQ, USBWP, Counties SWD, IDWR, USFWS	5,000	200	200	200	200	200	Ongoing
2	1.3.7	Minimize potential stream channel degradation from flood control actions	25	USFS, **IDWR, COE,** BLM, NRCS,	125	5	5	5	5	5	Costs are excluded for emergency flood actions because costs are unpredict-able. Proactive cost are ongoing.

Implementation Schedule for the Salmon River Recovery Unit Chapter of the Draft Bull Trout Recovery Plan											
Priority number	Task number	Task description	Task duration (years)	Responsible parties	Cost estimates ($1,000)**						Comments
					Total cost	Year 1	Year 2	Year 3	Year 4	Year 5	
2	1.3.8	Maintain aquatic habitat conditions in current wilderness and roadless areas and/or areas with low road densities	25	**USFS, BLM**	0						Ongoing admin. costs
2	1.3.9	Reduce campsite and other recreation impacts	25	**USFS, BLM,** IDFG, COUNTIES	0						Ongoing admin. costs
2	1.3.10	Compensate for transportation corridor encroachment on streams	25	**ITD, FHWA**	125	50	50	50	50	50	Ongoing admin. costs
2	1.3.12	Prepare a management plan for the maintenance and reconstruction of Highway 95 adjacent to the Little Salmon River	10	ITD, COE	100	10	10	10	10	10	Ongoing

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Priority number	Task number	Task description	Task duration (years)	Responsible parties	Cost estimates ($1,000)**						Comments
					Total cost	Year 1	Year 2	Year 3	Year 4	Year 5	
2	1.3.13	Conduct watershed assessments in areas where this has not yet been completed in the Salmon River Recovery Unit	25	**USFS, BLM**	0						Ongoing admin. costs
2	2.4.2	Evaluate bull trout and lake trout life history/populations in Warm Lake and Riorden Lake	5	**IDFG**, USFS	25	5	5	5	5	5	Ongoing
2	2.4.3	Evaluate bull trout and introduced rainbow trout interactions in Williams Lake in the Lake Creek Core Area	5	**IDFG**	25	5	5	5	5	5	Ongoing
2	2.6.1	Continue to monitor for brook trout expansion.	25	USFS, BLM, **IDFG**	100	4	4	4	4	4	Ongoing

Implementation Schedule for the Salmon River Recovery Unit Chapter of the Draft Bull Trout Recovery Plan											
Priority number	Task number	Task description	Task duration (years)	Responsible parties	Cost estimates ($1,000)**						Comments
					Total cost	Year 1	Year 2	Year 3	Year 4	Year 5	
2	3.3.1	Review anadromous fish stocking programs	25	**USFWS, IDFG,** (LSRCP), BPA, NPT, SBT	125	5	5	5	5	5	Ongoing
2	4.1.2	Manage local populations (number and life form) to maintain long-term viability	25	**IDFG,** USFS, BLM, IDL	0						Ongoing admin. costs
2	4.1.3	Investigate the genetic composition of isolated bull trout populations in Opal and Williams lakes	5	**IDFG**	25	5	5	5	5	5	Ongoing
2	4.2.1	During project planning, ensure new projects provide for connectivity within the Salmon River Recovery Unit.	25	**USFS, BLM,** IDFG, DEQ, IDWR, COE **ITD/FHWA**	0						Ongoing admin. costs

Implementation Schedule for the Salmon River Recovery Unit Chapter of the Draft Bull Trout Recovery Plan											
Priority number	Task number	Task description	Task duration (years)	Responsible parties	Cost estimates ($1,000)**						Comments
					Total cost	Year 1	Year 2	Year 3	Year 4	Year 5	
2	5.1.1	Monitor and assess the biological responses and changes in habitat from implementation of to recovery tasks	25	**USFWS**, USFS, BLM, IDFG, DEQ	250	10	10	10	10	10	
2	5.1.2	Develop a map-based process to track recovery efforts and bull trout distribution and abundance in the Salmon River Recovery Unit	25	**USFS, IDFG**, BLM, USFWS	250	50	50	50	50	50	
2	5.2.1	Determine abundance of and habitat use by fluvial trout and habitats used in the Salmon River Recovery Unit	10	**IDFG**, USFS, BLM, IDL, USFWS	500	50	50	50	50	50	Ongoing
2	5.2.2	Map bull trout spawning habitat	10	**USFWS**, USFS, BLM, IDFG, DEQ	200	20	20	20	20	20	Ongoing

Implementation Schedule for the Salmon River Recovery Unit Chapter of the Draft Bull Trout Recovery Plan											
Priority number	Task number	Task description	Task duration (years)	Responsible parties	Cost estimates ($1,000)**						Comments
					Total cost	Year 1	Year 2	Year 3	Year 4	Year 5	
2	5.2.3	Continue the implementation of existing bull trout population abundance studies	25	**IDFG**, USFS	500	20	20	20	20	20	Ongoing admin. costs
2	5.2.4	Conduct presence/absence surveys in previously uninventoried areas especially in wilderness areas in the Salmon River Recovery Unit	5	**USFS, BLM,** IDFG, USFWS	1,000	200	200	200	200	200	Ongoing. Additional funding is needed for this task as that is not project driven
2	5.2.6	Devise and implement a monitoring strategy to track abundance, distribution, and trend of bull trout in the Salmon River Recovery Unit	25	**IDFG, USFWS,** USFS, BLM IDEQ	1,900	100	75	75	75	75	

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Priority number	Task number	Task description	Task duration (years)	Responsible parties	Cost estimates ($1,000)**						Comments
					Total cost	Year 1	Year 2	Year 3	Year 4	Year 5	
2	5.3.1	Evaluate the effectiveness of habitat management practices on State and private lands	25	**IDL** USFWS, IDFG, DEQ,, OSC	0						Ongoing admin. costs
2	6.2.1	Ensure adequate temperature protection for bull trout at all life stages under the Idaho Water Quality Standards	25	**EPA, DEQ,** COE, USFS, BLM, IDFG, USFWS	0						CWA required costs
2	6.3.1	Avoid adverse effects to spawning and early rearing bull trout from suction dredging	25	**IDWR,** USFWS, IDL DEQ	500	20	20	20	20	20	Ongoing
2	6.3.2	Evaluate compliance with current large scale and small mining regulations	25	IDL	625	25	25	25	25	25	Ongoing

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Priority number	Task number	Task description	Task duration (years)	Responsible parties	Cost estimates ($1,000)**						Comments
					Total cost	Year 1	Year 2	Year 3	Year 4	Year 5	
3	1.1.10	Eliminate point and nonpoint source pollution from developed and dispersed recreation sites	10	**USFS**, BLM, IDFG, IDL	0						CWA required costs
3	1.1.11	Minimize residential and summer home development in bull trout habitat	25	**USFS**, BLM, IDL	0						Ongoing admin. costs
3	1.5.1	Monitor and mitigate wildfire suppression effects wildfire effects to bull trout habitat	25	**USFS**, BLM, IDL	500	20	20	20	20	20	Ongoing
3	1.5.2	Restore upland vegetation in high livestock use areas	25	**USFS**, **BLM**, IDL	0						Ongoing admin. costs
3	2.2.1	Investigate the existence of brook trout or lake trout in ponds on private land	25	**IDFG**	0						Ongoing admin. costs

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Priority number	Task number	Task description	Task duration (years)	Responsible parties	Cost estimates ($1,000)**						Comments
					Total cost	Year 1	Year 2	Year 3	Year 4	Year 5	
3	2.2.2	Prevent dispersal of nonnative fish species that compete with bull trout on private lands	25	**IDFG**	0						Ongoing admin. costs
3	2.2.3	Monitor any eradication activities on private land	25	**IDFG**	0						Ongoing admin. costs
3	3.1.1	Develop comprehensive fishery management plan for the Salmon River Recovery Unit that incorporates bull trout recovery	25	**IDFG**, NMFS, USFWS	125	5	5	5	5	5	Ongoing
3	3.1.2	Incorporate bull trout recovery needs into existing and future Tribal fisheries plans	25	**NPT, SBT**	0						Ongoing admin. costs
3	3.2.1	Evaluate the effects of fishing (*e.g.*, illegal harvest and hooking mortality on bull trout).	15	IDFG	150	10	10	10	10	10	Ongoing

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Priority number	Task number	Task description	Task duration (years)	Responsible parties	Cost estimates ($1,000)**						Comments
					Total cost	Year 1	Year 2	Year 3	Year 4	Year 5	
3	3.2.2	Continue providing information to the public about fishing regulations and bull trout identification	25	**IDFG**, USFS, BLM	125	5	5	5	5	5	Ongoing
3	3.2.3	Continue enforcement of current fishing regulations	25	**IDFG**, SBT, NPT	500	20	20	20	20	20	Ongoing
3	3.2.4	Inform public about fish ecology, fish management, and fish management issues	25	**IDFG**, USFS, BLM	1250	50	50	50	50	50	Ongoing
3	3.3.2	Investigate compliance with fishing regulations during the steelhead fishing season	25	**IDFG**, USFWS (LSRCP), BPA, NPT, SBT	125	5	5	5	5	5	Ongoing
3	3.3.3	Investigate effects of resident fish stocking on bull trout and implement actions to reduce adverse effects, if appropriate	10	**IDFG**, SBT, NPT	50	5	5	5	5	5	Ongoing

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Priority number	Task number	Task description	Task duration (years)	Responsible parties	Cost estimates ($1,000)**						Comments
					Total cost	Year 1	Year 2	Year 3	Year 4	Year 5	
3	3.4.1	Investigate compliance with fishing regulations during the summer general fishing season	25	**IDFG**	0						Ongoing admin. costs
3	4.1.1	Collect samples for genetic analysis to contribute to establishing a program to understand the genetic baseline and monitor genetic changes throughout the range of bull trout	25	**IDFG, USFWS,** USFS, BLM,	125	5	5	5	5	5	Ongoing
3	5.2.5	Identify suitable unoccupied habitat in the Salmon River Recovery Unit	5	**USFS, BLM,** IDFG	50	10	10	10	10	10	Ongoing
3	5.5.1	Continue to evaluate mountain lakes to identify potential bull trout habitats and distribution of fish stocked in lakes	5	**IDFG,** USFS, BLM	50	10	10	10	10	10	Ongoing

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Priority number	Task number	Task description	Task duration (years)	Responsible parties	Cost estimates ($1,000)**						Comments
					Total cost	Year 1	Year 2	Year 3	Year 4	Year 5	
3	6.1.1	Coordinate bull trout recovery with listed anadromous fish species recovery in the Salmon River Recovery Unit	25	**NMFS, USFWS**	250	10	10	10	10	10	Ongoing admin. costs
3	7.3.1	Periodically review progress toward recovery goals and assess recovery task priorities	25	**USFWS,** USFS, BLM, NMFS, NRCS, IDFG, NPT, SBT, COUNTIES SWD	0						Conduct every 5 years

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Appendix A: Bull trout and brook trout distribution summary by core area and local population.

Core Area and Local Population (Local Population) name with bull trout	Creek name within the local population	Citation for information	Brook Trout Presence (Yes)
Upper Salmon River Core Area			
Mainstem Salmon River		USRIIAT 1998, IDFG 2002 from GPM, FIS_REF, USFWS *in litt.*,	Yes
Fourth of July Creek Local Population	Fourth of July Creek	USFWS *in litt*, 2000a, USFS 1998, IDFG 2002 from GPM and FIS_REF	Yes
Valley Creek Local Population	Valley Creek	USFS 1999a, USFWS, *in litt.*, 2002c IDFG 2002 from GPM, R7StreamDB, and FIS_REF	Yes
	Trap Creek	Molton, *in litt.*, 2002	
	Meadow Creek	USFWS, *in litt*, 2002c	
	East Fork Valley Creek	IDFG 2002 from R7StreamDB,	
	Crooked Creek	IDFG 2002 from FIS_REF	Yes
	Goat Creek	IDFG 2002 from FIS_REF	Yes
	Iron Creek	IDFG 2002 from FIS_REF	Yes
	Elk Creek	IDFG 2002 from R7StreamDB and FIS_REF	Yes
	Job Creek	USFWS, *in litt.*, 2002c	

Appendix A: Bull trout and brook trout distribution summary by core area and local population.

Core Area and Local Population (Local Population) name with bull trout	Creek name within the local population	Citation for information	Brook Trout Presence (Yes)
Yankee Fork Creek Local Population	Yankee Fork Creek	USRIIAT 1998 IDFG 2002 from R7StreamDB and FIS_REF, and FISCOLP	Yes
	West Fork Yankee Fork Creek	USRIIAT 1998	
	Cabin Creek	USFWS, *in litt.*, 2002c	
	Jordan Creek	IDFG 2002 from R7StreamDB and FISCOLP	
	Deadwood Creek	USFWS, *in litt.*, 2002c	
	Lightening Creek	USFWS, *in litt,*. 2002c	
	Fivemile Creek	IDFG 2002 from R7StreamDB	Yes
	Sixmile Creek	USFWS, *in litt.* 2002c	
	McKay Creek	IDFG 2002 from R7StreamDB and FIS_REF	
	Elevenmile Creek	IDFG 2002 from R7StreamDB	
	Eightmile Creek	IDFG 2002 from R7StreamDB	
	Ninemile Creek	IDFG 2002 from R7StreamDB	
	Tenmile Creek	IDFG 2002 from R7StreamDB	

Appendix A: Bull trout and brook trout distribution summary by core area and local population.

Core Area and Local Population (Local Population) name with bull trout	Creek name within the local population	Citation for information	Brook Trout Presence (Yes)
	Twelvemile Creek	IDFG 2002 from R7StreamDB	
Warm Springs Creek Local Population	Warm Springs	USFS 1998, USFWS, *in litt.*, 2000a	Yes
	Martin Creek	USFS 2002a	
	Pigtail Creek	USFS 2002a	
Basin Creek Local Population	Basin Creek and unnamed tributary	USFWS, *in litt.*, 2000a IDFG 2002 from R7StreamDB	Yes
	Short Creek	USFWS, *in litt.*, 2002c	
	Sunday Creek	USFS *in litt.*, 2001, IDFG 2002 from R7StreamDB	
	East Basin Creek	IDFG 2002 from R7StreamDB	
Redfish Lake Creek Local Population	Redfish and Little Redfish Lake	USFS 2001	Yes
	Redfish Lake Creek	IDFG 2002 from FIS_REF, GPM, and R7StreamDB	
	Fishhook Creek	USFS 1998, IDFG 2002 from FIS_REF	

Appendix A: Bull trout and brook trout distribution summary by core area and local population.

Core Area and Local Population (Local Population) name with bull trout	Creek name within the local population	Citation for information	Brook Trout Presence (Yes)
Alturas Lake Creek Local Population	Alturas Lake Creek	USFWS, *in litt.*, 2000a, USRITAT 1998, IDFG 2002 from GPM, R7StreamDB, and FIS_REF	Yes
	Alpine Creek	USRITAT 1998, IDFG 2002 from R7StreamDB and FIS_REF	Yes
	Cabin Creek	IDFG 2002 from R7StreamDB, Molton *in litt.*, 2002	
East Fork Salmon River Local Population	Mainstem East Fork Salmon River	IDFG 2002 from GPM, R7StreamDB, and FIS_REF	
	Herd Creek (including east and west forks)	USRITAT 1998 IDFG 2002 from FIS_RES, R7StreamDB	
	East Pass Creek	USRITAT 1998; USFWS, *in litt.*, 2002c	
	Meridian Creek	USFWS, *in litt.*, 2002c	
	Bowery Creek	BLM and USFS 1999 IDFG 2002 from R7StreamDB and FIS_RES	
	Long Tom Creek	BLM and USFS 1999	

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Core Area and Local Population (Local Population) name with bull trout	Creek name within the local population	Citation for information	Brook Trout Presence (Yes)
	West Pass Creek	BLM and USFS 1999 IDFG 2002 from R7StreamDB and FIS_RES	
	South Fork East Fork Salmon River	BLM and USFS 1999 IDFG 2002 from FIS_RES	
	West Fork East Fork Salmon River	BLM and USFS 1999, IDFG 2002 from FIS_REF	
	Ibex Creek	BLM and USFS 1999	
	Chamberlain Creek	BLM and USFS 1999	
	Big Boulder Creek	BLM and USFS 1999; IDFG 2002 from FIS_RES and R7StreamDB	Yes
	Wickiup Creek	USFWS, *in litt.*, 2002c	
	Little Boulder Creek	BLM and USFS 1999 IDFG 2002 from R7StreamDB and FIS_RES, FISCOLP	
	Roaring Creek	USFWS, *in litt.*, 2002c; USRITAI 1998	
	Warm Springs Creek	Andersen 2002	

Appendix A: Bull trout and brook trout distribution summary by core area and local population.

Core Area and Local Population (Local Population) name with bull trout	Creek name within the local population	Citation for information	Brook Trout Presence (Yes)
	Baker Creek	BLM and USFS 1999	
Germania Creek Local Population	Germania Creek	Molton, *in litt.*, 2002. BLM and USFS 1999, IDFG 2002 from R7StreamDB and FIS_RES	
Squaw Creek Local Population	Squaw Creek	USFWS, *in litt.*, 2000a, USRIIAI 1998, IDFG 2002 from R7StreamDB and FIS_RES	Yes
	Martin Creek	USFS *in litt*, 2001 IDFG 2002 from R7StreamDB	
	Willow Creek	USFWS, *in litt.*, 2002c, USFWS, *in litt.*, 2000b	
Thompson Creek Local Population	Thompson Creek	USRIIAI 1998 IDFG 2002 from GPM and FIS_REF	Yes
Slate Creek Local Population	Slate Creek	USRIIAI 1998 IDFG 2002 from R7StreamDB	
	Livingston Creek	USFWS, *in litt.*, 2002c	
	Silver Rule Creek	Molton, *in litt.*, 2002	
Morgan Creek Local Population	Morgan Creek	IDFG 2002 from R7StreamDB	

Appendix A: Bull trout and brook trout distribution summary by core area and local population.

Core Area and Local Population (Local Population) name with bull trout	Creek name within the local population	Citation for information	Brook Trout Presence (Yes)
	West Fork Morgan Creek	USRITAT 1998 IDFG 2002 from R7StreamDB, and FIS_RES	
	Lick Creek	IDFG 2002 from R7StreamDB	
	Morgan Creek	IDFG 2002 from GPM, R7StreamDB, and GPM	Yes
	Alder Creek	IDFG 2002 from R7StreamDB	
	Van Horn Creek	IDFG 2002 from R7StreamDB	
Challis Creek Local Population	Challis Creek	USFWS, *in litt.*, 2000a IDFG 2002 from R7StreamDB	Yes
	Lodgepole Creek	IDFG 2002 from R7StreamDB	
	Bear Creek	IDFG 2002 from R7StreamDB	
	Mill Creek	IDFG 2002 from R7StreamDB	
Garden Creek Local Population	Garden Creek	USFWS, *in litt.* 2000a IDFG 2002 from FISCOLP and R7StreamDB	
Pettit Lake Creek Local Population	Pettit Lake Creek	IDFG 2002 from GPM	

Appendix A: Bull trout and brook trout distribution summary by core area and local population.

Core Area and Local Population (Local Population) name with bull trout	Creek name within the local population	Citation for information	Brook Trout Presence (Yes)
	Alturas Lake Creek	IDFG 2002 from GPM, R7StreamDB, and FIS_REF	
Yellowbelly Lake Creek Local Population	Alturas Lake Creek	IDFG 2002 from GPM, R7StreamDB, and FIS_REF	
Upper Salmon River Local Population			
	Beaver Creek	IDFG 2002 from GPM, FIS_REF, and R7StreamDB	Yes
	Frenchman Creek	IDFG 2002 from GPM, FIS_REF	Yes
	Smiley Creek	IDFG 2002 from GPM	Yes
	Pole Creek	IDFG 2002 from GPM and FIS_REF	Yes
Pahsimeroi River Core Area			
Mainstem Pahsimeroi River below sinks		USRITAT 1998, BLM and USFS 2001	Yes
Morgan Creek Local Population			
	Morgan Creek	BLM and USFS 2001, IDFG 2002 from R7StreamDB and FIS_REF	Yes
	Tater Creek	BLM and USFS 2001 IDFG 2002 from R7StreamDB	

Appendix A: Bull trout and brook trout distribution summary by core area and local population.

Core Area and Local Population (Local Population) name with bull trout	Creek name within the local population	Citation for information	Brook Trout Presence (Yes)
	Pahsimeroi River	IDFG 2002 from FIS_REF, GPM, and R7StreamDB	Yes
	Salmon River	IDFG 2002 from GPM, FIS_REF, and R7StreamDB	Yes
Morse Creek Local Population	Morse Creek	USFWS, *in litt.*, 2000a Servheen 2001 IDFG 2002 from FIS_REF and R7StreamDB	
Patterson Creek Local Population	Patterson Creek	BLM and USFS 2001 IDFG 2002 from FIS_REF and R7StreamDB	Yes
	Pahsimeroi River	IDFG 2002 from FIS_REF and R7StreamDB, GPM	
Falls Creek Local Population		USFWS, *in litt.*, 2000a Servheen 2001	
	Falls Creek	Servheen 2001, BLM and USFS 2001 IDFG 2002 from FIS_REF and R7StreamDB	
	Big Creek	IDFG 2002 from FIS_REF and R7StreamDB	

Appendix A: Bull trout and brook trout distribution summary by core area and local population.

Core Area and Local Population (Local Population) name with bull trout	Creek name within the local population	Citation for information	Brook Trout Presence (Yes)
	Inyo Creek	IDFG 2002 from R7StreamDB	
	Goldburg Creek	IDFG 2002 from R7StreamDB, FIS_REF	
	Pahsimeroi River	IDFG 2002 from GPM, FIS_REF, and R7StreamDB	Yes
Big Creek Local Population	Big Creek	USFWS, *in litt.*, 2000a IDFG 2002 from FIS_REF and R7StreamDB	Yes
	North Fork Big Creek	BLM and USFS 2001 IDFG 2002 from FIS_REF and R7StreamDB	
	South Fork Big Creek	BLM and USFS 2001 IDFG 2002 from FIS_REF, R7StreamDB	
	Pahsimeroi River	IDFG 2002 from GPM, FIS_REF and R7StreamDB, GPM	Yes
Upper Pahsimeroi River Local Population	Mainstem Pahsimeroi River	USFWS, *in litt.*, 2000a, IDFG 2002 from GPM, FISREF, R7StreamDB	Yes

Appendix A: Bull trout and brook trout distribution summary by core area and local population.

Core Area and Local Population (Local Population) name with bull trout	Creek name within the local population	Citation for information	Brook Trout Presence (Yes)
	Burnt Creek	Servheen 2001, BLM and USFS 2001 IDFG 2002 from FIS_REF and R7StreamDB	Yes
	East Fork Burnt Creek	BLM and USFS 2001 IDFG 2002 from R7StreamDB	
	Mahogany Creek	Servheen 2001, BLM and USFS 2001, IDFG 2002 from FIS_REF and R7StreamDB	Yes
	West Fork Pahsimeroi River	BLM and USFS 2001 IDFG 2002 from R7StreamDB	
	East Fork Pahsimeroi River	BLM and USFS 2001 IDFG 2002 from R7StreamDB	
	Goldburg Creek	Servheen 2001 IDFG 2002 from FIS_REF, R7StreamDB	Yes
	Big Gulch	IDFG 2002 from R7StreamDB	
Ditch Creek Local Population	Ditch Creek	IDFG 2002 from R7StreamDB	

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Core Area and Local Population (Local Population) name with bull trout	Creek name within the local population	Citation for information	Brook Trout Presence (Yes)
Tater Creek Local Population	Tater Creek	IDFG 2002 from R7StreamDB	
Lake Creek Core Area	Williams Lake/Lake Creek	Curet pers. comm., 2002, Barnes *et al.* 1994., USFWS 2002b. IDFG 2002 from R7StreamDB	
Lemhi River Core Area			
Mainstem Lemhi River		USRIIAI 1998	
Hayden Creek Local Population	Hayden Creek	USFWS, *in litt.*, 2000a USRIIAI 1998, BLM 1998, IDFG 2002 from R7StreamDB, GPM	Yes
	Deer Creek	BLM and USFS 2001, IDFG 2002 from R7StreamDB	
	Bear Valley Creek	IDFG 2002 from GPM and R7StreamDB	Yes
	Bray Creek	IDFG 2002 from R7StreamDB	
	Cooper Creek	IDFG 2002 from R7StreamDB	
	East Fork Hayden Creek	IDFG 2002 from R7StreamDB	
	Kadletz Creek	IDFG 2002 from R7StreamDB	
	Short Creek	BLM 1998	

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Core Area and Local Population (Local Population) name with bull trout	Creek name within the local population	Citation for information	Brook Trout Presence (Yes)
	Wright Creek	IDFG 2002 from R7StreamDB	
	West Fork Hayden Creek	IDFG 2002 from R7StreamDB	
Pattee Creek Local Population	Pattee Creek	USFWS, *in litt.*, 2000a USRITAT 1998 IDFG 2002 from R7StreamDB	
Upper Lemhi River Local Population	Upper Lemhi River	USFWS, *in litt.*, 2000a IDFG 2002 from FIS_REF, GPM, and R7StreamDB	Yes
	Big Timber Creek	BLM 1998, IDFG 2002 from FIS_REF and R7StreamDB	
	Big Eightmile Creek	BLM 1998 IDFG 2002 from FIS_REF and R7StreamDB	Yes
	Big Bear Creek	IDFG 2002 from R7StreamDB	
	Big Springs Creek	IDFG 2002 from GPM	Yes
	Canyon Creek	IDFG 2002 from FIS_REF	
	Dairy Creek	IDFG 2002 from R7StreamDB	

Appendix A: Bull trout and brook trout distribution summary by core area and local population.

Core Area and Local Population (Local Population) name with bull trout	Creek name within the local population	Citation for information	Brook Trout Presence (Yes)
	Deer Creek	IDFG 2002 from FIS_REF	
	Eighteenmile Creek	BLM 1998 IDFG 2002 from FIS_REF, and R7StreamDB	Yes
	Reservoir Creek	BLM 1998	
	Wild Cat Creek	S. Feldhausen, pers.comm 2002	
	Frank Hall Creek	S. Feldhausen, pers.comm 2002	
	Hawley Creek	BLM 1998, IDFG 2002 from FIS_REF and R7StreamDB	
	Little Eightmile	BLM 1998 IDFG 2002 from FIS_REF, R7StreamDB	
	Mill Creek	BLM 1998 IDFG 2002 from FIS_REF, R7StreamDB	
	Texas Creek	BLM 1998 IDFG 2002 from FIS_REF	
	Little Timber Creek	IDFG 2002 from FIS_REF	
	Cruikshank Creek	C. Evans, pers. comm 2002	
	Stroud Creek	IDFG 2002 from R7StreamDB	

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Core Area and Local Population (Local Population) name with bull trout	Creek name within the local population	Citation for information	Brook Trout Presence (Yes)
	Middle Fork Little Timber Creek	IDFG 2002 from FIS_REF	
Geertson Creek Local Population	Geertson Creek	USRITAT 1998, USFWS, *in litt.*, 2000a IDFG 2002 from R7StreamDB and FIS_REF	
Kenny Creek Local Population	Kenny Creek	USFWS, *in litt.*, 2000a, BLM 1998, IDFG 2002 from R7StreamDB and FIS_REF	Yes
	East Fork Kenny Creek	USFWS 1999a, BLM 1998, S. Feldhausen, pers. comm 2002	
Bohannon Creek Potential Local Population	Bohannon Creek	IDFG 2002 from R7StreamDB	Yes
Middle Salmon River-Panther Creek Core Area			
Mainstem Salmon River		USRITAT 1998	
Cow Creek Local Population	Cow Creek	USFWS, *in litt.*, 2000a IDFG 2002 from R7StreamDB, and FIS_REF	
Hat Creek Local Population	Hat Creek	USFWS, *in litt.*, 2000a, USFS, *in litt.*, 2002b	

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Core Area and Local Population (Local Population) name with bull trout	Creek name within the local population	Citation for information	Brook Trout Presence (Yes)
McKim Creek Local Population	McKim Creek	USFWS, *in litt.*, 2000a, BLM and USFS 1998, USFS, *in litt.*, 2002b, IDFG 2002 from FIS_REF and R7StreamDB	Yes
Iron Creek Local Population	Iron Creek	USFWS, *in litt.*, 2000a, USFS, *in litt.*, 2002b IDFG 2002 from FIS_REF and R7StreamDB	
	North Fork Iron Creek	IDFG 2002 from FIS_REF and R7StreamDB	
	South Fork Iron Creek	IDFG 2002 from FIS_REF and R7StreamDB	Yes
	West Fork Iron Creek	IDFG 2002 from FIS_REF	
Twelve Mile Creek Local Population	Twelve Mile Creek	USFWS, *in litt*, 2000a IDFG 2002 from FIS_REF and R7StreamDB	
	Salmon River	IDFG 2002 from FIS_REF and GPM	Yes
Carmen Creek Local Population	Carmen Creek	USFWS, *in litt.*, 2000a, USFS *in litt*, 2002b IDFG 2002 from FIS_REF and R7StreamDB	

Appendix A: Bull trout and brook trout distribution summary by core area and local population.

Core Area and Local Population (Local Population) name with bull trout	Creek name within the local population	Citation for information	Brook Trout Presence (Yes)
	Freeman Creek	IDFG 2002 from FIS_REF	
Williams Creek Local Population	Williams Creek	USFWS, *in litt.*, 2000a, USFS *in litt.*, 2002b IDFG 2002 from FIS_REF	Yes
	South Fork Williams Creek	USFS *in litt.*, 2002b, IDFG 2002 from FIS_REF, R7StreamDB	
	North Fork Williams Creek	IDFG 2002 from FIS_REF	
Allison Creek Local Population	Allison Creek	USFS *in litt.*, 2002b, IDFG 2002 from R7StreamDB, GPM and FIS	
Fourth of July Creek Local Population	Fourth of July Creek	USFWS, *in litt,* 2000a, USFS *in litt.*, 2002b, IDFG 2002 from R7StreamDB	
North Fork Salmon River Local Population	North Fork Salmon River	USFWS, *in litt,* 2000a IDFG 2002 from GPM and R7StreamDB, FIS_REF	Yes
	Pierce Creek	USFS *in litt.* 2002b, IDFG 2002 from R7StreamDB	
	Dahlonega Creek	USFS *in litt.* 2002b	Yes

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Core Area and Local Population (Local Population) name with bull trout	Creek name within the local population	Citation for information	Brook Trout Presence (Yes)
	Hughes Creek	USFS *in litt.* 2002b IDFG 2002 from FIS_REF and R7StreamDB	Yes
	Moose Creek	USFS *in litt.* 2002b IDFG 2002 from R7StreamDB	Yes
	West Fork North Fork Salmon River	USFS *in litt.* 2002b IDFG 2002 from R7StreamDB	
	Sheep Creek	USFS *in litt.* 2002b IDFG 2002 from R7StreamDB, FIS_REF	
	North Fork Sheep Creek	USFS *in litt.* 2002b	
	South Fork Sheep Creek	IDFG 2002 from R7StreamDB	
	South Fork Salmon River	USFS *in litt.* 2002b	
	Smithy Creek	USFS *in litt.* 2002b	Yes
	Twin Creek	USFS *in litt.* 2002b, IDFG 2002 from R7StreamDB, FIS_REF	
	Vine Creek	USFS *in litt.* 2002b IDFG 2002 from R7StreamDB	Yes
	Hull Creek	IDFG 2002 from FIS_REF	

Appendix A: Bull trout and brook trout distribution summary by core area and local population.

Core Area and Local Population (Local Population) name with bull trout	Creek name within the local population	Citation for information	Brook Trout Presence (Yes)
Indian Creek Local Population	Indian Creek	USFWS, *in litt.* 2000a, USFS *in litt.* 2002b IDFG 2002 from FIS_REF and R7StreamDB	Yes
	West Fork Indian Creek	USFS *in litt* 2002b, IDFG 2002 from R7StreamDB	
	Corral Creek	USFS *in litt.* 2002b	
	McConn Creek	USFWS 1999b IDFG 2002 from FIS_REF, R7StreamDB	
	Squaw Creek	IDFG 2002 from FIS_REF and R7StreamDB	Yes
Squaw Creek Local Population	Squaw Creek	USFWS, *in litt.* 2000a, USFS in litt. 2002b IDFG 2002 from FIS_REF and R7StreamDB	Yes
Boulder Creek Local Population	Boulder Creek	USFWS, *in litt.* 2000a, USFS *in litt.* 2002b IDFG 2002 from FIS_REF and R7StreamDB	
Owl Creek Local Population	Owl Creek	USFWS, *in litt.* 2000a IDFG 2002 from FIS_REF	

Appendix A: Bull trout and brook trout distribution summary by core area and local population.

Core Area and Local Population (Local Population) name with bull trout	Creek name within the local population	Citation for information	Brook Trout Presence (Yes)
Pine Creek Local Population	Pine Creek	USFS *in litt.* 2002b IDFG 2002 from FIS_REF and R7StreamDB, GPM	Yes
Jesse Creek Local Population	Jesse Creek	Roberts, pers. comm., 2002 IDFG 2002 from FIS_REF	
	Turner Gulch	IDFG 2002 from FIS_REF	
	Salmon River	IDFG 2002 from GPM, and FIS_REF	
Panther Creek Local Population	Panther Creek	USFWS 1999b, USFWS, *in litt.* 2002c IDFG 2002 from GPM, R7StreamDB, and FIS_REF	Yes
	Salt Creek	IDFG 2002 from R7streamDB	
	Mink Creek	IDFG 2002 from R7streamDB	
	Otter Creek	USFWS, *in litt.* 2002c	Yes
	Fourth of July Creek	USFWS, *in litt.* 2002c	
	West Fork Blackbird Creek	B. Smith, pers. comm., 2002	

Appendix A: Bull trout and brook trout distribution summary by core area and local population.

Core Area and Local Population (Local Population) name with bull trout	Creek name within the local population	Citation for information	Brook Trout Presence (Yes)
	Moyer Creek	USFWS, *in litt.* 2002c IDFG 2002 from FIS_REF, GPM, and R7StreamDB	Yes
	South Fork Moyer Creek	USFWS, *in litt.* 2002c	Yes
	Deep Creek	USFWS, *in litt.* 2002c IDFG 2002 from FIS_REF and R7StreamDB	Yes
	Little Deep Creek	USFWS, *in litt.* 2002c IDFG 2002 from FIS_REF	
	Spring Creek	USFWS 1999b	
	Corral Creek	USFWS 1999b	Yes
	Woodtick Creek	USFWS, *in litt.* 2002c IDFG 2002 from FIS_REF and R7StreamDB	
	Moccasin Creek	USFWS, *in litt.* 2002c	
	Porphyry Creek	USFWS, *in litt.* 2002c IDFG 2002 from FIS_REF	
	Musgrove Creek	USFWS, *in litt.* 2002c IDFG 2002 from R7StreamDB	

Appendix A: Bull trout and brook trout distribution summary by core area and local population.

Core Area and Local Population (Local Population) name with bull trout	Creek name within the local population	Citation for information	Brook Trout Presence (Yes)
	Clear Creek	USFWS, *in litt.* 2002c IDFG 2002 from FIS_REF and R7StreamDB	
	Beaver Creek	IDFG 2002 from FIS_REF and R7StreamDB	
	Salmon River	IDFG 2002 from GPM, R7StreamDB, and FIS_REF	Yes
Napias Creek Local Population	Napias Creek	USFWS, *in litt.* 2002c IDFG 2002 from FIS_REF and R7StreamDB	
	Phelan Creek	USFWS *in litt.*2002c	
	Arnett Creek	IDFG 2002 From FIS_REF	Yes
	Rapps Creek	USFWS *in litt.* 2002c	
	Trail Creek	IDFG 2002 from GPM and FIS_REF	
Horse Creek Local Population	Horse Creek	USFS in litt. 2002b IDFG 2002 from GPM, R7StreamDB, and FIS_REF	Yes

Appendix A: Bull trout and brook trout distribution summary by core area and local population.

Core Area and Local Population (Local Population) name with bull trout	Creek name within the local population	Citation for information	Brook Trout Presence (Yes)
Spring Creek Local Population	Spring Creek	USFWS, *in litt.* 2000a, USFS *in litt.* 2002b IDFG 2002 from R7StreamDB and FIS_REF	
Opal Lake Core Area	Opal Lake and Opal Creek	Roberts, pers. comm., 2002 Curet, pers. comm 2001	
Middle Fork Salmon River Core Area			
Mainstem Salmon River		Servheen 2001	
Bear Valley Creek Local Population	Bear Valley Creek	USFWS, *in litt,* 2000b, IDFG 2002 from GPM, FIS_REF, and R7StreamDB	Yes
	Elk Creek	SBNFTG 1998a IDFG 2002 from GPM and FIS_REF	Yes
	Bearskin Creek	SBNFTG 1998a IDFG 2002 from GPM and FIS_REF	Yes
	Cache Creek	SBNFTG 1998a IDFG 2002 from FIS_REF	
	Cold Creek	IDFG 2002 from FIS_REF	
	Upper Bear Valley Creek	SBNFTG 1998a IDFG 2002 from GPM and FIS_REF	Yes?

Appendix A: Bull trout and brook trout distribution summary by core area and local population.

Core Area and Local Population (Local Population) name with bull trout	Creek name within the local population	Citation for information	Brook Trout Presence (Yes)
	Lower Bear Valley Creek	SBNFTG 1998a IDFG 2002 from GPM and FIS_REF	UK Yes?
	Little East Fork Elk Creek	IDFG 2002 from FIS_REF, L. Jadlowski, pers. comm 2002	Yes
	East Fork Elk Creek	IDFG 2002 from FIS_REF, L. Jadlowski, pers. comm 2002	
	North Fork Elk Creek	IDFG 2002 from FIS_REF, L. Jadlowski, pers. comm 2002	
	West Fork Elk Creek	IDFG 2002 from FIS_REF, L. Jadlowski, pers. comm 2002	
	Pole Creek	IDFG 2002 from FIS_REF	
	Sack Creek	IDFG 2002 from FIS_REF, L. Jadlowski, pers. comm 2002	
	Sheep Trail Creek	IDFG 2002 from FIS_REF, L. Jadlowski, pers. comm 2002	
	Wyoming Creek	IDFG 2002 from FIS_REF, L. Jadlowski, pers. comm 2002	

Appendix A: Bull trout and brook trout distribution summary by core area and local population.

Core Area and Local Population (Local Population) name with bull trout	Creek name within the local population	Citation for information	Brook Trout Presence (Yes)
Little Loon Creek Local Population	Little Loon Creek	L. Jadlowski, pers. comm 2002	
Camus Creek Local Population	Camas Creek	Thurow 1985, USFWS, *in litt.*, 2000b, USFWS, *in litt.*, 2002c, IDFG 2002 from GPM, R7StreamDB, and FIS_REF	Yes
	Silver Creek	IDFG 2002 from R7StreamDB and FIS_REF	
	West Fork Camas Creek	IDFG 2002 from FIS_REF	
	Yellowjacket Creek	IDFG 2002 from R7StreamDB	
	Castle Creek	USFWS, *in litt.*, 2002c, L. Jadlowski, pers. comm 2002	
	Furnace Creek	USFS, *in litt.*, 2002, L. Jadlowski, pers. comm 2002	
	J. Fell Creek	USFS, *in litt.*, 2002, L. Jadlowski, pers. comm 2002	
	Fly Creek	USFS, *in litt.*, 2002, L. Jadlowski, pers. comm., 2002	

Appendix A: Bull trout and brook trout distribution summary by core area and local population.

Core Area and Local Population (Local Population) name with bull trout	Creek name within the local population	Citation for information	Brook Trout Presence (Yes)
Monumental Creek Local Population	Monumental Creek	Wagoner and Burns 2001a IDFG 2002 from GPM and FIS_REF	Yes
	West Fork Monumental Creek	Wagoner and Burns 2001a IDFG 2002 from GPM and FIS_REF	Yes
	Snowslide Creek	Wagoner and Burns 2001a	
	Big Creek	IDFG 2002 from GPM and FIS_REF	Yes
Rush Creek Local Population	Rush Creek	Wagoner and Burns 2001a, IDFG 2002 from GPM and FIS_REF	Yes
	South Fork Rush Creek	IDFG 2002 from GPM	Yes
Wilson Creek Local Population	Wilson Creek	Thurow 1985, USFWS, *in litt.*, 2000b, IDFG 2002 from FIS_REF, FISCOLP, and R7StreamDB	
Silver Creek Local Population	Silver Creek	USFWS, *in litt*, 2002c IDFG 2002 from R7StreamDB and FIS_REF	

Appendix A: Bull trout and brook trout distribution summary by core area and local population.

Core Area and Local Population (Local Population) name with bull trout	Creek name within the local population	Citation for information	Brook Trout Presence (Yes)
	Camas Creek	IDFG 2002 from GPM, R7StreamDB, and FIS_REF	Yes
Marble Creek Local Population	Marble Creek	Thurow 1985, USFWS, *in litt.*, 2000b IDFG 2002 from GPM, R7StreamDB, and FIS_REF	
Loon Creek Local Population	Loon Creek	Thurow 1985 IDFG 2002 from GPM, and FIS_REF	Yes
	Mayfield Creek	IDFG 2002 from FIS_REF	
	Rock Creek	IDFG 2002 from R7StreamDB	
	Warm Spring Creek	IDFG 2002 from FIS_REF	
Big Creek 1 Local Population	Big Creek	Thurow 1985, Wagoner and Burns 2001a, IDFG 2002 from GPM and FIS_REF	Yes
	Rush Creek	IDFG 2002 from GPM and FIS_REF	Yes
	Cabin Creek	IDFG 2002 from FIS_REF	

Appendix A: Bull trout and brook trout distribution summary by core area and local population.

Core Area and Local Population (Local Population) name with bull trout	Creek name within the local population	Citation for information	Brook Trout Presence (Yes)
Big Creek 3 Local Population	Big Creek	Wagoner and Burns 2001a IDFG 2002 from GPM and FIS_REF	Yes
	Beaver Creek	IDFG 2002 from FIS_REF	
	Crooked Creek	Wagoner and Burns 2001a	
Big Creek 4 Local Population	Big Creek	Wagoner and Burns 2001a IDFG 2002 from GPM and FIS_REF	Yes
	Smith Creek	Wagoner and Burns 2001a IDFG 2002 from FIS_REF	
	Logan Creek	Wagoner and Burns 2001a IDFG 2002 from FIS_REF	Yes
	Boulder Creek	Wagoner and Burns 2001a	
	Belvidere Creek	IDFG 2002 from FIS_REF	
	Middle Fork Smith Creek	IDFG 2002 from FIS_REF	
Yellowjacket Creek Local Population	Yellowjacket Creek	USFWS, *in litt.*, 2002c, IDFG 2002 from R7StreamDB	
	Hoodoo Creek	IDFG 2002 from R7StreamDB	

Appendix A: Bull trout and brook trout distribution summary by core area and local population.

Core Area and Local Population (Local Population) name with bull trout	Creek name within the local population	Citation for information	Brook Trout Presence (Yes)
	Lake Creek	IDFG 2002 from R7StreamDB	
	Little Jacket Creek	IDFG 2002 from R7StreamDB	Yes
	Shovel Creek	IDFG 2002 from R7StreamDB	
Beaver Creek Local Population	Beaver Creek	Wagoner and Burns 2001a IDFG 2002 from FIS_REF	Lake trout
	Boulder Creek	Wagoner and Burns 2001a	
	Hand Creek	Wagoner and Burns 2001a IDFG 2002 from FIS_REF	
	South Fork Chamberlain Creek	IDFG 2002 from GPM	
Indian Creek Local Population	Indian Creek	IDFG 2002 from FIS_REF, R7StreamDB	
	Middle Fork Salmon River	IDFG 2002 from GPM and FIS_REF	Yes
Lower Middle Fork Salmon River 1 Local Population	Middle Fork Salmon River	IDFG 2002 from GPM and FIS_REF	Yes
	Big Creek	IDFG 2002 from GPM and FIS_REF	Yes
	Papoose Creek	IDFG 2002 from FISCOLP	
	Ship Island Creek	IDFG 2002 from FISCOLP	

Appendix A: Bull trout and brook trout distribution summary by core area and local population.

Core Area and Local Population (Local Population) name with bull trout	Creek name within the local population	Citation for information	Brook Trout Presence (Yes)
Lower Middle Fork Salmon River 2 Local Population	Middle Fork Salmon River	IDFG 2002 from GPM and FIS_REF	Yes
	Wilson Creek	IDFG 2002 from FIS_REF, R7StreamDB, FISCOLP	
	Brush Creek	IDFG 2002 from FIS_REF	
Lower Middle Fork Salmon River 3 Local Population	Middle Fork Salmon River	IDFG 2002 from GPM and FIS_REF	Yes
	Camas Creek	IDFG 2002 from GPM and FIS_REF, R7StreamDB	Yes
	Loon Creek	IDFG 2002 from GPM, and FIS_REF	Yes
	Sheep Creek	IDFG 2002 from FIS_REF	
Marsh Creek Local Population	Marsh Creek	IDFG 2002 from GPM, ISSWORK and FIS_REF	Yes
	UNNAMED Creek	IDFG 2002 from FIS_REF	
	Cape Horn Creek	IDFG 2002 from GPM, R7StreamDB, and FIS_REF	Yes
	Knapp Creek	IDFG 2002 from GPM and FIS_REF	Yes
	Beaver Creek	IDFG 2002 from GPM and FIS_REF	Yes

Appendix A: Bull trout and brook trout distribution summary by core area and local population.

Core Area and Local Population (Local Population) name with bull trout	Creek name within the local population	Citation for information	Brook Trout Presence (Yes)
	Lola Creek	IDFG 2002 from R7StreamDB	Yes
	Winnemucca Creek	IDFG 2002 from FIS_REF	Yes
	Bear Creek	IDFG 2002 from R7StreamDB	
	Banner Creek	IDFG 2002 from FIS_REF	Yes
Mayfield Creek Local Population	Mayfield Creek	IDFG 2002 from FIS_REF	
	Loon Creek	IDFG 2002 from GPM, and FIS_REF	Yes
	Pioneer Creek	IDFG 2002 from FIS_REF	
	East Fork Mayfield Creek	IDFG 2002 from FIS_REF	
	Mystery Creek	IDFG 2002 from R7StreamDB	Yes
Pistol Creek Local Population	Pistol Creek	IDFG 2002 from GPM and FIS_REF, R7StreamDB	Yes
	Little Pistol Creek	IDFG 2002 from FIS_REF	
Rapid Creek Local Population	Rapid Creek	IDFG 2002 from FIS_REF	
	Baldwin Creek	IDFG 2002 from R7StreamDB	
	Vanity Creek	IDFG 2002 from R7StreamDB	

Appendix A: Bull trout and brook trout distribution summary by core area and local population.

Core Area and Local Population (Local Population) name with bull trout	Creek name within the local population	Citation for information	Brook Trout Presence (Yes)
Sulphur Creek Local Population	Sulphur Creek	IDFG 2002 from GPM and FIS_REF	Yes
	North Fork Sulphur Creek	IDFG 2002 from GPM	Yes
Upper Middle Fork Salmon River 1 Local Population	Middle Fork Salmon River	IDFG 2002 from GPM and FIS_REF	Yes
	Pistol Creek	IDFG 2002 from GPM and FIS_REF, R7StreamDB	Yes
	Rapid River	IDFG 2002 from FIS_REF	
	Marble Creek	IDFG 2002 from GPM, R7StreamDB, and FIS_REF	
	Little Creek	IDFG 2002 from FishData	
Upper Middle Fork Salmon River 2 Local Population	Middle Fork Salmon River	IDFG 2002 from GPM and FIS_REF	Yes
	Marsh Creek	IDFG 2002 from GPM, ISSWORK, and FIS_REF	Yes
	Sulphur Creek	IDFG 2002 from GPM and FIS_REF	
	Rapid River	IDFG 2002 from FIS_REF	
	Bear Valley Creek	IDFG 2002 from GPM and FIS_REF, R7StreamDB	Yes

Appendix A: Bull trout and brook trout distribution summary by core area and local population.

Core Area and Local Population (Local Population) name with bull trout	Creek name within the local population	Citation for information	Brook Trout Presence (Yes)
	Dagger Creek	IDFG 2002 from FIS_REF	
West Fork Camas Creek Local Population	West Fork Camas Creek	IDFG 2002 from FIS_REF	
Warm Spring Creek Local Population	Warm Spring Creek	IDFG 2002 from FIS_REF	
	Loon Creek	IDFG 2002 from GPM, and FIS_REF	Yes
Middle Salmon River - Chamberlain Core Area			
Mainstem Salmon River		USRITAT 1998	
Chamberlain Creek Local Population	Chamberlain Creek	CBBTTAT 1998b, USFWS, *in litt.*, 2000b IDFG 2002 from GPM, R7StreamDB, and FIS_REF	Yes
	South Fork Chamberlain Creek	IDFG 2002 from GPM and FIS_REF	
	West Fork Chamberlain Creek	IDFG 2002 from GPM and FIS_REF	
	McCalla Creek	IDFG 2002 from FIS_REF	
	Whimstick Creek	IDFG 2002 from FIS_REF	
	Game Creek	IDFG 2002 from GPM and FIS_REF	

Appendix A: Bull trout and brook trout distribution summary by core area and local population.

Core Area and Local Population (Local Population) name with bull trout	Creek name within the local population	Citation for information	Brook Trout Presence (Yes)
	Moose Creek	IDFG 2002 from GPM and FIS_REF	
	Rim Creek	IDFG 2002 from GPM and FIS_REF	
Sabe Creek Local Population	Sabe Creek	CBBTTAT 1998b, USFWS, *in litt.*, 2000b IDFG 2002 from FIS_REF	
Big Squaw Creek Local Population	Big Harrington	USFWS in litt 2002b	
Bargamin Creek Local Population	Bargamin Creek	CBBTTAT 1998b, USFWS, *in litt.*, 2000b IDFG 2002 from GPM, R7StreamDB, and FIS_REF	Yes
Wind River Local Population	Wind River	USFWS *in litt.*, 2002b IDFG 2002 from GPM and FIS_REF	Yes
Sheep Creek Local Population	Sheep Creek	USFWS *in litt.*, 2002b IDFG 2002 from GPM, R7StreamDB, and FIS_REF	Yes
Warren Creek Local Population	Warren Creek	Servheen 2001, USFWS, *in litt.*, 2000a, USFS 2002b, IDFG 2002 from FIS_REF	Yes

Appendix A: Bull trout and brook trout distribution summary by core area and local population.

Core Area and Local Population (Local Population) name with bull trout	Creek name within the local population	Citation for information	Brook Trout Presence (Yes)
	Schissler Creek	CBBTTAT 1998b IDFG 2002 from FIS_REF	
	Guard Creek	CBBTTAT 1998b IDFG 2002 from FIS_REF	
	Slaughter Creek	CBBTTAT 1998b IDFG 2002 from FIS_REF	
	Mayflower Creek	CBBTTAT 1998b IDFG 2002 from FIS_REF	
	Webfoot Creek	IDFG 2002 from FIS_REF	
	Bear Creek	IDFG 2002 from GPM	
California Creek Local Population	California	USFS 2002b	
Fall Creek Local Population	Fall Creek	CBBTTAT 1998b, USFS 2002b IDFG 2002 from FIS_REF	
	East Fork Fall Creek	CBBTTAT 1998b IDFG 2002 from FIS_REF	
	Lake Creek	IDFG 2002 from FIS_REF	
South Fork Salmon River Core Area	South Fork Salmon River	SBNFTG 1998b	
Mainstem South Fork Salmon River		SBNFTG 1998b, IDFG 2002 from FIS_REF	

Appendix A: Bull trout and brook trout distribution summary by core area and local population.

Core Area and Local Population (Local Population) name with bull trout	Creek name within the local population	Citation for information	Brook Trout Presence (Yes)
Buckhorn Creek Local Population	Buckhorn Creek	USFS 2002b, SBNFTG 1998b, IDFG 2002 from FIS_REF	
	Little Buckhorn Creek	IDFG 2002 from FIS_REF	Yes
	South Fork Buckhorn Creek	IDFG 2002 from FIS_REF	Yes
Fitsum Creek Local Population	East Fork South Fork Salmon River	USFS 2002b, IDFG 2002 from GPM and FIS_REF	
	Fitsum Creek	IDFG 2002 from FIS_REF	
	North Fork Fitsum Creek	IDFG 2002 from FIS_REF	
	Secesh River	IDFG 2002 from GPM and FIS_REF	
Blackmare Creek Local Population	Blackmare Creek	USFS 2002b, IDFG 2002 from FIS_REF	
	South Fork Blackmare Creek	IDFG 2002 from FIS_REF	
Fourmile Creek Local Population	Fourmile Creek	IDFG 2002 from FIS_REF	
Elk Creek Local Population	Elk Creek	USFS 2002b, IDFG 2002 from FIS_REF	
	West Fork Elk Creek	IDFG 2002 from FIS_REF	

Appendix A: Bull trout and brook trout distribution summary by core area and local population.

Core Area and Local Population (Local Population) name with bull trout	Creek name within the local population	Citation for information	Brook Trout Presence (Yes)
Pony Creek Local Population	Pony Creek	USFS 2002b IDFG 2002 from FIS_REF	
	South Fork Salmon River	IDFG 2002 from FIS_REF	Yes
	Grouse Creek	IDFG 2002 from FIS_REF	
Upper Lake Creek Local Population	Lake Creek	USFS 2002b, IDFG 2002 from GPM and FIS_REF	Yes
	Three Mile Creek	NMFS 2000	
	Nethker Creek	NMFS 2000 IDFG 2002 from FISCOLP	Yes
	Willow Creek	NMFS 2000	
	Secesh River	IDFG 2002 from GPM and FIS_REF	Yes
	Salt Creek	IDFG 2002 from FIS_REF	
Profile Creek Local Population	Profile Creek	IDFG 2002 from FIS_REF, Wagoner and Burns 2001b IDFG 2002 from FIS_REF	
	Camp Creek	IDFG 2002 from FIS_REF	
	Missouri Creek	IDFG 2002 from FIS_REF	

Appendix A: Bull trout and brook trout distribution summary by core area and local population.

Core Area and Local Population (Local Population) name with bull trout	Creek name within the local population	Citation for information	Brook Trout Presence (Yes)
Riordan Creek Local Population	Riordan Creek	SBNFTG 1998b, USFS 2000 IDFG 2002 from FIS_REF	
Trapper Creek Local Population	Trapper Creek	SBNFTG 1998b, USFS 2000 IDFG 2002 from FISCOLP	
Burntlog Creek Local Population	Burntlog Creek	SBNFTG 1998b, USFS 2000 IDFG 2002 from FIS_REF	Yes
Warm Lake Creek Local Population	Warm Lake Creek	USFWS, *in litt.*, 2000b, USFS 2000 IDFG 2002 from FIS_REF	
Six-Bit Creek Local Population	Six-Bit Creek	IDFG 2002 from GPM and FIS_REF	
	Reeves Creek	IDFG 2002 from FIS_REF	
	Cabin Creek	IDFG 2002 from FIS_REF	
Curtis Creek Local Population	Curtis Creek	USFWS, *in litt.*, 2000b, USFS 2000 IDFG 2002 from FIS_REF	
	Trail Creek	IDFG 2002 from FIS_REF Hogen 2001	
Tamarack Creek Local Population	Bum Creek	IDFG 2002 from FIS_REF	

Appendix A: Bull trout and brook trout distribution summary by core area and local population.

Core Area and Local Population (Local Population) name with bull trout	Creek name within the local population	Citation for information	Brook Trout Presence (Yes)
	Tamarack Creek	IDFG 2002 from FIS_REF, Hogen 2001	
Summit Creek Local Population	Summit Creek	IDFG 2002 from FIS_REF	
	Josephine Creek	IDFG 2002 from FIS_REF	
Sugar Creek Local Population	East Fork South Fork Salmon River	Hogen 2001, IDFG 2002 from FIS_REF and GPM	
	Sugar Creek	IDFG 2002 from FIS_REF	
Ruby Creek Local Population	Secesh River	USFS 2002b, IDFG 2002 from FIS_REF and GPM	
Quartz Creek Local Population	Quartz Creek	USFS 2002b, IDFG 2002 from FIS_REF	
Loon Creek Local Population	Loon Creek	USFS 2002b, IDFG 2002 from FIS_REF	
	Secesh River	USFS 2002b, IDFG 2002 from FIS_REF and GPM	
Lick Creek Local Population	Lick Creek	USFS 2002b, IDFG 2002 from FIS_REF and GPM	
	Hum Creek	IDFG 2002 from FIS_REF	
	Secesh River	IDFG 2002 from FIS_REF and GPM	

Appendix A: Bull trout and brook trout distribution summary by core area and local population.

Core Area and Local Population (Local Population) name with bull trout	Creek name within the local population	Citation for information	Brook Trout Presence (Yes)
Grouse-Flat Creek Local Population	Grouse Creek	USFS 2002b, IDFG 2002 from FIS_REF	
	Sand Creek	IDFG 2002 from FIS_REF	
	Secesh River	USFS 2002b, IDFG 2002 from FIS_REF and GPM	
Cougar Creek Local Population	Cougar Creek	USFS 2002b, IDFG 2002 from FIS_REF	
	South Fork Salmon River	IDFG 2002 from GPM and FIS_REF	
Victor Creek Local Population	Secesh River	USFS 2002b, IDFG 2002 from GPM and FIS_REF	
	Victor Creek	IDFG 2002 from FIS_REF	
	Willow Basket Creek	IDFG 2002 from FIS_REF	
Zena Creek Local Population	Secesh River	USFS 2002b, IDFG 2002 from GPM and FIS_REF	
	South Fork Salmon River	IDFG 2002 from GPM and FIS_REF	
Upper South Fork Salmon River Local Population	Bear Creek	I USFS 2002b, DFG 2002 from FIS_REF	
	Curtis Creek	IDFG 2002 from FIS_REF	

Appendix A: Bull trout and brook trout distribution summary by core area and local population.

Core Area and Local Population (Local Population) name with bull trout	Creek name within the local population	Citation for information	Brook Trout Presence (Yes)
	Lodgepole Creek	IDFG 2002 from FIS_REF	
	Mormon Creek	IDFG 2002 from FIS_REF	
	Rice Creek	IDFG 2002 from FIS_REF	
	South Fork Salmon River	IDFG 2002 from GPM and FIS_REF	
	Tyndall Creek	IDFG 2002 from FIS_REF	
	South Fork Salmon River	IDFG 2002 from GPM and FIS_REF	Yes
Upper East Fork South Fork Salmon River Local Population	Upper East Fork South Fork Salmon River LP	IDFG 2002 from GPM and FIS_REF	
Little Salmon River-Lower Salmon River Core Area			
Mainstem Little Salmon River		CBBTTAT 1998a	
Mainstem Salmon River		CBBTTAT 1998a	
Slate Creek Local Population	Slate Creek	CBBTTAT 1998a, USFWS, *in litt.*, 2000b IDFG 2002 from GPM and FIS_REF, FISCOLP	Yes
	Van Buren Creek	CBBTTAT 1998a	
	Little Slate Creek	IDFG 2002 from GPM and FIS_REF	Yes
	Willow Creek	IDFG 2002 from FIS_REF	Yes

Appendix A: Bull trout and brook trout distribution summary by core area and local population.

Core Area and Local Population (Local Population) name with bull trout	Creek name within the local population	Citation for information	Brook Trout Presence (Yes)
	Deadhorse Creek	K. Munson, pers. comm, 2002	
John Day Creek Local Population		CBBTTAT 1998a,	Yes
	Main John Day Creek	CBBTTAT 1998a IDFG 2002 from FIS_REF	
	East Fork John Day Creek	CBBTTAT 1998a IDFG 2002 from FIS_REF	
Rapid River Local Population	Rapid River	CBBTTAT 1998a, IDFG 2002 from GPM and FIS_REF	Yes
	West Fork Rapid River	IDFG 2002 from GPM and FIS_REF	
	Lake Fork Rapid River	Schill et al. 1994	
	Granite Fork Lake Fork Rapid River	Schill et al. 1994	
Hard Creek Local Population	Hard Creek	CBBTTAT 1998a	
	Hazard Creek	IDFG 2002 from GPM and FIS_REF	
Boulder Creek Local Population	Boulder Creek	CBBTTAT 1998a, IDFG 2002 from GPM and FIS_REF	Yes
	Yellow Jacket Creek	CBBTTAT 1998a	
Lake Creek/Lower Salmon River Local Population	Lake Creek	USFS 2002b	
Partridge Creek Local Population	Partridge	USFS 2002b, CBBTTAT 1998a	

Appendix B: Disconnected Streams in the Upper Salmon River, Lemhi River, Pahsimeroi River and Middle Salmon Panther core areas targeted for recovery actions (Curet, *in litt.*, 2001)

Pahsimeroi River Core Area
Morgan Creek
Tater Creek
Morse Creek
Falls Creek
Patterson Creek
Big Creek
Upper and lower Pahsimeroi river (seasonally)
Lemhi River Core Area
Lemhi River (seasonally)
Geertson Creek
Bohannon Creek
Hawley Creek
Agency Creek
Little Eightmile Creek
Texas Creek
Big Timber Creek
M.F. Little Timber Creek
Big Eightmile Creek
Middle Salmon - Panther Creek Core Area
Fourth of July Creek
Carmen Creek
Jesse Creek
Williams Creek
Twelvemile Creek
Iron Creek
Poison Creek
Hat Creek

Hughes Creek
Allison Creek
Upper Salmon River Core Area
Morgan Creek
Challis Creek
Garden Creek
Mill Creek
Kinnikinic Creek
Meadow Creek
Iron Creek
Goat Creek
Fourth of July Creek
Champion Creek
Smiley Creek
Beaver Creek
Squaw Creek
Valley Creek

Appendix C: Tasks in the recovery narrative section that correspond to Reasons for Decline (threats) to bull trout discussed in the Salmon River Recovery Unit Chapter.

Recovery task that addresses threats	Threat: Forestry Management Practices	Threat: Livestock Grazing	Threat: Agricultural Practices	Threat: Transportation Networks	Threat: Mining	Threat: Residential Development and Urbanization	Threat: Fisheries Management	Threat: Fragmentation
1.1.1	x	x	x	x	x			
1.1.2	x	x	x	x	x			
1.1.3	x	x	x	x	x			
1.1.4	x	x	x	x	x			
1.1.5	x	x	x	x	x	x		
1.1.6				x	x			
1.1.7				x	x			
1.1.8					x			
1.1.9			x	x	x			
1.1.10	x	x	x					
1.1.11				x				
1.1.12						x		
1.2.1			x					x

Appendix C. Tasks in the recovery narrative section that correspond to Reasons for Decline (threats) to bull trout discussed in the Salmon River Recovery Unit Chapter.

Recovery task that addresses threats	Threat: Forestry Management Practices	Threat: Livestock Grazing	Threat: Agricultural Practices	Threat: Transportation Networks	Threat: Mining	Threat: Residential Development and Urbanization	Threat: Fisheries Management	Threat: Fragmentation
1.2.2			x					x
1.2.3			x					x
1.2.4			x					x
1.2.5			x				x	x
1.2.6				x				x
1.2.7								x
1.2.8								x
1.2.9								x
1.2.10				x				
1.3.1		x						
1.3.2		x	x					
1.3.3			x					
1.3.4		x	x					
1.3.5		x			x			
1.3.6	x			x				

Appendix C. Tasks in the recovery narrative section that correspond to Reasons for Decline (threats) to bull trout discussed in the Salmon River Recovery Unit Chapter.

Recovery task that addresses threats	Threat: Forestry Management Practices	Threat: Livestock Grazing	Threat: Agricultural Practices	Threat: Transportation Networks	Threat: Mining	Threat: Residential Development and Urbanization	Threat: Fisheries Management	Threat: Fragmentation
1.3.7				x				
1.3.8				x				
1.3.9				x		x		
1.3.10				x				
1.3.11			x		x	x		
1.3.12				x				
1.5.1	x							
1.5.2	x							
1.5.3		x						
2.2.1							x	
2.2.2							x	
2.2.3							x	
2.4.1							x	
2.4.2							x	
2.4.3							x	

Appendix C: Tasks in the recovery narrative section that correspond to Reasons for Decline (threats) to bull trout discussed in the Salmon River Recovery Unit Chapter.

Recovery task that addresses threats	Threat: Forestry Management Practices	Threat: Livestock Grazing	Threat: Agricultural Practices	Threat: Transportation Networks	Threat: Mining	Threat: Residential Development and Urbanization	Threat: Fisheries Management	Threat: Fragmentation
2.5.1							x	
2.5.2							x	
2.6.1							x	
3.1.1							x	
3.1.2							x	
3.2.1							x	
3.2.2							x	
3.2.3							x	
3.2.4							x	
3.3.1							x	
3.3.2							x	
3.3.3							x	
3.4.1							x	
4.1.1							x	
4.1.2							x	

Appendix C. Tasks in the recovery narrative section that correspond to Reasons for Decline (threats) to bull trout discussed in the Salmon River Recovery Unit Chapter.

Recovery task that addresses threats	Threat: Forestry Management Practices	Threat: Livestock Grazing	Threat: Agricultural Practices	Threat: Transportation Networks	Threat: Mining	Threat: Residential Development and Urbanization	Threat: Fisheries Management	Threat: Fragmentation
4.1.3							x	
4.2.1								x
5.1.1	x	x		x	x			
5.1.2							x	
5.2.1							x	
5.2.2							x	
5.2.3							x	
5.2.4							x	
5.2.5							x	
5.2.6							x	
5.3.1	x				x			
5.5.1							x	
6.1.1			x		x	x		
6.2.1	x	x		x	x	x		

6.2.2	x	x	x	x	x	x		
6.2.3	x	x	x	x	x	x		
6.2.4	x	x	x	x	x			
6.2.5	x	x	x	x	x		x	
6.2.6	x		x		x			
6.3.1					x			
6.3.2					x			
6.3.3					x			

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Chapter 21	Middle Columbia River Recovery Unit, Washington
Chapter 22	Upper Columbia River Recovery Unit, Washington
Chapter 23	Northeast Washington Recovery Unit, Washington
Chapter 24	Snake River Washington Recovery Unit, Washington
Chapter 25	St. Mary-Belly River Recovery Unit, Montana

LUTG Salmon

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Bureau of Land Management
Salmon Field Office

2004
Annual Water Temperature Report



Haynes Creek 2004

Protestant

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Bureau of Land Management
Salmon Field Office
2004 Annual Water Temperature Report

Summary

As part of an ongoing effort to monitor riparian habitat, the BLM Salmon Field Office collected temperature data during the 2004 field season on select streams in the Lemhi River sub basin. Thermographs were in place from late May until November and were set to record ten readings per day. Streams were selected for monitoring based on a variety of criteria: the need to gather information on 303(d) temperature listed streams, compile information on bull trout habitat, and continue gathering baseline and trend information. A complete list of thermograph locations for 2004 is included in this report.

Results

Seasonal maximum temperatures and maximum 7-day average maximum temperatures for all sites monitored in the Lemhi and Salmon River basins since 1993 are listed in a summary table. Results from the 2004 monitoring sites follow in alphabetical order by main watershed. A site map is provided for each thermograph location where monitoring was conducted at this year.

Temperature data for each thermograph sites are displayed in two graphs. The first graph shows the daily maximum, average, and minimum temperatures. The second graph shows the maximum daily temperature and the 7-day average maximum temperature compared to PACFISH guidelines. PACFISH guidelines are 17.8° C (64.0° F) for a rearing migration maximum and 15 6° C (60.1° F) for a spawning maximum. Bull trout guidelines for the sub basin are 2-5° C (35-41° F) for incubation, 4-12° C (39-54° F) for rearing, and 4-9° C (39-48° F) for spawning.

Within the thermograph study area, there were higher than average temperatures and lower than average precipitation during the early spring resulting in an early loss of snow pack. The summer followed with normal to above normal precipitation and cooler than average temperatures. This weather pattern resulted in two flatter peaks in the hydrograph. There was also a cooler than normal period with snow fall in the mountains during late September.

The Pratt Creek thermograph was misplaced in an irrigation ditch next to Pratt Creek. The location was approximately 50 yards below the split from the main stem of Pratt Creek. The data is included in this report since temperatures are still reflective of Pratt Creek. Also, the Hat Creek and Pattee Creek thermographs were lost.

Contact Information

For additional information about this data or to obtain the original data please contact Scott Feldhausen (208) 756-5478, Jude Trapani (208) 756 5475, or Matt Anderson (208) 756-5418 at the Salmon Field Office.

LEMHI RIVER SUBASIN STREAM TEMPERATURE SUMMARY 1993 - 2004

eam Name	1993	1994		1995		1996		1997		1998		1999		2000				2002		2003			
	Max	Max	7-Day Max	Max	7-Day Max	Max	7-Day Max	Max	7-Day Max	Max	7-Day Max	Max	7-Day Max	Max	7-Day Max	Max	7-Day Max	Max	7-Day Max	Max	7-Day Max	Max	7-Day Max
Lemhi River																							
Mouth	68.8	73.9																					
Hayden Cr	62.4																						
Agency																							
Lower		68.2	67.1	64.2	62.5	65.2	63.9	66.1	64.4	67.3	66.6	67	65.6	69.9	68.6	70.2	68	70.8	68.9	Malfunction		68.4	66.5
Upper		65.3	64.5	55.1	54.2	54.5	53.9	56.8	55.7	59	58.4	57.9	56.6	Malfunction		Malfunction		59.3	58.2	60.8	59.7	58	57
Cow @ BLM/pvt																Malfunction		Malfunction		64.2	63.1	61.5	60.2
Flume @ mouth																62.1	60.3	60.8	59.6	62.2	61.1		
Big Eightmile																							
Lee Cr Road		66.2	64.1	62.4	58.7	64.4	62.1	62.7	59.9														
Private/USFS	56.5	61								58.7	56	54.7	53.3	Malfunction		57.9	57.1	58.7	57.8				
Big Timber																							
Mouth		70.3	68.1	63	61.4	65	63.4	66.4	63.6	64.9	62.6	63.8	61.1	68.7	66.4					69	67	67.7	64.8
@ Basin Cr	60.7	68.2																		66.3	63.9	64.2	62.9
@ Grove Cr	58.1	59.3		57		60.4		61.9	58	59	57.6	58.1	56.7										
MF Little Timber	57.6	61.8		61		50.4		59.6	58	60.7	58.8	60.1	58.8	64.4	63.2								
NF Little Timber	52.9			53						55.1	54.5	54.9	53.8										
Swan Basin		68.5	67.1	63.2	61.2	66.5	64.9	64.9	62.8	65	63.7	63.8	61.5	69.1	66.5								
Bohannon																							
Lower								65.1	62.9														
Upper																		53.2	52.5	55.3	51.5	53.2	52.5
East Fork																		54.6	53.9	56	54.9	56	54.2
Canyon																							
BLM/Private		64.7	63.7	60.7	59.2	62.1	61.3	61.5	60.3	63.8	62.7	62.1	59.4	64.2	62	64	62.5	66.3	64.7	65.6	64.4	63.5	62.3
BLM/USFS	61.8	63.5		61		62.1		62.4	60.9	67.4	65.7	59.6	57.5	70.4	65.7								
@ Hood Gulch								63.2	61.8	66.1	65	63.8	61.2	65.5	63.3	66.8	65	69.4	66.8				
Frank Hall						53.9		55	53.7	56.4	55.7	58.6	55.7			56.1	55	60.1	58.8				
Eighteenmile																							
Lower		66.2	64	60.1	56.7	63	62	67.7	65.2							74.5	70.9	76.7	73.5	70.5	70.5		
Middle								72.2	68.1														
Upper				60.1	56.7	63	62	64.2	60.6	63.8	62.5	63.2	60	66.5	63.5	64.4	62.4	67.6	65.1	65.6	62.5	64.9	61.5
WSA										59.4	57.4	60.6	58										
Hawley	59.8	63.8		61		62.7		61.9	59.8	61.9	61.2	61.9	60	61.9	60.7	Malfunction		66.3	63.9				
Reservoir	62.1			61		64.6		64.7	62.1	65	64.4	64.8	62.1	66.2	64.3	65.5	63.9	65.5	62.1				
Big Bear Lower	54.5	52.9		56		54		53.1	52	55	54.1	54	52.6	49.7	49.1	51.1	49.7	51.1	49.6				
Big Bear Upper						60.1				63.5	62.6	62.2	60.2	66.3	63.6								
Geertson		56.5	55.2	52.9	48.8	53.4	52.7	55.9	55	54	53.1												
Hayden																							
Guard Station	59.6	68.2				69.2		60.8	59.1			62.8	61.5			68.4	66.3	63.5	62.1			60.1	59.2
@ Basin Cr	64.7	63.2				57	56.5	57.5	56.6	59.2	58.2	63.5	61.5	63.2	61.4								
BLM/USFS		62.1	58.8	54	52.7							56.1	55	60.6	59.3	59.2	57.8	58.1	56.9	60.8	58.7	65.6	61.3
@ Bear Valley	60.7																						
@ East Fork	52.9	58.1								54.6	54	53.9	53.3										

Temperatures listed in degrees Fahrenheit
Max = maximum temperature recorded for the season
7-day max = maximum 7-day average maximum for the season

Big Timber Creek Fisheries Report



Idaho Department of Fish and Game
Anadromous Screen Program
Region 7 – Salmon, ID
March 2004

By
Patrick Murphy – Regional Fishery Biologist
Merritt Horsmon – Fisheries Technician

Funded By
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ABSTRACT

The Idaho Department of Fish and Game's Anadromous Screen Program conducted fisheries surveys and irrigation inventories in the Big Timber Creek watershed in the summer of 2003. These initial watershed inventories will provide baseline data for monitoring and evaluation assessments of future fisheries improvement projects. These surveys documented the presence of fish species and life histories in the watershed and will determine management directions for improving irrigation practices for fisheries benefits. Irrigation improvements may include: improving fish passage, identifying fish screening opportunities, diversion modification, consolidation or elimination, decreasing irrigation conveyance losses, and producing water-savings for increasing instream flow. Fisheries surveys were conducted utilizing electrofishing methodologies to document the distribution, occurrence, and abundance of salmonids throughout the watershed. These fisheries surveys encompassed 2.95 km of stream length, and 9,642 m^2 of sampled stream habitat. Salmonid species documented in the watershed included; bull trout (*Salvelinus confluentus*),), resident rainbow/redband trout (*Oncorhynchus mykiss)*, westslope cutthroat trout (*Oncorhynchus clarki lewisi*), and mountain whitefish (*Prosopium williamsoni*). There are 15 active irrigation diversions on Big Timber Creek that are currently diverting water for flood irrigation and may cause seasonally dewatering of the stream. None of the diversions have fish screens. The lower irrigation diversions and ditch intercepts near the confluence of Big Timber Creek and the Lemhi River cause seasonal dewatering and create fish barriers at low flows. Big Timber Creek is one of the higher quality salmonid streams in the Lemhi River subbasin and has multiple opportunities for fisheries improvement projects.

INTRODUCTION

In the Upper Salmon River Basin, fish screening to protect anadromous fish has taken place since the late 1950's. The Idaho Department of Fish and Game's (IDFG) Anadromous Fish Screen Program to date, has installed fish screens (~220) on most of the mainstem river corridor diversions on the Salmon River, Lemhi River, Pahsimeroi River, and North and East Fork Salmon Rivers. These larger diversions were direct threats to threatened salmonids: migratory pre-smolt and smolt spring/summer chinook salmon (*Oncorhynchus tshawytscha*), steelhead (*Oncorhynchus mykiss*), sockeye salmon (*Oncorhynchus nerka*), and fluvial bull trout (*Salvelinus confluentus*). Most unscreened diversions are currently found throughout both the large and small tributary systems of the main rivers, and number in the hundreds throughout the basin. Unlike most of the mainstem river diversions, which occur on private property, many diversions in the tributaries occur on both private property and Federal administered lands, primarily Bureau of Land Management (BLM) and Forest Service (USFS).

The IDFG, Upper Salmon Basin Watershed Project (USBWP), Idaho Governor's Office of Species Conservation (OSC), Idaho Department of Water Resources (IDWR) and the regulatory agencies of the United States Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS, NOAA Fisheries) have developed a prioritized tributary work plan for addressing fish screening, fish passage, ditch consolidations and water-savings in the Upper Salmon River Basin. This document, "Screening and Habitat Improvement Prioritization for the Upper Salmon Sub-basin" (SHIPUSS), effectively ranks tributaries to prioritize restoration efforts. The main goal of SHIPUSS is to create a prioritized list of streams within watersheds to guide screening and habitat improvement projects on privately owned lands in the Upper Salmon River Basin. SHIPUSS will be used by the IDFG, USBWP, and other local interested parties in conjunction with project level prioritization to accomplish screening and habitat objectives.

The goal for this prioritized tributary approach is that it is to be effectively incorporated into a long-term Conservation Agreement. SHIPPUS has been incorporated into the Upper Salmon River Basin Conservation Memorandum of Understanding (MOU) 2003 (signed 10/03). This Agreement provides for protection of listed anadromous and resident fish species and additionally provides incentive and protection of individual landowners and their ability to use irrigation water. This Conservation Agreement is intended to establish a process for voluntary compliance with the Endangered Species Act (ESA), resulting in appropriate incidental take authorization. This Agreement is intended to address fish conservation needs on or adjacent to lands used for irrigated agricultural and livestock ranching. Native anadromous and resident fish species, including those listed under the ESA, may be negatively affected by irrigation water diversion, livestock grazing, and associated activities. Farmers and ranchers in the area are interested in ensuring their land and water management actions may continue, although in a manner consistent with the purposes of the ESA for protection and recovery of these fish species (USFWS 2003).

Landowners, local entities, and State and Federal agencies must work together in order to achieve the goals and objectives of the draft MOU. A series of conservation and administrative commitments will be required on the part of landowners and state resource managers in exchange for commensurate regulatory commitments from Federal agencies, including the FWS

and the NMFS, collectively known as the Services (USFWS 2003). IDFG and USBWP Technical Team have identified BigTimber Creek as being a Priority II tributary (SHIPUSS) for both resident and anadromous salmonids in the river reach section (including all tributaries) of the Lemhi River Subbasin. An overall management plan will be developed with irrigators of BigTimber Creek that will define actions to be addressed, including:

a. Stream flows and water usage within stream reaches, providing water flows for fish.
b. Fish passage requirements at diversions.
c. Installation and maintenance of fish screens.
d. Methods of managing return flow water.
e. Initiation of ramp-downs and minimal flows when turning ditches off to avoid stranding fish.
f. Methods for maintaining or enhancing riparian habitat.

Salmonid Communities within Big Timber Creek

The Big Timber Creek watershed supports habitat for a number of key salmonid fish species, including resident, and anadromous forms. Historically, spawning and rearing habitat was probably supported within the watershed for three federally-listed fish species, spring/summer Chinook salmon, steelhead, and bull trout. Along with all other waters of the Salmon River drainage, the Big Timber Creek Watershed has been designated as critical habitat for Snake River spring and summer Chinook salmon. Big Timber Creek is on the Idaho Department of Environmental Quality (DEQ) list of impaired water bodies (303d list), because stream segments within the watershed pose nutrients and sediment concerns. It is likely that Big Timber Creek historically supported abundant spawning and rearing habitat, with year-round connectivity with the Lemhi River. Genetic diversity within resident fish populations was enhanced by this connectivity with the Lemhi River and access to adjacent fish populations (Lemhi River Subbasin Assessment 1998).

Chinook Salmon

All waters of the Salmon River drainage, including Big Timber Creek and its tributaries, were designated as critical habitat for Snake River spring/summer Chinook salmon on December 28, 1993 (Federal Register, Vol. 58 No. 68545) pursuant to the Endangered Species Act listing of Snake River spring/summer Chinook salmon as threatened on April 22, 1992 (Federal Register, Vol. 58, No 78. No known, written information exists that would document utilization of Big Timber Creek or any of its tributaries as spawning areas for Chinook salmon.

Steelhead/Rainbow Trout

The Snake River Basin Ecologically Significant Unit (ESU) of steelhead trout was listed as threatened under ESA on August 18, 1997(Federal Register, Vol. 62 No. 159). No known,

written information exists that would document utilization of Big Timber Creek or any of its tributaries as spawning areas for steelhead.

Bull Trout

The Columbia River population segment of bull trout was listed as threatened on June 10, 1998 (Federal Register, Vol. 63 No. 111). Bull trout are documented as present in the middle and headwater reaches of Big Timber Creek. It is likely that both fluvial and resident bull trout populations historically occurred in Big Timber Creek. It is unknown if a fluvial life history is still present in the watershed. Fluvial life history would currently require bull trout to negotiate the dewatered sections of the creek in spring/early summer to reach potential headwater spawning areas.

Westslope Cutthroat Trout

Westslope cutthroat trout (*Oncorhynchus clarki lewisi*) was recently under review for petitioning as threatened under the Endangered Species Act. However, a court decision in March 2003 determined that a listing was not warranted.

Objectives

The objective of the fisheries surveys in Big Timber Creek is to document the distribution, occurrence, and abundance of salmonids throughout the watershed. This initial inventory will identify life-history characteristics of species present and determine management directions for improving irrigation practices, including fish screening opportunities, diversion modification, consolidation, or elimination, and improving conveyance losses for water-savings and increasing instream flow or passage.

STUDY AREA

Almost entire section was taken from the:

USDI Bureau of Land Management. February 1998. *Lemhi River Sub-basin Assessment. An Assessment of Resource Conditions and Issues within the Watersheds of the Lemhi River Valley.* Prepared by the Salmon Field Office, BLM, and Idaho Division of Environmental Quality for the Principal Working Group, Lemhi County Riparian Conservation Agreement. Salmon, Idaho: Salmon Field Office, BLM.

Watershed Description

The Big Timber Creek watershed, located approximately 50 miles southeast of Salmon, enters the Lemhi River near the town of Leadore. The watershed encompasses 55,275 acres of combined private, State and Federally managed lands. The lower portions of Big Timber Creek are mostly on private property stretching east toward Leadore. There are a few isolated pieces of

BLM adjacent to this lower section of stream that are part of the Timber Creek and Leadore Hill allotments.

The landscape has a few rolling hills that attract the viewers eye. These are deposits of glacial moraine that are covered by sagebrush/grass communities. Large areas of irrigated land occupy the lower portions of the watershed. Slopes in the lower portion of the watershed are less than 5% for the most part. West of Big Timber Creek, a knoblike ridge with 20% slopes isolates the stream from the main road that bisects the area lengthwise. The topography is fairly gentle, when compared to most other watersheds within the EMA, since only 10% of area exceeds 40% slope. Elevation varies from 6,000 feet in the flats near Leadore, to 10,000 feet, at the hydrologic divide which forms the western boundary. Aspect is generally easterly to northeasterly.

Table 1. Big Timber Creek acreage and stream ownership distribution.

	Total	BLM	USFS	State	Private
Watershed Acres	55,275	3,959	43,162	63	8,090
Mainstem Stream Miles	19.1	3.0	12.5	0.0	3.6
Watershed Stream Miles	62.5	5.6	47.0	0.0	9.9
Percent Watershed Acres	100%	7.2%	78.1%	0.1%	14.6%
Percent Watershed Stream Miles	100%	8.7%	75.4%	0.0%	15.9%

Climate

Precipitation varies with elevation and aspect. The lower elevation, flat areas and gentle slopes near Leadore tend to receive 8 to 11 inches of precipitation, while the steeper and wettest sites receive up to 23 inches annually, mostly in the form of snow. Climatic records from the Leadore area show the following:

average annual temperature: 36 degrees F
maximum temperature: 99 degrees F
minimum temperature: -38 degrees F

average annual precipitation: 7.47 inches
maximum annual precipitation: 10.7 inches
minimum annual precipitation: 6.2 inches

Water Body Description

Big Timber Creek has a mainstem base flow of approximately 45 cfs before diversions begin to affect water quantity. Near the town of Leadore, the base flow is down to around 5 cfs before the final diversions remove the remainder of the water. The mean annual flow is 38.6 cfs. The North Fork Little Timber has a mean annual flow of 10.5 cfs and the Middle Fork is 7.5 cfs. Stream gradient is generally slight, ranging from 1 to 4% across most of the B channel. Higher up in the watershed, however, stream gradient exceeds 4% for 39% of the stream length, in the A channel. Both forks of Little Timber are much higher gradient systems. Big Timber has several important tributaries, including Little Timber, Trail, Cabin, Squirrel, Rocky and Basin Creeks. There are also many smaller tributaries and springs within the watershed.

There are numerous unscreened diversions and one large diversion dam on Big Timber Creek, which have been in place and used since the late 1800's. During the irrigation season, Big Timber Creek is dewatered by the time it reaches the Lee Creek Road, about one mile west of Leadore. The single largest diversion occurs at the Carey Act dam, which is located just below where Big Timber Creek leaves the canyon and enters the flats. There are three other diversions on BLM lands along Big Timber Creek and one diversion on Little Big Timber.

Vegetation

Riparian areas within the Big Timber Creek and Leadore Hill allotments were identified as needing improvement in the Lemhi RMP (1987). An interdisciplinary team scoped the issue in 1993, and identified Basin Creek as the only area requiring a change in management to improve riparian condition. Big Timber Creek has a fairly narrow riparian corridor, but it is heavily vegetated with cottonwoods and willow, with a sparser *Carex/Juncus* component, which is typical of this site type. A lack of a middle age class of woody plants, but a healthy younger component, indicates a dramatic shift in management or use some time in the past. Basin Creek has a mix of dense willow communities and open *Poa* benches, with the stream widening and downcutting in the latter. Upper portions of Big Timber Creek and its tributaries are in good ecological condition, except at cross fences where livestock congregate on the creek.

Within areas of allotments with a history of season long grazing, many riparian conditions are generally characterized as having a mature to over-mature woody component with little reproduction, a depauperate *Carex/Juncus* community, considerable bare ground in some reaches, dominance of upland species (e.g., bluegrasses, cheatgrass) on immediate streambanks in many areas and frequent sloughing raw banks.

Table 2. Riparian habitat condition classes for streams within the Big Timber Creek watershed.

Stream	Length (miles)	Condition												Dewatered
		Proper Functioning Condition				Functional At Risk/Trend				Non-Functional				
		BLM	USFS	State	Pvt.	BLM	USFS	State	Pvt.	BLM	USFS	State	Pvt.	
Big Timber	19.1	3.0	10.5	0.0	1.0	0.0	2.0 ↑	0.0	2.1 →	0.0	0.0	0.0	0.0	0.5
Little Timber	4.2	0.0	0.0	0.0	0.0	0.5 ↑	0.0	0.0	2.0 →	0.0	0.0	0.0	0.0	1.7
Middle Fork	5.1	0.0	3.0	0.0	0.0	0.0	1.1 →	0.0	1.0 →	0.0	0.0	0.0	0.0	0.0
North Fork	3.8	0.0	2.0	0.0	0.0	0.0	0.9	0.0	0.9 →	0.0	0.0	0.0	0.0	0.0
Basin	4.9	0.5	1.7	0.0	0.0	0.3 ↑	0.0	0.0	1.9	0.0	0.0	0.0	0.5	0.0
TOTAL:	37.1	3.5	17.2	0.0	1.0	0.8	4.0	0.0	7.9	0.0	0.0	0.0	0.5	2.2

→ indicates a static trend
↑ indicates an upward trend

The condition and trend are Unknown for the majority of the small tributaries.

Elevation, aspect, precipitation and soil type are the primary factors determining the upland vegetative community present on a given site. Big Timber Creek has timber on the north facing slopes of Leadore Hill, with a sagebrush/grass community on south facing slopes. The lower portion of the watershed is nearly flat sagebrush grass communities dominated by Wyoming big sagebrush with an understory of bluebunch wheatgrass. There are numerous, very old irrigation ditches that bisect the uplands and give the appearance of streams since they have riparian vegetation along the ditch banks. The upper portions of the watershed, above Swan Basin are heavily timbered. Swan Basin is a large sagebrush/grass bowl with stringers of riparian vegetation running through it. Large stands of aspen are also a dominant feature of this area of the watershed.

Table 3. Condition class for BLM administered land within the Big Timber Creek watershed, based upon the 1983 Ecological Site Inventory. The trend was Static to Downward throughout the watershed. Ecological health is unknown on Forest and Private lands.

AREA	CONDITION CLASS (ACRES)				
	EXCELLENT	GOOD	FAIR	POOR	UNMAPPED
Big Timber Creek Allotment	0	2,069	4,793	0	85
Leadore Hill Allotment	0	884	1,212	0	617
Overall BLM	0%	30%	67%	0%	3%

Upland areas within both the Big Timber Creek and Leadore Hill Allotments were identified as needing improvement in the Lemhi RMP (1987). Except for small scattered inclusions of Good condition range, Fair condition uplands tend to be primarily the norm on the Big Timber Creek allotment. Fair upland conditions are evidenced by low vigor, generally sparse stands of bluebunch wheatgrass and Idaho fescue. A review of the uplands within the allotment during 1992 indicated potential for erosion in the Leadore Hill Allotment. This observed potential may not have been as evident had the area not been subjected to consecutive droughts in recent years. The need for an improved grazing system was also identified in the Lemhi RMP (1987). The current grazing system, however, has allowed the riparian areas to recover and continue to function properly. The generally limited grass/forb component on the uplands within the watershed is reducing habitat quality for numerous game and non-game species.

No rare plant populations are known to occur within this watershed.

Noxious weed infestations along the Mill Creek road are being addressed by a cooperative agreement between the USFS and the BLM to spray for three target species, black henbane, musk thistle, and leafy spurge.

Aquatic Resources

The Big Timber Creek watershed has been identified as having mountain whitefish, cutthroat, rainbow and bull trout present. It is also critical habitat for the Endangered Snake River spring/summer Chinook salmon and Snake River steelhead trout. There are currently no anadromous fish using the Big Timber Creek watershed, as it's dewatered when migration and spawning would occur. Big Timber Creek was historically used for spawning and rearing, but has not been used for either during the past 30 years. The status of all fish populations within the watershed are currently unknown, except that any migratory portions have been lost.

In 1997, the BLM and IDFG sampled fish densities at two sites in Big Timber Creek. Densities of rainbow trout at these site was estimated at 5.1 fish/100m^2. Bull trout were only found at the upper site. Densities of bull trout were estimated at 0.3 fish/100m^2.

Dewatering of lower Big Timber Creek prevents access to or from the Lemhi River for the majority of the year. Several tributaries to Big Timber Creek are also partially or completely dewatered for significant periods, severely restricting any migrations of any fish within the system to summering or wintering areas. None of the diversions within the watershed are screened to prevent access by fish. If fish could enter the creek to spawn, fish loss would occur as the juveniles could enter the ditches on their downstream migration. BLM biologists have noted fish trapped in diversion ditches after the irrigation season (Jude Trapani, BLM, pers. comm.).

Irrigation diversions have the biggest impact on the fish resources in the watershed. They pose barriers to all fish during times of potential migration. This factor has eliminated the migratory portion of any fish populations, so that resident populations in the headwaters remain the only portion of any historic presence. As such, catastrophic events could jeopardize the resident populations.

Although most of Big Timber Creek has received a Proper Functioning Condition rating, its peak summer temperatures still exceed those recommended in Idaho State Water Quality Standards and PACFISH Standards and Guidelines. Temperatures do not reach lethal levels, but warmer temperatures increase the metabolic needs of fish, increase the effect of any stressors already found within the environment and decrease the fishes' ability to deal with disease.

Roads

The Big Timber Creek watershed has 67.1 miles of roads, of which 0.1 miles are paved (0.1%), 7.6 miles (11.4%) are improved gravel, 31.8 miles (47.4%) are unimproved and 27.8 miles (41.1%) are two-tracks. Road densities have been calculated at 0.78 miles per square mile.

The Little Big Timber Creek road, a USFS/County maintained road, has been identified in the BLM's PACFISH Road Maintenance Plan as a Moderate sediment producer. This road has the potential to input sediment to Little Big Timber Creek.

Land Use

Livestock Grazing

There are two BLM administered allotments within the watershed, Big Timber Creek and Leadore Hill. Big Timber Creek has a two pasture deferred grazing system with fall trailing. Leadore Hill Allotment has season long grazing with no defined schedule. The USFS has one allotment, Big Timber Creek Cattle and Horse, with three pastures. There is no allotment management plan for this allotment, however Forest Grazing Standards are applied. Grazing preference for the watershed is 540 AUM's (est.) for the Forest and 1766 on BLM.

Energy and Mineral Exploration

There are several historic mining prospects and low level explorations on Federally administered lands, as well as some patented lands. None of the sites are located in the flats, nor are felt to affect the ecological health of the watershed.

Timber Harvest

There is no salable Big Timber on the BLM portion of the watershed, although there have been historic sales on the Forest.

Monitoring Data

The BLM has established vegetation monitoring sites at two locations within the watershed. Monitoring has been conducted at these sites since 1993, and consists of stubble heights, photographs and water temperature. Color infrared photographs were obtained and a detailed riparian inventory was conducted in 1995 to help evaluate conditions and determine valid objectives. Each year the collected data and a synopsis of that year's management are presented in a monitoring report. In general, the vegetative monitoring shows overall good conditions.

The USFS also conducts vegetative monitoring at multiple sites on their allotments within the watershed. Monitoring has been conducted since 1993 and includes water temperature, greenlines, bank stability, cross-sections, woody species regeneration, utilization levels and photographs. Management for the next grazing season is based on the trend studies and utilization levels. The data indicates a positive trend in condition ratings.

The Idaho Division of Environmental Quality sampled water quality parameters at three sites on Big Timber Creek in 1994 and 1995. Sampling was conducted using the Beneficial Use Reconnaissance Program protocols. The upper most site is approximately 3 miles upstream from the Warm Springs BLM road crossing (T 14N R 26E NE 1/4 NE 1/4 SE 1/4 of Section 6 on the Sheephorn Peak Quadrangle). The next site downstream is at the Warm Springs BLM road

crossing (T15N R 26E SW 1/4 SW 1/4 NW 1/4 of Section 20 on the Sheephorn Peak Quadrangle). The lowest BURP survey site is approximately 1.3 miles below the confluence of Little Timber Creek (T 15N R 26E SW 1/4 SE 1/4 NE 1/4 of section 5 on the West of Leadore Quadrangle). McNeil sediment core samples were collected approximately 1/4 mile below the lowest BURP site. Erosion Inventory Estimates were conducted at two sites: 1) from the Warm Springs BLM road crossing downstream 1,162 feet to the private land boundary, and on 2,325 feet of Big Timber Creek working upstream from approximately ½ mile below the lowest BURP site. Nutrient samples were not collected on Big Timber Creek due to dewatering of the lower section of the 303d segment.

Sediment analysis includes Wolman Pebble Count, McNeil Core Sampling, and a Bank Erosion Inventory. The Wolman Pebble Count is an evaluation of surface substrate particle size. There appears to be little correlation between surface and subsurface fines (R. Rose, USFS, personal communication). Three sites were evaluated for % surface fines in the watershed. The uppermost BURP site showed a Wolman Pebble Count of 39% less than 1/4". The middle site was 3% and the most downstream site was 9%. The data at the upper site indicates a likely reduction in fry survival based on professional judgements and comparison to the McNeil sampling data. The McNeil sampling data evaluates subsurface fines, to a depth of 4" for resident fish species, and indicates expected fry survival as it relates to percentage of intragravel fines less than 1/4". Two sites were sampled on mainstem Big Timber Creek in 1997, one by IDEQ on the lower BLM and one by the USFS, downstream of Basin Creek. At the upper site, below Basin Creek, the mean % fines, including substrate 2 1/2" and greater, was 24.6%. This site has been sampled since 1993 and has shown a statistically significant decrease in % fines since that time. At the lower site, the mean % fines, including substrate 2 1/2" and greater, was 18.2%, with a standard deviation of 4.3. The USFS also sampled sites on the North Fork and Middle Fork of Little Big Timber Creek in 1993 and 1994. At both sites, a decrease in percent fines occurred between the two years. Chapman (1988) suggested that fine sediment < 0.85 mm is most responsible for suffocation and abrasion of salmonid eggs and coarser sediment, <9.5 mm can create a survival barrier preventing salmonid fry emergence from the redd (Tappel and Bjornn 1983). The mean % fines less than 0.85 mm including substrate 2 1/2" and greater was 5%. The mean % fines less than 0.85 mm not including substrate 2 1/2" and greater was 7.6%. Hall (1986) found survival (eyed egg to emergence) of coho, Chinook and chum salmon to be only 7-10% in gravel mixtures made up of 10% fines as compared to 50- 75% survival in gravel mixtures with no fines less than 0.85 mm. Reiser and White (1988) observed little survival of steelhead and Chinook salmon eggs beyond 10-20% fines less than 0.85 mm.

The Bank Erosion Inventory is a qualitative evaluation of channel shape, bank stability and riparian vegetation developed by the NRCS as a tool to evaluate erosion condition on streambanks, gullies and roads. In 1997, surveys were conducted along 8% (0.66 miles) of the listed reach length. The evaluation was done along two different reaches, one near the Carey Act dam, and one down on the lower BLM, to provide a more comprehensive overview. Streambanks along the upper reach were classified as having a slight erosion potential, with an overall rating of 3.5 out of a potential 15. This equates to a lateral recession rate of 0.035 feet per year, resulting in an estimated sediment yield of 4.98 tons per year for this reach. Streambanks along the lower reach were classified as having a slight erosion potential as well,

with an overall rating of 4 out of a potential 15. This equates to a lateral recession rate of 0.05 feet per year, resulting in an estimated sediment yield of 6 tons per year for this reach.

The Stream Erosion Condition Inventory conducted on the upper section of Big Timber Creek estimates 22.63 tons per stream mile of sediment from stream bank erosion over the sample reach. This ranks 16th out of 27 sample reaches surveyed on 13 streams in the Lemhi watershed. The average estimate of tons of sediment contributed by steam bank erosion per mile for all stream sample sections was 110 tons per mile. Of the total 303d listed mainstem stream miles, the upper site is likely representative of approximately 2 miles. This equates to 45.25 tons of sediment from stream bank erosion from the Carey Act Dam to the confluence of Little Timber Creek.

The Lower sample site estimate is 12.6 tons per mile of sediment from stream bank erosion over the sample reach. This ranks 18th out of the 27 sample reaches surveyed. The lower sample site is most closely representative of 5.36 miles of Big Timber Creek. This equates to 72.9 tons of sediment from stream bank erosion from the confluence of Little Timber Creek with Big Timber Creek to the confluence of Big Timber Creek with the Lemhi River. Aquatic insect communities sampled at the upper, middle, and lower sites on Big Timber Creek showed scores of 4.4, 4.7 and 4.6, respectively. Scores greater than 3.5 are indicative of non-impaired macroinvertebrate communities. These samples score high due to the presence of macroinvertebrate species which require cold water to survive.

The Habitat Index gives a score based on the natural fish habitat conditions. The sites on Big Timber Creek fall within two ecoregions, the Northern Rockies Ecoregion (upper site) and the Snake River Basin/High Desert Ecoregion (middle and lower sites). The score of 81 at the upper site fails to meet the necessary criteria, requiring further evaluation of conditions in order to make a determination. This score could be influenced by the management of the Carey Act dam, as each fall water is quickly released causing a strong, short duration impulse of high water that likely increases the width to depth ratio for some distance down stream also reducing bank stability. The scores of 104 (middle) and 88 (lower) at the other two sites indicate non-impaired conditions within the listed reach.

The BLM and USFS have recorded water temperature at various sites within the watershed since 1993. Maximum water temperatures at the lowermost BLM/private boundary average 66.2° F between 1994 and 1997. Maximum water temperatures recorded in Big Timber Creek at Grove Creek, have averaged 59.3° F since 1993, with an annual average increase of 6.5° F over this nine mile distance. Maximum water temperatures at the mouth of Basin Creek have averaged 65.8° F since 1994, fluctuating on an annual basis. Maximum temperatures in the Middle Fork Little Timber Creek have averaged 58° F since 1993, again, fluctuating on an annual basis.

Water Quality Concerns

Big Timber Creek is on the 303d list for sediment from the US Forest Service Boundary to its confluence with the Lemhi River. This listing definition encompasses the lower third of the stream. The primary land use along the listed section includes grazing and irrigated agriculture. Land ownership adjacent to the 303d listed segment of Big Timber Creek is approximately 25% BLM and 75% private.

Designated beneficial uses for the listed reach include, Primary Contact Recreation, Industrial Water Supply, Wildlife Habitat, and Aesthetics. Existing beneficial uses include Coldwater Biota, Salmonid Spawning and Agricultural Water Supply. The listed reach on Big Timber Creek has been determined to Fully Support beneficial uses. The effect of acute sediment pulses, resulting from rapid release of water impounded by the Carey Act dam, on fish habitat needs to be investigated further.

Analysis

Sediment production from within the watershed has the potential to reach the Lemhi River affecting the spawning and rearing habitat of Chinook salmon. Utilization of riparian habitat by livestock has slightly reduced both the younger age class of woody riparian vegetation and the established woody vegetation. This affects the ability of the riparian habitat to slow the water down and filter sediment during peak flows and overland events. In places, livestock grazing has resulted in a widening of the stream channel and streambank trampling, increasing sediment production. Sediment combined from all sources has an adverse affect on the potential of Chinook spawning/rearing in Big Timber Creek, although it appears by current information and observation that most deposition in the lower reaches occurs from irrigation practices (Scott Feldhausen, BLM, pers. comm.). Suspended sediment settles out behind the Carey Act dam during the irrigation season. At the end of this season, the opening of the dam and subsequent release of impounded water deposits accumulated sediment for miles downstream. The acute effects of this sediment release, on fish physiology and aquatic insect communities, are significantly more substantial than potential effects from activities discretionary to federal agencies. BLM biologists have noted deposits up to two inches deep five miles downstream from the dam after impounded water is released in the fall (Scott Feldhausen, BLM, pers. comm.).

Evaluation of sediment deposition characteristics within the stream and of erosion characteristics of stream banks do not show elevated sediment deposition and erosion respectively. The primary source of sediment is stream bank erosion within the 303d segment, however sediment accumulation above the Carey Act dam indicates potential significant sources above the 303d segment, which would include roads, stream bank erosion and overland erosion. Overall, riparian vegetation appears to be adequate adjacent within the 303d segment.

Although the water temperatures at the site in lower Big Timber Creek do not meet standards, it is interesting to note that the difference between the Grove Creek site and the lower Big Timber Creek site has decreased every year since 1994. In 1994, the difference was 11 degrees, but in 1997, it was down to 4.5 degrees. The Grove Creek site, however, has shown a

very slight warming trend. Efforts at improving conditions on Basin Creek need to continue to allow woody vegetation to provide the necessary shade to cool this stream and decrease the effect on the temperature regime in Big Timber Creek.

METHODOLOGY

Fisheries Surveys

Fish presence and abundance was documented by utilization of backpack electrofishing methodologies in the summer of 2003. Site locations encompassed the entire Big Timber Creek watershed, with sites located on private property, BLM property, and within the Salmon-Challis National Forest boundary. Site locations were selected to encompass a complete sampling coverage of fish communities within Big Timber Creek, and between major tributaries and diversions along the mainstem Big Timber Creek. Some site locations were selected based on adequate access and permission from landowners.

Sites generally consisted of a 100 meter transect isolated with block nets. Most sites were a one-pass electrofishing survey, with a few monitoring sites surveyed utilizing three-pass depletion-removal electrofishing techniques. Site selection was based upon variability and abundance of fish habitat within each transect, as well as stream flow and channel width. Electrofishing was conducted with a 3 to 5 person team, with one person operating a Smith-Root Model 15D generator powered backpack electrofishing unit. The other team members netted fish, with 1 or 2 primary netters and one secondary netter who carried the 5-gallon holding bucket. The electrofishing unit was typically operated at the H- to I-5 setting at 400-700 volts pulsed DC. All settings were within the guidelines for electrofishing waters containing salmonids listed under the Endangered Species Act established by the National Marine Fisheries Service.

After the completion of each electrofishing pass, all salmonids were measured for fork-length (mm) and weight (g), and all other fish species were enumerated. Before handling, all fish were anesthetized with a 15g/L solution of MS-222 to reduce stress and prevent injury. In between passes, fish were held in recovery live-wells, and released back into the transect after completion of all 3 passes and processing. Habitat data was collected following fish processing, including stream widths recorded at 20 m intervals through each transect, water temperature measurements, and percent habitat type.

For all completed streams surveys, we met the assumptions of depletion-removal electrofishing by (1) placing block nets (0.5 cm mesh) at both ends of a stream transect (closing the population), (2) sampling each transect within the same day (usually 3 hours), and (3) using constant effort in each pass.

Population estimates for stream transects with multiple passes were generated using a program developed by Steve Duke (1994). This program uses methods from the following papers: (1) Carle, F.L and Strub, M.R. (1978). A new method for estimating population size from removal data. Biometrics 34:621-630., and (2) Zippin,C. (1956). An evaluation of the removal method of estimating animal populations. Biometrics 12:163-189. This program generates total population estimates, probability of capture, standard error of total population, and 95% confidence intervals for total population.

Diversion and Irrigation Inventories

An inventory was conducted to document all individual diversion and irrigation water withdrawal practices within the watershed, including; property ownership, irrigators, associated water rights, diversion type, headgate type, and measuring devices. Property owners and irrigators are interviewed to understand their irrigation needs and to obtain permission to survey diversions and access potential fish threats for possible mitigation projects. These preliminary field surveys will be used to prioritize projects to minimize threats from entrainment, dewatering, and migration barriers.

Water Temperature Monitoring

Because stream reaches with extreme water temperatures can block adult migrations upstream and prevent juveniles from dispersing downstream into suitable rearing habitat, thermographs were stationed at various locations throughout the Lemhi River basin, including BigTimber Creek, to monitor water temperature. This was conducted by IDFG as part of the Lemhi River Monitoring Plan in the 2003 field season (Resseguie 2003). Data extracted from thermographs were used to evaluate whether suitable water temperatures for different salmonid life stages existed in a particular reach of the river or stream. Thermographs were set to record at two-hour intervals. Recording accuracy of the devices was ±0.2°C. Operational range was –5 to 40 degrees Celsius. Thermographs were in place and operated from early May through mid October.

As part of an ongoing effort to monitor riparian habitat, the BLM Salmon Field Office collected temperature data at one site on BigTimber Creek during the 2003 field season (BLM 2003). Thermographs were in place to monitor from late June or early July until October and were set to record ten readings per day. Temperature data for each thermograph is displayed as daily maximum, daily average, daily minimum temperatures, and 7-day maximum temperatures. These are compared to PACFISH guidelines. PACFISH guidelines are 17.8° C (64.0° F) for a rearing/migration maximum and 15.6° C (60.1° F) for a spawning maximum. Bull trout guidelines for the subbasin are 2-5° C (35-41° F) for incubation, 4-12° C (39-54° F) for rearing, and 4-9° C (39-48° F) for spawning.

RESULTS

Fish presence and abundance was documented in the Big Timber Creek watershed by Idaho Department of Fish and Game (IDFG) personnel in the summer of 2003. A total of 30 transects were completed on mainstem Big Timber Creek and all of it's tributaries, including; Basin Creek, and Little Timber Creek. Most of the surveys were on USFS and BLM land with a few on Lower Big Timber Creek and Basin Creek on private property (Figure 1). These transects encompassed 2.955 km of stream length, and 9,642 m^2 of sampled stream habitat (Table 6). The electrofishing surveys were conducted between 14 August and 10 October 2003 (Table 7). Of the 30 transects, 10 mainstem Big Timber Creek sampling sites were located at approximate 1-mile intervals upstream from the de-watering point of Big Timber Creek to it's headwaters. One transect was done on each of Big Timber Creeks seven tributaries approximately one kilometer upstream from their confluence. Although it fails to connect for most of the year, Little Timber Creek was also surveyed. Four transects were done on both the

Middle Fork and North Fork Little Timber Creeks, and two more on the mainstem Little Timber Creek. The lowest transect on Little Timber Creek was actually in an irrigation ditch that disconnects Little Timber Creek from Big Timber Creek. Three transects were also conducted on Basin Creek. In order to obtain fish population estimates, two multiple-pass transects were conducted in Big Timber Creek and one in Little Timber Creek.

Of the total stream length and area sampled, 35% (1.02 km) of stream length and 54% (5,178 m^2) of stream area sampled were in mainstem Big Timber Creek. In Little Timber Creek 0.97 km of stream length and 2,678 m^2 of stream area were sampled. Fish were collected at every site sampled in the Big Timber Creek watershed. No salmonids were collected in one of the Swan Basin transects of Basin Creek, but there were some sculpin documented.

Chinook Salmon

Chinook salmon were not present in Big Timber Creek watershed during the survey period.

Steelhead/Rainbow Trout

Rainbow trout were present in 10 transects (33.3% of all electrofishing sites) in Big Timber Creek (Figure 2). Rainbow trout were only found in mainstem Big Timber Creek below Rocky Creek. They were also found in very high densities in lower Basin Creek. Rainbow trout densities ranged from 0.23 to 29.03 fish per $100m^2$ (Table 8). The mean density of rainbow trout sampled in Big Timber Creek was 5.04 fish per $100m^2$. There were no rainbows found in Little Timber Creek, and they were found in one transect in Basin Creek at 29.03 fish per $100m^2$. According to fish densities, rainbow trout were most abundant in lower sections of Big Timber Creek, and in lower Basin Creek as densities declined as elevation increased.

In Big Timber Creek watershed, rainbow trout lengths ranged from 39 mm to 293 mm (Table 9, Figure 9). The mean length of rainbow trout sampled in the drainage was 142.3 mm. Weights were collected at all sites in Big Timber Creek watershed. Weights ranged from >1 to 260 g, and averaged 50.8 g.

Bull Trout

Bull trout were present at 18 sites (60% of all transects) in the Big Timber Creek watershed (Figure 3). Bull trout were collected from the middle of the mainstem of Big Timber Creek upstream to its highest tributaries near the headwaters. Bull trout were also found in Little Timber Creek in both the Middle and Nork Fork Little Timber Creek. Bull trout were the most abundant species found in the Big Timber Creek watershed. Density of bull trout in Big Timber Creek watershed ranged from 0.17 to 19.18 fish per $100m^2$, with a mean of 10.32 individuals per $100m^2$ (Table 10). Bull trout sampled ranged in length from 31 mm to 470 mm, with a mean of 143.31mm (Table 11, Figure 10). Bull trout were weighed at all of the sites they were present. We were unable to weigh all of the bull trout accurately due to larger specimens exceeding the limitations of our scales. The mean and maximum weights do not reflect some of the larger fish. Bull trout weights ranged from >1 g to 620 g, with a mean of 51.5 g.

Westslope Cutthroat Trout

Westslope cutthroat trout were present at 18 sites (60% of all transects) in the Big Timber Creek watershed (Figure 4). Westslope cutthroat trout were most abundant in the middle to upper reaches on the mainstem Big Timber Creek, and in Little Timber Creek. They were also found in high densities in the headwaters of Basin Creek. Density of westslope cutthroat trout in Big Timber Creek watershed ranged from 0.45 fish per $100m^2$ to 18.48 fish per $100m^2$ (Table 12). The mean density of cutthroat trout throughout the watershed was 5.59 fish per $100m^2$.

Westslope cutthroat trout lengths ranged from 36 mm to 286 mm (Table 13, Figure 11), with a mean length for cutthroat in the watershed being 133.66 mm. Cutthroat trout weights ranged from >1g to 217 g, with a mean weight of 44.7 g.

Westsope cutthroat trout were observed and caught on hook and line in Stone Reservoir on Little Timber Creek, and observed in Middle Fork Little Timber Lake. These were larger fish (150mm – 270mm), but no data was recorded.

Rainbow Cutthroat Hybrids

Rainbow Cutthroat hybrids were present in one transect, accounting for 3% of the total sites sampled within the Big Timber Creek watershed (Figure 5). The single specimen was 172 mm long and weighed 58 g. This fish was found in a middle mainstem transect of Big Timber Creek. The density resulted in 0.2 fish per $100m^2$ (Table 14).

Mountain Whitefish

Mountain Whitefish *(Prosopium williamsoni)* were present in seven transects, accounting for 23.3% of the total sites sampled within the Big Timber Creek watershed. All mountain whitefish were found in the mainstem Big Timber Creek below Cabin Creek. Whitefish densities ranged from 0.17 fish per $100m^2$ to 2.59 fish per $100m^2$ with an average density of 1.01 fish per $100m^2$ (Table 14) Mountain Whitefish lengths ranged from 65 mm to 350 mm (Figure 12) with many larger specimens. Their weights ranged from 3 g to 470 g.

Sculpin sp.

Sculpin (*Cottus sp.*)were present in 15 transects in the Big Timber Creek watershed, accounting for 50% of the total electrofishing transects sampled (Figure 6). Due to the difficulty of field identification, individual sculpin species were grouped together. Sculpin were found from lower sections of Big Timber Creek extending to Cabin Creek. They were also found in the lower sections of Little Timber Creek and Basin Creek. Sculpin densities ranged from 0.98 to 43.38 fish per $100m^2$, with a mean of 19.67 fish per $100m^2$ (Table 14). Sculpin were enumerated only and not measured for weight and length.

Diversion and Irrigation Inventories

In Big Timber Creek there are 15 active diversions that are currently diverting water for flood irrigation (Figure 8, Table 4). None of the diversions have measuring devices or fish screens installed. There are more unscreened diversions in Little Timber Creek and Basin Creek drainages (~ 12), although the total numbers are unknown. All irrigators and water rights listed

in Table 4 are unofficial, and are only being used as preliminary guidelines to understanding water use in the watershed. Any official documentation of legal water rights or claims should be conducted through the Idaho Department of Water Resources.

Water Temperature Monitoring 2003

In 2003, IDFG documented water temperatures with temperature-recording devices (HOBO's) in Big Timber Creek to evaluate whether suitable water temperature for different salmonid life stages exists. Thermographs were set to record at two-hour intervals. Temperature recording accuracy of the devices was ±0.2°C. Operational range was –5 to 40 degrees Celsius. Thermographs were operated from early May through mid October. Thermographs were checked periodically (usually biweekly) to ensure that they remained submerged and had a working battery.

Thermographs were collected on October 15th or shortly after. Data was downloaded and reviewed so any invalid data recorded when devices were in transit could be eliminated to avoid skewing results. The data was then processed and summarized using a macro developed in Microsoft Excel ™ by IDEQ. Idaho Cold Water Biota exceedance criteria (maximum instantaneous temperature: 22° C; daily average 19° C) were used to evaluate water temperature and to identify dates when salmonids may have experienced temperature related stress near each site. Temperature criteria for Idaho salmonid spawning (maximum instantaneous temperature: 13° C; daily average: 9° C) and related exceedance dates are also evaluated (Resseguie 2004).

At the Big Timber Creek HOBO location, the mean daily average water temperature was 11.4°C and the instantaneous maximum temperature was 20.8 ° C (Figure 13). Temperatures met Idaho Salmonid Spawning Criteria (daily average < 9.0° C) for 49 days (32 % of the days during the recording period). Exceedances for this criteria occurred between May 14th and September 12th, 2003.

The BLM monitored water temperatures in at the mouth of Big Timber Creek in 2003. The seven-day maximum average was 19.4° C, with a maximum daily average water temperature of 20.5° F (Table 5, Figure 14-15).

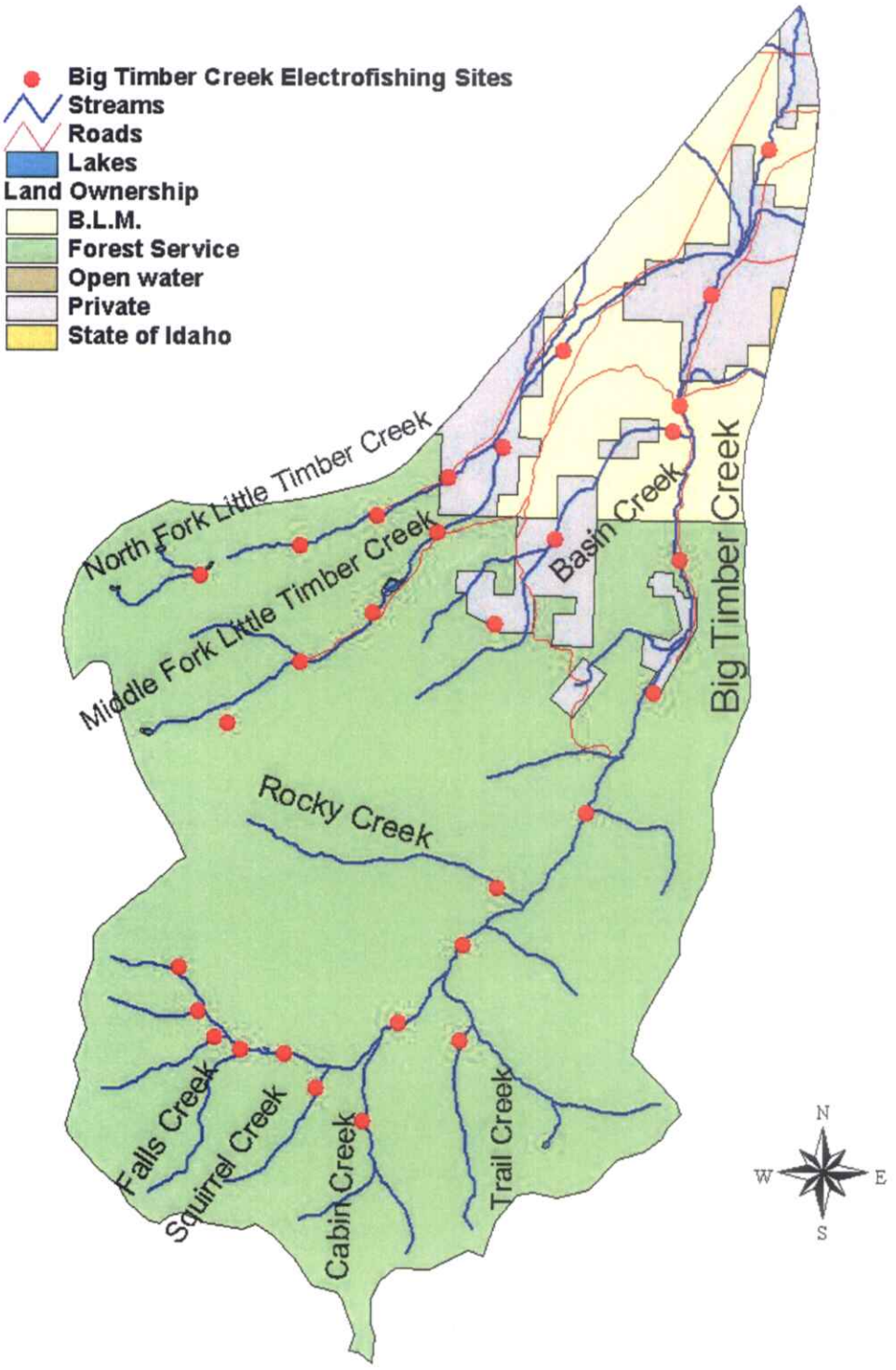


Figure 1. Locations of electrofishing sites completed by Idaho Department of Fish and Game, 2003, Big Timber Creek watershed, Lemhi County, Idaho.

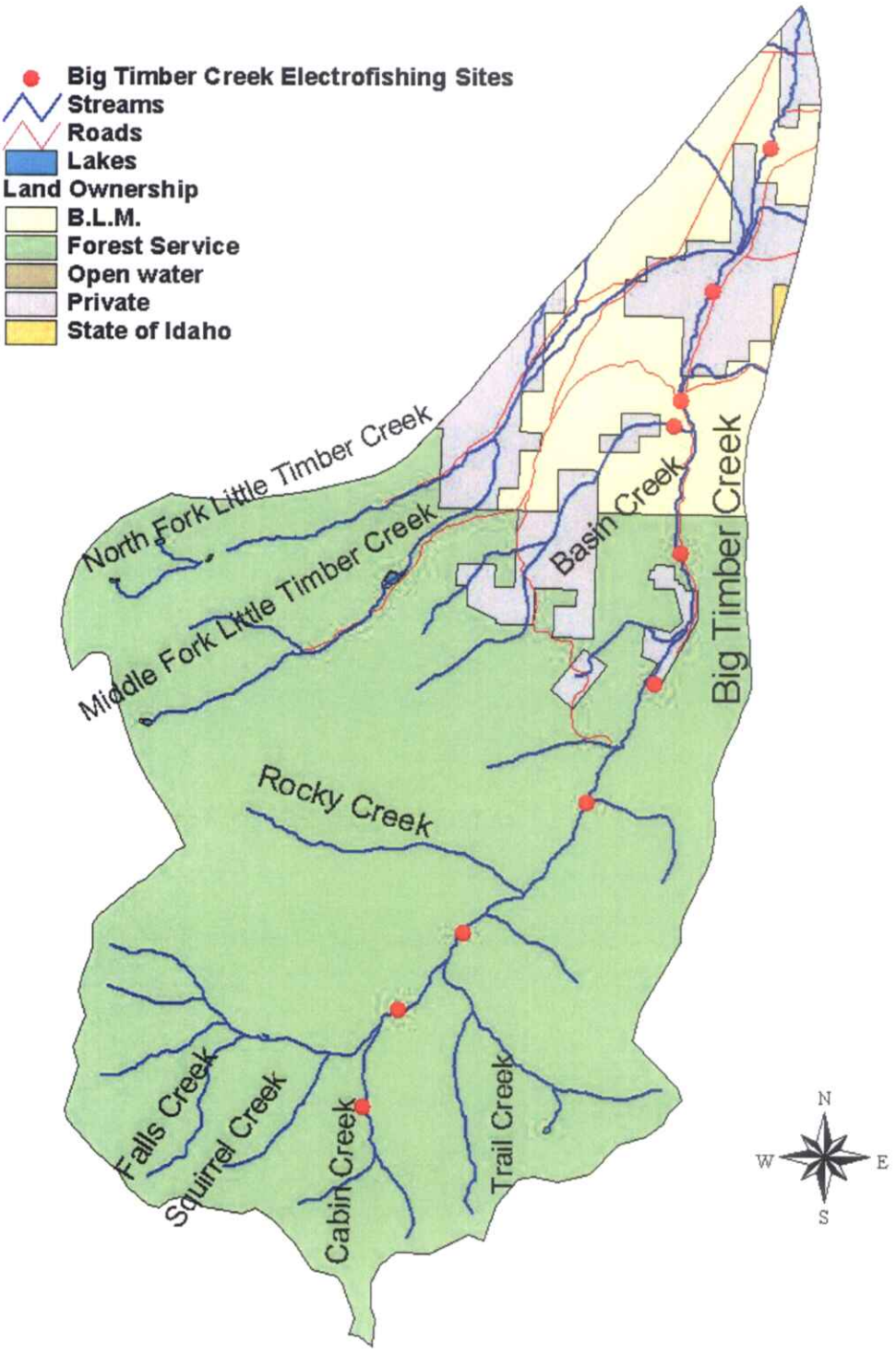


Figure 2. Locations of electrofishing sites where steelhead/rainbow trout *(Oncorhynchus mykiss)* were collected during 2003 electrofishing surveys, Big Timber Creek watershed, Lemhi County, Idaho.

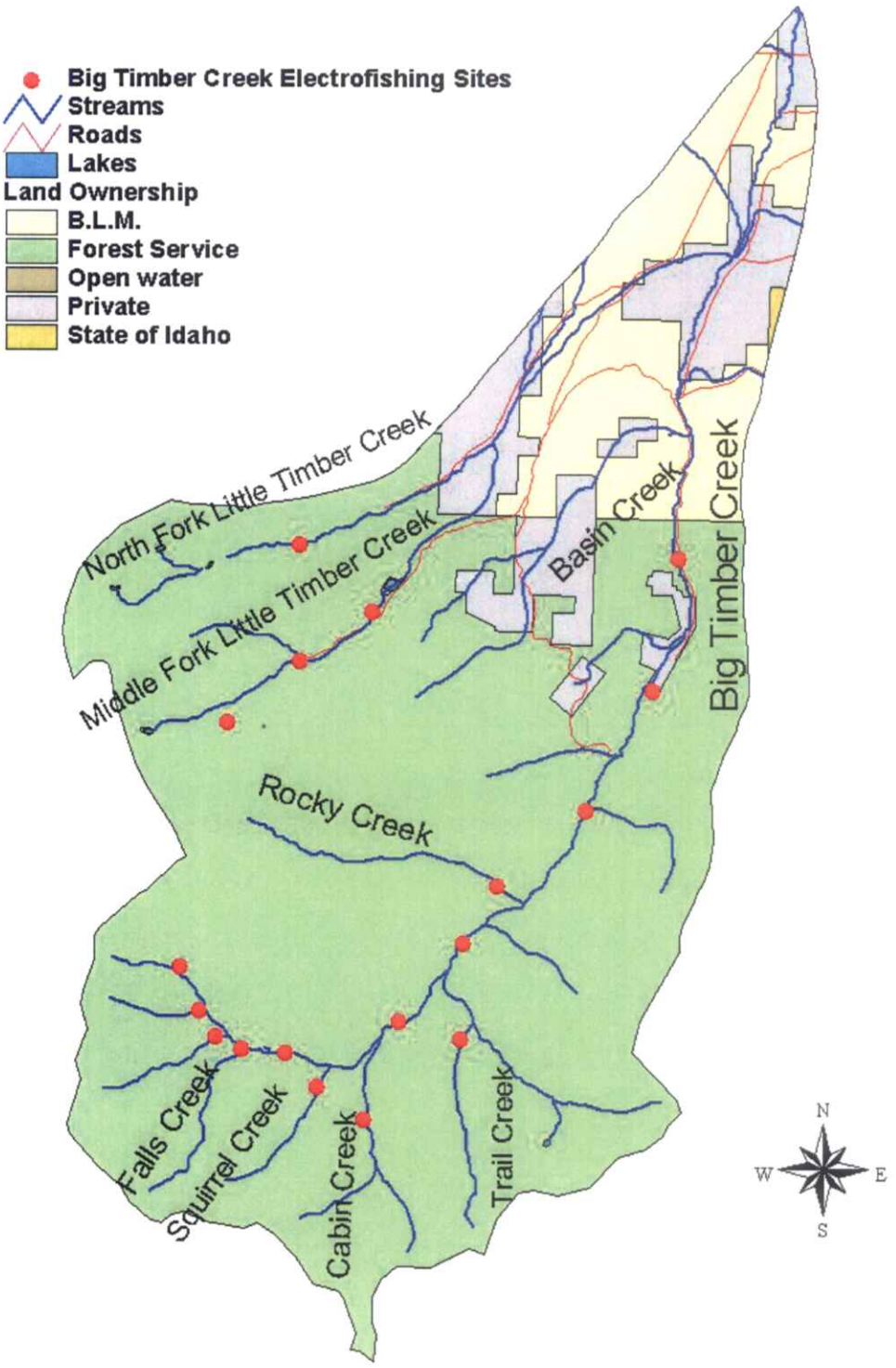


Figure 3. Locations of electrofishing sites bull trout *(Salvelinus confluentus)* were collected during 2003 electrofishing surveys, Big Timber Creek watershed, Lemhi County, Idaho.

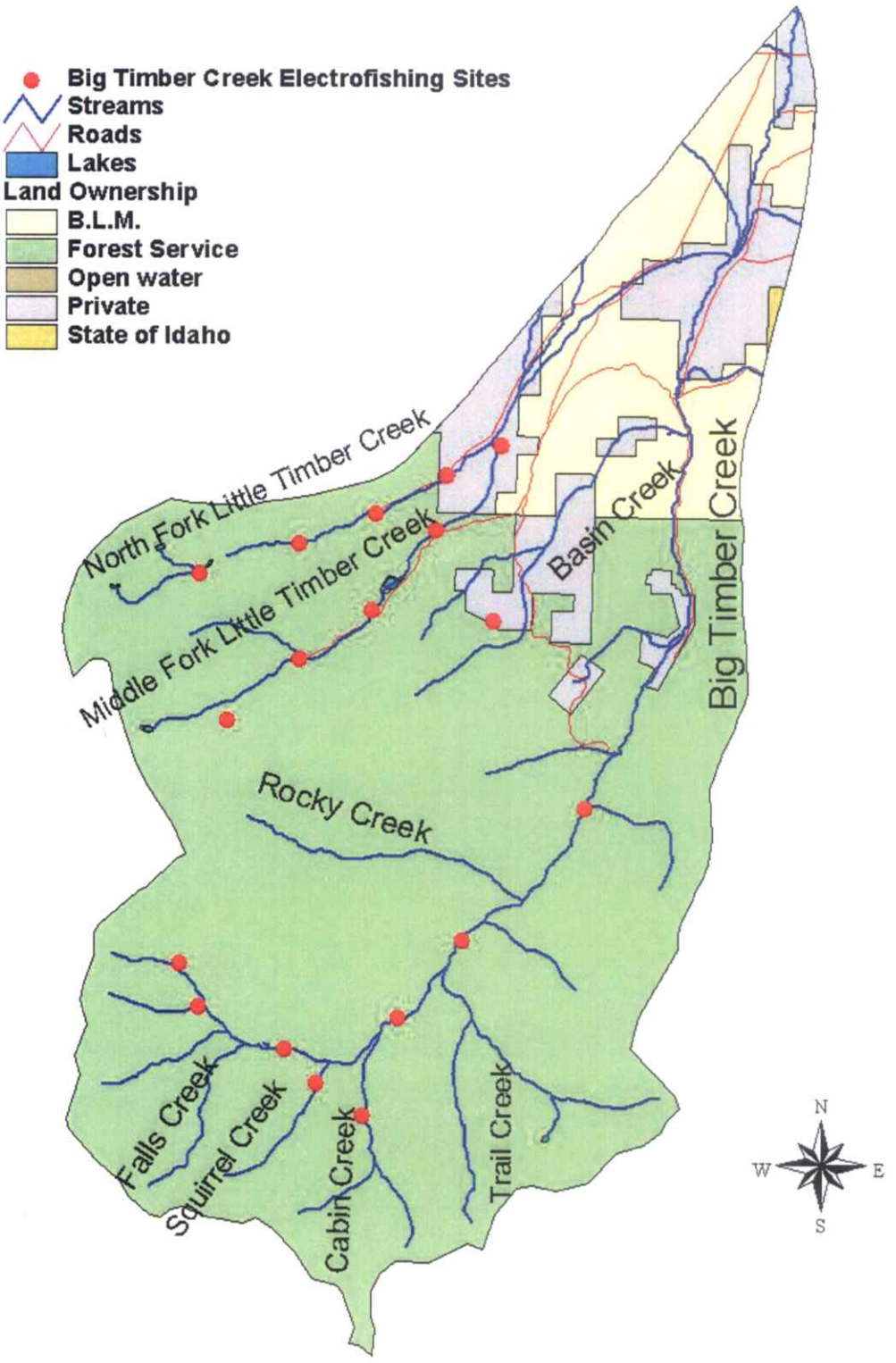


Figure 4. Locations of electrofishing site where westslope cutthroat trout *(Oncorynchus clarki lewisi)* were collected during 2003 electrofishing surveys, Big Timber Creek watershed, Lemhi County, Idaho.

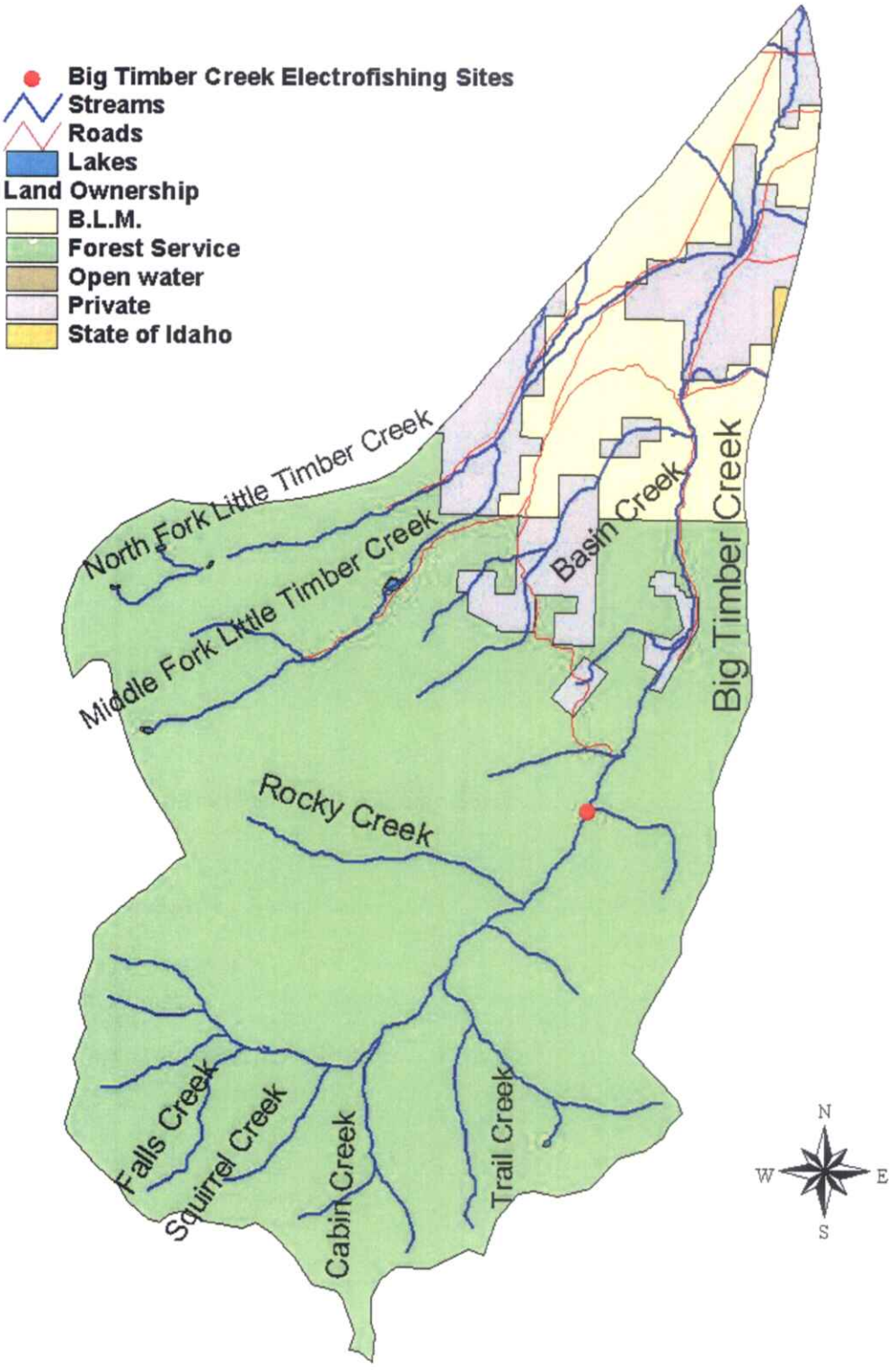


Figure 5. Locations of electrofishing site where rainbow cutthroat hybrids *(Oncorynchus sp.)* were collected during 2003 electrofishing surveys, Big Timber Creek watershed, Lemhi County, Idaho.

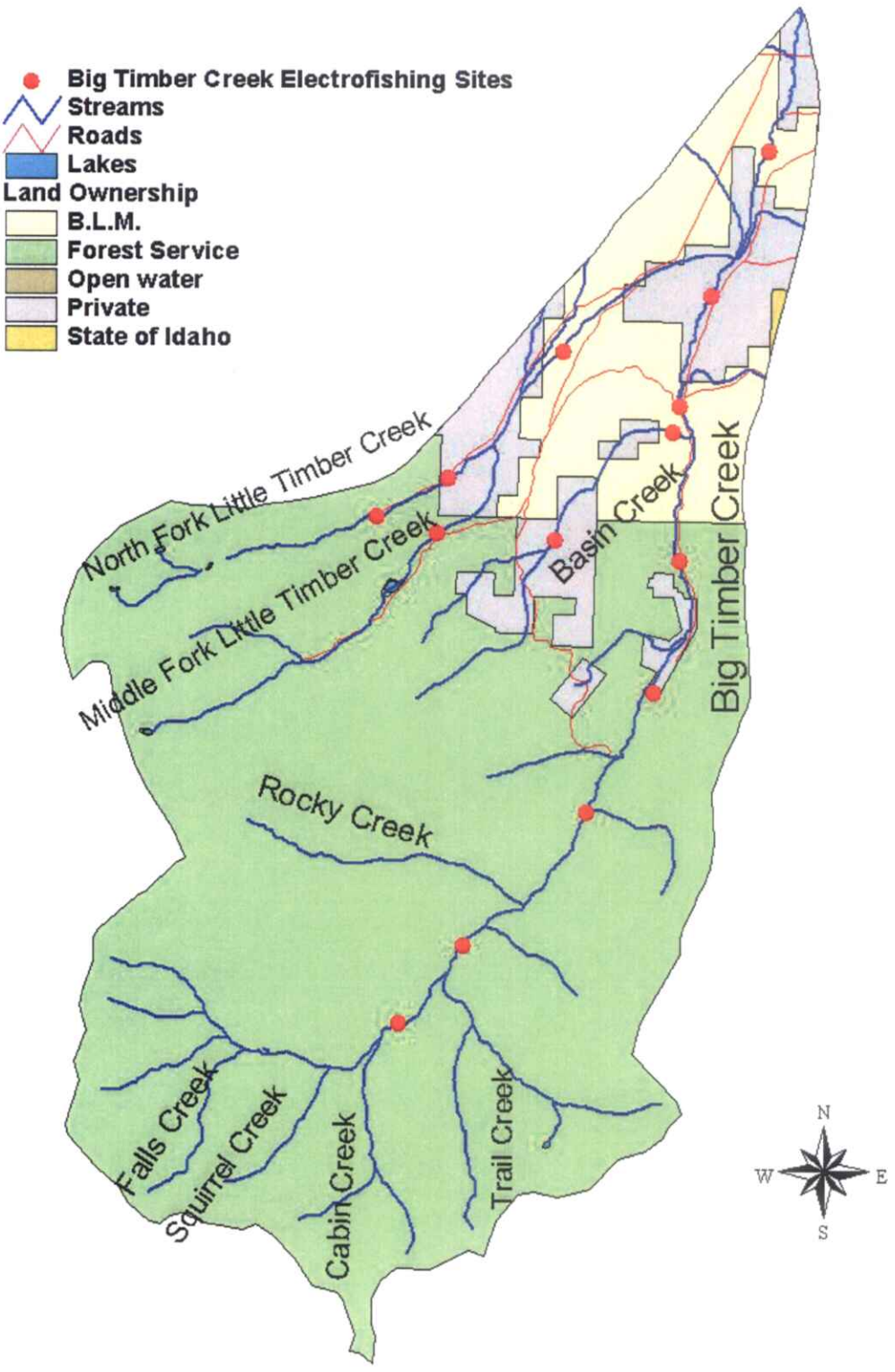


Figure 6. Locations of electrofishing sites where sculpin *(Cottus sp.)* were collected during 2003 electrofishing surveys, Big Timber Creek watershed, Lemhi County, Idaho.

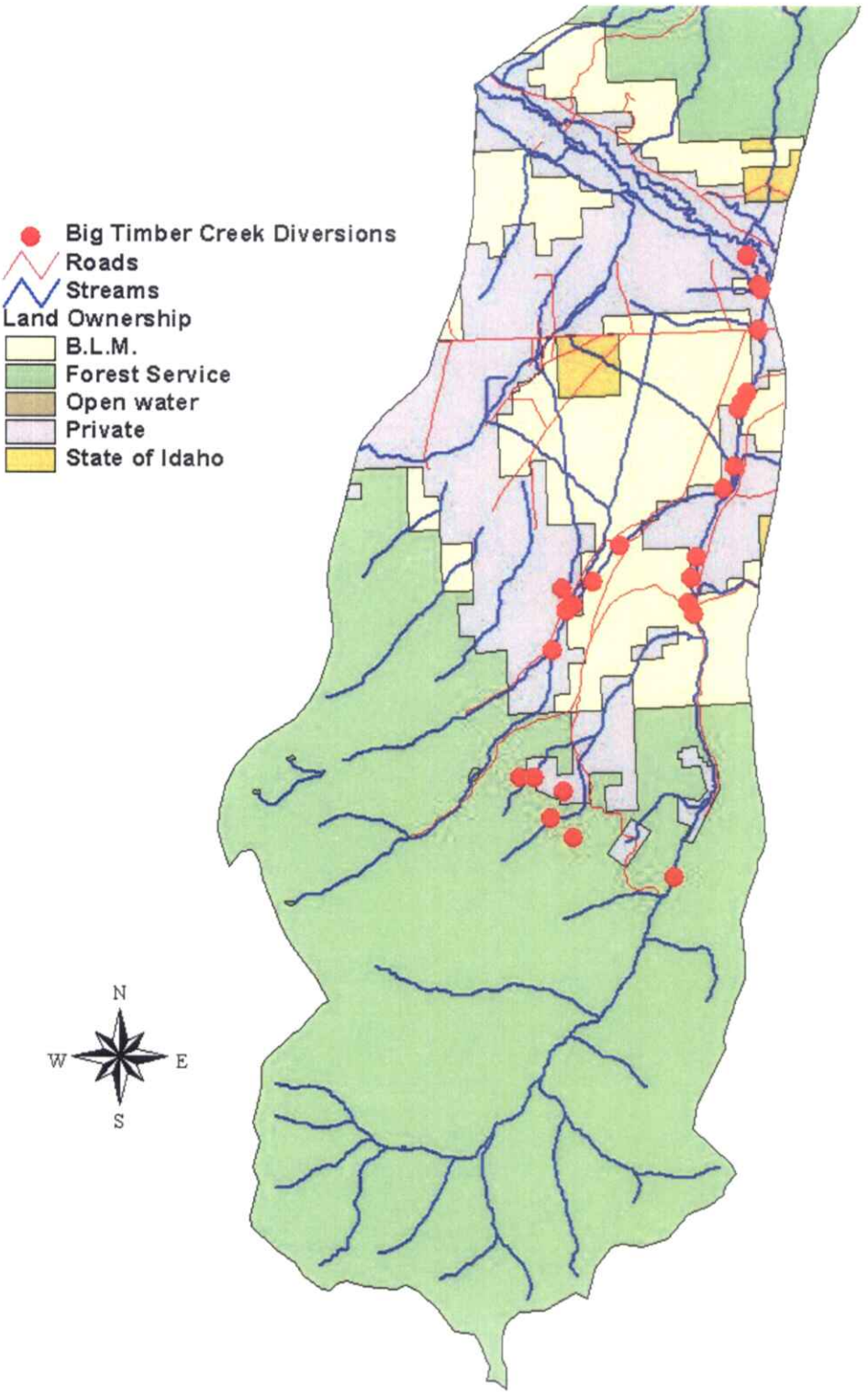


Figure 7. Locations of diversion sites, Big Timber Creek watershed, Lemhi County, Idaho. 2003.

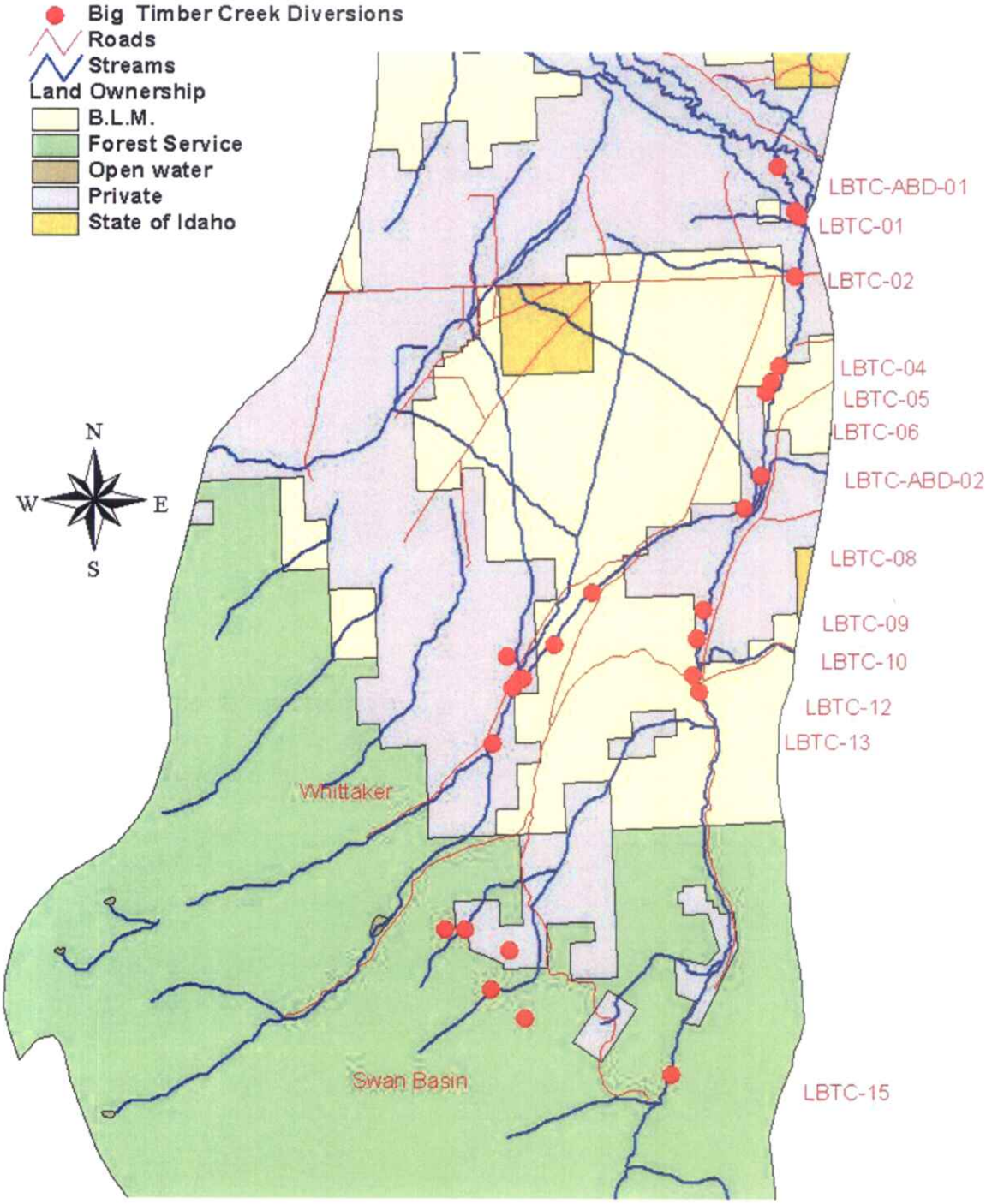


Figure 8. Diversion locations and names, Big Timber Creek watershed, Lemhi County, Idaho. 2003.

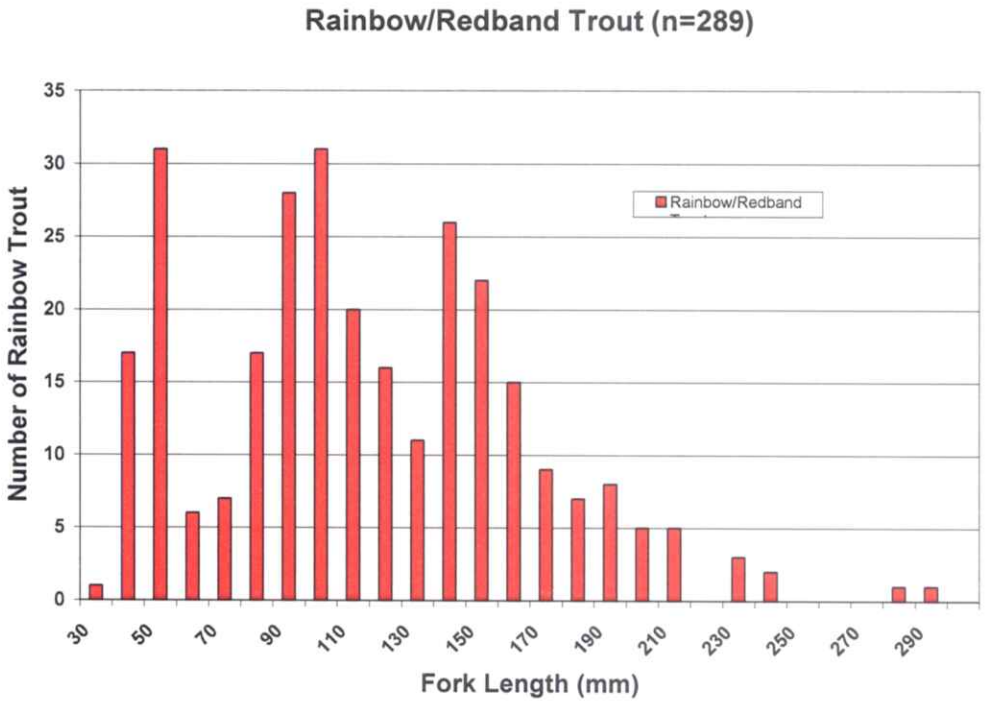


Figure 9. Length frequency of rainbow/redband trout *(Oncorhynchus mykiss)* (n=289) sampled in Big Timber Creek watershed by IDFG in 2003.

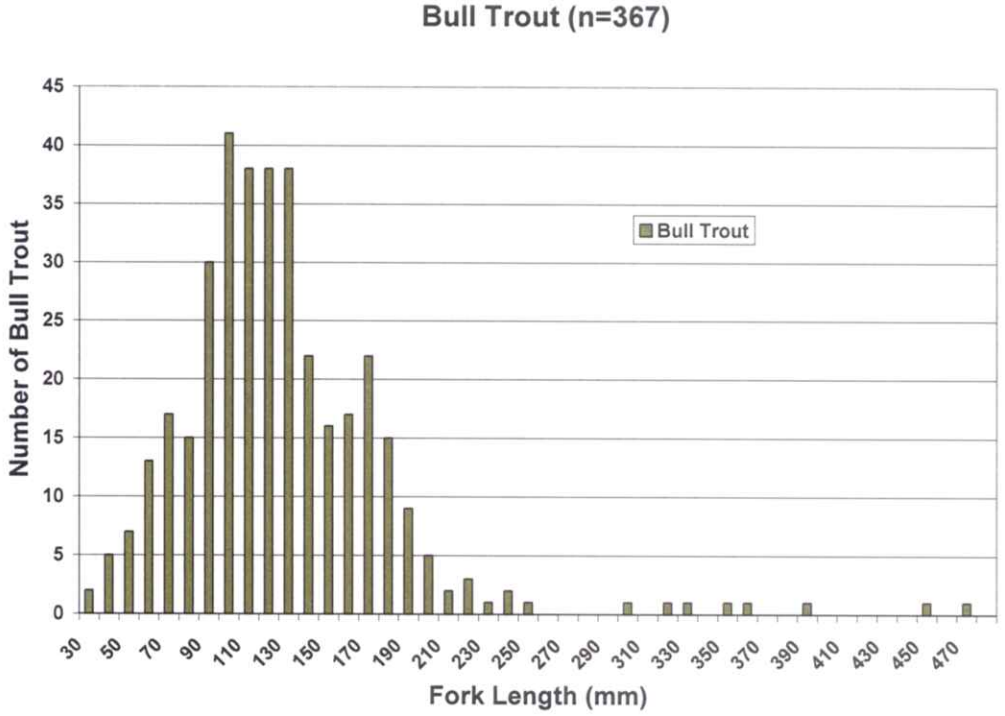


Figure 10. Length frequency of bull trout *(Salvelinus confluentus)* (n=367) sampled in Big Timber Creek watershed by IDFG in 2003

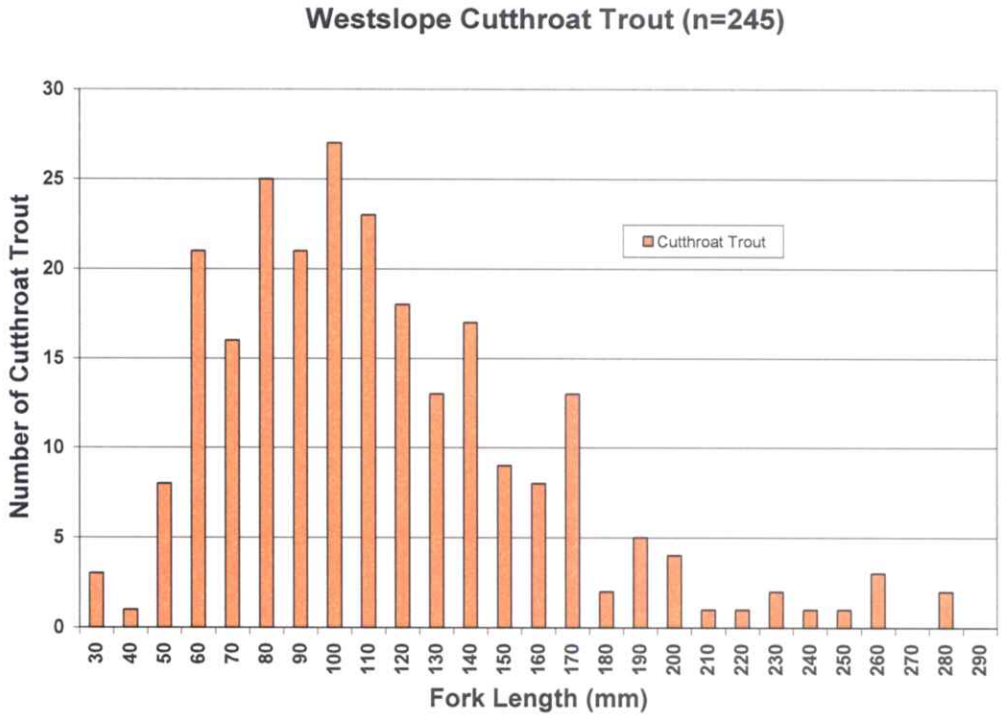


Figure 11. Length frequency of westslope cutthroat trout *(Oncorhynchus clarki lewisi)* (n=245) sampled in Big Timber Creek watershed by IDFG in 2003.

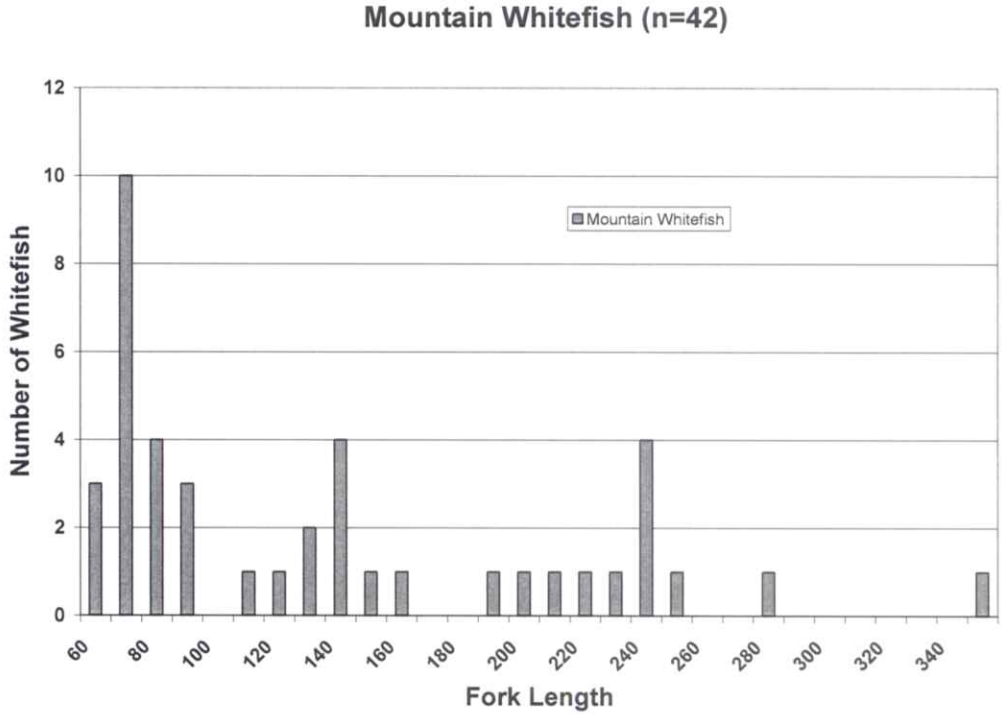


Figure 12. Length frequency of mountain whitefish ***(Prosopium williamsoni)*** (n=42) sampled in Big Timber Creek watershed by IDFG in 2003.

Table 4. Irrigation diversions located in the Big Timber Creek watershed.

Diversion ID	ZONE 11 UTM Easting	ZONE 11 UTM Northing	Water Right Number (cfs)	Water Right Usage	Barrier	Dewater	Lockable headgate	Measuring device	Screened
LBTC-ABD-01	787343	4955470	n/a	n/a	yes	yes	no	no	no
LBTC-01	787700	4954596	74-31 (1.4)	0	yes	yes	no	splitter	no
LBTC-INT-01	787635	4954694	n/a	n/a	yes	yes	no	no	no
LBTC-02	787630	4953537	74-37 (3.36), 74-39A (2.53), 74-7175 (2.1), 74-992 (0.02)	4.76	yes	yes	no	no	no
LBTC-03	n/a	n/a	74-59B (0.28)	0	no	no	no	no	no
LBTC-04	787352	4951933	74-59A (2)	highwater	no	no	no	unknown	no
LBTC-05	787212	4951667	74-51 (6.4)	6.4	no	no	no	unknown	no
LBTC-06	787123	4951485	74-40 (4.2), 74-61 (3.72)	highwater	possible	no	unknown	unknown	no
LBTC-ABD-02	787031	4950014	n/a	n/a	no	no	no	no	no
LBTC-07	787031	4950014	74-398 (5.76), 74-399 (0.48), 74-1834 (1.37)	highwater	probable	no	no	unknown	no
LBTC-08	786743	4949422	74-42 (4.8)	4.8	no	no	no	no	no
LBTC-09	786030	4947641	74-32 (3.24)	3.24	no	no	yes	yes	no
LBTC-10	785906	4947131	74-7165 (6.55), 74-34 (2.17), 74-35 (6.61)	8.78	no	no	no	unknown	no
LBTC-11	n/a	n/a	74-1619 (0.5)	0	no	no	no	no	no
LBTC-12	785824	4946471	74-148 (27.8)	highwater	yes	no	yes	unknown	no
LBTC-13	785958	4946176	74-63 (0.96), 74-39B (6.0), 74-14980 (1.46), 74-15003 (3.72), 74-1102 (6.4)	6.0	no	no	yes	no	no
LBTC-14	n/a	n/a	74-1103 (0.48)	0	no	no	no	no	no
LBTC-15	785470	4939390	74-56 (2)	2	no	no	unknown	unknown	no
Little Timber Top	782659	4946242	n/a	n/a	unknown	unknown	unknown	unknown	no
Little Timber HID	782675	4946270	n/a	n/a	unknown	unknown	unknown	unknown	no
Little Timber String	782772	4946380	n/a	n/a	unknown	unknown	unknown	unknown	no
Little Timber Tag	782842	4946406	n/a	n/a	unknown	unknown	unknown	unknown	no
Little Timber Split	783379	4946999	n/a	n/a	unknown	unknown	unknown	unknown	no
Little Timber ABD	784060	4947939	n/a	n/a	unknown	unknown	unknown	unknown	no
Whittaker	782302	4945250	n/a	n/a	unknown	unknown	unknown	unknown	no
Guardian/Whit/	782571	4946808	n/a	n/a	unknown	unknown	unknown	unknown	no
Swan Basin spr 3	782875	4940391	n/a	n/a	unknown	unknown	unknown	unknown	no
Swan Basin 1	782596	4941590	n/a	n/a	unknown	unknown	unknown	unknown	no
Swan Basin	782276	4940906	n/a	n/a	unknown	unknown	unknown	unknown	no
Swan Basin spr	781828	4941953	n/a	n/a	unknown	unknown	unknown	unknown	no
Swan Basin spr 2	781473	4941945	n/a	n/a	unknown	unknown	unknown	unknown	no

Table 5. Big Timber Creek stream temperature summary 1993-2003, from *Annual Water Temperature Report*. 2003. BLM Salmon Field Office.

Stream Name	1993	1994		1995		1996		1997		1998		1999		2000		2003	
Big Timber	Max	Max	7-Day Max	Max	7-Day Max	Max	7-Day Max	Max	7-Day Max	Max	7-Day Max	Max	7-Day Max	Max	7-Day Max	Max	7-Day Max
Mouth		70.3	68.1	63	61.4	65	63.4	66.4	63.6	64.9	62.6	63.8	61.1	68.7	66.4	69	67
@ Basin Cr.	60.7	68.2														66.3	63.9
@ Grove Cr.	58.1	59.3		57		60.4		61.9	58	59	57.6	58.1	56.7				
MF Little Timber	57.6	61.8		61		50.4		59.6	58	60.7	58.8	60.1	58.8	64.4	63.2		
NF Little Timber	52.9			53						55.1	54.5	54.9	53.8				
Swan Basin		68.5	67.1	63.2	61.2	66.5	64.9	64.9	62.8	65	63.7	63.8	61.5	69.1	66.5		

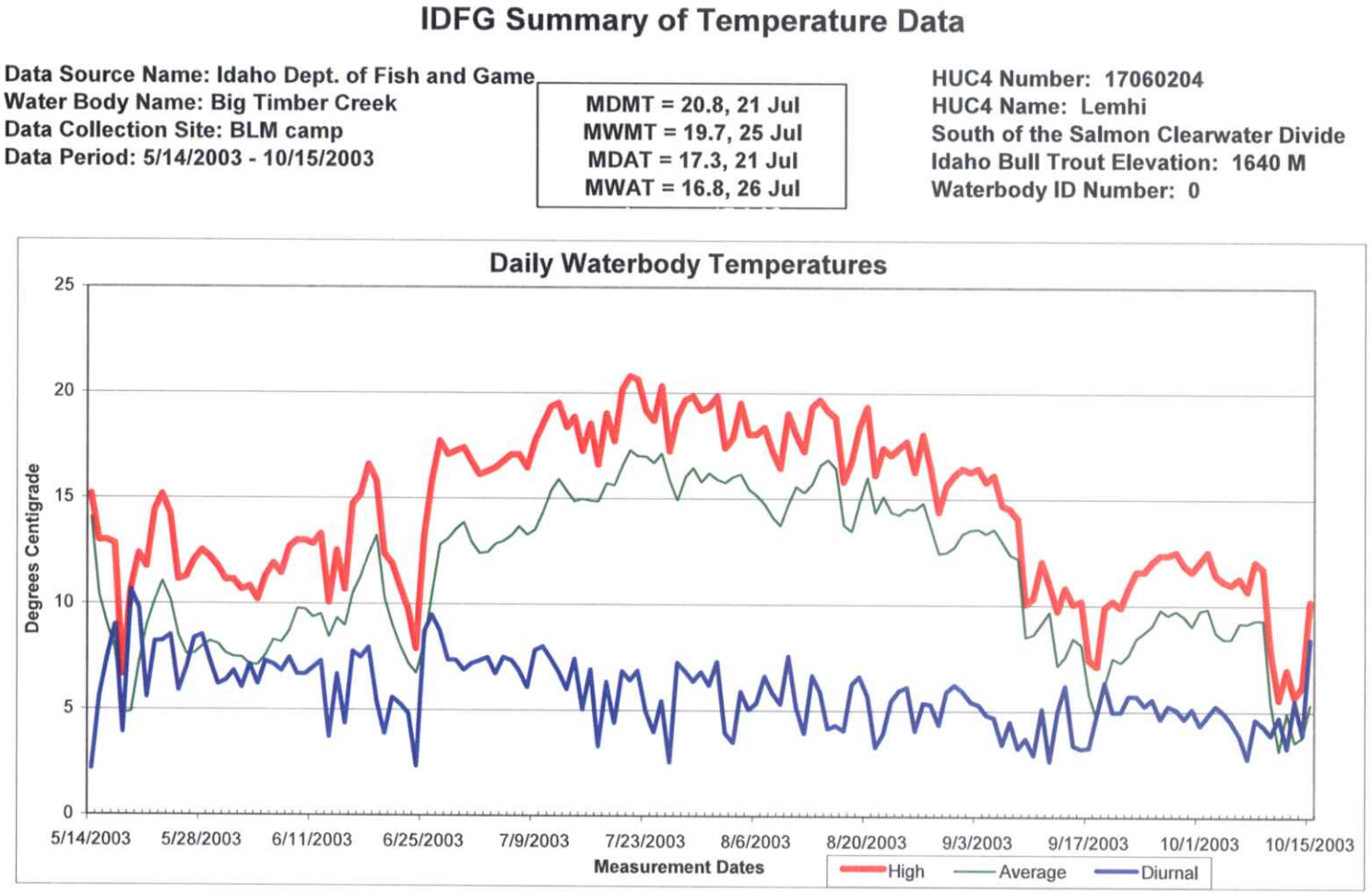


Figure 13. Water temperatures taken with HOBO data recorders from Big Timber Creek by IDFG 2003.

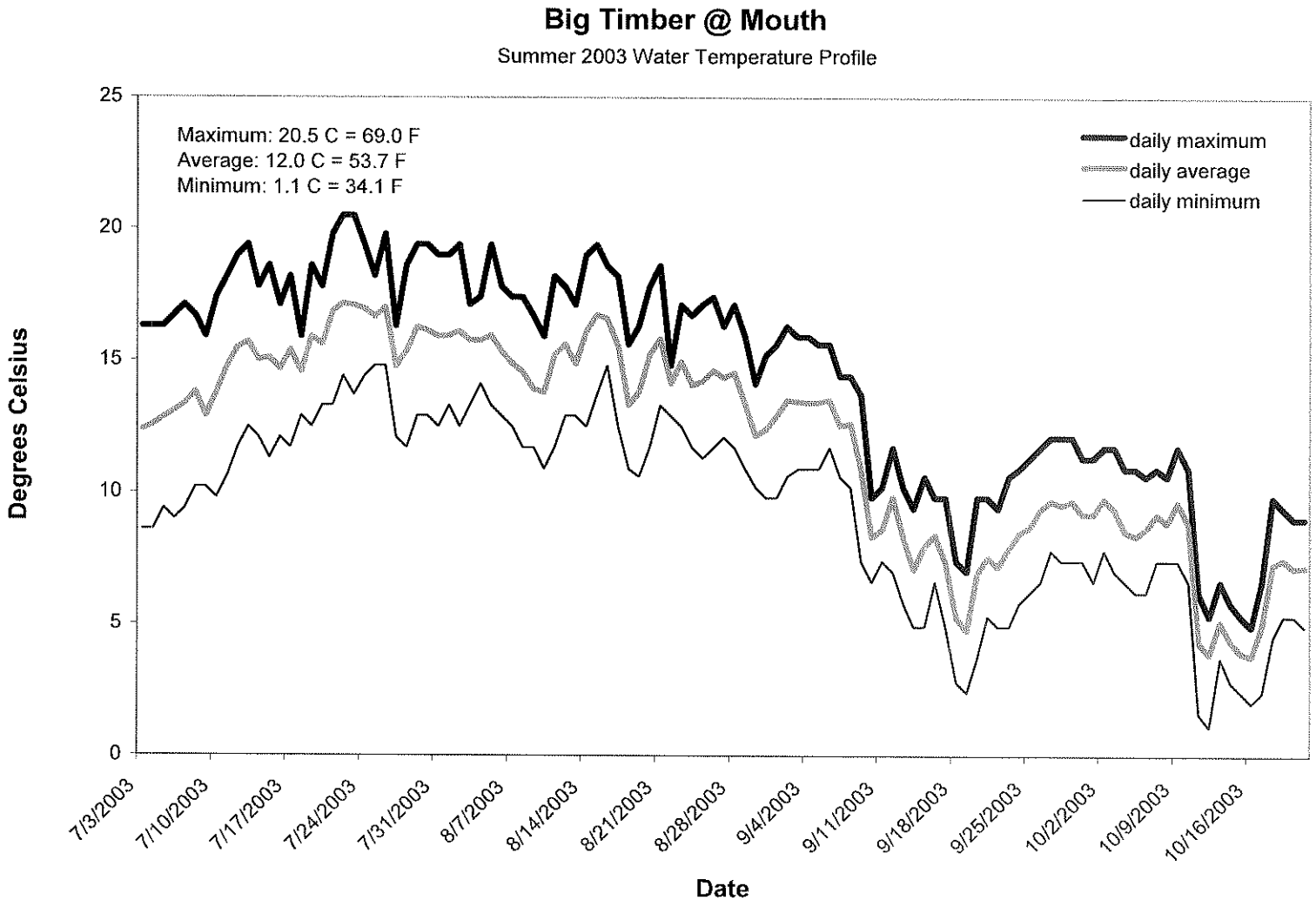


Figure 14. Water temperature profile of daily maximum, daily average, and daily minimum water temperatures taken from the mouth of Big Timber Creek, 2003. *Annual Water Temperature Report.* BLM Salmon Field Office.

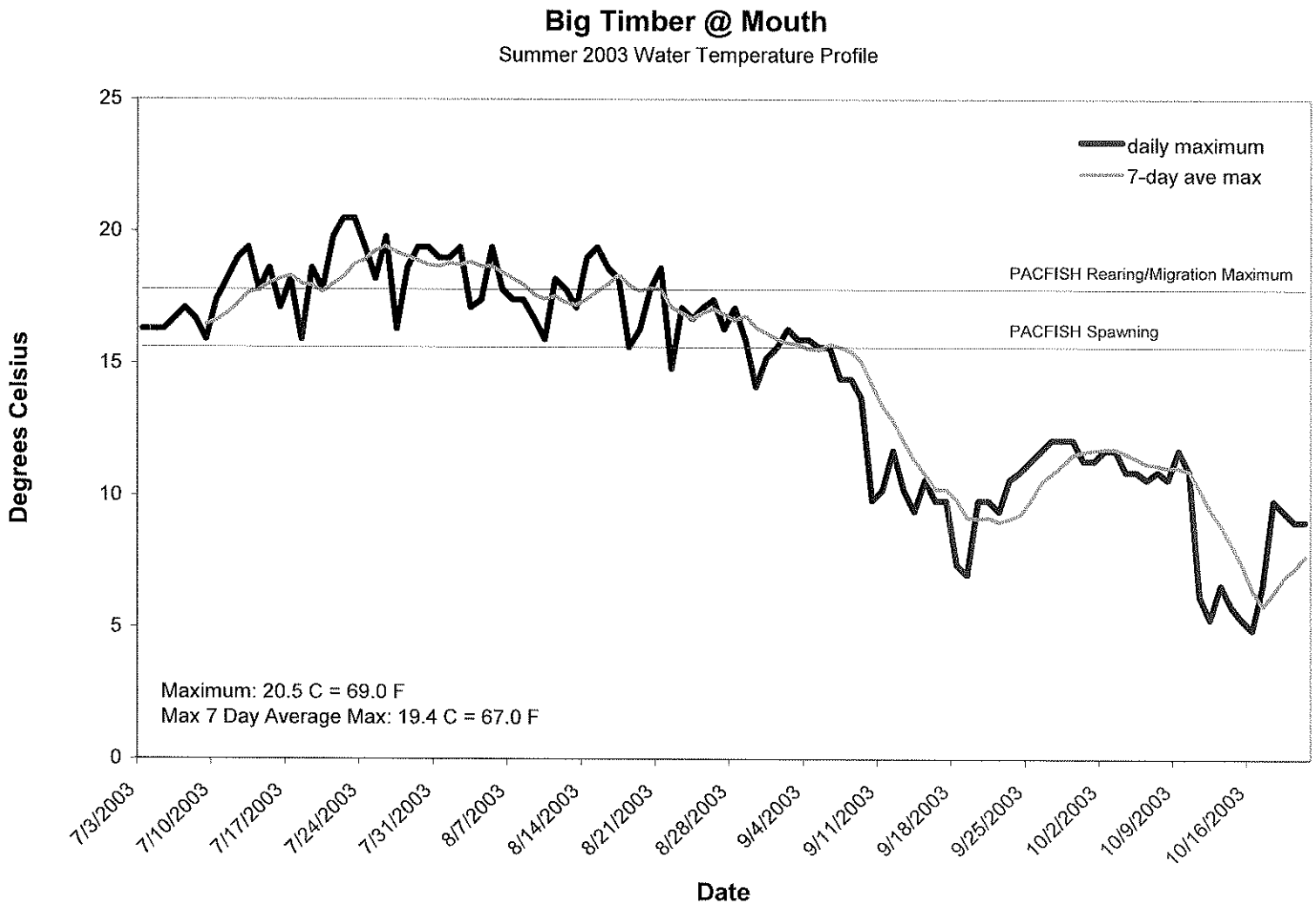


Figure 15. Water temperature profile of daily maximum and 7-day average maximum temperatures the mouth of Big Timber Creek, 2003. *Annual Water Temperature Report*. BLM Salmon Field Office.

DISCUSSION

Chinook Salmon

In the Lemhi River subbasin, Chinook salmon typically spawn in the mainstem upper Lemhi River above the confluence with Hayden Creek. We suspect that adult Chinook salmon currently do not spawn in the Big Timber Creek watershed due the dewatering and passage issues. The current dewatering situation from irrigation withdrawals causes disconnection of the creek from the Lemhi River for most of the year. Although little data exists, it is highly probable that the Big Timber Creek watershed was a historically important watershed for Chinook salmon spawning and rearing habitat. Due to its proximity with the Lemhi River spawning habitat, Chinook salmon pre-smolts would utilize Big Timber Creek for rearing and thermal refuge if dewatering and passage issues were mitigated and improved.

Steelhead/Rainbow Trout

Although rainbow trout were abundant in the Big Timber Creek watershed, it was not possible to distinguish between native rainbow/redband trout, and anadromous steelhead pre-smolts. Because of the de-watering situation it is unlikely that anadromous fish have much spawning success in the Big Timber Creek watershed. However, due to the spring spawn timing of steelhead it is possible that some fish do make it past the dewatering barrier during high water. Although no historical steelhead surveys have been completed, more data is needed to explore this possibility further, and adult steelhead and redd count surveys by the IDFG are planned in the spring of 2004.

Resident rainbow trout were found mostly in the lower sections of the mainstem of Big Timber Creek. The average size of the fish sampled increased and densities of fish decreased the farther upstream we surveyed. A high density of small rainbow trout was found in the lower portion of Basin Creek. No rainbow trout were found in Little Timber Creek. However, rainbow trout were stocked in Stone Reservoir in the late 1950's and early 1960's.

Bull Trout

Most of the bull trout collected during our fisheries surveys appear to be resident populations. Bull trout were found in the plunge pool habitat of the tributaries, as well as in the larger mainstem reaches of Big Timber Creek. Larger fish were found mostly in the mainstem and Rocky Creek. Large woody debris was abundant throughout the watershed providing good bull trout habitat. The smaller resident fish were found at higher altitudes in the tributaries of Big Timber Creek and the North and Middle Fork Little Timber Creeks. No bull trout were found in Basin Creek.

The discovery of larger fish first in Rocky Creek and then in the mainstem of Big Timber Creek may represent a fluvial life history in the watershed. We sampled multiple fish over 300 mm in length, with the largest being measured at 470 mm. Some of these fish exceeded our scale limit, and were released immediately without taking weights. These seem very large for

resident fish in Rocky Creek, and are most likely fluvial specimens. Due to the time of the surveys we were able to identify and observe several more fish in the 300-400 mm. range during spawning activities without disturbing them.

Westslope Cutthroat Trout

Westslope cutthroat trout were abundant in the Big Timber Creek watershed. They were most abundant in the headwater transects of mainstem Big Timber Creek, and in the lower portions of the Middle and North Fork Little Timber Creek. They were also found in abundance in the uppermost transect of Basin Creek.

The upper reaches of Big Timber Creek provides high quality habitat for westslope cutthroat trout. Additionally, Little Timber Creek had very good cutthroat habitat with high velocities and large substrate cover in the lower reaches. Westslope cutthroat trout densities were high in these mainstem reaches with some larger fish present. In the tributaries of Big Timber Creek, habitat changed to a plunge pool habitat with increased woody debris and the cutthroat trout densities dropped off, while bull trout densities increased in these areas.

There is a large fish barrier on North Fork Little Timber Creek in the form of a large rockslide. The rockslide formed a small lake and the water goes subterranean at the outlet for approximately 150 feet into the creek below. Westslope cutthroat trout were found in the lake and in the creek upstream of it. This was one of four headwater lakes and one reservoir in the Little Timber Creek watershed. Stocking records indicate that each lake have a unique stocking history with lakes stocked with an assortment of species and stocks, including; undetermined cutthroat stock, westslope cutthroat trout (C2) ,Yellowstone cutthroat trout (C3 - Henry's Lake stock), and rainbow trout. These stockings are summarized in Table 17.

Basin Creek has a high density of small resident westslope cutthroat trout in the headwater transects above the irrigation diversions. These fish were small due to the size of the habitat they occupied. The stream was narrow and shallow with some small pockets of deeper water and heavy canopy cover. The irrigation diversions in Basin Creek may isolate this population because of passage barriers and one-way movements downstream.

Rainbow Cutthroat Hybrids

Only one phenotypic rainbow cutthroat hybrid was readily identified in the Big Timber Creek watershed. This fish was found in the mid section of mainstem Big Timber Creek. This is an overlapping habitat area where both rainbow and cutthroat are found in good numbers, and this was probably a natural hybridization.

Mountain Whitefish

Mountain whitefish was found in the lower and middle sections of the mainstem of Big Timber Creek. They tended to occupy the larger deeper holes and specimens up to 350 mm were sampled.

Sculpin sp.

Sculpin exist in significant numbers in Big Timber Creek watershed. They ranged from the lower reaches of mainstem Big Timber Creek extending to above Squirrel Creek. Sculpin were also abundant in lower portions of Little Timber Creek. Basin Creek was the only tributary where sculpin were found. Sculpin probably fill a large role as a significant source of forage for the many larger trout within the watershed.

Water Temperature Monitoring 2003

Big Timber Creek never reached the upper thermal exceedance (Idaho Cold Water Biota) making even the lower portions suitable for salmonid habitation. Idaho Salmonid Spawning temperature criteria was exceeded during the hot summer months (July and August) but remained with in an acceptable range during spring and autumn when resident salmonids spawn.

According to the BLM temperature data the daily maximum exceeded 20.0° C at the mouth of Big Timber Creek (Figure 14-15) which is located below all of the diversions, except LBTC-02. Daily and seven- day maximum averages exceeded PACFISH rearing and migration criteria for most of July and August.. Continued improvements in riparian condition, and increased instreamflow from irrigation improvements from will result in reduced water temperatures.

Diversion and Irrigation Inventories

There are 15 active diversions on Big Timber Creek (LBTC-01 through LBTC-15). In addition, the L-63 irrigation ditch intercepts Big Timber Creek just above Highway 28 (LBTC-INT-01). There are also active diversions on the Little Timber Creek and Basin Creek tributaries that have to date not been fully investigated by IDFG. None of the diversions on Big Timber Creek or its tributaries are screened.

LBTC-12 (the Carey Act Dam) does not cause dewatering of Big Timber Creek but is a seasonal barrier to fish passage. A junior water right (74-148 with 1909 priority date) is held at this POD by Guardian Limited Partnership. The Carey Act Dam is located on BLM land and is currently being studied by the BLM for modification and transfer of related water rights upstream to a proposed consolidated POD (at the current location of LBTC-13). Under current BLM plans, the overall structure would remain because of its historical significance but the gates that create the passage barrier would be removed. Two other PODs, LBTC-06 and LBTC-07, do not cause dewatering of Big Timber Creek during summer irrigation season but are potential fish passage barriers at certain flows. These PODs should be further surveyed for possible modifications designed to eliminate possible barriers.

LBTC-02 is a diversion that dewaters the stream and disconnects Big Timber Creek from the Lemhi River during the irrigation season Water normally flows to this diversion during irrigation season because of the senior water right (74-37 with priority date 1884) held at this POD. Big Timber Creek flows past this POD to the Lemhi River starting in early November

when irrigation season ends. Big Timber Creek normally remains connected to the Lemhi River through winter and into early March. In early March, some irrigators holding junior water rights begin to divert flows above LBTC-02 before LBTC-02 is in operation. At that time no water reaches LBTC-02 and the stream dewaters at a location between LBTC-04 and LBTC-07 depending on irrigator use of available water. In particular, the LBTC-07 diversion diverts a junior water right (74-398, 5.76 cfs with priority date 1933), that is reported to cause dewatering at this time of year. Big Timber Creek remains disconnected from the Lemhi River until high water because LBTC-02 takes all instream flows once it goes into operation. When high water occurs, usually during late May and early June, all PODs have sufficient flows for operation and Big Timber Creek flows past LBTC-02 until high water recedes.

LBTC-01 is a diversion with the potential to dewater and disconnect Big Timber Creek from the Lemhi River. A 1.4 CFS water right (74-31), with a priority date of 1884, is held at this POD. LBTC-01 is not currently active due to a POD water exchange agreement between Beyeler and Tyler. Under this arrangement, Beyeler diverts 1.4 CFS from the Lemhi River (at L-63) using a portion of a water right held at L-63 by Tyler. At a splitter box located in Leadore City Park, Beyeler rediverts his portion from the L-63 ditch before the 1.4 CFS reaches the Big Timber Creek stream bed. In exchange, Tyler diverts an equivelant 1.4 CFS at LBSC-02.

The L-63 irrigation ditch, operated by Tyler, intercepts Big Timber Creek above LBTC-01 at LBTC-INT-01. This ditch intercept is a seasonal fish passage barrier capable of dewatering Big Timber Creek. A siphon installed at LBTC-INT-01 to separate Big Timber Creek flow from L-63 irrigation flows would be required to eliminate this barrier. LBTC-ABD-01 was a diversion barrier and dewatering point on Big Timber Creek operated near the confluence of Big Timber Creek with the Lemhi River. IDWR has determined that the springs water right (74-908) does not allow for use of an instream diversion on Big Timber Creek. If other efforts to provide stream reconnection to the river are to be successful, it will be necessary to ensure that this diversion structure no longer exists.

Little Timber Creek dewaters during the irrigation season. Under very low water conditions this could occur at the diversion operated under the senior water right (74-40). Normally, dewatering occurs at the downstream diversion that has the second senior water right #74-33. This diversion is also a seasonal barrier to fish passage because the diversion structure completely dams the stream bed and diverts all instream flows.

Basin Creek, also contains diversions that create structural and thermal fish passage barriers and that cause dewatering of the stream during irrigation season.

Literature Cited

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Table 6. Site characteristics for electrofishing transects in Big Timber Creek watershed, 2003, Lemhi County, ID.

Transect ID	Surveyor	Survey Date	Survey Time	Transect Start UTM E	Transect Start UTM N	Elevation (m)	Transect Length (m)	Site Area (100 m2)	Water Temp (°C)
Big Timber Creek									
LBTC01	IDFG	8/29/2003	1415	0311683	4947883	1859.8	100	491	13.9
LBTC02	IDFG	8/29/2003	1645	0310499	4944928	1908.5	100	578	15.6
LBTC03	IDFG	9/25/2003	1215	0309880	4942643	1974.1	100	618	6.1
LBTC04	IDFG	9/25/2003	1530	0309880	4939471	2035.1	100	590	12.8
LBTC05	IDFG	10/2/2003	1210	0309332	4936757	2088.4	100	698	8.9
LBTC06	IDFG	10/2/2003	1630	0307947	4934300	2157.0	120	617	9.4
LBTC07	IDFG	9/11/2003	1730	0305441	4931572	2250.0	100	600	11.1
LBTC08	IDFG	9/10/2003	1705	0304110	4929968	2304.9	100	442	6.7
LBTC09	IDFG	9/11/2003	1400	0301805	4929336	2378.0	100	336	8.9
LBTC10	IDFG	9/4/2003	1230	0299622	4931099	2609.8	100	208	10
LBTCRC01	IDFG	9/12/2003	1600	0306142	4932744	2286.6	70	206	8.3
LBTCTC01	IDFG	9/12/2003	1225	0305390	4929608	2353.7	100	141	5
LBTCCABC01	IDFG	9/3/2003	1640	0303388	4927950	2390.2	100	199	11.1
LBTCSC01	IDFG	9/11/2003	1115	0302449	4928641	2414.6	100	196	5.6
LBTCFC01	IDFG	9/5/2003	1230	0300899	4929422	2463.4	100	244	7.8
LBTCPC01	IDFG	9/4/2003	1645	0300377	4929657	2500.0	100	219	7.8
LBTCCLC01	IDFG	9/4/2003	1430	0300020	4930212	2585.4	100	140	10
Little Timber Creek									
LBTCLTCD01	IDFG	8/28/2003	1545	0307474	4943757	2035.1	100	205	N/A
LBTCLTC01	IDFG	8/15/2003	1715	0306243	4941770	2103.7	100	415	18.3
Middle Fork Little Timber									
LBTCLTCMF01	IDFG	8/15/2003	1530	0304895	4940040	2248.5	100	276	16.7
LBTCLTCMF02	IDFG	8/15/2003	1245	0303601	4938378	2324.7	100	344	9.4
LBTCLTCMF03	IDFG	8/13/2003	1720	0302105	4937382	2439.0	100	219	10.6
LBTCLTCMF04	IDFG	8/13/2003	1500	0300629	4936113	2591.5	100	174	10
North Fork Little Timber									
LBTCLTCNF01	IDFG	8/20/2003	1430	0305135	4941159	2187.5	100	346	14.4
LBTCLTCNF02	IDFG	8/20/2003	1230	0303668	4940370	2301.8	100	324	11.1
LBTCLTCNF03	IDFG	8/14/2003	1630	0302104	4939754	2408.5	65	159	12.2
LBTCLTCNF04	IDFG	8/14/2003	1400	0300044	4939131	2583.8	100	216	10.6
Basin Creek									
LBTCBC01	IDFG	8/28/2003	1230	0309713	4942105	2004.6	100	155	11.1
LBTCBC02	IDFG	8/27/2003	1545	0307323	4939904	2146.3	100	144	21.1
LBTCBC03	IDFG	8/27/2003	1315	0306081	4938150	2286.6	100	142	10.6

Table 7. Electrofishing survey data for electrofishing transects in Big Timber Creek watershed, 2003, Lemhi County, ID.

Transect ID	Survey Date	Survey Time	# Passes	# Crew Members	Electrofishing Total Time (sec)	Pass #1 Time (sec)	Pass #2 Time (sec)	Pass #3 Time (sec)	Settings	Volts
Big Timber Creek										
LBTC01	8/29/2003	1415	3	3	3353	1044	782	1527	I5	400
LBTC02	8/29/2003	1645	1	5	1183	1183			I5	400
LBTC03	9/25/2003	1215	1	4	1389	1389			I5	400
LBTC04	9/25/2003	1530	1	4	736	736			I5	500
LBTC05	10/2/2003	1210	1	5	1667	1667			I5	500
LBTC06	10/2/2003	1630	1	5	846	846			I5	400
LBTC07	9/11/2003	1730	1	4	970	970			I5	500
LBTC08	9/10/2003	1705	3	4	2726	1048	988	690	I5	500
LBTC09	9/11/2003	1400	1	4	1347	1347			I5	500
LBTC10	9/4/2003	1230	1	4	1215	1215			I5	600
LBTCRC01	9/12/2003	1600	1	3	718	718			I5	500
LBTCTC01	9/12/2003	1225	1	3	1109	1109			H5	400
LBTCCABC01	9/3/2003	1640	1	4	907	907			I5	400
LBTCSC01	9/11/2003	1115	1	4	913	913			I5	600
LBTCFC01	9/5/2003	1230	1	3	1057	1057			I5	600
LBTCPC01	9/4/2003	1645	1	3	1054	1054			I5	600
LBTCCLC01	9/4/2003	1430	1	4	678	678			I5	500
Little Timber Creek										
LBTCLTCD01	8/28/2003	1545	1	3	587	587			I5	400
LBTCLTC01	8/15/2003	1715	1	3	899	899			I5	500
Middle Fk. Little Timber										
LBTCLTCMF01	8/15/2003	1530	1	3	1093	1093			I6	400
LBTCLTCMF02	8/15/2003	1245	3	3	2517	1065	930	522	I5	400
LBTCLTCMF03	8/13/2003	1720	1	3	732	732			H5	600
LBTCLTCMF04	8/13/2003	1500	1	3	835	835			H5	600
North Fork Little Timber										
LBTCLTCNF01	8/20/2003	1430	1	3	729	729			I5	500
LBTCLTCNF02	8/20/2003	1230	1	3	860	860			I5	500
LBTCLTCNF03	8/14/2003	1630	1	3	447	447			I5	700
LBTCLTCNF04	8/14/2003	1400	1	3	464	464			I6	700
Basin Creek										
LBTCBC01	8/28/2003	1230	1	3	618	618			I5	400
LBTCBC02	8/27/2003	1545	1	3	478	478			I5	400
LBTCBC03	8/27/2003	1315	1	3	1132	1132			I5	400

Table 8. Population estimates/densities for rainbow trout/steelhead (*Oncorhynchus mykiss*)(RBT) in Big Timber Creek watershed electrofishing transects, 2003, Lemhi County, ID. (** 9 YOY Rainbow trout omitted from third pass before density estimate)

Transect ID	# Passes	Total RBT	# RBT Pass 1	# RBT Pass 2	# RBT Pass 3	RBT /100m2	RBT 1st Pass /100m2	RBT Population Estimate	RBT 95 % CI	Population Estimate /100m2	RBT Capture Probability
Big Timber Creek											
LBTC01	3	101	47	32	22	20.57	9.57	108	(92,127)	22.00	0.46 **
LBTC02	1	28	28			4.84					
LBTC03	1	40	40			6.47					
LBTC04	1	21	21			3.56					
LBTC05	1	40	40			5.73					
LBTC06	1	18	18			2.92					
LBTC07	1	3	3			0.50					
LBTC08	3	1	1	0	0	0.23	0.23	n/a	n/a	n/a	n/a
LBTC09	1	0	0			0					
LBTC10	1	0	0			0.00					
LBTCRC01	1	0	0			0					
LBTCTC01	1	0	0			0.00					
LBTCCABC01	1	1	1			0.50					
LBTCSC01	1	0	0			0.00					
LBTCFC01	1	0	0			0.00					
LBTCPC01	1	0	0			0.00					
LBTCCLC01	1	0	0			0.00					
Little Timber Creek											
LBTCLTCD01	1	0	0			0.00					
LBTCLTC01	1	0	0			0.00					
Middle Fork Little Timber											
LBTCLTCMF01	1	0	0			0.00					
LBTCLTCMF02	3	0	0	0	0	0.00	0.00	n/a	n/a	n/a	n/a
LBTCLTCMF03	1	0	0			0.00					
LBTCLTCMF04	1	0	0			0.00					
North Fork Little Timber											
LBTCLTCNF01	1	0	0			0.					
LBTCLTCNF02	1	0	0			0.00					
LBTCLTCNF03	1	0	0								
LBTCLTCNF04	1	0	0			0.00					
Basin Creek											
LBTCBC01	1	45	45			29.03					
LBTCBC02	1	0	0			0.00					
LBTCBC03	1	0	0			0.00					

Table 9. Descriptive statistics of length (mm) and weight (g) measurements for Rainbow Trout/Steelhead (*Oncorhynchus mykiss*) from Big Timber Creek Watershed electrofishing transects, 2003, Lemhi County, ID.

Transect ID	Total Rainbow	Mean Length (mm)	Minimum Length (mm)	Maximum Length (mm)	Mean Weight (g)	Minimum Weight (g)	Maximum Weight (g)
Big Timber Creek							
LBTC01	101	97.67	39	230	19.42	0	149
LBTC02	28	128.14	89	241	29.50	7	183
LBTC03	40	126.13	50	200	29.68	2	94
LBTC04	21	116.57	43	212	20.90	0	100
LBTC05	40	129.60	50	215	38.53	1	115
LBTC06	18	184.50	115	293	86.67	10	260
LBTC07	3	179.33	151	214	70.67	40	113
LBTC08	1	234.00	234	234	176.00	176	176
LBTC09	0	n/a	n/a	n/a	n/a	n/a	n/a
LBTC10	0	n/a	n/a	n/a	n/a	n/a	n/a
LBTCRC01	0	n/a	n/a	n/a	n/a	n/a	n/a
LBTCTC01	0	n/a	n/a	n/a	n/a	n/a	n/a
LBTCCABC01	1	120.00	120	120	19.00	19	19
LBTCSC01	0	n/a	n/a	n/a	n/a	n/a	n/a
LBTCFC01	0	n/a	n/a	n/a	n/a	n/a	n/a
LBTCPC01	0	n/a	n/a	n/a	n/a	n/a	n/a
LBTCCLC01	0	n/a	n/a	n/a	n/a	n/a	n/a
Little Timber Creek							
LBTCLTCD01	0	n/a	n/a	n/a	n/a	n/a	n/a
LBTCLTC01	0	n/a	n/a	n/a	n/a	n/a	n/a
Middle Fork Little Timber							
LBTCLTCMF01	0	n/a	n/a	n/a	n/a	n/a	n/a
LBTCLTCMF02	0	n/a	n/a	n/a	n/a	n/a	n/a
LBTCLTCMF03	0	n/a	n/a	n/a	n/a	n/a	n/a
LBTCLTCMF04	0	n/a	n/a	n/a	n/a	n/a	n/a
North Fork Little Timber							
LBTCLTCNF01	0	n/a	n/a	n/a	n/a	n/a	n/a
LBTCLTCNF02	0	n/a	n/a	n/a	n/a	n/a	n/a
LBTCLTCNF03	0	n/a	n/a	n/a	n/a	n/a	n/a
LBTCLTCNF04	0	n/a	n/a	n/a	n/a	n/a	n/a
Basin Creek							
LBTCBC01	45	107.27	71	162	17.60	5.0	51.0
LBTCBC02	0	n/a	n/a	n/a	n/a	n/a	n/a
LBTCBC03	0	n/a	n/a	n/a	n/a	n/a	n/a

Table 10. Population estimates/densities of bull trout (*Salvelinus confluentus*)(BLT) in Big Timber Creek watershed electrofishing transects, 2003, Lemhi County, ID.

Transect ID	# Passes	Total BLT	# BLT Pass 1	# BLT Pass 2	# BLT Pass 3	BLT /100m2	BLT 1st Pass /100m2	BLT Population Estimate	BLT 95 % CI	Population Estimate /100m2	BLT Capture Probability
Big Timber Creek											
LBTC01	3	0	0	0	0	0.00	0.00	n/a	n/a	n/a	n/a
LBTC02	1	0	0			0.00					
LBTC03	1	0	0			0.00					
LBTC04	1	1	1			0.17					
LBTC05	1	2	2			0.29					
LBTC06	1	12	12			1.94					
LBTC07	1	16	16			2.67					
LBTC08	3	29	17	10	2	6.56	3.85	30	(29,34)	6.79	0.63
LBTC09	1	21	21			6.25					
LBTC10	1	13	13			6.25					
LBTCRC01	1	38	38			18.45					
LBTCTC01	1	17	17			12.06					
LBTCCABC01	1	31	31			15.58					
LBTCSC01	1	19	19			9.69					
LBTCFC01	1	31	31			12.70					
LBTCPC01	1	10	10			4.57					
LBTCCLC01	1	2	2			1.43					
Little Timber Creek											
LBTCLTCD01	1	0	0			0.00					
LBTCLTC01	1	0	0			0.00					
Middle Fork Little Timber											
LBTCLTCMF01	1	0	0			0.00					
LBTCLTCMF02	3	58	39	14	5	16.86	11.34	60	(58,65)	17.44	0.66
LBTCLTCMF03	1	42	42			19.18					
LBTCLTCMF04	1	26	26			14.94					
North Fork Little Timber											
LBTCLTCNF01	1	0	0			0.00					
LBTCLTCNF02	1	0	0			0.00					
LBTCLTCNF03	1	11	11			6.92					
LBTCLTCNF04	1	0	0			0.00					
Basin Creek											
LBTCBC01	1	0	0			0.00					
LBTCBC02	1	0	0			0.00					
LBTCBC03	1	0	0			0.00					

Table 11. Descriptive statistics of length (mm) and weight (g) measurements for bull trout (*Salvelinus confluentus*) from Big Timber Creek watershed electrofishing transects, 2003, Lemhi County, ID.

Transect ID	Total BLT	Mean Length (mm)	Minimum Length (mm)	Maximum Length (mm)	Mean Weight (g)	Minimum Weight (g)	Maximum Weight (g)
Big Timber Creek							
LBTC01	0	n/a	n/a	n/a	n/a	n/a	n/a
LBTC02	0	n/a	n/a	n/a	n/a	n/a	n/a
LBTC03	0	n/a	n/a	n/a	n/a	n/a	n/a
LBTC04	1	335.00	335	335	363.00	363	363
LBTC05	2	115.50	64	167	25.00	5	45
LBTC06	12	179.00	94	391	110.00	5	620
LBTC07	16	122.86	51	205	24.69	1	89
LBTC08	29	121.17	45	227	25.21	0	109
LBTC09	21	156.86	73	257	45.71	5	191
LBTC10	13	128.00	42	230	26.85	0	92
LBTCRC01	38	195.81	74	470	43.38	5	131
LBTCTC01	17	136.71	98	190	31.82	12	73
LBTCCABC01	31	119.58	70	189	18.45	2	91
LBTCSC01	19	112.63	42	157	16.47	0	38
LBTCFC01	31	146.03	66	223	39.90	3	101
LBTCPC01	10	166.50	117	249	55.30	16	132
LBTCCLC01	2	75.00	68	82	4.00	2	6
Little Timber Creek							
LBTCLTCD01	0	n/a	n/a	n/a	n/a	n/a	n/a
LBTCLTC01	0	n/a	n/a	n/a	n/a	n/a	n/a
Middle Fork Little Timber							
LBTCLTCMF01	0	n/a	n/a	n/a	n/a	n/a	n/a
LBTCLTCMF02	58	98.53	31	182	15.67	0	77
LBTCLTCMF03	42	119.76	58	188	25.57	2	79
LBTCLTCMF04	26	130.65	76	191	30.58	5	81
North Fork Little Timber							
LBTCLTCNF01	0	n/a	n/a	n/a	n/a	n/a	n/a
LBTCLTCNF02	0	n/a	n/a	n/a	n/a	n/a	n/a
LBTCLTCNF03	11	119.91	91	171	24.73	7	61
LBTCLTCNF04	0	n/a	n/a	n/a	n/a	n/a	n/a
Basin Creek							
LBTCBC01	0	n/a	n/a	n/a	n/a	n/a	n/a
LBTCBC02	0	n/a	n/a	n/a	n/a	n/a	n/a
LBTCBC03	0	n/a	n/a	n/a	n/a	n/a	n/a

Table 12. Population estimates/densities for Westslope Cutthroat Trout (Oncorhynchus clarki lewisi)(CTT) in Big Timber Creek Watershed, 2003, Lemhi County, ID.

Transect ID	# Passes	Total CTT	# CTT Pass 1	# CTT Pass 2	# CTT Pass 3	CTT /100m2	CTT 1st Pass /100m2	CTT Population Estimate	CTT 95 % CI	Population Estimate /100m2	CTT Capture Probability
Big Timber Creek											
LBTC01	3	0	0	0	0	0.00	0.00	n/a	n/a	n/a	n/a
LBTC02	1	0	0			0.00					
LBTC03	1	0	0			0.00					
LBTC04	1	0	0			0.00					
LBTC05	1	0	0			0.00					
LBTC06	1	3	3			0.49					
LBTC07	1	11	11			1.83					
LBTC08	3	2	2	0	0	0.45	0.45	n/a	n/a	n/a	n/a
LBTC09	1	3	3			0.89					
LBTC10	1	37	37			17.79					
LBTCRC01	1	0	0			0.00					
LBTCTC01	1	0	0			0.00					
LBTCCABC01	1	4	4			2.01					
LBTCSC01	1	2	2			1.02					
LBTCFC01	1	0	0			0.00					
LBTCPC01	1	0	0			0.00					
LBTCCLC01	1	4	4			2.86					
Little Timber Creek											
LBTCLTCD01	1	0	0			0.00					
LBTCLTC01	1	20	20			4.82					
Middle Fork Little Timber											
LBTCLTCMF01	1	51	51			18.48					
LBTCLTCMF02	3	21	14	5	2	6.10	4.07	21	0.99	(21,23)	0.7
LBTCLTCMF03	1	5	5			2.28					
LBTCLTCMF04	1	2	2			1.15					
North Fork Little Timber											
LBTCLTCNF01	1	14	14			4.05					
LBTCLTCNF02	1	20	20			6.17					
LBTCLTCNF03	1	9	9			5.66					
LBTCLTCNF04	1	6	6			2.78					
Basin Creek											
LBTCBC01	1	0	0			0.00					
LBTCBC02	1	0	0			0.00					
LBTCBC03	1	31	31			21.83					

Table 13. Descriptive statistics of length (mm) and weight (g) measurements for Westslope Cutthroat Trout (Oncorhynchus clarki lewisi) from Big Timber Creek Watershed electrofishing transects, 2003, Lemhi County, ID.

Transect ID	Total Cutthroat	Mean Length (mm)	Minimum Length (mm)	Maximum Length (mm)	Mean Weight (g)	Minimum Weight (g)	Maximum Weight (g)
Big Timber Creek							
LBTC01	0	n/a	n/a	n/a	n/a	n/a	n/a
LBTC02	0	n/a	n/a	n/a	n/a	n/a	n/a
LBTC03	0	n/a	n/a	n/a	n/a	n/a	n/a
LBTC04	0	n/a	n/a	n/a	n/a	n/a	n/a
LBTC05	0	n/a	n/a	n/a	n/a	n/a	n/a
LBTC06	3	164.33	74	261	87.67	4	210
LBTC07	11	148.91	79	260	65.91	5	202
LBTC08	2	115.00	105	125	16.50	12	21
LBTC09	3	199.00	138	261	98.67	25	178
LBTC10	37	105.97	58	192	19.46	2	77
LBTCRC01	0	n/a	n/a	n/a	n/a	n/a	n/a
LBTCTC01	0	n/a	n/a	n/a	n/a	n/a	n/a
LBTCCABC01	4	143.50	65	202	43.25	2	97
LBTCSC01	2	65.20	59	66	2.50	2	3
LBTCFC01	0	n/a	n/a	n/a	n/a	n/a	n/a
LBTCPC01	0	n/a	n/a	n/a	n/a	n/a	n/a
LBTCCLC01	4	148.50	121	171	43.25	21	67
Little Timber Creek							
LBTCLTCD01	0	n/a	n/a	n/a	n/a	n/a	n/a
LBTCLTC01	20	141.30	94	282	51.30	9	293
Middle Fork Little Timber							
LBTCLTCMF01	51	100.67	36	176	19.22	0	82
LBTCLTCMF02	21	137.05	47	286	46.33	1	217
LBTCLTCMF03	5	157.40	105	259	71.00	14	189
LBTCLTCMF04	2	175.50	153	198	72.00	44	100
North Fork Little Timber							
LBTCLTCNF01	14	118.71	73	178	27.64	5	78
LBTCLTCNF02	20	129.35	83	195	35.80	8	105
LBTCLTCNF03	9	108.78	55	179	24.67	2	74
LBTCLTCNF04	6	157.17	76	232	69.17	6	163
Basin Creek							
LBTCBC01	0	n/a	n/a	n/a	n/a	n/a	n/a
LBTCBC02	0	n/a	n/a	n/a	n/a	n/a	n/a
LBTCBC03	31	89.52	57	120	10.12	2	24

Table 14. Rainbow Cutthroat Hybrid and Mountain Whitefish *(Prosopium williamsoni)* densities from 2003 Big Timber Creek electrofishing transects, Lemhi County, ID.

Transect ID	Total RB×CT	RB×CT /100m2	Total MWF	MWF /100m2
Big Timber Creek				
LBTC01	0	0.00	5	1.02
LBTC02	0	0.00	2	0.35
LBTC03	0	0.00	10	1.62
LBTC04	0	0.00	1	0.17
LBTC05	0	0.00	8	1.15
LBTC06	1	0.16	16	2.59
LBTC07	0	0.00	1	0.17
LBTC08	0	0.00	0	n/a
LBTC09	0	0.00	0	n/a
LBTC10	0	0.00	0	n/a
LBTCRC01	0	0.00	0	n/a
LBTCTC01	0	0.00	0	n/a
LBTCCABC01	0	0.00	0	n/a
LBTCSC01	0	0.00	0	n/a
LBTCFC01	0	0.00	0	n/a
LBTCPC01	0	0.00	0	n/a
LBTCCLC01	0	0.00	0	n/a
Little Timber Creek				
LBTCLTCD01	0	0.00	0	n/a
LBTCLTC01	0	0.00	0	n/a
Middle Fork Little Timber				
LBTCLTCMF01	0	0.00	0	n/a
LBTCLTCMF02	0	0.00	0	n/a
LBTCLTCMF03	0	0.00	0	n/a
LBTCLTCMF04	0	0.00	0	n/a
North Fork Little Timber				
LBTCLTCNF01	0	0.00	0	n/a
LBTCLTCNF02	0	0.00	0	n/a
LBTCLTCNF03	0	0.00	0	n/a
LBTCLTCNF04	0	0.00	0	n/a
Basin Creek				
LBTCBC01	0	0.00	0	n/a
LBTCBC02	0	0.00	0	n/a
LBTCBC03	0	0.00	0	n/a

Table 15. Population estimates/densities of sculpin (*Cottus sp.)* in Big Timber Creek watershed electrofishing transects, 2003, Lemhi County, ID.

Transect ID	# Passes	Total Sculpin	Sculpin Pass 1	Sculpin Pass 2	Sculpin Pass 3	Sculpin /100m2	Sculpin 1st Pass /100m2	Sculpin Population Estimate	Sculpin 95 % CI	Population Estimate /100m2	Sculpin Capture Probability
Big Timber Creek											
LBTC01	3	213	98	62	53	43.38	19.96	328	(235,421)	66.80	0.29
LBTC02	1	172	172			29.76	29.76				
LBTC03	1	68	68			11.00	11.00				
LBTC04	1	82	82			13.90	13.90				
LBTC05	1	133	133			19.05	19.05				
LBTC06	1	125	125			20.26	20.26				
LBTC07	1	52	52			8.67	8.67				
LBTC08	3	57	28	16	13	12.90	6.33	74	(57,99)	16.74	0.38
LBTC09	1	0	0			0.00	0.00				
LBTC10	1	0	0			0.00	0.00				
LBTCRC01	1	0	0			0.00	0.00				
LBTCTC01	1	0	0			0.00	0.00				
LBTCCABC01	1	0	0			0.00	0.00				
LBTCSC01	1	0	0			0.00	0.00				
LBTCFC01	1	0	0			0.00	0.00				
LBTCPC01	1	0	0			0.00	0.00				
LBTCCLC01	1	0	0			0.00	0.00				
Little Timber Creek											
LBTCLTCD01	1	2	2			0.98	0.98				
LBTCLTC01	1	86	86			20.72	20.72				
Middle Fork Little Timber											
LBTCLTCMF01	1	93	93			33.70	33.70				
LBTCLTCMF02	3	0	0	0	0	0.00	0.00	n/a	n/a	n/a	n/a
LBTCLTCMF03	1	0	0			0.00	0.00				
LBTCLTCMF04	1	0	0			0.00	0.00				
North Fork Little Timber											
LBTCLTCNF01	1	146	146			42.20	42.20				
LBTCLTCNF02	1	95	95			29.32	29.32				
LBTCLTCNF03	1	0	0			0.00	0.00				
LBTCLTCNF04	1	0	0			0.00	0.00				
Basin Creek											
LBTCBC01	1	11	11			7.10	7.10				
LBTCBC02	1	3	3			2.08	2.08				
LBTCBC03	1	0	0			0.00	0.00				

Table 16. Percentage (%) and mean density (100/m2) of electrofishing transects containing steelhead/rainbow trout, cutthroat trout, rainbow cutthroat hybrids and bull trout in Big Timber Creek watershed, 2003, Lemhi County, ID.

Stream	# Transects	# (%) Sites w/ Rainbow Trout	# (%) Sites w/ Cutthroat Trout	# (%) Sites w/ CTT/RBT Hybrids	# (%) Sites w/ Bull Trout	Mean Density Rainbow Trout	Mean Density Cutthroat Trout	Mean Density CTT/RBT Hybrids	Mean Density Bull Trout	Total Site Area /100m2	Mean Site Area /100m2
Big Timber Creek	17	9(53%)	8(47%)	1(6%)	14(82%)	5.04	3.42	0.16	7.04	65.23	3.84
Little Timber Creek	2	0(0%)	1(50%)	0(0%)	0(0%)	n/a	4.82	n/a	n/a	6.20	3.10
Middle Fk. Little Timber	4	0(0%)	4(100%)	0(0%)	3(75%)	n/a	7.01	n/a	16.99	10.13	2.53
North Fk. Little Timber	4	0(0%)	4(100%)	0(0%)	1(25%)	n/a	4.67	n/a	6.92	10.45	2.61
Basin Creek	3	1(33%)	1(33%)	0(0%)	0(0%)	29.03	21.83	n/a	n/a	4.41	1.47

Table 17. Little Timber Creek Drainage Lakes stocking records

Lake Name	Year Stocked	Species	Size	Number Stocked
N F Little TIMBER L	1983	Henry's Lake CTT	Fry (0-3 Inches)	250
N F TIMBER Cr L #1	1986	Henry's Lake CTT	Fry (0-3 Inches)	250
M F Little TIMBER L #1	1989	Westslope CTT	Fry (0-3 Inches)	1000
M F TIMBER Cr L	1992	Westslope CTT	Fry (0-3 Inches)	1000
M F Little TIMBER L #1	1996	Westslope CTT	Fry (0-3 Inches)	1000
M F Little TIMBER L #1	1998	Westslope CTT	Fry (0-3 Inches)	1000
Stone Res	1958	Rainbow	Catchable	2081
Stone Res	1959	Rainbow	Catchable	3300
Stone Res	1960	Rainbow	Catchable	1650
Stone Res	1961	Rainbow	Catchable	1500
Stone Res	1962	Rainbow	Catchable	2100
Stone Res	1963	Rainbow	Catchable	1840
Timber Cr MFk L #1	1965	Cutthroat	Fry (0-3 Inches)	3800
Timber Cr MFk L #1	1983	Cutthroat	Fry (0-3 Inches)	250
Timber Cr MFk L #1	1986	Cutthroat	Fry (0-3 Inches)	250
Lunker L	1989	Cutthroat	Fry (0-3 Inches)	1000
Lunker L	1992	Westslope CTT	Fry (0-3 Inches)	1000
Timber Cr MFk L #1	1996	Westslope CTT	Fry (0-3 Inches)	1000
Timber Cr MFk L #1	1998	Westslope CTT	Fry (0-3 Inches)	1000



Photo 1. Bull trout from mainstem Big Timber Creek, 2003



Photo 2. Westslope cutthroat trout from mainstem Big Timber Creek, 2003



Photo 3. Big Timber Creek electrofishing transect LBTC01, 2003

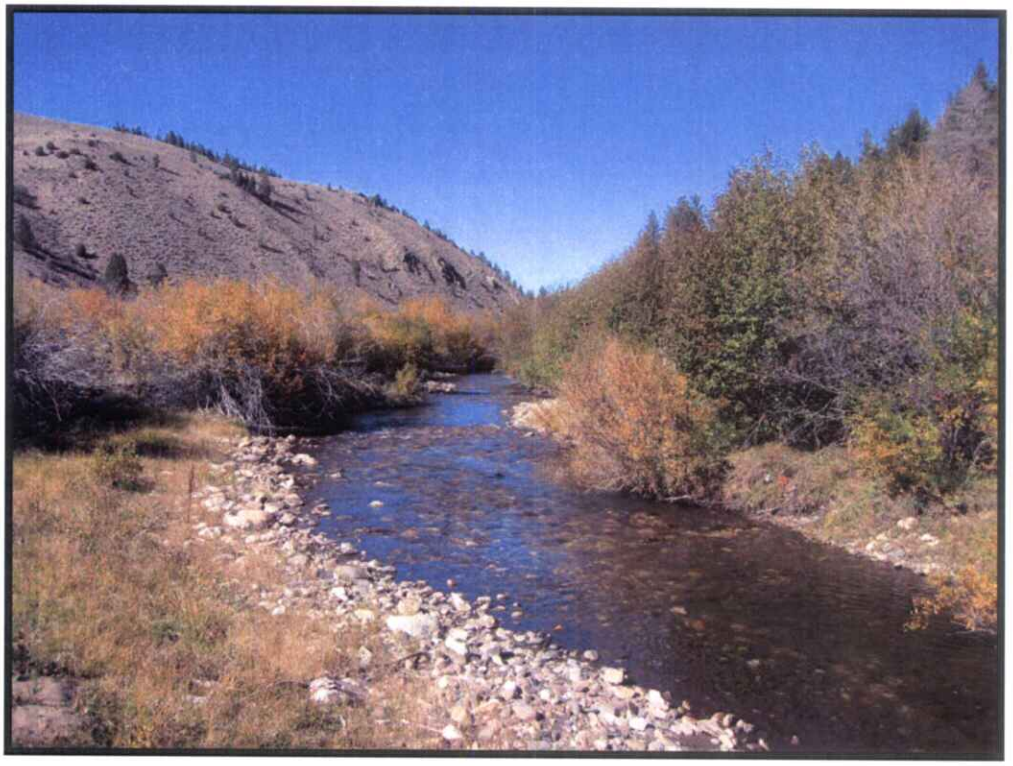


Photo 4. Big Timber Creek electrofishing transect LBTC04, 2003



Photo 5. Big Timber Creek electrofishing transect LBTC06, 2003

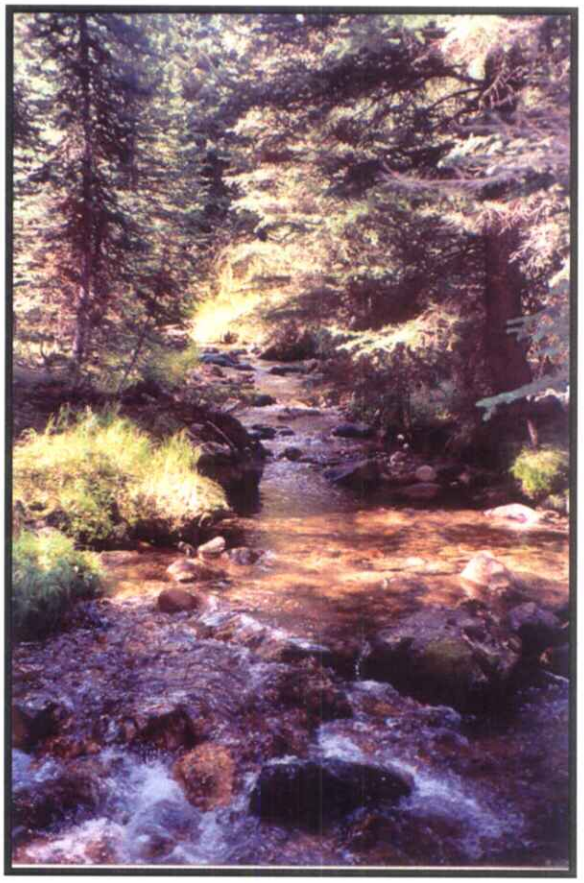


Photo 6. Big Timber Creek electrofishing transect LBTC09, 2003

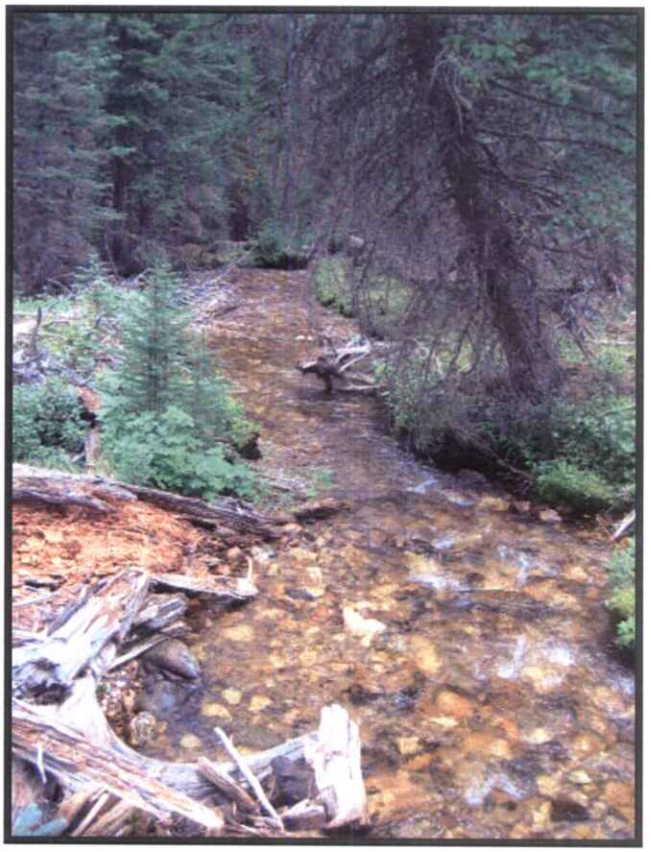


Photo 7. Middle Fork Little Timber Creek electrofishing transect LBTCLTCMF02, 2003



Photo 8. Middle Fork Little Timber Creek westslope cutthroat trout, 2003



Photo 9. North Fork Little Timber Creek electrofishing transect LBTCLTCNF02, 2003



Photo 10. Mainstem Little Timber Creek at the confluence of the North and Middle Forks, 2003



Photo 11. Little Timber Creek above last diversion, 2003



Photo 12. Mainstem Little Timber Creek below diversions, 2003

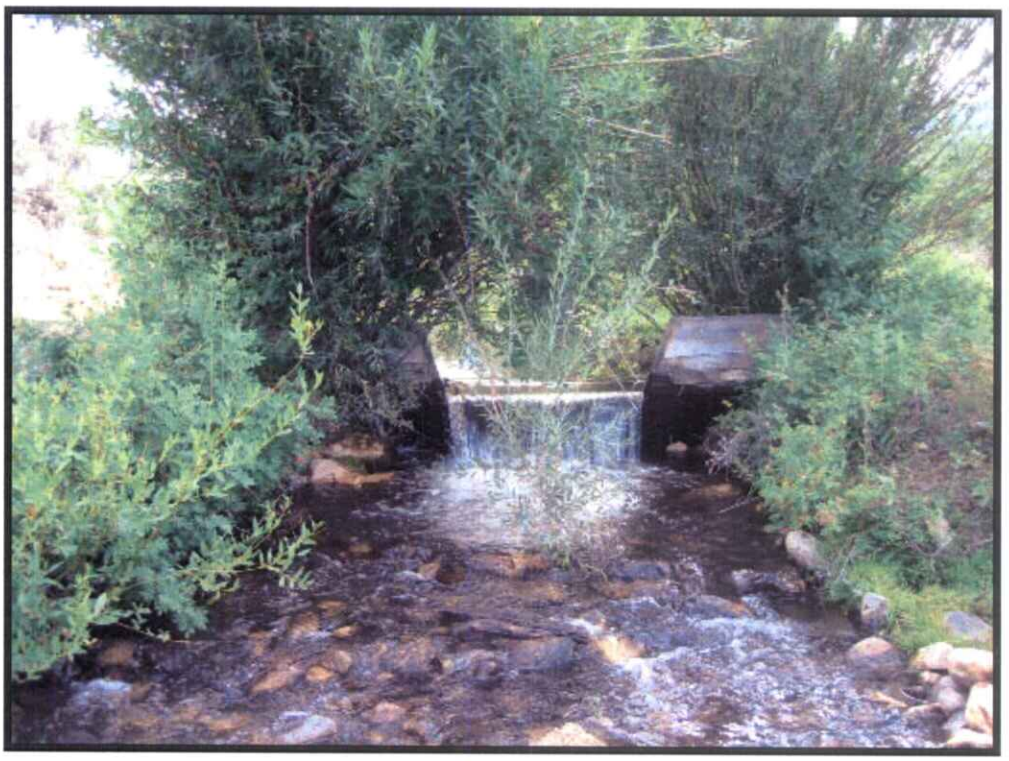


Photo 13. Coleman ditch measuring wier. (1 cfs water right), 2003.



Photo 14. Little Timber Creek channel below Coleman ditch, 2003



Photo 15. Basin Creek electrofishing transect LBTCBC01, 2003



Photo 16. Basin Creek electrofishing transect LBTCBC03, 2003



Photo 17. Rocky Creek electrofishing transect LBTCRC01, 2003



Photo 18. Rocky Creek, 2003



Photo 19. Bull trout sampled from Rocky Creek electrofishing transect, 2003



Photo 20. Bull trout sampled from Rocky Creek electrofishing transect, 2003



Photo 21. Trail Creek



Photo 22. Cabin Creek



Photo 23. Squirrel Creek



Photo 24. Falls Creek

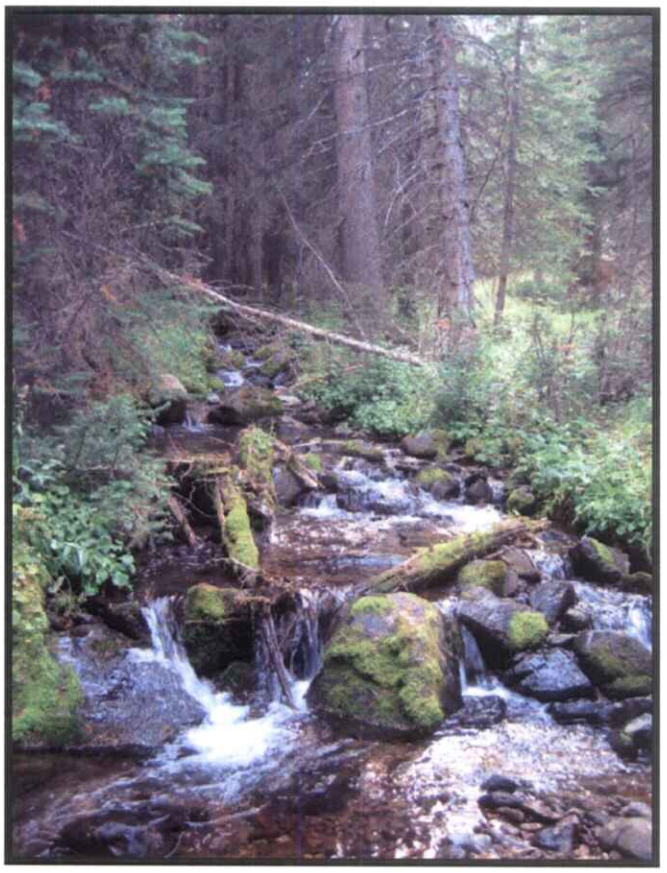


Photo 25. Prospect Creek



Photo 26. Climb Creek



Photo 27. LBTC-ABD-01 (creek through culvert)



Photo 28. LBTC-INT-01 (L-63 ditch flow from lower right corner/Big Timber Creek flow from lower left corner)



Photo 29. Beyeler "Straight Ditch" irrigation diversion (L-63 FLOWS)



Photo 30. LBTC-02 (DITCH TO LEFT)

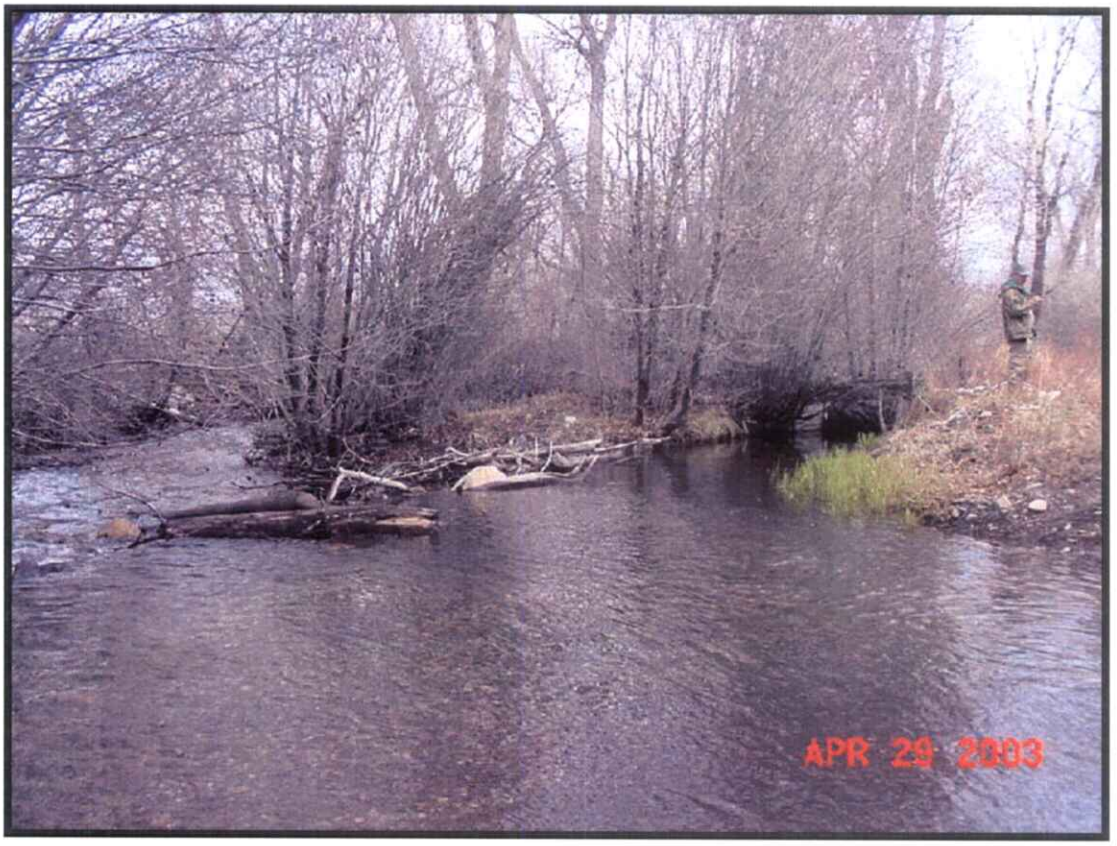


Photo 31. LBTC-05 diversion



Photo 32. LBTC-06 diversion



Photo 33. LBTC-07 diversion



Photo 34. LBTC-08 diversion



Photo 35. LBTC-09 diversion



Photo 36. LBTC-10 diversion



Photo 37. LBTC-12 Carey Act Dam (from below)

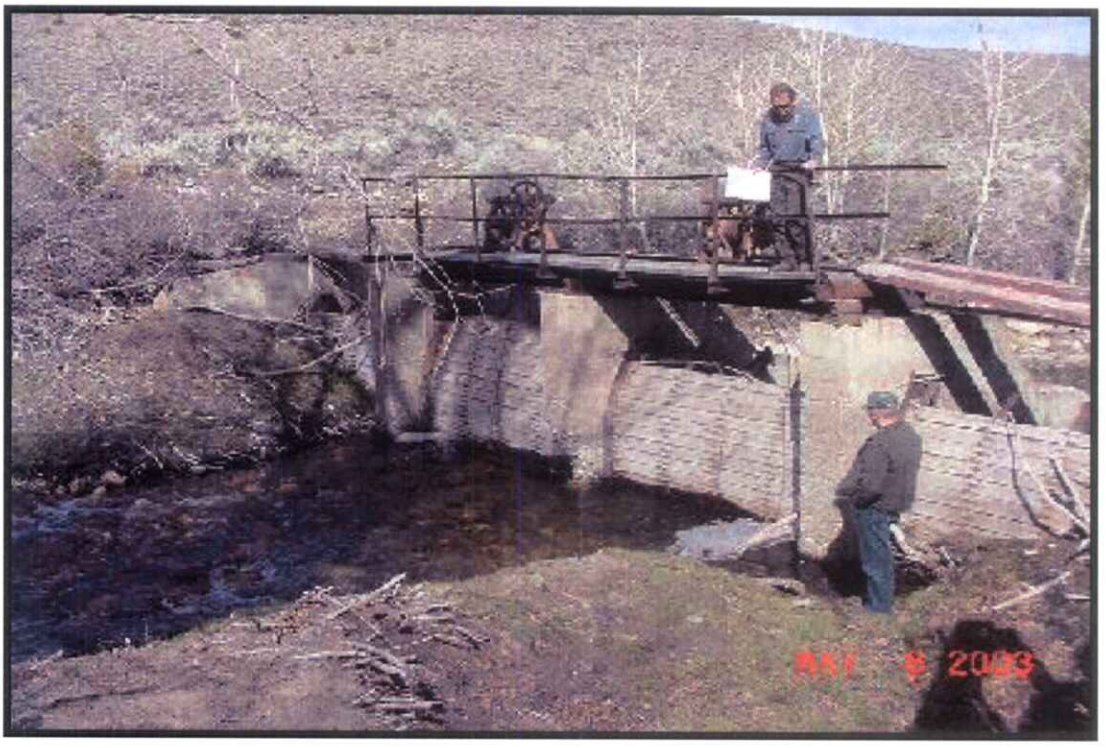


Photo 38. LBTC-12 Carey Act Dam (from above)



Photo 39. LBTC-13 diversion



Photo 40. Carey Act Dam historical photo, 1913

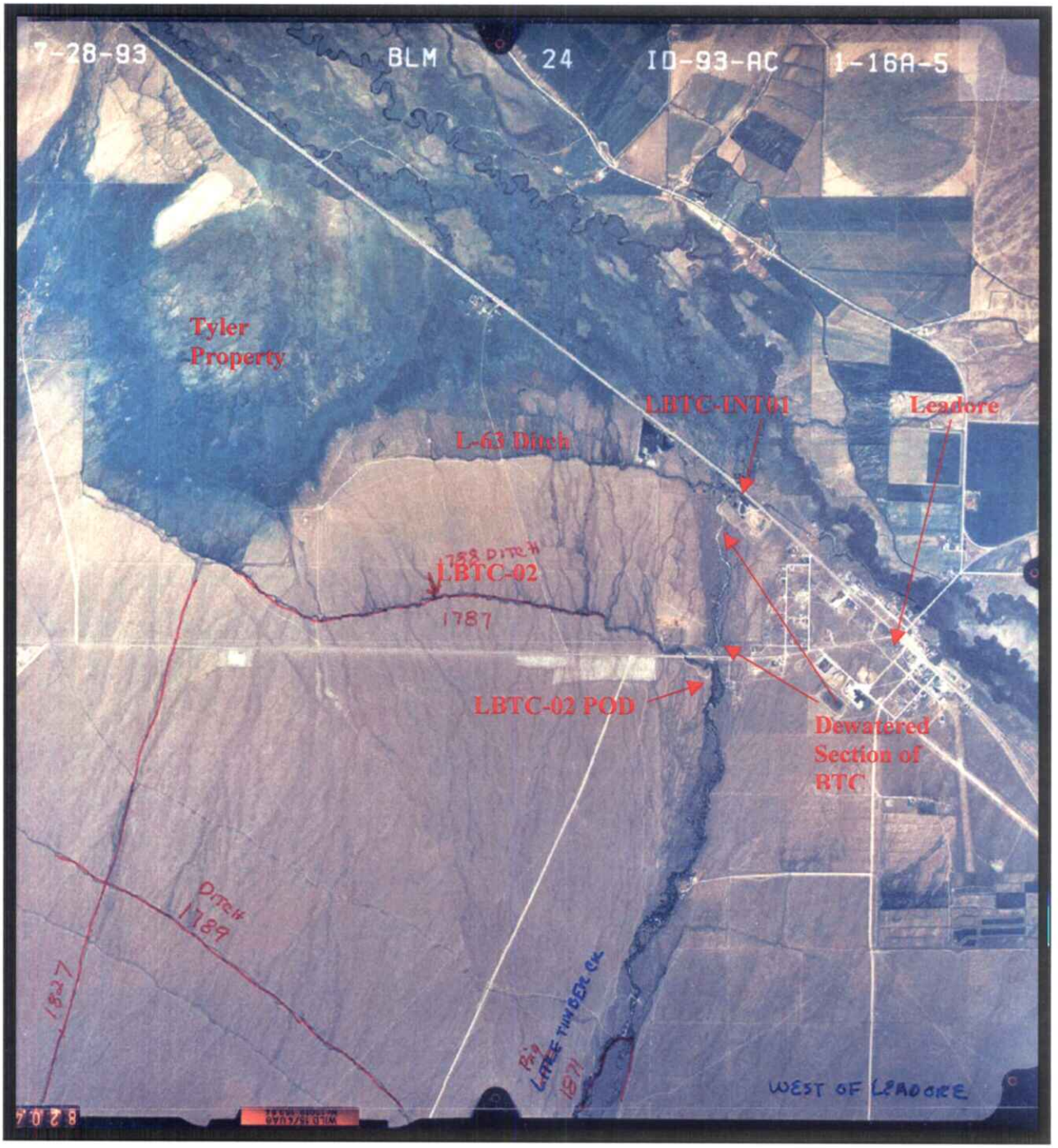


Photo 41. Big Timber Creek Aerial Photo 1

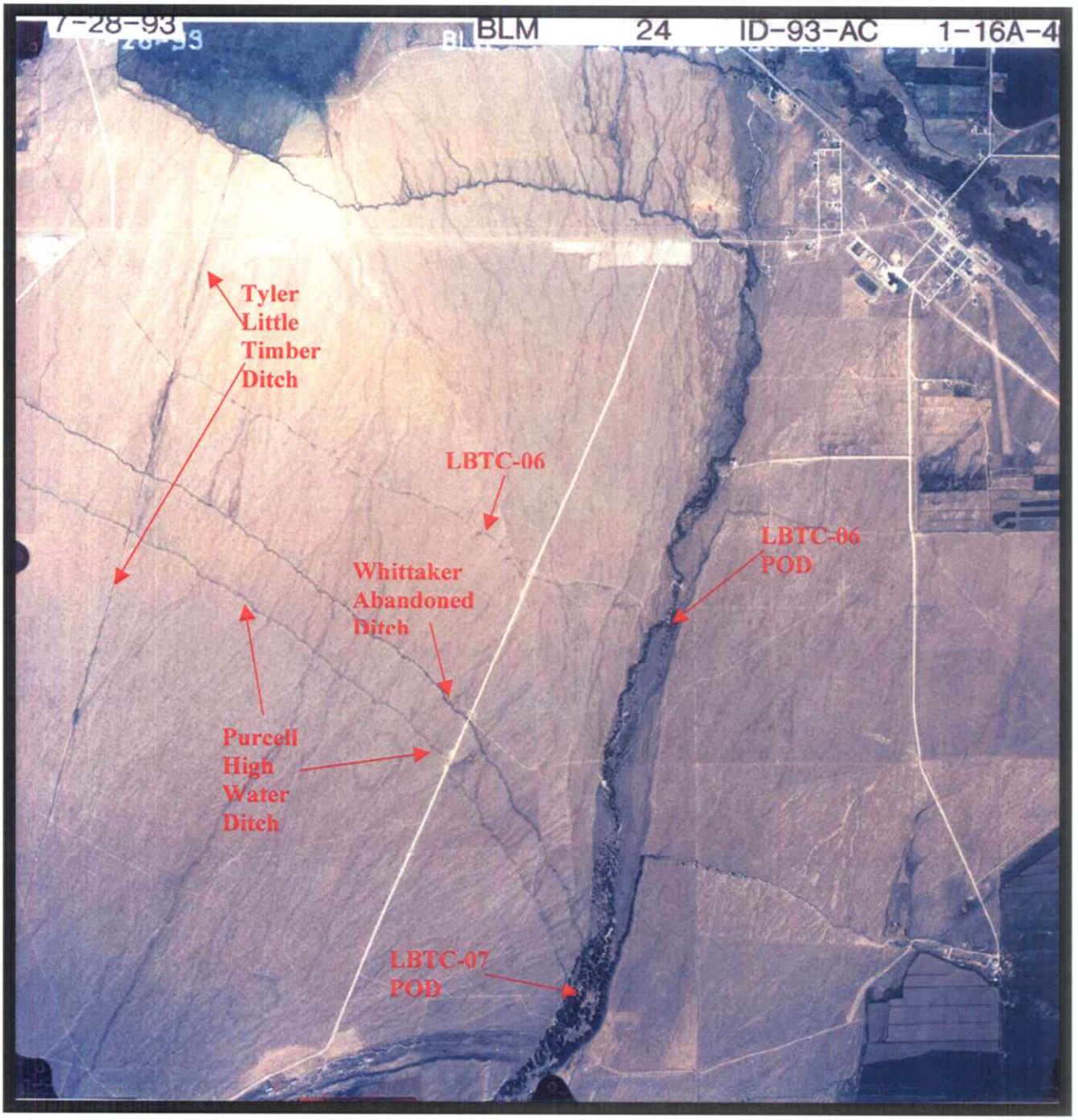


Photo 42. Big Timber Creek Aerial Photo 2

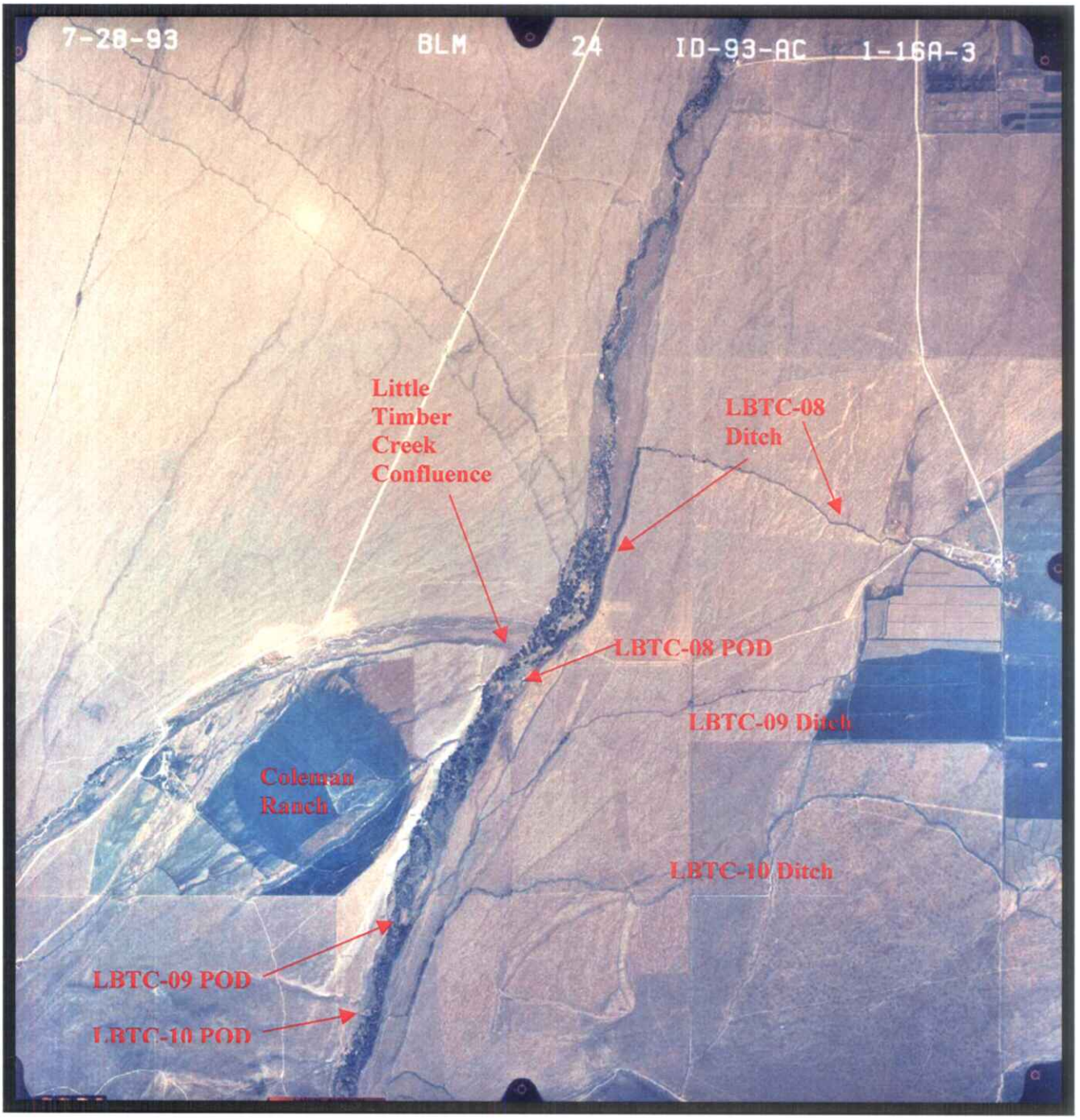


Photo 43. Big Timber Creek Aerial Photo 3

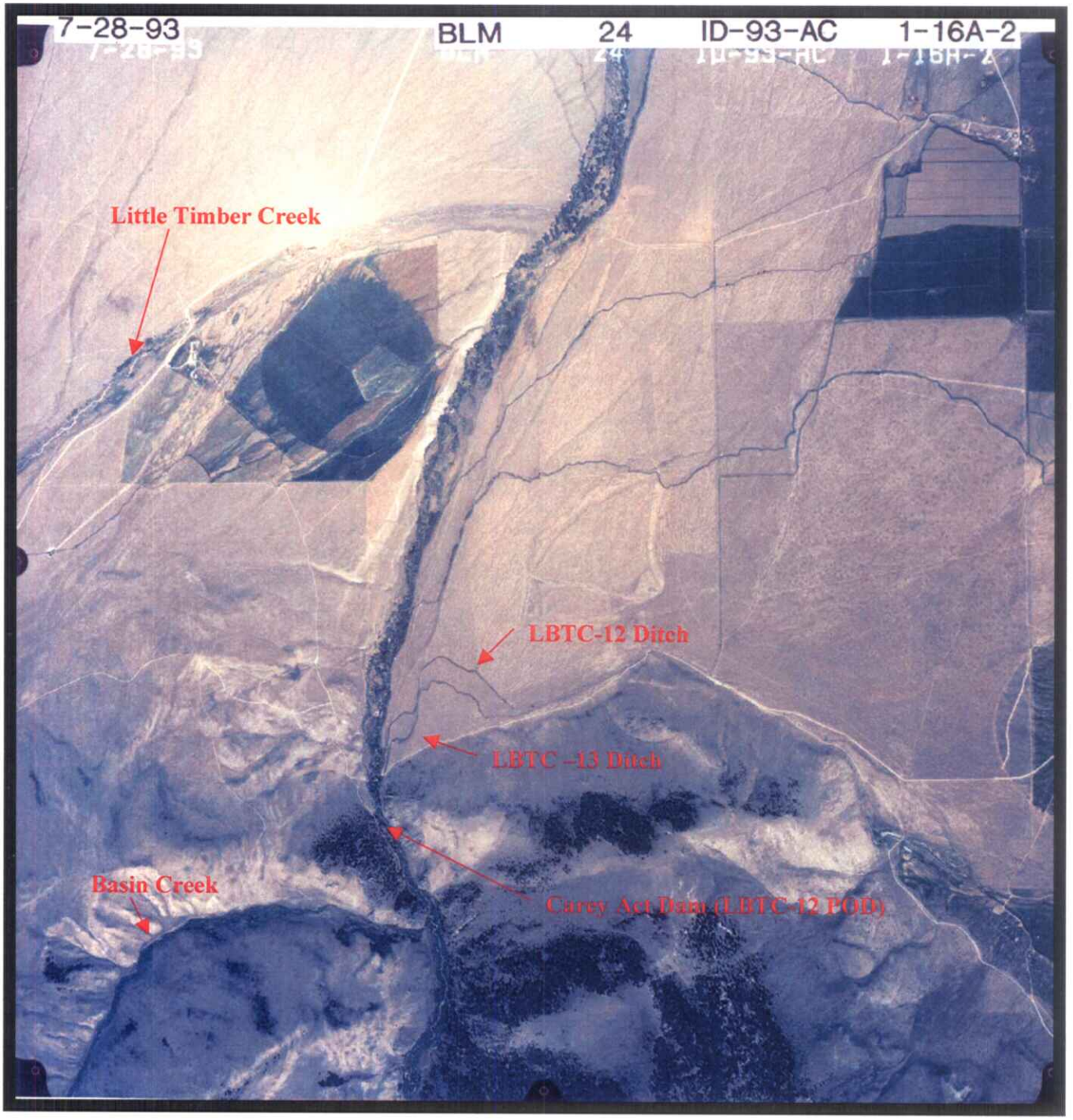


Photo 44. Big Timber Creek Aerial Photo 4

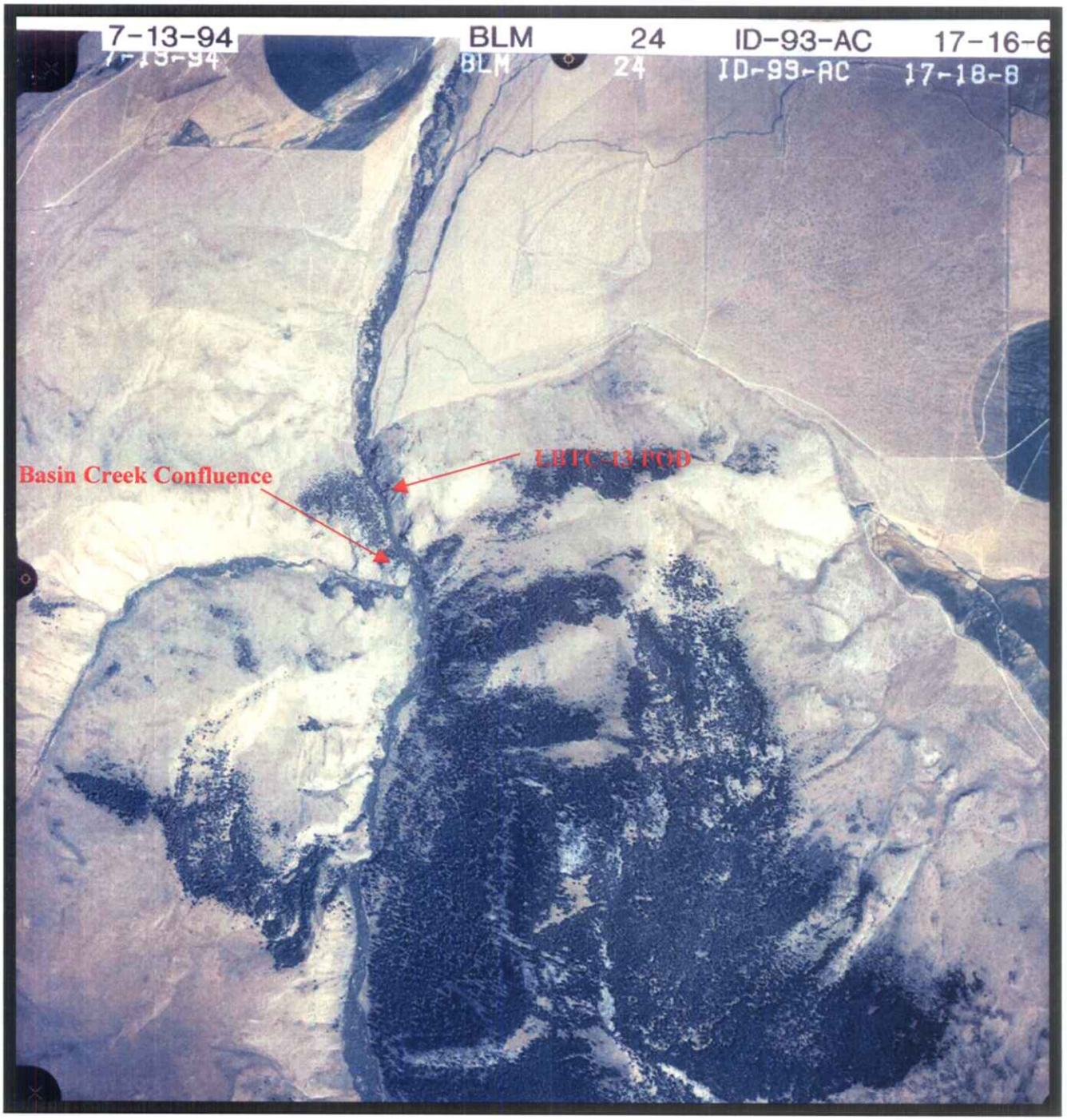


Photo 45. Big Timber Creek Aerial Photo 5