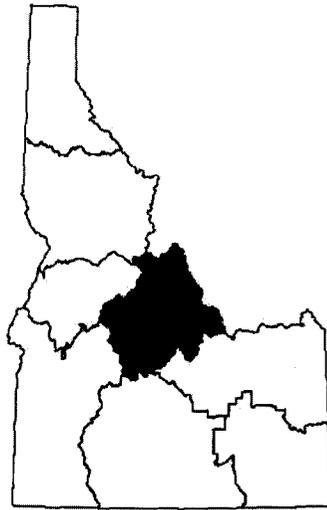


# FISHERY MANAGEMENT INVESTIGATIONS



**IDAHO DEPARTMENT OF FISH AND GAME  
FISHERY MANAGEMENT ANNUAL REPORT  
Cal Groen, Director**



**SALMON REGION**

**2008**



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**December 2009  
IDFG 09-126**



# 2008 SALMON REGION FISHERY MANAGEMENT ANNUAL REPORT

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## 2008 SALMON REGION FISHERY MANAGEMENT ANNUAL REPORT

### Surveys and Inventories - Mountain Lakes

#### ABSTRACT

The Idaho Department of Fish and Game (IDFG) stocked 82 mountain lakes in the Salmon-Challis National Forest and Sawtooth National Recreation Area in 2008. Seventy-three lakes were stocked with 57,325 westslope cutthroat trout *Oncorhynchus clarkii lewisi* fry. Seven lakes were stocked with 1,726 Troutlodge triploid rainbow trout *O. mykiss* fry and two lakes were stocked with 4,216 golden trout *O. aquabonita* fry. No Arctic grayling *Thymallus arcticus* were stocked this year.

Regional IDFG personnel surveyed 12 mountain lakes during 2008. Survey data will be used as part of a statewide management plan and to better understand mountain lake resources within the Salmon-Challis National Forest, Sawtooth National Recreational Area, and Sawtooth Wilderness Area. In 2008, we assessed fish status visually and by hook and line, evaluated mountain lake use, and reviewed past stocking efforts. Nine of the 12 lakes surveyed were previously stocked. Of the nine lakes previously stocked, eight had fish in them at the time of the surveys. We determined that fish stocking should continue in eight lakes to maintain a mountain lake fishery. Three unstocked lakes surveyed were likely fishless. These three lakes should remain fishless to provide refugia for native fauna. Two surveyed lakes showed campsite impact ratings of none to low in the use category.

## **INTRODUCTION**

The Salmon Region has approximately one thousand mountain lakes. Some of these lakes have never been inventoried or have not been surveyed in decades. Development of a mountain lake management plan, concern for sensitive fish and amphibian species, high levels of angler satisfaction, and increased requests for information on mountain lakes fishing opportunities led the Salmon Region to increase its priority of conducting mountain lake surveys. Since 2000, the Salmon Region has continued its effort to assess mountain lakes and increase the number of lakes surveyed annually. The information collected from these surveys is stored in a regional geodatabase which is used to provide mountain lake information for the angling public, regional planning, and government agencies.

## **OBJECTIVES**

### **Mountain Lake Stocking**

Assess the status of the stocking program in mountain lakes of the Salmon Region in order to maintain a viable and diverse program.

### **Mountain Lake Surveys**

Assess the status of fish and amphibian populations by surveying all stocked and unstocked mountain lakes within the Salmon Region. Surveys will document fish and amphibian populations, determine spawning potential of inlets and outlets, and record parameters of angler/camper use.

## **STUDY AREA AND METHODS**

### **Mountain Lake Stocking**

Salmon Region mountain lakes in the Salmon-Challis National Forest (SCNF) were stocked by Mackay Fish Hatchery personnel by backpacking and fixed-wing aircraft. Golden trout were raised at the IDFG McCall Fish Hatchery this year and sent to Mackay Fish Hatchery before stocking.

During 2008, Salmon Region mountain lakes located in the Sawtooth National Recreation Area (SNRA) were stocked by Sawtooth Fish Hatchery personnel and Sawtooth Flying Service using a Cessna – 185 fixed-wing aircraft.

### **Mountain Lake Surveys**

Regional IDFG personnel conducted surveys by backpacking and day hiking into 12 mountain lakes in the SCNF. We documented fish presence and species by visual observation and by angling. Fish were identified by species and measured to the nearest mm TL. Fish

spawning potential of inlets and outlets and amphibian surveys were not conducted in 2008. Shoreline areas were visually surveyed for campsites and signs of human use, and the difficulty of access to the lake was assessed. We used Bahls (1992) campsite impact rating (Table 1) to assess the condition of areas surrounding the lakes. All survey data were entered into the Salmon Region's mountain lake Microsoft Access database for future analysis. Physical locations and characteristics of the mountain lakes are detailed in Appendix A. Data sheets were archived at the IDFG Salmon Region office.

## **RESULTS AND DISCUSSION**

### **Mountain Lake Stocking**

In 2008, Mackay Fish Hatchery personnel stocked nine mountain lakes in the SCNF. Four lakes were stocked with 1,028 Troutlodge triploid rainbow trout fry by backpacking. Two lakes were stocked with 4,216 golden trout fry and three lakes with 698 Troutlodge triploid rainbow trout fry by aircraft (Table 2). All golden trout and rainbow trout were between 43.2-47.0 mm TL. The total flight time was 3.5 hours at a cost of \$1,200, or an average of \$133.33 per lake, using the same airline company (McCall Aviation) and plane model used in 2007. By comparison with 2007, 11 lakes were stocked with a total flight time of 4.8 hours at a cost of \$1,632.00, or an average of \$148.36 per lake. No Arctic grayling were stocked in 2008.

Sawtooth Fish Hatchery personnel stocked 73 mountain lakes in the SNRA and SCNF in 2008. Fish size at stocking was 400 per pound and averaged 54 mm long. A total of five flights were flown at a total flight cost of \$3,367, or an average of \$46.00 per lake. Stocking followed Rotation A in 2008 (Table 3), and Rotation C to make up for 22,375 westslope cutthroat trout that were not stocked in 2007 (Table 4). Yellowbelly Lake was stocked in 2008 with 11,000 surplus westslope cutthroat trout in the hatchery inventory (Table 3).

### **Mountain Lake Surveys**

Regional IDFG personnel surveyed 12 mountain lakes in 2008 in the SCNF (Table 5). Nine of the 12 lakes surveyed this year were previously stocked. Of the nine previously stocked lakes, we determined that stocking should be continued in eight of the lakes to provide a mountain lake fishery. Fish were documented in eight of the 12 lakes surveyed in 2008. All of the three previously unstocked lakes should remain fishless to provide refugia for native fauna. Wright Lake was the only lake surveyed that had been previously stocked, but no fish were detected in 2008. Wright Lake was last stocked in 1998 with 250 westslope cutthroat trout fry.

Using Bahls (1992) campsite impact rating in Table 1, two of the lakes surveyed this year showed a campsite impact rating of none or low use.

## **MANAGEMENT RECOMMENDATIONS**

Continue stocking mountain lakes using Rotation B in 2009.

Continue surveys of mountain lakes to update the status of fish and amphibian populations, human use, and the success of current stocking strategies.

Stock all Arctic grayling lakes in 2009 that were not stocked in 2008 or 2007. Coordinate with the IDFG's Fisheries Bureau to find a reliable, consistent source of Arctic grayling, westslope cutthroat trout, and golden trout.

Table 1. Bahls total campsite impact rating for lakes.

Impact Rating	No. of Campsites Observed
None	0
Low	1 - 4
Moderate	5 - 7
High	> 7

Table 2. Salmon Region mountain lakes stocked in 2008 by Mackay Fish Hatchery personnel.

Lake Name	Catalog No.	Land Area <sup>a</sup>	Species <sup>b</sup>	No. Fish Stocked
China Lake #3	7-0885	SCNF	GN	3,866
Gentian Lake	7-1370	SCNF	RBT	326
Liberty Lake #1	7-0830	SCNF	RBT	156
Liberty Lake #2	7-0833	SCNF	RBT	197
Pass Lake	7-1307	SCNF	GN	350
Pole Lake	7-0834	SCNF	RBT	217
Rock Lake #1	7-0863	SCNF	RBT	135
Rock Lake #2	7-0864	SCNF	RBT	540
Twin Creek Lake #2	7-1319	SCNF	RBT	155
<b>Total</b>				<b>5,942</b>

<sup>a</sup> SCNF = Salmon-Challis National Forest.

<sup>b</sup> GN = Golden trout fry, RBT = Troutlodge triploid rainbow trout fry.

Table 3. Salmon Region mountain lakes stocked with westslope cutthroat trout fry in 2008 by Sawtooth Fish Hatchery personnel using Rotation A.

Lake Name	Catalog No.	Land Area <sup>a</sup>	No. Fish Stocked
Big Frog Lake #2	7-1385	SNRA	1,000
Cache Creek Lake #1	7-0843	SCNF	250
Castle Lake	7-1420	SNRA	650
Castle Lake #1	7-0835	SNRA	125
Castle View Lake	7-1440	SNRA	250
Challis Creek Lake #2	7-1333	SCNF	750
Challis Creek Lake #3	7-1335	SCNF	950
Chamberlain Lake #7	7-1439	SNRA	500
Cirque Lake	7-1369	SNRA	1,150
Cove Lake	7-1364	SNRA	1,100
Crater Lake	7-1460	SCNF	875

Table 3. Continued.

Lake Name	Catalog No.	Land Area <sup>a</sup>	No. Fish Stocked
Drift Lake (Shallow Lake)	7-1424	SNRA	375
East Basin Creek Lake #1	7-1514	SCNF	475
Elk Lake	7-1163	SNRA	675
Fourth Of July Lake	7-1685	SNRA	725
Garland Lake #1	7-1468	SNRA	500
Garland Lake #2	7-1469	SNRA	500
Garland Lake #3	7-1470	SNRA	350
Goat Lake	7-1375	SNRA	1,150
Gunsight Lake	7-1350	SNRA	450
Hindman Lake #1 <sup>b</sup>	7-1495	SCNF	1,000
Honey Lake	7-1433	SNRA	200
Hoodoo Lake	7-1463	SNRA	250
Lightning Lake	7-1680	SNRA	275
Little Redfish Lake	7-1347	SNRA	250
Martindale Lake #2	7-0816	SCNF	200
Mystery Lake #3	7-0879	SCNF	75
Ocalkens Lake #1	7-1464	SNRA	500
Ocalkens Lake #2	7-1465	SNRA	750
Phyllis Lake	7-1683	SNRA	375
Pipe Lake (Blackrock Lake)	7-1732	SNRA	200
Rainbow Lake	7-1727	SNRA	200
Sapphire Lake	7-1367	SNRA	1,250
Sheep Lake	7-1356	SNRA	500
Six Lake #1	7-1672	SNRA	475
Slide Lake	7-1363	SNRA	275
Snow Lake	7-1374	SNRA	375
Swimm Lake	7-1467	SNRA	875
Thunder Lake	7-1679	SNRA	225
W F Bear Creek Lake #1	7-1328	SCNF	200
W F Camas Creek Lake #1	7-0818	SCNF	1,200
W F Camas Creek Lake #3	7-0820	SCNF	750
W F Camas Creek Lake #5	7-0824	SCNF	500
Washington Lake #2	7-1444	SNRA	750
Yellowbelly Lake <sup>c</sup>	7-1734	SNRA	11,000
<b>Total</b>			<b>35,450</b>

<sup>a</sup> SCNF = Salmon-Challis National Forest, SNRA=Sawtooth National Recreation Area.

<sup>b</sup> Stocked in all three rotations.

<sup>c</sup> Stocked with excess fry.

Table 4. Salmon Region mountain lakes stocked with westslope cutthroat trout fry in 2008 by Sawtooth Fish Hatchery personnel using Rotation C.

Lake Name	Catalog No.	Land Area <sup>a</sup>	No. Fish Stocked
Basin Creek Lake #5	7-1237	SCNF	1,000
Bear Valley Lake #3	7-1245	SCNF	150
Birdbill Lake	7-1197	SCNF	500
Broncho Lake	7-0566	SCNF	725
Devils Lake	7-1260	SCNF	350
Everson Lake	7-1257	SCNF	1,500
Harbor Lake	7-0796	SCNF	3,000
Heart Lake	7-0793	SCNF	1,675
Hidden Lake	6-0616	SCNF	1,125
Iron Lake #1	7-1279	SCNF	1,000
Line Lake	6-0603	SCNF	350
Middle Fork Hat Creek Lake #5	7-1293	SCNF	1,075
McNutt Lake	7-1236	SCNF	350
North Fork East Fork Reynolds Lake #2	7-0575	SCNF	1,325
North Fork East Fork Reynolds Lake #4	7-0578	SCNF	1,000
Paragon Lake	7-0756	SCNF	275
Park Fork Creek Lake (Yellow Peak)	7-1298	SCNF	150
Patterson Creek Lake #1	7-1258	SCNF	125
Patterson Creek Lake #2	7-1259	SCNF	200
Puddin Mtn Lake #10 (Turquoise)	7-0778	SCNF	275
Puddin Mtn Lake #15 (Skyhigh)	7-0787	SCNF	675
R F Big Eightmile Lake	7-1264	SCNF	150
Ramshorn Lake	7-0755	SCNF	350
Ship Island Lake #5 (Airplane)	7-0618	SCNF	1,000
Ship Island Lake #7 (Sheepeater)	7-0620	SCNF	325
U P Lake	7-1220	SCNF	1,000
Welcome Lake	7-0790	SCNF	1,225
Wilson Lake	7-0794	SCNF	1,000
<b>Total</b>			<b>21,875</b>

<sup>a</sup> SCNF = Salmon-Challis National Forest.

Table 5. Salmon Region mountain lakes surveyed in 2008.

LLID	IDFG Catalog No.	Lake Name	Survey Date	Primary Fish Species Observed
1135929446187	7-1263	Dairy Lake	7/15/2008	ND <sup>a, b</sup>
1136134446256	7-1257	Everson Lake	7/17/2008	ND <sup>b</sup>
1136639452386	7-1227	Geertson Lake #2	10/7/2008	ND <sup>b</sup>
1138203447394	0	Kadletz Creek Lake #A	7/30/2008	ND
	0	Kadletz Creek Lake #B	7/30/2008	ND
1138195447425	0	Kadletz Creek Lake	7/30/2008	ND
1135321445506	7-1271	Middle Fork Little Timber Lake #1	8/3/2008	Westslope cutthroat trout
1136591446554	7-1254	Mill Creek Reservoir #1	10/7/2008	ND <sup>b</sup>
1133908445099	7-1273	Nez Perce Lake	7/15/2008	Arctic grayling
1135170445818	7-1265	North Fork Timber Creek Lake #1	8/6/2008	Westslope cutthroat trout
1136218446424	7-1256	Stroud Lake	7/17/2008	Bull trout
1138288447376	7-1246	Wright Lake	7/30/2008	ND

<sup>a</sup> ND = No data.

<sup>b</sup> Fish were observed but not identified.

## 2008 SALMON REGION FISHERY MANAGEMENT ANNUAL REPORT

### Surveys and Inventories - Lowland Lakes

#### ABSTRACT

Regional fishery staff sampled fish populations in selected lowland lakes to assess population size structures, relative weights, and relative changes in zooplankton abundance and forage availability. In Herd and Carlson lakes, survey results were used in a continuing effort to determine the effectiveness of tiger muskellunge (northern pike *Esox lucius* x muskellunge *E. masquinongy*) introductions to improve the size structure of fish populations. While mean relative weights declined slightly for fish populations in both lakes in 2008 compared to 2006, an overall increase in mean TL and average weight of fish was found in both lakes. Rainbow trout in Jimmy Smith Lake were sampled by gill nets during 2008. The average catch rate of rainbow trout this year increased to 10.1 fish per hour from 4.3 fish per hour observed in 2006. Overall, rainbow trout mean relative weight, average length and weight declined from 2006 results. In 2008, we determined the zooplankton quality index (ZQI) for Herd, Jimmy Smith, Williams, and Yellowbelly lakes. ZQI in 2008 showed little variation ( $< 0.02$ ) for Jimmy Smith and Yellowbelly lakes compared with 2007 findings. The Williams Lake ZQI value of 0.73 represented an increase from 0.56 in 2005, but similar to the ZQI value of 0.72 in 2003. In Herd Lake, ZQI values in 2008 slightly decreased to 0.98 from 1.28 found in 2007, but were still significantly higher than previous values found prior to tiger muskellunge introductions. In 2008, quagga mussel (*Dreissena bugensis*) sampling in Alturas and Redfish lakes yielded no detections of veligers.

## INTRODUCTION

The Salmon Region contains 20 lowland lakes, 1 reservoir, and 7 public ponds (Table 6). Regional fishery staff defines its lowland lakes as being accessible by road and currently stocked with fish by truck. IDFG manages lowland lake fisheries to provide diverse recreational and angling opportunities for the public, and collects and maintains information on lowland lakes that helps managers meet objectives of the Fisheries Management Plan 2007-2012 (IDFG 2007).

## OBJECTIVES

### Alturas Lake

Sample Alturas Lake using plankton tows for the presence of quagga mussel veligers.

### Herd Lake

Assess the effects of a tiger muskellunge introduction to control the localized, self-sustaining rainbow trout population. Monitor the ZQI to detect relative changes in zooplankton populations following the 2006 tiger muskellunge introduction.

### Jimmy Smith Lake

Monitor Jimmy Smith Lake's rainbow trout population to determine whether management action is necessary to improve the size and population structure of rainbow trout within the lake. Monitor Jimmy Smith Lake's ZQI to detect relative changes in zooplankton population and use the lake as a "control" for comparison with ZQI results in Herd Lake.

### Carlson Lake

Assess the effects of the tiger muskellunge introduction on the brook trout *Salvelinus fontinalis* population.

### Williams Lake

Monitor ZQI values to detect relative changes in zooplankton population and forage availability. Spawn rainbow trout collected from Lake Creek, the inlet tributary to Williams Lake, and release progeny back into Lake Creek to alleviate public pressure to stock Williams Lake from a hatchery source.

### Yellowbelly Lake

Monitor ZQI values to detect relative changes in zooplankton population and forage availability.

## Redfish Lake

Sample Redfish Lake using plankton tows for the presence of quagga mussel veligers.

## STUDY AREA AND METHODS

### Alturas Lake

Alturas Lake is a highly oligotrophic lake located in southern Custer County at 2,138 m elevation (UTM coordinates NAD27, zone 11, 671797mE, 4864342mN,) in the SNRA near Stanley, Idaho. The lake has a surface area of 338.2 ha and 7.9 km of shoreline. Its outlet and inlet is Alturas Lake Creek. The inlet is on the southwest end and the outlet is on the northeast end of the lake.

The lake supports a population of bull trout *Salvelinus confluentus*, along with kokanee *Oncorhynchus nerka*, mountain whitefish *Prosopium williamsoni*, sucker *Catostomus sp.*, northern pikeminnow *Ptychocheilus oregonensis*, and hatchery rainbow trout.

Alturas Lake was sampled for quagga mussel veligers using a plankton net (simple, conical net with 63 $\mu$  pore size and 0.25 m diameter net opening with a removable cod-end piece). Samples were collected by boat at three different sites near shore and in open water areas near boat ramps. Three to four vertical tows were collected using a 10 m pull. Samples were stored in polyethylene bottles and preserved with 95% ethanol (ETOH). Samples were sent to the IDFG's Nampa Research office for analysis.

### Herd Lake

Herd Lake is a landslide lake located in Custer County at 2,187 m elevation (UTM coordinates NAD27, zone 11, 726324mE, 4885654mN,). The lake has a surface area of 6.7 ha. The lake is a coldwater rainbow trout fishery managed under general fishing rules. The inlet to Herd Lake is Lake Creek in the East Fork Salmon River drainage.

Herd Lake was sampled by regional fishery staff on June 5, 2008. Fish captured by angling were identified to species, measured in TL (mm), and weighed (g). Fish length and weight data were used to calculate relative weights ( $W_r$ ) using formulas developed by Murphy et al. 1991.

Zooplankton samples were taken from two locations on Herd Lake on the afternoon of August 29, 2008 following methods outlined by Teuscher (1999). The 2008 sampling methodology varied from guidelines of Teuscher (1999) due to decreased lake depth. Sampling locations were limited to the two deepest locations detected with a handheld depth finder near the outlet. Zooplankton quality was analyzed using ZQI methodology developed by the Wyoming Game and Fish Department (Yule, unpublished data; Table 7) and Teuscher (1999).

### **Jimmy Smith Lake**

Jimmy Smith Lake is a landslide lake located in north central Custer County in the East Fork Salmon River drainage at 1,948 m elevation with a surface area of 26 ha (UTM coordinates NAD27, zone 11, 707474mE, 4894112mN.). The lake has one outlet and two inlet streams. The outlet stream is located at the north end of the lake and two inlet streams are located at the west and south ends of the lake.

The lake supports a naturally reproducing population of rainbow trout that likely originated from 184,600 rainbow trout stocked from Mackay Hatchery between 1927 and 1938. The lake has not been stocked since that time.

Four experimental variable-mesh gill nets, two floating and two sinking, were used from July 31 - August 1, 2008 to sample the fish population of Jimmy Smith Lake. Captured fish were identified to species, measured for TL (mm), and weighed (g). Rainbow trout length and weight data was used to calculate  $W_r$  using formulas developed by Murphy et al. 1991.

On the morning of August 29, 2008, zooplankton samples were taken in Jimmy Smith Lake at two locations following methods outlined by Teuscher (1999). Zooplankton tows were adjusted due to decreased lake depth. Sampling locations were selected at the two deepest locations detected with a handheld depth detector at mid-lake and near the outlet. A ZQI value was analyzed using methodology developed by Yule and Teuscher (1999) (Table 7).

### **Carlson Lake**

Carlson Lake is a sub-alpine lake approximately 2 ha in size located in the Pahsimeroi River drainage (NAD27, zone 12, 280334mE, 4906829mN,) and is situated at 2,438 m in elevation. Subterranean flow from the lake drains into Double Springs Creek, a tributary of the Pahsimeroi River. Currently, brook trout is the only naturally reproducing fish species found in Carlson Lake.

Fish population surveys in the early 1990's revealed a stunted brook trout population in Carlson Lake (LITER and Lukens 1994). IDFG initiated various population control measures to manipulate the brook trout population and its size structure, but no measurable response was observed (Brimmer et al. 2006). In 2002, 41 tiger muskellunge were introduced into Carlson Lake in an effort to increase the size structure of the brook trout population. An additional 32 tiger muskellunge were stocked in 2006 in a continuing effort to improve the brook trout size structure.

Carlson Lake was sampled by angling from the shoreline and by float tubes on July 22-23, and August 14-15, 2008, respectively. Captured fish were identified to species, measured for TL (mm), and weighed (g). Brook trout length and weight data was used to calculate relative weights using formulas developed by Murphy et al. 1991. Otolith samples were collected and stored in individually labeled vials at IDFG's Salmon Regional office for age and growth analysis.

### **Williams Lake**

Williams Lake, an early eutrophic lake, is located in central Lemhi County (UTM coordinates NAD27, zone 12, 265427mE, 4989077mN,) at 1,600 m elevation. The lake has a surface area of 72.8 ha, a maximum depth of 58 m, and a mean depth of 23 m. The principle in-flow is provided by Lake Creek, with other water sources originating from springs and intermittent streams. The lake supports a naturally reproducing rainbow trout population that includes trophy-sized fish. Bull trout is the only other fish species recorded inhabiting the lake.

A rainbow trout spawning project has been implemented annually in Lake Creek since 1997 in an effort to address the request of Williams Lake property owners and anglers that stocking is needed to increase the lake's fish population.

Zooplankton samples were taken from three locations, near the inlet, mid-lake, and near the outlet of Williams Lake, on the afternoon of August 18, 2008 following methods outlined by Teuscher. ZQI and ZPR values were developed using methodology developed by Yule (unpublished data) and Teuscher (1999).

### **Yellowbelly Lake**

Yellowbelly Lake, an oligotrophic lake, is located in southern Custer County at 2,157 m elevation. The lake has 77.9 ha of surface area, a maximum depth of 24.5 m, and 8.4 km of shoreline. The principle in-flow is provided by Yellowbelly Lake Creek. Yellowbelly Lake is managed as a catch-and-release westslope cutthroat trout fishery. Documented fish species in the lake are brook trout, westslope cutthroat trout, rainbow trout, bull trout, northern pikeminnow, and sucker. In an effort to reestablish native fish populations, the lake was treated with Rotenone in 1990. Additionally, a fish barrier located at the outlet of Yellowbelly Lake was removed in 2000 by SNRA personnel to reestablish connectivity with the main-stem Salmon River.

Zooplankton samples were taken from three locations on Yellowbelly Lake, near the inlet, at mid-lake, and near the outlet, on the afternoon of August 28, 2008 following methods described above. A ZQI value was developed using methodology developed by Teuscher and Yule (unpublished data) (Table 7).

### **Redfish Lake**

Redfish Lake is located in Custer County at 1,996 m elevation (UTM coordinates NAD27, zone 11, 665771mE, 4884958mN,) in the SNRA near Stanley. The lake has a surface area of 615 ha and maximum depth of 91 m.

Redfish Lake was sampled for quagga mussel veligers using a plankton net (simple, conical net with 63 $\mu$  pore size and 0.25 m diameter net opening with a removable cod-end piece). Samples were collected by boat at three different sites: near shore and in two open-water areas near boat ramps. Three to four vertical tows were collected using a 10 m pull. Samples were stored in polyethylene bottles and preserved with 95% ETOH. Samples were sent to the IDFG's Nampa Research office for analysis.

## **RESULTS AND DISCUSSION**

### **Alturas Lake**

The three samples collected for quagga mussel veligers in Alturas Lake tested negative.

### **Herd Lake**

A total of 100 fish were angled in 2008 with an average  $W_r$  of 79.9, a value that was slightly lower than the 86.8 found in 2006 when gill nets were used (Table 8). However, these values are both higher in comparison with the average  $W_r$  of 71.8 observed in 2005 (Table 8). Results of this year's survey did show an increase in average TL and weight of rainbow trout. In 2008, rainbow trout had an average TL of 226 mm, compared to 192 mm and 207 mm in 2006 and 2005, respectively. Rainbow trout sampled in 2008 ranged in size from 135 - 312 mm TL. Rainbow trout had an average weight of 122.1 g this year, an increase from 78.9 g average weight in 2006, and 82.7 g in 2005. Although the relative weights were lower this year, both average lengths and average weights were greater. The weight increase evidently was not proportional to increases in length therefore affecting our results. Sampling gear differences may have also biased the sample. An analysis of covariance (ANCOVA) and Tukey's honestly significant difference (HSD) test was run on the three years (2005, 2006, and 2008) of relative weight data; it was determined there was a significant difference between the three years (Table 8). However, observed differences are relatively minor and contradictory to expectations.

Using Teuscher's (1999) ZQI ratings in Table 7, the 2008 value of 0.98 in Herd Lake suggests that competition for food is unlikely. ZQI values for Herd Lake have ranged from 0.01 to 1.28 respectively (Table 9; Figure 1). The ZQI values found prior to 2007, obtained before tiger muskellunge introduction, indicate that competition for food was likely. The 2007 and 2008 increase in ZQI values is likely a result of the tiger muskellunge introduction of 2006 and the presumed decrease in the rainbow trout population.

### **Jimmy Smith Lake**

Regional fishery staff captured 914 rainbow trout during 90.3 gillnet hours in 2008 (Table 10). Rainbow trout had a size range of 147 - 320 mm with an average TL of 201 mm (Figure 2). The 2008 catch rate of 10.1 fish per hour was much higher than the 2006 rate of 4.4 fish per hour. Mean average weight of rainbow trout was 100 g in 2008 compared to 222 g in 2006. The mean relative weight of rainbow trout declined to 80.3 in 2008 from 107.5 in 2006. Higher catch rates, decreased average length and weight of rainbow trout, and lower relative weight values suggest an increased population size and increased competition for available food resources is likely occurring in Jimmy Smith Lake.

Results of zooplankton analysis generated a ZQI value of 0.02 in 2008 in Jimmy Smith Lake (Table 11). Teuscher's (1999) ZQI rating of  $< 0.1$  suggests that forage resources in the lake are limiting (Table 7). ZQI values in Jimmy Smith Lake have varied little (0-0.15) over the years that the lake has been surveyed (Table 11).

### **Carlson Lake**

A total of 67 brook trout were collected during this year's survey. Results from angling indicate a decrease in  $W_r$  from 113.6 observed in 2006 to 96.6 in 2008. A value of 100 is considered average for North American populations. Brook trout had a size range of 154 - 270 mm TL. The survey found an average TL of 225 mm for brook trout in 2008, compared to 216 mm in 2006 (gill net data). Three tiger muskellunge were observed in the littoral zone of Carlson Lake during the two sampling periods in 2008.

### **Williams Lake**

Zooplankton sampling produced a ZQI average value of 0.73 in 2008 (Table 12), suggesting that competition for food is unlikely (Table 7). ZQI values have been greater than 0.60 for all years sampled with 2005 being the one exception at 0.56 (Table 12; Figure 3). ZQI average values have ranged from 0.56-0.92 during this period. The zooplankton ratio (ZPR) value for Williams Lake was calculated at 0.80 in 2008, slightly higher than the previous sampling value of 0.71 in 2005 (Table 12; Figure 3). ZPR values have been 0.70 and higher since sampling was initiated in 2000 except for 2001 when a ZPR of 0.65 was observed.

On May 14, 2008, 10 female and 10 male rainbow trout were collected and spawned, followed by an additional 10 pairs of rainbow trout collected and spawned on May 21, 2008. An IDFG cooperater tended the fertilized eggs until "button up." Approximately 40,000 fry were released into Lake Creek on June 25, 2008.

### **Yellowbelly Lake**

ZQI values were 0.03 in 2008, similar to the finding of 0.01 found in 2007. These results indicate that forage resources are limited and competition for food is likely occurring for fish in Yellowbelly Lake.

### **Redfish Lake**

The three samples collected for quagga mussel veligers in Redfish Lake tested negative.

## **MANAGEMENT RECOMMENDATIONS**

### **Alturas Lake**

Continue monitoring Alturas Lake for the presence of quagga mussel veligers. Assist other State and Federal agencies, to the extent practical, to prevent the invasion of quagga mussels into the Salmon Region.

### **Carlson Lake**

Continue monitoring Carlson Lake to determine the effects of tiger muskellunge introduction on the size structure of the brook trout population.

### **Herd Lake**

In 2009, monitor Herd Lake to determine the effects of tiger muskellunge introduction on the size structure of the rainbow trout population. Consider using angling prior to gill netting to look at bias of sampling gear.

### **Jimmy Smith Lake**

Monitor the fish population in Jimmy Smith Lake as a control for the Herd Lake tiger muskellunge experiment.

### **Redfish Lake**

Continue monitoring Redfish Lake for the presence of quagga mussel veligers.

### **Williams Lake**

Participate in collaboration with interested parties to develop a long-term strategy for improving water quality in Williams Lake.

As funds and personnel are available, continue to monitor DO levels and water temperatures at specified locations and depths to provide a long-term dataset of water quality parameters in Williams Lake.

Continue rainbow trout trapping and spawning operations in Lake Creek. Stock the resulting fry in Lake Creek.

### **Yellowbelly Lake**

The goal of a wild, quality westslope cutthroat trout fishery has proven difficult to achieve at Yellowbelly Lake. The drainage is dominated by brook trout and the lake is primarily populated with non-game species. The species composition continues to favor non-game species despite past chemical treatments. Future management direction should focus on stocking westslope cutthroat fry at a rate of 200 fry per surface acre or 38,000 fry total. Despite low ZQI values, Teuscher (1999) stated "it is important to note that the zooplankton indices should not be the sole criteria for evaluating a stocking program." Forage is not limited to zooplankton therefore we propose introducing cutthroat in an attempt to improve fishing in the lake. Likely, the goal may need modification to maintain a quality westslope cutthroat fishery through annual stocking.

Table 6. Names and locations of 20 lowland lakes, 1 reservoir, and 7 ponds in the Salmon Region.

Name	IDFG	Zone	NAD27 UTM	
	Catalog No.		Northing	Easting
Lowland Lakes:				
Alturas Lake	7-1778	11	671963	4864477
Bayhorse Lake #1	7-1338	11	708009	4921710
Buster Lake	7-1337	11	706028	4922789
Cape Horn Lake #1	7-1112	11	648493	4918154
Cape Horn Lake #2	7-1113	11	648850	4919182
Carlson Lake	7-1303	12	280416	4906625
Herd Lake	7-1343	11	726354	4885410
Iron Lake #1	7-1279	11	721510	4976200
Jimmy Smith Lake	7-1345	11	707776	4893702
Josephus Lake #1	7-0985	11	647669	4934347
Little Redfish Lake	7-1347	11	697200	4886348
Meadow Creek Lake	7-1274	12	315739	4922282
Perkins Lake	7-1770	11	673421	4866014
Pettit Lake	7-1757	11	670368	4871590
Redfish Lake	7-1617	11	665771	4884958
Stanley Lake	7-1553	11	655164	4900680
Wallace Lake	7-1218	11	735026	5014449
Williams Lake	7-1277	12	265665	4988861
Yellowbelly Lake	7-1734	11	670387	4874005
Yellowjacket Lake #1	7-0803	11	696540	4991854
Reservoir:				
Mosquito Flat Reservoir	7-1327	11	703860	4932387
Ponds:				
Blue Mountain Pond	7-1326	11	719530	4931314
Hayden Creek Ponds	7-1231	12	289718	4968275
Hyde Creek Pond	7-1219	12	274678	5000522
Kelly Creek Pond	7-1518	11	665862	4905206
Kids Creek Pond	7-1222	12	272938	5005492
Squaw Creek Pond	7-1346	11	703184	4902901
Yankee Fork Dredge Pond #1	7-1435	11	682234	4908825

Table 7. Zooplankton ratio (ZPR) and zooplankton quality index (ZQI) ratings from Teuscher (1999).

ZPR > 0.6	Stock heavy density fingerlings (150-300 per acre)
0.6 > ZPR <= 0.25	Stock moderate density of fingerlings (75-150 per acre)
ZPR < 0.25	Stock less than 75 fingerlings per acre or catchables
ZQI > 0.60	Competition for food unlikely.
0.60 > ZQI > 0.10	Competition for food may be occurring.
ZQI < 0.10	Forage resources are limiting.

Table 8. Summary of rainbow trout sampling efforts in Herd Lake for 1994, 1996, 2001 to 2003, 2005, 2006, and 2008.

Survey Dates	Sample Size	Size Range (TL mm)	Mean TL (mm)	Mean Weight (g)	No. Gillnets	Total Gillnet Hours	Fish/Net Hour (CPUE <sup>a</sup> )	Relative Weight
8/1-2/1994	113	140-260	199	--		30.0	3.8	--
6/11-12/1996	15	160-292	258	--		16.0	0.9	--
6/21-22/2001	30	95-280	178	49.1		32.6	0.9	--
6/6-7/2002	81	97-350	200	106.7		51.2	1.6	--
7/31-8/1/2003	93	107-308	212	101.6		49.3	1.9	73.8
6/7-8/2005	272	163-292	207	82.7	4	65.2	4.2	71.8
6/13-15/2006	682	141-268	192	78.9	16	165.8	4.1	86.8
6/5/2008	100	135-312	226	122.1	-- <sup>b</sup>	--	10.0 <sup>c</sup>	79.9

<sup>a</sup> CPUE=Catch per unit effort.

<sup>b</sup> Sampled by angling.

<sup>c</sup> Reported as fish/angling hour.

Table 9. Zooplankton quality index (ZQI) values for Herd Lake from 2002 to 2004, and 2006 to 2008.

Year	ZQI
2002	0.01
2003	0.01
2004	0.35
2006	0.02
2007	1.28
2008	0.98

Table 10. Comparison of rainbow trout sampling efforts in Jimmy Smith Lake for 1964, 1996, 2001, 2003, 2005, 2006, and 2008.

Year	Survey Date	Sample Size	Size Range (TL mm)	Mean TL (mm)	Mean Weight (g)	No. Gillnets	Total Gillnet Hours	Fish/Net Hour (CPUE <sup>a</sup> )	Relative Weight
1964	12/15	N/A	130-380	233	N/A	N/A	Creel sample	N/A	N/A
1996	6/11	157	155-332	213	N/A	1	15.0	10.1	N/A
2001	6/21-22	113	110-370	203	N/A	1	16.5	6.9	N/A
2003	7/21	144	112-368	277	283.3	4	62.2	2.3	105.5
2005	6/7-8	351	138-412	238	311.4	4	65.2	5.5	107.8
2006	6/13-15	809	133-419	222	162.7	4	181.8	4.4	107.5
2008	7/31-8/1	914	147-320	201	100.0	4	90.3	10.1	81.0

<sup>a</sup> CPUE=Catch per unit effort.

Table 11. Zooplankton quality index (ZQI) values for Jimmy Smith Lake, 2002, 2003, and 2006 to 2008.

Year	ZQI
2002	0.00
2003	0.15
2006	0.15
2007	0.00
2008	0.02

Table 12. Zooplankton quality index (ZQI) values derived from three sample sites at Williams Lake, and average zooplankton ratio (ZPR) values, 2000 to 2003, 2005, and 2008.

Year	ZQI Sample Site			ZQI	ZPR
	Inlet	Mid-lake	Outlet	Average	Average
2000	ND <sup>a</sup>	ND	ND	0.67	0.86
2001	0.65	0.71	1.40	0.92	0.65
2002	0.29	0.98	0.71	0.66	0.70
2003	0.50	0.80	0.80	0.72	1.55
2005	0.15	0.60	0.92	0.56	0.71
2008	0.24	0.72	1.23	0.73	0.80

<sup>a</sup> ND=No data.

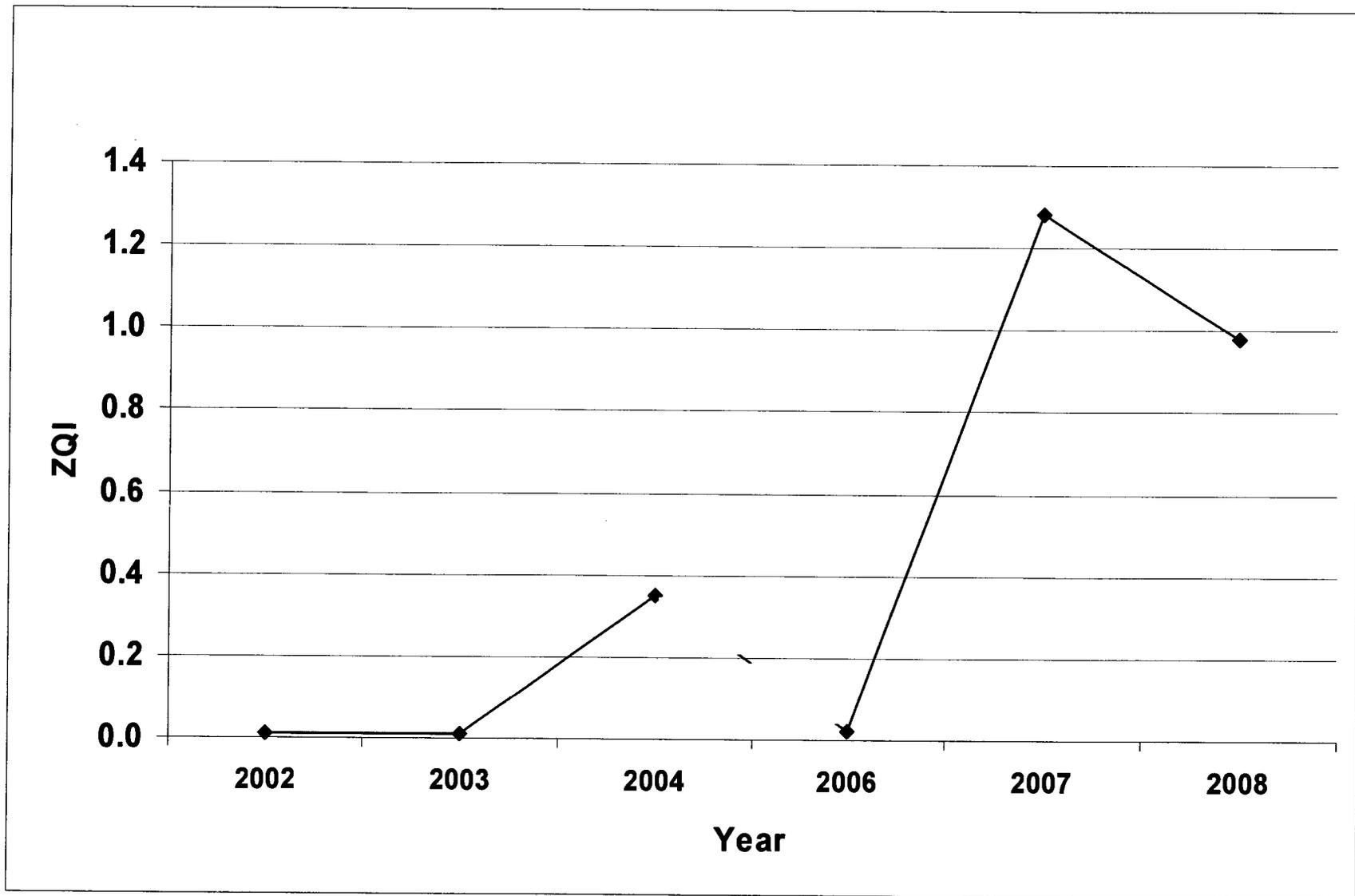


Figure 1. Zooplankton quality index (ZQI) values for Herd Lake from 2002 to 2004, and 2006 to 2008.

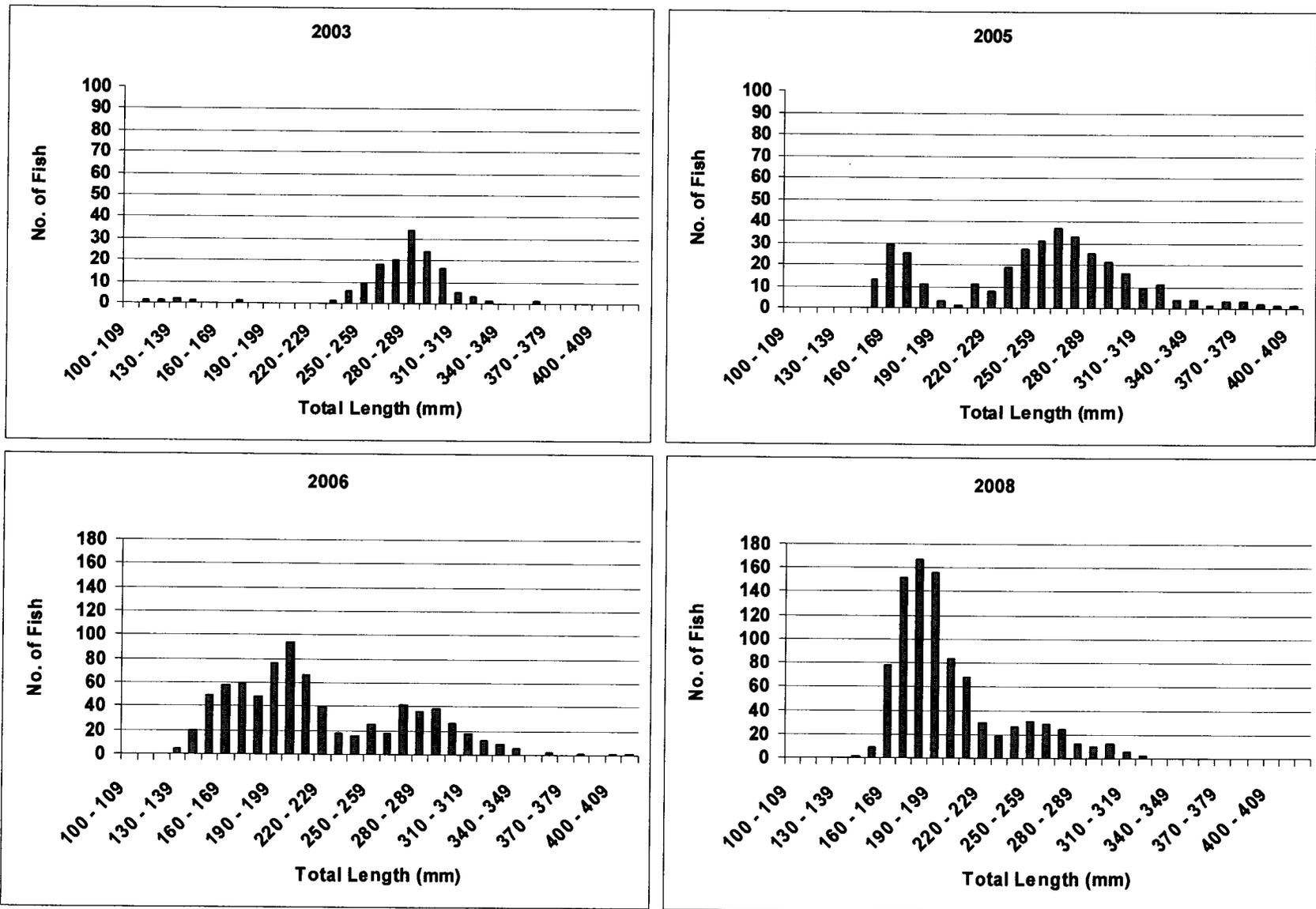


Figure 2. Comparison of rainbow trout length frequencies sampled in Jimmy Smith Lake, 2003, 2005, 2006, and 2008.

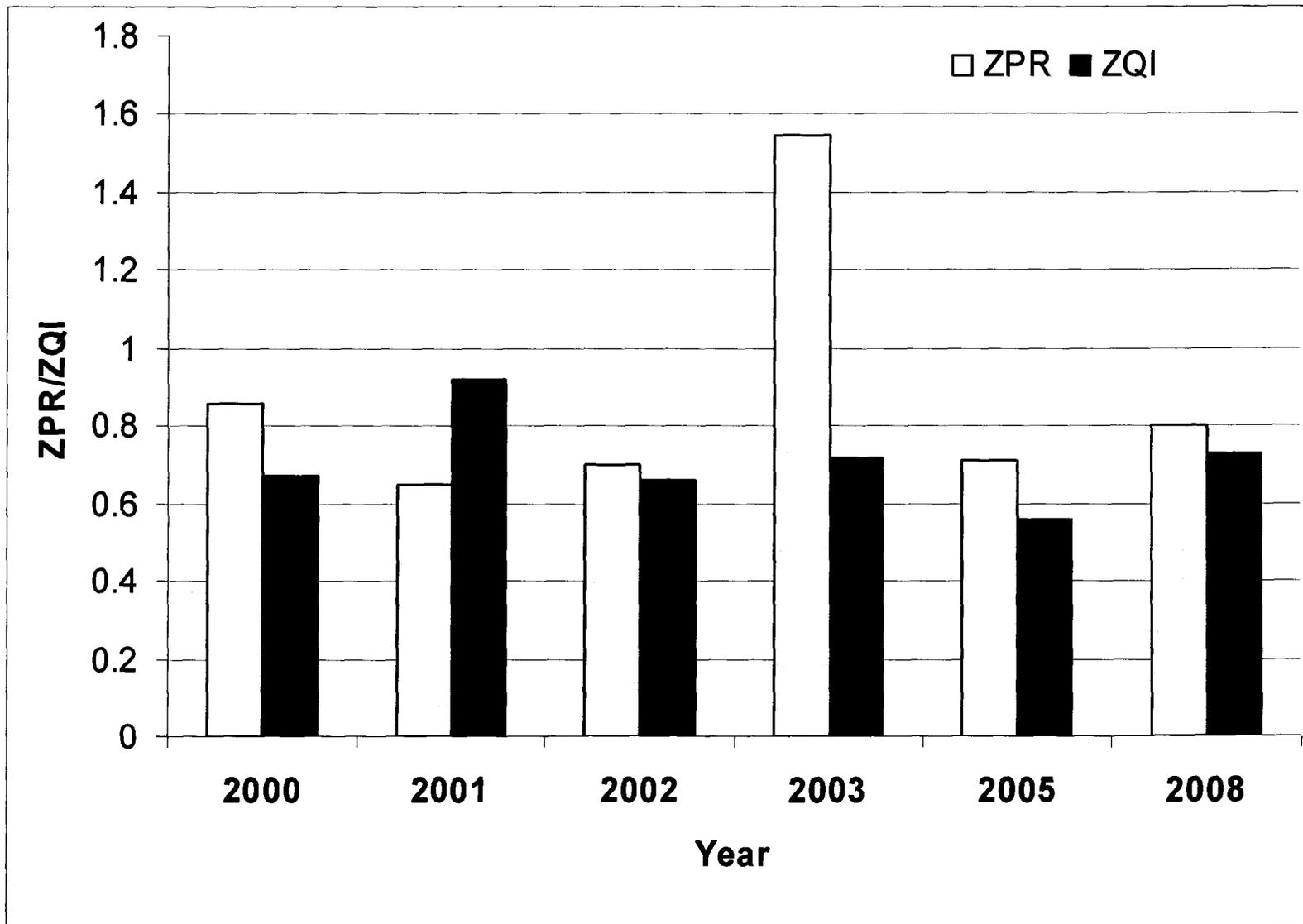


Figure 3. Zooplankton ratio (ZPR) and zooplankton quality index (ZQI) values at Williams Lake, 2000 to 2003, 2005, and 2008.

## 2008 SALMON REGION FISHERY MANAGEMENT ANNUAL REPORT

### River and Stream Surveys - Wild Trout Redd Counts

#### ABSTRACT

During the summer and fall of 2008, personnel from IDFG, SCNF, the Salmon District of the Bureau of Land Management, and the Idaho Department of Environmental Quality sampled 75 streams of the upper Salmon River basin to determine fish species composition, relative abundance, and size distribution. Of these 75 creeks surveyed, 67 had salmonid or non-salmonid fish species present. Rainbow trout/steelhead were found in 43% of the 67 fish-bearing streams surveyed and had TLs ranging from 30 to 280 mm. Bull trout were found in 52% of the fish-bearing streams and had TLs ranging from 39 to 275 mm. Westslope cutthroat trout were found in 54% of the fish-bearing streams surveyed and had TLs ranging from 30 to 310 mm. Brook trout were found in 39% of the surveyed streams with fish present and had TLs ranging from 39 to 275 mm. Juvenile Chinook salmon *O. tshawytscha* were found in 7% of surveyed streams with fish present. Apparent cutthroat/rainbow hybrid trout *O. clarki lewisii* x *O. mykiss* were found in 4% of streams where fish were detected and had TLs ranging from 128 to 215 mm. Apparent bull/brook hybrid trout *S. confluentus* x *S. fontinalis* were found in 4% of the 67 fish-bearing streams and had TLs ranging from 38 to 176 mm.

Other species recorded during 2008 stream surveys included sculpin *Cottus sp.*, which were found in 33% of the 67 fish-bearing streams, mountain whitefish (found in 7% of fish-bearing streams), longnose dace *Rhinichthys cataractae* and speckled dace *R. osculus* (each found in 4% of the fish-bearing creeks), and suckers (found in 1% of fish-bearing creeks).

Regional fishery personnel conducted rainbow trout/redband and bull trout spawning ground surveys to monitor redd count trends in the Salmon Region. A total of 199 rainbow trout redds were counted in three survey transects in the upper Lemhi River and Big Springs Creek. The number of rainbow trout/redband redd counts in these transects has moderately increased during the last three years. Additionally, regional fishery staff counted 21 bull trout redds in a trend transect of upper Hayden Creek, compared to 26 redds counted last year. A total of 28 bull trout redds were observed in spawning areas upstream of the Hayden Creek trend site compared to 115 in 2007. Bull trout trend sites surveyed in the upper Salmon River drainage near Stanley during 2008 totaled 39 redds compared to 88 bull trout redds counted in these sites during 2007.

Fish hatchery personnel in the Salmon Region collect data on resident salmonid species encountered at their respective weirs. Weir count information is an aid in monitoring the status and timing of fluvial fish movement in regional waters. Seventy-six rainbow trout, five bull trout, and one brook trout were counted at the Pahsimeroi Fish Hatchery rack during 2008. Fish encountered at the East Fork Satellite Facility included 170 bull trout, 4 westslope cutthroat trout, 2 rainbow trout, and 128 mountain whitefish. A single westslope cutthroat/rainbow hybrid trout was also handled. Eighteen bull trout, 10 westslope cutthroat trout, 10 rainbow trout, and 20 mountain whitefish were encountered at Sawtooth Fish Hatchery weir.

## INTRODUCTION

### Wild Trout Population Surveys

During the summer and fall of 2008, personnel from IDFG, the SCNF, the Salmon District Bureau of Land Management, and Idaho Department of Environmental Quality cooperatively inventoried fish communities in tributary streams of the upper Salmon River basin. Accurate and current information is needed to effectively manage fish stocks, particularly since several threatened fish species, including bull trout, Chinook salmon, and steelhead trout (anadromous rainbow trout), and one endangered fish species, sockeye salmon *O. nerka*, are known to inhabit the upper Salmon River basin.

### Fluvial Trout Monitoring

#### **Big Springs Creek and Lemhi River**

In 1994, IDFG initiated resident rainbow trout redd count surveys on Big Springs Creek, a tributary to the upper Lemhi River near the town of Leadore. By 1997, regional fishery staff established three transect areas to monitor long-term resident rainbow trout population trends: two transects on Big Springs Creek and one on the upper Lemhi River. This annual monitoring effort is conducted to identify trends in the number of redds observed. Fishing rule changes on the Lemhi River were implemented in 1994 so that only rainbow trout 356 mm (14 inches) and greater could be harvested. Theoretically, rule changes, habitat improvement projects, and tributary reconnect projects should produce increased number of rainbow trout spawners within these transects.

#### **Bear Valley Creek**

This year marked the seventh year of counting bull trout redds in Bear Valley Creek, a tributary of Hayden Creek in the Lemhi River drainage. The area surveyed in Bear Valley Creek is located within a relatively low gradient meadow formed by a historic landslide. The redd count transect is located about 3.2 km upstream from the confluence of Bear Valley Creek with Hayden Creek. Bear Valley Creek is an important tributary for spawning fluvial bull trout in the Lemhi River drainage (Esselman et al. 2008).

#### **East Fork Hayden Creek**

East Fork Hayden Creek, a tributary to Hayden Creek in the Lemhi River drainage, has a bull trout spawning transect located in a meadow 5 km upstream from its confluence with Hayden Creek. Counts have been done in this transect since 2002.

#### **Hayden Creek**

Historically, Hayden Creek has been monitored in early fall, on an annual basis, for Chinook salmon spawning redds. Within the Lemhi River drainage, the Hayden Creek watershed is the only known location where fluvial-sized bull trout rear and spawn (Lamperth et al. 2007). In 2005, many bull trout adults were observed spawning in upper Hayden Creek above the mouth of Bear Valley Creek. Consequently, regional fishery staff initiated bull trout redd counts on Hayden Creek from approximately the mouth of East Fork Hayden Creek upstream to the mouth of Carol Creek. Between April and July 2006, 32 bull trout were

captured in the Lemhi River below Hayden Creek and implanted with radio tags. Radio tags were used to determine fluvial bull trout distribution, migration patterns, and habitat use within the Lemhi River sub-basin (Lamperth et al. 2007). In 2006, radio tagged bull trout were detected in Wright, Bray, and West Fork Hayden creeks. As a result, redd count surveys were expanded in 2006 to include transects in these tributaries.

### **Big Timber Creek**

In 2007, baseline stream sections were established in Big Timber Creek, a tributary to the Lemhi River, to monitor fish population responses to habitat improvement projects. Baseline data collected in 2007 and 2008 will be used to assess changes in stream habitat, fish abundance, distribution, and survival as stream reconnect projects are completed.

### **Kenney Creek**

The objective of fisheries surveys in Kenney Creek is to document the distribution, occurrence, and abundance of salmonids throughout the watershed. Initial inventories in 2003 (Murphy and Horsmon 2003) identified life-history characteristics of fish species present and suggested management direction 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. These inventories will also be used as baseline data to assess changes in fish populations in response to future habitat improvements projects.

### **Alpine and Fishhook Creeks**

In 1998, standardized bull trout redd count surveys were initiated on Alpine Creek (tributary to Alturas Lake) and Fishhook Creek (inlet to Redfish Lake) in the upper Salmon River drainage to monitor long-term bull trout spawning trends. These samples were established by and maintained by the IDFG sockeye recovery team.

### **Fourth of July Creek**

Bull trout redds in Fourth of July Creek were counted for the fifth year in 2007. Fourth of July Creek is a tributary to the main-stem Salmon River, 23.4 km south of Stanley, in the SNRA. The survey transect starts approximately 6.8 km upstream from the mouth of Fourth of July Creek and ends approximately 5.8 km upstream from the start of the transect. Bull trout redd counts in Fourth of July Creek were initiated in 2003 to monitor fish population responses to recent flow improvement projects, elimination of passage barriers at diversion structures, and screening of irrigation ditches.

### **Pahsimeroi, East Fork, Squaw Pond, Redfish Lake Creek, and Sawtooth weirs and traps**

Annually, resident salmonid species are encountered at the Pahsimeroi, East Fork, Squaw Pond, Redfish Lake Creek, and Sawtooth Fish Hatchery weirs as part of routine steelhead and Chinook salmon trapping activities. These resident salmonid catches provide a reliable method of enumerating fluvial fish migrating into the Pahsimeroi River, East Fork Salmon River, and the upper Salmon River drainage.

## **OBJECTIVES**

Evaluate fish populations in rivers and streams of the Salmon Region.

Evaluate the effects of harvest restrictions and habitat improvement efforts on resident rainbow trout populations in Big Springs Creek and the upper Lemhi River.

Evaluate the number of bull trout redds in Bear Valley, East Fork Hayden, Hayden, Bray, Wright, West Fork Hayden, Alpine, Fishhook, and Fourth of July creeks to provide baseline and trend information relative to bull trout recovery efforts and harvest restrictions. Based on bull trout movement studies, expand surveys to include other likely spawning reaches.

## **STUDY AREA AND METHODS**

### **Wild Trout Population Studies**

Between May 14 and October 22, 2008, 75 streams of the Salmon River basin were surveyed for fish composition, relative abundance, and size distribution. Stream characteristics, including temperature, transect length, width, and area sampled, were typically recorded. Drainage information and map coordinates were also documented.

Fish presence and abundance were documented using backpack electro-fishing methodologies. Site locations were selected to encompass a complete coverage of fish communities within various habitats, although some locations were based on adequate access and permission from landowners.

Streams were sampled by electro-fishing, typically with a backpack electro-fisher (typically a Smith Root, Inc. Model 15 or 15D). Samplers attempted to catch all sizes of fish while moving upstream in transects that ranged from 25 to 200 meters in length following one of two stream survey protocols. For a standard stream survey (the most commonly used survey method in 2008), a given transect was sampled one, two, three times, and in two instances, four times. Captured fish were measured in TL (mm), placed in holding pens, and monitored for recovery. Once electro-fishing was completed, fish were released back into the surveyed reach. Genetic samples were taken on some game fish for analysis. Whitefish and non-game fish were enumerated and, at times, measured depending on the collecting agency. The second survey type used was presence and absence sampling whereby a stream section of unmeasured length and width was sampled to determine if fish could be detected. The deviation between sampling methods was a result of varying agency objectives and needs at sampling locations.

Where applicable, density estimates were expressed as the number of fish per 100 m<sup>2</sup>. Population estimates were calculated using Microfish<sup>®</sup> population software (Van Deventer and Platts 1986). Population estimates for all species of salmonids were calculated for two-, three-, and four-pass electro-fishing transect sites when a 50% reduction in salmonid numbers was counted. Estimates were based on total sample size of all salmonids sampled during each electro-fishing pass. When consecutive electro-fishing passes did not achieve a 50% reduction, no population estimate for the stream transect was calculated. Young of the year (Age-0) fish were included in density estimate calculations. However, Age-0 fish were not included in population estimates when individual species could not be identified during electro-fishing

surveys. Negative 95% confidence interval values that resulted from population estimate calculations were also not reported.

## **Fluvial Trout Monitoring**

### **Big Springs Creek and Lemhi River**

In 1997 we established three transect areas to monitor long-term resident rainbow trout population trends, two on Big Springs Creek and one on the upper Lemhi River near the town of Leadore. The two sites on Big Springs Creek include the entire stream flowing through the property known as the Karl Tyler Ranch (Start: NAD27, zone 12, 310017mE, 4953211mN, and end: 307299mE, 4955469mN) and the historic Darwin Neibaur Ranch (Start: NAD27, zone 12, 311162mE, 4952233mN, and end: 310017mE, 4953211mN). The upper Lemhi River site includes that section of river flowing through the property known as the Merrill Beyeler Ranch from the fence line 100 meters upstream of the upper water gap to the lower fenced boundary (Start: NAD27, zone 12, 312832mE, 4950675mN, and end: 312238mE, 4952088mN). Redd counts are usually conducted during the last week of April or the first week of May using visual ground count methods. This year, regional fishery personnel conducted redd counts on May 5, 2008.

### **Bear Valley Creek**

Fluvial and resident bull trout redd counts on Bear Valley Creek were conducted September 4, 2008 by regional fishery staff using visual ground count methods. Fluvial bull trout redds were classified as redds equal to or greater than 0.4 m by 0.6 m in diameter. Redds smaller in size were considered to be constructed by smaller, resident bull trout. The redd count transect starts at NAD27, zone 12, 283049mE, 4961521mN, and ends at 282129mE, 4962370mN. The Bear Valley transect consists of "C"- channel (Rosgen 1996) habitat. In 2007, redd counts on Bear Valley Creek were expanded to include a reach beginning at the mouth of Wright Creek upstream to a point 0.8 km below Buck Creek (Start: NAD27, zone 12, 280271mE, 4963536mN, and end: 277687mE, 4964066mN). This transect, located above the trend transect site in Bear Valley Creek, was surveyed on September 19, 2008 using methods outlined above. Additionally, a lower section of Wright Creek, a tributary to Bear Valley Creek, was surveyed on September 8 and again on September 15, 2008. Survey coordinates for Wright Creek begin at NAD27, zone 12, 281470mE, 4961806mN, and end at 282129mE, 4962370mN. This year's survey transect was slightly longer (0.2 km) than the coordinates listed for 2006 and 2007. Except for the Wright Creek transect, all other transects were only surveyed once during 2008, a variance from survey protocol for the past two years in Bear Valley Creek.

### **East Fork Hayden Creek**

The resident bull trout redd count on East Fork Hayden Creek was conducted September 12, 2008 using visual ground count methods. An earlier count in this transect on September 4, 2008 was deemed too early. The redd count transect starts at NAD27, zone 12, 288525mE, 4956202mN, and ends at 288880mE, 4955583mN. The East Fork Hayden Creek transect consists of "C" - channel (Rosegen 1996) type habitat.

## **Hayden Creek**

Expanded transects, developed in 2006 on upper Hayden Creek, were surveyed for fluvial and resident bull trout redds in 2008 incidental to a yearly survey for Chinook salmon redds using visual ground count methods. Classification of fluvial and resident bull trout redds followed the same protocol as listed above for Bear Valley Creek. In past years, two transect survey dates were selected to correspond as closely as possible with the peak of fluvial bull trout spawning activity and approximately one week after the peak. Unfortunately, limited manpower prevented the two-survey protocol per transect this year. The upper one-half of the trend transect (Carol Creek to the fence above Tobias Creek) was counted twice this year per normal protocol while all remaining transects on Hayden Creek were counted once. Survey counts began on September 3 and ended September 18, 2008. The 2008 surveys began at the mouth of Hayden Creek upstream to West Fork Hayden Creek, up West Fork Hayden Creek to Bray Creek, and up Bray Creek 0.8 km. The Hayden Creek transects total 26.7 km in length. UTM coordinates for all the Hayden Creek transects start at NAD27, zone 12, 292614mE, 49716411mN, and end at 280090mE, 4953407mN. The trend transect site, located from Carol Creek downstream to Bear Valley Creek, begins at NAD27, zone 12, 285724mE, 4952456mN and ends at 285808mE, 4961070mN.

## **Big Timber Creek**

Twenty-two transects of Big Timber Creek in the upper Lemhi River drainage were surveyed in 2008 using electro-fishing methods described in the "Wild Trout Population Studies" above. Additionally, all salmonids except mountain whitefish were scanned with a PIT tag reader to detect recaptured fish. Population estimates were refined from 2007 numbers by using two to four electro-fishing passes per transect this year. Surveys were conducted from July 30 to August 27, 2008. UTM coordinates for the Big Timber Creek sections start at NAD27, zone 12, 311850mE, 4952107mN, and end at 300920mE, 4929476mN.

## **Kenney Creek**

Seven transects in Kenney Creek, a tributary to the Lemhi River, were surveyed in 2008 using electro-fishing methods described above. Salmonids (except mountain whitefish) were scanned with a PIT tag reader to determine recaptured fish. However, fish in the lower-most transect of Kenney Creek were not scanned on the second electro-fishing pass due to equipment failure. Surveys were conducted from July 14 to July 22, 2008 to establish baseline data before an IDFG cooperative stream reconnect project is initiated. Coordinates for the Kenney Creek sections begin at NAD27, zone 12, 291078mE, 4989167mN, and end at 296304mE, 4992639mN.

## **Alpine and Fishhook Creeks**

Two counts are conducted annually about two weeks apart on both Alpine and Fishhook creeks in the Stanley Basin to monitor the timing and numbers of bull trout spawning redds. Redd counts were conducted by IDFG research personnel on August 28 and September 11, 2008 on Alpine Creek. Two sites on Fishhook Creek were surveyed on August 29, September 11, and September 12, 2008. In addition to the Fishhook Creek trend transect, a second transect site was established this year after surveyors observed bull trout spawning below the trend transect site in 2006 and 2007 (K. Plaster, IDFG, personal communication). All redds in progress or redds that had been completed were counted during the first survey and flagged for later identification. On the second survey, additional redds were counted and included with the

number of flagged redds to provide a total number of redds counted for each stream. Coordinates for the Alpine Creek survey transect start at NAD27, zone 11, 666259mE, 4863406mN, and end at 665656mE, 4863195mN. Coordinates for the Fishhook Creek original survey start at NAD27, zone 11, 662581mE, 4888855mN, and end at 661766mE, 4888863mN. Coordinates for the newly established Fishhook Creek transect begin at NAD27, zone, 662623mE, 4888888mN, and end at 661799mE, 4888662mN.

#### **Fourth of July Creek**

Salmon Region fishery staff conducted the Fourth of July Creek bull trout redd count on September 1, 2008 using visual ground count methods. Coordinates for the Fourth of July Creek survey start at NAD27, zone 11, 679680mE, 4878679mN, and end at 684992mE, 4879856mN.

#### **Pahsimeroi, East Fork, Squaw Pond, Redfish Lake Creek and Sawtooth weirs and traps**

Pahsimeroi, East Fork, Squaw Pond, and Sawtooth Fish Hatchery personnel annually provide results of resident salmonids encountered during routine steelhead and Chinook salmon trapping operations for reporting and analysis by regional fisheries staff. Additionally, a temporary weir and trap was operated on Redfish Lake Creek to monitor salmonid movement in and out of Redfish Lake. The trap was installed on July 3, 2008 and operated until October 21, 2008.

## **RESULTS AND DISCUSSION**

### **Wild Trout Population Studies**

Salmonids and non-game fish were found in 67 (89%) of 75 streams surveyed in the Salmon Region during 2008 (Tables 13-15). Rainbow trout (N = 1,759) was the most abundant salmonid species observed during this year's investigations. Rainbow trout were found in 29 (43%) of the 67 fish-bearing streams and ranged in size from 30 to 280 mm TL (Tables 13 and 14). The highest densities of rainbow trout were found in two transects of McKim Creek. Bull trout (N = 616) were observed in 35 (52%) fish-bearing streams and had TLs ranging from 20 to 308 mm. The highest densities of bull trout occurred in Horse and North Fork McKim creeks. Westslope cutthroat trout (N = 559) were found in 33 (49%) fish-bearing streams and had TLs ranging from 30 to 310 mm. Little Deep and McKim creeks had the highest densities of westslope cutthroat trout. Brook trout (N = 356) were found in 26 (39%) fish-bearing streams and had TLs ranging from 39 to 275 mm. The highest densities of brook trout were found in Mayrick and Flat creeks. Juvenile Chinook salmon (N = 32) were found in 5 (7%) fish-bearing streams. Cape Horn and Swamp creeks had the highest densities of juvenile Chinook salmon. Apparent bull/brook hybrid trout (N = 13) were found in 3 (4%) of the 67 fish-bearing tributary streams. Apparent bull/brook hybrid trout lengths ranged from 38 to 176 mm TL and the highest densities were found in Challis and Cape Horn creeks. Apparent cutthroat/rainbow hybrid trout (N = 4) were found in 3 (4%) of the 67 fish-bearing tributary streams. Apparent cutthroat/rainbow hybrid trout lengths ranged from 128 to 215 mm TL with the highest densities found in Boundary and Dagger creeks. Fish were not detected in 8 of the 75 streams surveyed during 2008.

Mountain whitefish, sculpin species, longnose and speckled dace, and sucker species were also recorded during 2008 surveys (Table 15). Sculpin were detected in 22 (33%) tributaries surveyed with fish present. The highest densities of sculpin enumerated during surveys were found in Mayrick and Tower creeks. The number of sculpin (N = 1,208) shown in Table 15 should be considered very low since non-game species were not targeted during surveys by some cooperating agencies and were not enumerated on some surveys. Sculpin were detected on 15 additional stream transects in 2008, but were not individually tallied during surveys. Mountain whitefish were identified in five (7%) streams surveyed with fish present. Longnose dace were encountered in three (4%) streams while speckled dace were detected in two (4%) fish-bearing streams. Suckers were observed in one (1%) tributary. In future surveys, cooperating agencies will be asked to enumerate and account for whitefish and non-game fish.

Standard stream survey protocol was followed on 74 streams surveyed in 2008. The one remaining stream was sampled for presence and absence. More detailed information on stream survey sites is located in Appendix B, which lists stream transects, sampling dates, transect measurements, sub-basin locations, and UTM coordinates.

### **Fluvial Trout Monitoring**

#### **Big Springs Creek and Lemhi River**

We observed a total of 199 rainbow trout redds in two Big Springs Creek transects and one transect in the upper Lemhi River (Figure 4). Eighty-two redds were counted in the historic Neibaur Ranch transect while 108 redds were observed in the current Tyler Ranch transect (Table 16). Nine redds were counted in the current Beyeler Ranch transect in the upper Lemhi River. This year's total count showed a decrease from the 223 total redds counted in 2007.

Reviewing redd counts from the three survey reaches over time suggests there may be alternate year spawning occurring. Should alternate year spawning be occurring, counts in 2008 are expected to be lower. Figure 4 shows a modest increase in the total number of redds counted during the last three years since a low in 2005. To date, the total number of redd counts have fluctuated from 39 to 556 annually and may indicate other unknown influences are affecting the rainbow trout population. These sites will continue to be monitored and trends will be evaluated in the rainbow trout population in future years. Habitat changes will be monitored to document improvements in the riparian areas.

#### **Bear Valley Creek**

Regional fishery staff counted 27 fluvial bull trout redds in the Bear Valley Creek trend transect in 2008, compared with 25 bull trout redds observed in 2007 (Figure 5). The trend of bull trout redds counted in this transect has been stable for the last three seasons, but below the record count of 44 in 2004. In 2008, 21 bull trout redds were counted in two additional transects upstream of the traditional count site; 14 of which were classified as fluvial bull trout redds based on size. The combination of redd counts and telemetry relocations suggest that a larger area of the Bear Valley Creek watershed is used by fluvial bull trout than was previously thought. Comparing overall drainage redd counts with the trend transect area indicate that the current index site may not accurately reflect the fish population status and may ultimately need to be moved to a different area within Bear Valley Creek (Table 17). Overall counts for the watershed are of concern in that there has been a notable decrease in redds during recent years. The 2008 surveys in Bear Valley Creek drainage included a change in regional staff, many with less bull trout redd survey experience, as well as reduced staff that were unable to

cover the transect areas using standard protocols. These changes, as well as the possibility of alternate year spawning by fluvial fish, may have also contributed to the lower redd count totals. A recent genetic study of this population confirms that drainage size and connectivity have sustained high levels of genetic diversity (Kofzkay et al. 2008).

### **East Fork Hayden Creek**

Sixty-one bull trout redds were observed in East Fork Hayden Creek in 2008, an increase of nine redds from the 2007 count (Figure 6). Bull trout redds in this transect have been steadily increasing for the last four years. This population appears to be a solely resident population with individuals being appreciably smaller in size than the fluvial bull trout population in Bear Valley Creek (Esselman et al. 2008; Lampert 2007). Genetic evaluation of this population and other Lemhi River bull trout populations confirmed that this population, while predominantly a resident population, has significant genetic diversity. This diversity may be due to connectivity with main-stem Hayden Creek during high water years, due to East Fork Hayden Creek's large population size, or both (Kofzkay et al. 2008).

### **Hayden Creek**

Twenty-one bull trout redds were counted in the Hayden Creek trend site in 2008 compared to 26 bull trout redds counted in 2007 (Table 17). Additional Hayden Creek transects located upstream from the mouth of Carol Creek showed a total of 28 bull trout redds compared to 115 redds counted in this stretch last year. An overall total of 49 fluvial bull trout redds were observed in all Hayden Creek survey transects in 2008, a drop of 92 redds from the number observed a year ago (Table 17). Almost all the bull trout transects in the Hayden Creek drainage showed a decline in the number of redds observed in 2008 when compared to the previous two years. In 2008, only the upper one-half of the Hayden Creek trend transect (from Carol Creek downstream to the fence above Tobias Creek) was surveyed twice in September, which likely resulted in a lower count than previous years. Additionally, transects located above the trend site were only walked once in 2008 which also likely resulted in a lower count. The 2008 surveys in Hayden Creek drainage included a change in regional staff, many with less bull trout redd survey experience, as well as reduced staff that were unable to cover the transect areas using standard protocols. These changes, as well as the possibility of alternate year spawning by fluvial fish, may have also contributed to the lower redd count totals. Because of these changes, the authors do not think that the past two years' data would be directly comparable. Both resident and fluvial-sized bull trout were observed spawning in Hayden Creek from the mouth of Bear Valley Creek upstream to the mouth of Carol Creek in 2008, marking the fourth consecutive year when this behavior was observed. This spawning behavior has also been observed in Bear Valley and Big Timber creeks in the Lemhi River drainage. A recent genetic study of this population confirmed that drainage size and connectivity have sustained high levels of genetic diversity (Kofzkay et al. 2008). Further, Kofzkay et al. noted that Hayden Creek and Bear Valley Creek populations experienced the highest degree of genetic cross-assignment of 14 Lemhi River drainages studied, and are not genetically differentiated from one another, suggesting high gene flow between these two tributaries.

### **Big Timber Creek**

Twenty-two electro-fishing surveys were conducted over 14 survey dates from July 30 through August 27, 2008 in Big Timber Creek. A total of 773 salmonids were detected during these 2008 surveys (Table 18). Of these 773 fish, a total of 362 rainbow trout, 243 bull trout,

and 52 westslope cutthroat trout received passive integrated transponder (PIT) tags. An additional 66 PIT-tagged salmonids were recaptured from tagging operations in 2007, consisting of 34 rainbow trout, 25 bull trout, and 7 westslope cutthroat trout.

Bull trout redd surveys were conducted on September 30, October 2, and October 6, 2008 in the Big Timber Creek watershed. Approximately 4.2 km of Big Timber Creek above Grove Creek was surveyed. Additional surveys were conducted in the lower 1.4 km of Trail Lake, the lower 1.5 km of Lake Creek (tributary to Trail Creek), as well as the lower 5.2 km of Rocky Creek. A total of 17 bull trout redds were observed. Thirteen resident-sized bull trout (<300 mm TL) were observed during these surveys; all 13 fish were counted in the two Rocky Creek transects. Although no bull trout greater than 300 mm were observed during the 2008 surveys, bull trout greater than 450 mm were observed in Big Timber Creek in past surveys (Murphy and Horsmon 2003). It is unknown if the large (>450 mm) bull trout were migratory or resident fish in the Big Timber Creek watershed.

### **Kenney Creek**

Seven electro-fishing surveys, conducted from a starting point near State Highway 28 and continuing upstream approximately 7.0 km, resulted in the capture of 233 salmonids in Kenney Creek in 2008. Rainbow trout was the most numerous salmonid encountered (N=134), followed by westslope cutthroat trout (N=58), twenty-three brook trout, and 18 bull trout. No PIT tag recaptures were detected in Kenney Creek from previous tagging operations elsewhere in the Lemhi River drainage.

### **Alpine and Fishhook Creeks**

No bull trout redds were observed in Alpine Creek in 2008 even though an IDFG fisheries crew observed bull trout staging below the trend transect area on the count day. By comparison, 18 redds were counted in 2007 (Table 19). The crew was unable to walk the entire creek on count day, but suspected that a natural barrier prevented upstream migration of bull trout to their usual spawning areas (M. Peterson, IDFG, personal communication). IDFG hopes to walk Alpine Creek in 2009 from its mouth upstream to the trend transect site to determine the location and extent of the suspected barrier.

Thirteen redds were observed in the trend transect in Fishhook Creek in 2008 compared to 21 redds counted in 2007 (Table 20). A new bull trout spawning transect was added downstream of the original trend transect site in Fishhook Creek in 2008. Fourteen redds were counted in this new section (Table 21). Redd count trend data for Alpine and Fishhook creeks for the last 11 years are shown in Tables 19 and 20 and Figures 7 and 8, respectively. The Alpine Creek counts have remained relatively stable since 2000 excepting 2008, varying from 9 to 18 redds counted each year. The Fishhook Creek counts have shown more variation than Alpine Creek since 2000, with counts ranging from 11 to 25 per year. However, since bull trout may spawn every year or on alternating years, redd count numbers may vary from year to year (Willard et al. 2005).

Counts of bull trout on Redfish Lake Creek were established to monitor migratory bull trout in Redfish Lake. In 2005, Schoby (2006) documented the movement of large proportions of bull trout from the main-stem Salmon River into the Redfish Lake system to overwinter. The Redfish Lake Creek trap was operated until the third week of October 2008 to more accurately track migratory bull trout populations using the Redfish Lake system (see "Pahsimeroi, Squaw Pond, East Fork, Redfish Lake Creek, and Sawtooth weirs and traps" report section).

## **Fourth of July Creek**

Twenty-six completed bull trout redds were counted in the Fourth of July Creek trend transect (Table 22 and Figure 9) in 2008. Since counts were initiated in 2003, there has been a general upward trend in redd counts. This population is likely responding to improved passage conditions within the watershed, screening facilities on irrigation ditches that protect juvenile salmonids, and increased flows during fall migration. A wildfire immediately after the 2005 survey changed the characteristics of the watershed. Long-term impacts to the bull trout population are yet to be determined.

## **Pahsimeroi, Squaw Pond, East Fork, Redfish Lake Creek, and Sawtooth weirs and traps**

In the last 11 years, the trend in the number of resident rainbow trout migrating past the Pahsimeroi Fish Hatchery weir (since 1998) is increasing (Figure 10). This year's total of 76 adult rainbow trout counted at the weir represents the second highest count since 1991. The male to female sex ratio continues to consistently favor females over the recorded period (Table 23). This year, 82% of the rainbow trout encountered at the Pahsimeroi trap were female. Current picket spacing at the Pahsimeroi weir possibly favors passage of resident male rainbow trout through the weir while inhibiting female movement upstream. Five bull trout and one brook trout were also counted at the Pahsimeroi weir during the spring 2008 steelhead spawning period.

Trapping at the East Fork Satellite Facility resulted in 170 bull trout, 5 westslope cutthroat, 2 rainbow trout, and 128 mountain whitefish counted in 2008 (Table 24). Generally, bull trout numbers appear to be increasing in the last five years (Figure 11).

Sawtooth Fish Hatchery encountered 18 bull trout, 10 westslope cutthroat trout, 10 rainbow trout, and 20 mountain whitefish during trapping operations in 2008 (Table 25). Lower resident salmonid numbers were counted this year compared to 2007 (Figure 12). Extended high water throughout the month of June may have allowed resident fish passage upstream of the weir before the weir was fully deployed. Counts of resident salmonids have generally increased in the past three years. Rainbow trout counts at Sawtooth Fish Hatchery should be altered in future years to delineate wild/natural rainbow trout and those of hatchery-origin.

The Squaw Creek steelhead trap has not trapped any resident trout since its inception in 2002. Biologists have determined that the adult weir design is not appropriately sized to trap resident fish.

A trap on Redfish Lake Creek resulted in 89 bull trout, 2 Chinook salmon, 1 mountain whitefish, and 325 suckers encountered during summer and fall, 2008. The 89 bull trout all had TLs greater than 300 mm and ranged in length from 330 - 630 mm (K. Plaster, IDFG, personal communication).

Table 13. Combined salmonid<sup>a</sup> population estimates (including fry) with 95% confidence intervals (CI), and species composition for selected streams in the upper Salmon River basin, 2008

Stream	Transect <sup>b</sup>	Sample Date	Transect Area (m <sup>2</sup> )	No. of Fish Sampled	Population Estimate (95% CI)	Fish/100 m <sup>2</sup>	Species Composition % <sup>c</sup>						
							CT	RBT	BU	CTx RBT	EBT	CK	BUX EBT
Allison	L	07/08/2008	150.0	9	--	6.0	100						
Allison	L	08/26/2008	200.0	12	--	6.0	100						
Ayers	L	06/10/2008	246.0	9	--	3.7		11			89		
Ayers	U	06/10/2008	157.0	0	--	--							
Baldwin	L	07/16/2008	150.0	11	--	7.3			100				
Bear	L	07/15/2008	202.1	6	--	3.0			83				17
Bear	L	07/15/2008	238.1	3	--	1.3		34	33			33	
Beaver	M	08/25/2008	1,100.0	1	--	0.1					100		
Bench	L	06/11/2008	514.0	1	--	0.2					100		
Bernard	L	07/16/2008	146.0	2	--	1.4	50		50				
Big Bear	L	08/07/2008	276.0	17	17 (15, 19)	6.2	35	24	41				
Big Timber	L	08/26/2008	ND <sup>d</sup>	24	24 (23, 25)	--		92			8		
Big Timber	L	08/26/2008	ND	13	14 (9, 19)	--		85	8		7		
Big Timber	L	08/25/2008	ND	54	57 (50, 64)	--		98	2				
Big Timber	L	08/25/2008	ND	25	25 (23, 27)	--		96	4				
Big Timber	L	08/18/2008	ND	71	77 (68, 86)	--	1	99					
Big Timber	M	08/18/2008	ND	68	80 (63, 97)	--		96	4				
Big Timber	M	08/21/2008	ND	34	36 (30, 42)	--	3	88	9				
Big Timber	M	08/21/2008	ND	22	23 (19, 27)	--		100					
Big Timber	M	08/19/2008	ND	21	23 (16, 30)	--		86	14				
Big Timber	M	08/19/2008	ND	19	19 (17, 21)	--	5	79	16				
Big Timber	M	08/20/2008	ND	39	41 (35, 47)	--		82	18				
Big Timber	M	08/20/2008	ND	15	15 (13, 17)	--		80	20				
Big Timber	U	08/27/2008	ND	28	31 (23, 39)	--	7	61	32				
Big Timber	U	08/13/2008	ND	33	35 (29, 41)	--	7	45	48				
Big Timber	U	08/07/2008	ND	42	44 (39, 49)	--	7	19	74				
Big Timber	U	08/05/2008	ND	36	40 (31, 49)	--	11	6	83				
Big Timber	U	08/05/2008	ND	29	37 (33, 41)	--	19		81				
Big Timber	U	08/06/2008	ND	41	43 (38, 48)	--	27	2	71				

Table 13. Continued.

Stream	Transect <sup>b</sup>	Sample Date	Transect Area (m <sup>2</sup> )	No. of Fish Sampled	Population Estimate (95% CI)	Fish/100 m <sup>2</sup>	Species Composition % <sup>c</sup>						
							CT	RBT	BU	CTx RBT	EBT	CK	BUx EBT
Big Timber	U	08/06/2008	ND	40	41 (37, 45)	--	43		57				
Big Timber	U	08/01/2008	ND	29	29 (27, 31)	--	28	3	69				
Big Timber	U	07/31/2008	ND	37	38 (35, 41)	--	11		89				
Big Timber	U	07/30/2008	ND	35	38 (31, 45)	--	14		86				
Boulder	M	07/29/2008	374.0	24	24 (21, 27)	6.4			100				
Boundary	L	07/15/2008	188.0	10	--	5.3	50		30	20			
Cape Horn	L	07/17/2008	1,423.1	29		2.0			3			97	
Cape Horn	L	08/20/2008	517.2	41	41 (39, 43)	7.9		8	12			63	17
Challis	U	08/04/2008	372.0	46	50 (42, 58)	12.4	48		4			37	11
Corral	L	07/22/2008	ND	0	--	--							
Dagger	L	07/15/2008	223.0	6	--	2.7	50	17	33				
Dagger	U	07/15/2008	165.0	3	--	1.8		67		33			
Deep	L	08/19/2008	ND	29	--	--	41		59				
Dry	L	07/16/2008	ND	0	--	--							
Dry	U	07/17/2008	57.0	0	--	--							
Duck	L	06/06/2008	320.0	17	24 (3, 45)	5.3		6				94	
Duck	U	06/04/2008	460.0	34	39 (28, 50)	7.4		24				76	
Duck	U	06/04/2008	560.0	4	--	0.7		25				75	
Duffield	M	07/16/2008	220.0	4	--	1.8	50		50				
East Fork Hayden	M	08/12/2008	360.0	25	28 (22, 34)	6.9	4		96				
East Fork													
Pahsimeroi River	M	07/30/2008	485.6	11	12 (6, 18)	2.3			100				
East Fork Tower	L	07/07/2008	214.0	65	67 (62, 72)	30.4		97				3	
East Fork Tower	L	07/08/2008	226.0	52	62 (46, 78)	23.0		100					
East Fork Tower	M	07/09/2008	290.0	98	103 (96, 110)	33.8		100					
East Fork Tower	M	07/15/2008	170.0	20	--	11.8		100					
East Fork Tower	U	07/15/2008	178.0	0	--	--							
East Pass	L	07/31/2008	477.0	3	-- <sup>e</sup>	0.6		100					
Everson	M	08/12/2008	148.0	10	10 (7, 13)	6.8			100				
Flat	L	07/17/2008	91.2	32	--	35.1						100	
French	L	07/10/2008	340.0	18	--	5.3	100						
Garden	L	05/30/2008	ND	26	--	--	8		92				
Gold	L	08/25/2008	200.0	19	--	9.5		100					

Table 13. Continued.

Stream	Transect <sup>b</sup>	Sample Date	Transect Area (m <sup>2</sup> )	No. of Fish Sampled	Population Estimate (95% CI)	Fish/100 m <sup>2</sup>	Species Composition % <sup>c</sup>						
							CT	RBT	BU	CTx RBT	EBT	CK	BUx EBT
Goldburg	M	07/08/2008	400.0	6	--	1.5							100
Goldburg	U	07/08/2008	600.0	13	--	2.2							100
Goldburg	U	07/08/2008	600.0	15	--	2.5							100
Harlan	L	07/16/2008	174.2	16	--	9.2	56		44				
Hat	U	08/14/2008	366.0	36	42 (29, 55)	9.8	61		39				
Hawley	M	08/01/2008	386.0	24	26 (19, 33)	6.2	4	96					
Horse	L	09/03/2008	600.0	15	--	2.5	47			53			
Horse	U	07/31/2008	200.0	19	21 (14, 28)	9.5			100				
Huckleberry	L	08/25/2008	500.0	12	--	2.4		33				67	
Jordan	L	07/22/2008	240.0	3	--	1.3		33		33			34
Kelly	L	07/16/2008	ND	0	--	--							
Kelly	M	07/17/2008	36.7	4	--	10.9							100
Kelly	M	07/17/2008	38.0	1	--	2.6							100
Kenney	L	07/14/2008	--	27	29 (23, 35)	--		81					19
Kenney	L	07/15/2008	--	42	52 (35, 69)	--		90					10
Kenney	L	07/16/2008	--	30	31 (27, 35)	--		97					3
Kenney	L	07/16/2008	--	54	67 (47, 87)	--		89					11
Kenney	M	07/17/2008	--	27	29 (23, 35)	--	4	96					
Kenney	M	07/17/2008	--	33	34 (30, 38)	--	73	21	6				
Kenney	M	07/22/2008	--	30	47 (7, 87)	--	70	3	27				
Kenney	M	07/21/2008	--	50	65 (41, 89)	--	66	2	32				
Lime	L	07/17/2008	128.0	8	--	6.3	75		25				
Little Deep	M	08/13/2008	284.0	39	42 (35, 49)	13.7	79		21				
Little Springs	L	06/17/2008	522.0	15	-- <sup>e</sup>	2.9		13					87
Little Springs	L	06/17/2008	458.0	7	7 (6, 8)	1.5		43					57
Little Springs	M	06/19/2008	372.0	9	9 (6, 12)	2.4		11					89
Lyon	L	10/22/2008	283.0	28	--	9.9		96	4				
Lyon	L	10/22/2008	310.0	74	--	23.9		100					
Lyon	M	10/22/2008	260.0	49	--	18.8		100					
Lyon	M	10/22/2008	213.0	4	--	1.9		100					
Mahogany	M	08/20/2008	200.0	11	--	5.5				100			

Table 13. Continued.

Stream	Transect <sup>b</sup>	Sample Date	Transect Area (m <sup>2</sup> )	No. of Fish Sampled	Population Estimate (95% CI)	Fish/100 m <sup>2</sup>	Species Composition % <sup>c</sup>						
							CT	RBT	BU	CTx RBT	EBT	CK	BUx EBT
Marsh	U	07/17/2008	144.0	31	--	21.5							100
Mayrick	L	06/09/2008	100.3	34	55 (4, 106)	33.9							100
Mayrick	L	06/09/2008	336.0	5	5 (4, 6)	1.5			20				80
Mayrick	M	06/10/2008	190.0	7	7 (5, 9)	3.7			14				86
Mayrick	U	06/16/2008	88.8	0	--	--							
McKay	L	08/04/2008	394.9	17	24 (1, 47)	4.3				100			
McKim	L	08/11/2008	154.0	89	101 (87, 115)	57.8	1	99					
McKim	L	08/20/2008	432.0	156	165 (155, 175)	36.1	1	98	1				
McKim	M	08/13/2008	340.0	52	56 (48, 64)	15.3	19	81					
McKim	M	08/06/2008	390.0	17	--	4.4	47	18	35				
McKim	U	08/06/2008	288.0	40	41 (37, 45)	13.9	55		45				
McKim	U	08/05/2008	379.0	29	--	7.7	100						
North Fork McKim	L	08/04/2008	288.0	37	39 (34, 44)	12.8	32		68				
North Fork McKim	M	07/30/2008	334.0	12	--	3.6	100						
North Fork McKim	U	07/30/2008	277.0	0	--	--							
North Fork Salmon River	U	09/03/2008	600.0	22	--	3.7	91		9				
Pahsimeroi River	L	06/19/2008	442.0	20	28 (4, 52)	4.5		25					75
Panther	U	08/26/2008	500.0	1	--	0.2		100					
Panther	U	08/26/2008	600.0	9	--	1.5	11	33					56
Patterson	L	07/23/2008	ND	10	12 (2, 22)	--		20					80
Perreau	M	06/02/2008	276.0	12	--	4.3	100						
Pollard Canyon	M	05/30/2008	ND	15	-- <sup>e</sup>	--	100						
Porphyry	L	08/26/2008	250.0	4	--	1.6				100			
Porphyry	M	08/26/2008	250.0	12	--	4.8				100			
Seafoam	L	07/15/2008	782.9	7	--	0.9							
Shady	L	07/16/2008	162.0	0	--	--							
Silver	L	07/17/2008	112.0	0	--	--							
Silver	L	08/26/2008	700.0	12	--	1.7		100					
South Fork Big	L	08/20/2008	550.0	7	--	1.3	43		57				
Spud	L	07/09/2008	300.0	0	--	--							
Spud	L	07/09/2008	18.8	0	--	--							
Squaw	L	07/29/2008	177.0	15	15 (13, 17)	8.5	7	20	73				

Table 13. Continued.

Stream	Transect <sup>b</sup>	Sample Date	Transect Area (m <sup>2</sup> )	No. of Fish Sampled	Population Estimate (95% CI)	Fish/100 m <sup>2</sup>	Species Composition % <sup>c</sup>						
							CT	RBT	BU	CTx RBT	EBT	CK	BUx EBT
Sulphur	L	07/16/2008	231.0	4	--	1.7	25	75					
Sulphur	U	07/16/2008	155.4	0	--	--							
Swamp	L	07/17/2008	194.4	7	--	3.6			14		57	29	
Thatcher	L	06/11/2008	424.5	2	--	0.5					100		
Tower	L	07/28/2008	298.0	81	-- <sup>e</sup>	27.2		99				1	
Tower	L	07/29/2008	376.0	62	65 (59, 71)	16.5		90			10		
Tower	M	07/07/2008	278.0	45	49 (42, 56)	16.2		100					
Tower	M	07/28/2008	227.0	49	--	21.6		100					
Tower	U	07/09/2008	304.0	67	75 (63, 87)	22.0		100					
Tower	U	07/14/2008	386.0	38	--	9.8		100					
Tower	U	07/14/2008	250.0	45	51 (39, 63)	18.0	100						
Unnamed Tributary to Big Jureano	U	07/28/2008	ND <sup>f</sup>	0	--	--							
Unnamed Tributary to Kelly	L	07/17/2008	ND	0	--	--							
Unnamed Tributary to Kelly	L	07/17/2008	ND	0	--	--							
Unnamed Tributary to Mayrick	L	06/16/2008	106.2	3	-- <sup>e</sup>	2.8					100		
Unnamed Tributary to Rapid River	L	07/16/2008	57.0	2	--	3.5	100						
Unnamed Tributary to Woods Fork	L	07/31/2008	201.0	49	58 (42, 74)	24.4		80	20				
Vader	L	07/16/2008	ND	0	--	--							
Van Horn	M	09/23/2008	219.0	31	--	14.2	87		13				
Van Horn	M	09/23/2008	32.7	2	--	6.1	100						
Vanity	M	07/15/2008	148.0	9	--	6.1	22		78				
West Fork Morgan	M	08/26/2008	400.0	2	--	0.5	50	50					
Williams	M	08/25/2008	200.0	4	--	2.0					100		

<sup>a</sup> Does not include mountain whitefish.

<sup>b</sup> L = transect's lower reach, M = middle reach, and U = upper reach.

<sup>c</sup> CT = Westslope cutthroat trout, RBT = Rainbow trout/steelhead, BU = Bull trout, CTxRBT = Apparent cutthroat/rainbow hybrid trout, EBT = Brook trout, CK = Chinook salmon, and BUxEBT = Apparent bull trout x brook trout hybrid.

<sup>d</sup> ND = No data.

Table 13. Continued.

- <sup>e</sup> Population estimate calculation returned a negative value for the 95% confidence interval and was not reported.
- <sup>f</sup> P/A = Presence and absence sampling.

Table 14. Salmonid species<sup>a</sup>, number of fish observed, mean TL (mm), and size range (TL mm) for selected streams in the upper Salmon River basin, 2008.

Stream	No. of Fish Observed	Salmonid Species <sup>b</sup>	Mean TL (mm)	Size Range (TL mm)
Allison	21	CT	137.6	30 - 230
Ayers	8	EBT	138.6	114 - 183
Ayers	1	RBT	97.0	97
Baldwin	11	BU	95.8	65 - 146
Bear	6	BU	149.5	104 - 189
Bear	1	BUxEBT	163.0	163
Bear	1	CK	101.0	101
Bear	1	RBT	159.0	159
Beaver	1	EBT	97.0	97
Bench	1	EBT	112.0	112
Bernard	1	BU	119.0	119
Bernard	1	CT	138.0	138
Big Bear	7	BU	192.9	140 - 260
Big Bear	6	CT	246.7	205 - 290
Big Bear	4	RBT	221.3	190 - 280
Big Timber	3	EBT	109.0	71 - 156
Big Timber	275	BU	165.7	64 - 308
Big Timber	66	CT	168.2	64 - 310
Big Timber	418	RBT	146.9	63 - 280
Boulder	24	BU	105.6	55 - 180
Boundary	3	BU	116.7	112 - 121
Boundary	5	CT	129.2	85 - 195
Boundary	2	CTxRBT	161.5	128 - 195
Cape Horn	6	BU	126.7	83 - 209
Cape Horn	7	BUxEBT	103.7	78 - 176
Cape Horn	28	CK	48.4	37 - 66
Cape Horn	26	EBT	102.7	39 - 207
Cape Horn	3	RBT	132.3	111 - 166
Challis	2	BU	109.5	39 - 180
Challis	5	BUxEBT	115.4	38 - 149
Challis	22	CT	144.0	55 - 227
Challis	17	EBT	190.8	81 - 275
Challis	1	UNK	61.0	61
Dagger	2	BU	144.0	136 - 152
Dagger	3	CT	87.0	77 - 95
Dagger	1	CTxRBT	180.0	180
Dagger	3	RBT	88.3	47 - 160
Deep	12	BU	137.9	70 - 185
Deep	17	CT	139.4	60 - 225
Duck	45	EBT	77.7	45 - 180
Duck	10	RBT	125.0	100 - 165
Duffield	2	BU	113.5	106 - 121
Duffield	2	CT	131.0	116 - 146
East Fork Hayden	24	BU	190.4	75 - 270

Table 14. Continued.

Stream	No. of Fish Observed	Salmonid Species <sup>b</sup>	Mean TL (mm)	Size Range (TL mm)
East Fork Hayden	1	CT	210.0	210
East Fork Pahsimeroi River	11	BU	196.9	116 - 288
East Fork Tower	1	EBT	135.0	135
East Fork Tower	233	RBT	96.8	55 - 200
East Pass	3	RBT	165.0	130 - 220
Everson	10	BU	81.0	50 - 140
Flat	32	EBT	105.3	74 - 199
French	18	CT	96.7	70 - 130
Garden	2	CT	192.5	177 - 208
Garden	24	RBT	105.8	81 - 153
Gold	19	RBT	40.3	30 - 97
Goldburg	34	EBT	144.7	50 - 260
Harlan	7	BU	99.9	67 - 151
Harlan	9	CT	113.2	52 - 167
Hat	14	BU	124.6	70 - 185
Hat	22	CT	142.7	65 - 230
Hawley	23	RBT	157.8	35 - 260
Horse	27	BU	110.0	20 - 178
Horse	7	RBT	141.0	90 - 187
Huckleberry	8	EBT	134.3	85 - 180
Huckleberry	4	RBT	112.5	55 - 180
Jordan	1	CTxRBT	215.0	215
Jordan	1	CK	750.0	750
Jordan	1	RBT	175.0	175
Kelly	5	EBT	109.0	73 - 140
Kenney	26	BU	169.0	81 - 222
Kenney	79	CT	133.5	52 - 248
Kenney	24	EBT	120.1	90 - 209
Kenney	164	RBT	105.6	52 - 230
Lime	2	BU	131.5	110 - 153
Lime	6	CT	112.3	60 - 162
Little Deep	8	BU	120.6	85 - 190
Little Deep	31	CT	104.4	30 - 170
Little Springs	25	EBT	124.2	50 - 195
Little Springs	6	RBT	154.0	100 - 155
Lyon	1	BU	200.0	200
Lyon	154	RBT	91.8	40 - 190
Mahogany	11	BU	185.0	40 - 275
Marsh	31	EBT	119.7	53 - 220
Mayrick	44	EBT	70.6	40 - 175
Mayrick	2	RBT	142.5	140 - 145
McKay	17	BU	124.3	45 - 185
McKim	27	BU	132.6	40 - 250
McKim	71	CT	137.7	70 - 235
McKim	288	RBT	98.9	35 - 205
North Fork McKim	25	BU	141.4	75 - 225
North Fork McKim	24	CT	142.9	65 - 200

Table 14. Continued.

Stream	No. of Fish Observed	Salmonid Species <sup>b</sup>	Mean TL (mm)	Size Range (TL mm)
North Fork Salmon River	2	BU	165.0	140 - 190
North Fork Salmon River	20	CT	176.8	90 - 260
Pahsimeroi River	15	EBT	153.0	65 - 200
Pahsimeroi River	5	RBT	142.0	125 - 185
Panther	1	CT	195.0	195
Panther	5	EBT	160.4	135 - 185
Panther	4	RBT	189.5	150 - 213
Patterson	8	EBT	123.8	65 - 255
Patterson	2	RBT	217.5	190 - 245
Perreau	12	CT	137.5	40 - 200
Pollard Canyon	15	CT	119.7	70 - 155
Porphyry	16	BU	140.4	83 - 195
Seafoam	1	BU	210.0	210
Seafoam	3	CT	173.0	148 - 216
Seafoam	3	EBT	139.7	100 - 167
Silver	12	RBT	154.8	100 - 220
South Fork Big	3	BU	100.0	100
South Fork Big	4	CT	128.8	80 - 200
Squaw	11	BU	108.6	70 - 160
Squaw	1	CT	150.0	150
Squaw	3	RBT	125.0	75 - 160
Sulphur	1	CT	109.0	109
Sulphur	2	RBT	116.0	102 - 130
Sulphur	1	UNK	60.0	60
Swamp	1	BU	166.0	166
Swamp	2	CK	94.5	74 - 115
Swamp	4	EBT	125.5	116 - 144
Thatcher	2	EBT	75.0	73 - 77
Tower	6	EBT	103.3	50 - 130
Tower	1	CK	ND <sup>c</sup>	ND
Tower	61	CT	112.0	45 - 195
Tower	319	RBT	108.1 <sup>d</sup>	55 - 235
Unnamed Tributary to Mayrick	3	EBT	56.7	55 - 60
Unnamed Tributary to Rapid River	2	CT	106.0	86 - 126
Unnamed Tributary to Woods Fork	10	BU	102.0	35 - 125
Unnamed Tributary to Woods Fork	39	RBT	111.9	45 - 185
Van Horn	4	BU	106.5	84 - 146
Van Horn	29	CT	119.6	77 - 193
Vanity	7	BU	100.9	77 - 141
Vanity	2	CT	135.0	100 - 170
West Fork Morgan	1	CT	150.0	150
West Fork Morgan	1	RBT	110.0	110
Williams	4	EBT	101.3	60 - 150

<sup>a</sup> Does not include mountain whitefish.

Table 14. Continued.

- <sup>b</sup> BU = Bull trout, BUxEBT = Apparent bull trout x brook trout hybrid, CK = Chinook salmon, CT = Westslope cutthroat trout, CTxRBT = Apparent cutthroat/rainbow hybrid trout, EBT = Brook trout, RBT = Rainbow trout, and UNK = Unknown salmonid.
- <sup>c</sup> ND = No data.
- <sup>d</sup> Includes 237 of 319 sampled.

Table 15. Combined mountain whitefish and non-game fish population densities, and species composition for selected streams surveyed in the upper Salmon River basin, 2008.

Stream	Transect <sup>a</sup>	Sample Date	Transect Area (m <sup>2</sup> )	No. of Fish Sampled	Fish/100 m <sup>2</sup>	Species Composition (%) <sup>b</sup>					
						SCU	LND	SPD	MWF	SUC	RSS
Allison	L	07/08/2008	150.0	ND <sup>c</sup>		P <sup>d</sup>					
Ayers	L	06/10/2008	246.0	6	2.4			100			
Bear	L	07/15/2008	238.1	ND		P					
Beaver	M	08/25/2008	1,100.0	20	1.8						
Bench	L	06/11/2008	514.0	ND		P					
Bernard	L	07/16/2008	146.0	ND		P					
Big Bear	L	08/07/2008	276.0	ND		P					
Big Timber	L	08/26/2008	--	1	--	P			100		
Big Timber	L	08/26/2008	--	ND	--	P					
Big Timber	L	08/25/2008	--	ND	--	P					
Big Timber	L	08/25/2008	--	2	--	P			100		
Big Timber	L	08/18/2008	--	ND	--	P					
Big Timber	M	08/18/2008	--	ND	--	P					
Big Timber	M	08/21/2008	--	1	--	P			100		
Big Timber	M	08/21/2008	--	3		P			100		
Big Timber	M	08/19/2008	--	ND	--	P					
Big Timber	M	08/19/2008	--	ND	--	P					
Big Timber	M	08/20/2008	--	1	--	P			100		
Big Timber	M	08/20/2008	--	ND	--	P					
Big Timber	U	08/27/2008	--	1	--	P			100		
Big Timber	U	08/13/2008	--	ND	--	P					
Big Timber	U	08/07/2008	--	ND	--	P					
Big Timber	U	08/05/2008	--	ND	--	P					
Big Timber	U	08/05/2008	--	2	--				100		
Big Timber	U	08/06/2008	--	ND	--	P					
Big Timber	U	08/06/2008	--	ND	--	P					
Big Timber	U	08/01/2008	--	ND	--	P					

Table 15. Continued.

Stream	Transect <sup>a</sup>	Sample Date	Transect Area (m <sup>2</sup> )	No. of Fish Sampled	Fish/100 m <sup>2</sup>	Species Composition (%) <sup>b</sup>					
						SCU	LND	SPD	MWF	SUC	RSS
Big Timber	U	07/31/2008	--	ND	--	P					
Cape Horn	L	07/17/2008	1,423.1	ND	--	P					
Cape Horn	L	08/20/2008	517.2	ND	--	P					
Challis	U	08/04/2008	372.0	ND	--	P					
Dagger	L	07/15/2008	223.0	ND	--	P					
Dagger	U	07/15/2008	165.0	ND	--	P					
Duck	L	06/06/2008	320.0	89	27.8	100					
Duck	U	06/04/2008	460.0	45	9.8	100					
Duck	U	06/04/2008	560.0	22	3.9	100					
Duffield	M	07/16/2008	220.0	ND	--	P					
East Fork Pahsimeroi River	M	07/30/2008	485.6	ND	--	P					
East Fork Tower	L	07/07/2008	214.0	29	13.6	100					
East Pass	L	07/31/2008	477.0	ND	--	P					
Garden	L	05/30/2008	ND	4	--	100					
Gold	L	08/25/2008	200.0	3	1.5	100					
Goldburg	M	07/08/2008	400.0	1	0.3	100					
Goldburg	U	07/08/2008	600.0	16	2.7	100					
Goldburg	U	07/08/2008	600.0	26	4.3	100					
Hawley	M	08/01/2008	386.0	2	0.5	100					
Huckleberry	L	08/25/2008	500.0	22	4.4	100					
Jordan	L	07/22/2008	ND	2	--					100	
Kenney	L	07/16/2008	--	ND	--	P					
Little Springs	L	06/17/2008	522.0	24	4.6	100					
Little Springs	L	06/17/2008	458.0	34	7.4	100					
Little Springs	M	06/19/2008	372.0	29	7.8	100					
Marsh	U	07/17/2008	144.0	ND	--	P					
Mayrick	L	06/09/2008	100.3	14	14.0	100					
Mayrick	L	06/09/2008	336.0	62	18.5	100					

Table 15. Continued.

Stream	Transect <sup>a</sup>	Sample Date	Transect Area (m <sup>2</sup> )	No. of Fish Sampled	Fish/100 m <sup>2</sup>	Species Composition (%) <sup>b</sup>					
						SCU	LND	SPD	MWF	SUC	RSS
Mayrick	M	06/10/2008	190.0	146	76.8	100					
Mayrick	U	06/16/2008	88.8	16	18.0	100					
McKay	L	08/04/2008	394.9	ND	--	P					
McKim	L	08/11/2008	154.0	2	1.3		100				
North Fork Salmon River	U	09/03/2008	600.0	3	0.5	100					
Pahsimeroi River	L	06/19/2008	442.0	30	6.8	100					
Panther	U	08/26/2008	500.0	17	3.4	94			6		
Panther	U	08/26/2008	600.0	16	2.7	100					
Patterson	L	07/23/2008	ND	32	--	97				3	
Perreau	M	06/02/2008	276.0	4	1.4	100					
Pollard Canyon	M	05/30/2008	ND	45	--	100					
Seafoam	L	07/15/2008	782.9	ND	--	P					
South Fork Big Spud	L	08/20/2008	550.0	22	4.0	100					
Spud	L	07/09/2008	18.8	18	95.7	P	100				
Sulphur	L	07/16/2008	231.0	ND	--	P					
Thatcher	L	06/11/2008	424.5	ND	--	P					
Tower	L	07/28/2008	298.0	4	1.3	75	25				
Tower	L	07/29/2008	376.0	37	9.8	100					
Tower	M	07/07/2008	278.0	89	32.0	100					
Tower	M	07/28/2008	227.0	51	22.5	100					
Tower	U	07/09/2008	304.0	180	59.2	100					
Tower	U	07/14/2008	386.0	24	6.2	100					
Unnamed Tributary to Mayrick	L	06/16/2008	106.2	32	30.1	100					
West Fork Morgan	M	08/26/2008	400.0	19	4.8	100					
Williams	M	08/25/2008	200.0	1	0.5	100					

<sup>a</sup> L = stream transect's lower reach, M = middle reach, and U = upper reach.

<sup>b</sup> SCU = Sculpin, LND = Longnose dace, SPD = Speckled dace, MWF = Mountain whitefish, SUC = Sucker, and RSS = Redside shiner.

Table 15. Continued.

<sup>c</sup> ND = No data.

<sup>d</sup> P = Species present during survey but not enumerated.

Table 16. Number of resident rainbow trout redds counted in the Lemhi River and Big Springs Creek, 1994 to 2008.

Date	Lemhi River (Beyeler Ranch <sup>a</sup> )	Big Springs Creek (Neibaur Ranch <sup>b</sup> )	Big Springs Creek (Tyler Ranch <sup>c</sup> )	Total
4/26/1994	-	-	-	40 <sup>d</sup>
5/3/1995	-	57	-	57
5/3/1996	7	32	-	39
4/21/1997- 5/3/1997	8	44	45	97
5/3/1998	18	93	124	235
4/29/1999	29	39	71	139
4/20/2000	23	160	123	306
4/5/2001	2	95	186	283
4/25/2002	3	360	193	556
4/22/2003	56	128	103	287
4/22/2004	15	174	45	234
4/26/2005	3	75	43	121
4/27/2006	9	63	143	215
4/26/2007	8	163	62	233
5/5/2008	9	82	108	199

<sup>a</sup> Habitat improvement project implemented in spring 1995.

<sup>b</sup> Habitat improvement project completed in 2003.

<sup>c</sup> Habitat improvement project implemented in spring 1998.

<sup>d</sup> Incidental count taken during a Lemhi Model Watershed Project habitat survey; includes all of Big Springs Creek.

Table 17. Bull trout redd count summary in the Hayden Creek drainage, 2006, 2007, and 2008. Both fluvial and resident bull trout redds were included in survey transect counts.

Stream	No. of Bull Trout Redds		
	2006	2007	2008
Hayden Creek trend transect	39	26	21 <sup>a</sup>
Upstream of trend transect	<u>74</u>	<u>115</u>	<u>28<sup>b</sup></u>
Hayden Creek Subtotal	113	141	49
East Fork Hayden Creek	49	52	61
Bear Valley Creek trend transect	26	25	27
Upstream of trend transect	<u>60</u>	<u>115</u>	<u>21</u>
Bear Valley Creek Subtotal	86	140	48
Wright Creek	10	6	4
Hayden Creek Drainage Total	258	339	162

<sup>a</sup> Only the upper one-half of transect surveyed twice in 2008.

<sup>b</sup> Upstream areas surveyed once in 2008.

Table 18. Big Timber Creek electro-fishing survey results, 2007 and 2008.

Year	No. of Salmonids By Species					Total No. of Fish
	Rainbow Trout	Bull Trout	Westslope Cutthroat Trout	Brook Trout	Mountain Whitefish	
2007	269	193	51	0	28	541
%	50	36	9	0	5	
2008	418	275	66	3	11	773
%	54	36	9	<1	1	

Table 19. Bull trout redd counts observed in trend survey sections of Alpine Creek, 1998 to 2008.

Year	Survey Dates	No. of Redds
1998	8/23, 9/11	0, 1
1999	8/26 <sup>a</sup>	3
2000	8/30, 9/15	6, 9
2001	8/28, 9/11 <sup>b</sup>	11, 15
2002	8/30, 9/12	8, 14
2003	8/27, 9/8	11, 14
2004	8/30, 9/9	6, 9
2005	8/30, 9/12	9, 13
2006	8/29, 9/12	6, 13
2007	8/28, 9/12	17, 18
2008	8/28, 9/11	0, 0 <sup>c</sup>

<sup>a</sup> Only one count completed.

<sup>b</sup> Counts done independently, not cumulatively.

<sup>c</sup> An unknown blockage preventing upstream migration is suspected below the transect site.

Table 20. Bull trout redd counts observed in the first trend survey section of Fishhook Creek, 1998 to 2008.

Year	Survey Dates	No. of Redds
1998	8/22, 9/10	5, 11
1999	8/22, 8/26	0, 15
2000	8/31, 9/14	12, 18
2001	8/28, 9/11 <sup>a</sup>	15, 11
2002	9/4, 9/11	6, 17
2003	8/27, 9/8	6, 17
2004	8/30, 9/9	10, 11
2005	8/30, 9/12	12, 23
2006	8/29, 9/13	16, 25
2007	8/29, 9/13	21, 21
2008	8/29, 9/11	8, 13

<sup>a</sup> Counts done independently, not cumulatively.

Table 21. Bull trout redd counts observed in the second trend survey section of Fishhook Creek. This new survey transect was established in 2008.

Year	Survey Dates	No. of Redds
2008	8/29, 9/12	5, 14

Table 22. Fluvial bull trout redd counts observed in trend survey sections of Fourth of July Creek, 2003 to 2008.

Year	Survey Date	No. of Redds
2003	9/17	16
2004	9/9	33
2005	9/2	41
2006	9/6	71
2007	9/5	49
2008	9/1	26

Table 23. Summary of resident trout trapping at the Pahsimeroi Fish Hatchery, 1991 to 2008.

Year	Trapping Dates	No. of Resident Rainbow Trout			No. of Bull Trout	Other Salmonids <sup>a</sup>
		Males	Females	Total		
1991	02/13 - 05/15	--	--	81	--	--
1992	02/07 - 04/30	--	--	55	--	--
1993	02/19 - 05/04	7	36	43	--	--
1994	02/15 - 05/06	10	17	27	--	--
1995	02/20 - 05/16	11	17	28	--	--
1996	03/01 - 05/25	5	23	28	--	--
1997	03/01 - 05/09	1	7	8	--	--
1998	03/01 - 05/08	8	17	25	--	--
1999	02/19 - 05/03	7	17	24	--	--
2000	02/25 - 05/01	10	27	37	--	--
2001	03/01 - 03/17	27	41	68	--	--
2002	03/01 - 05/05	19	43	62	--	--
2003	02/28 - 05/02	9	31	40	--	--
2004	03/05 - 04/29	11	39	50	1	0
2005	03/02 - 05/12	4	50	54	1	1 CTxRBT
2006	03/03 - 04/26	13	29	42	0	1 CT <sup>b</sup>
2007	03/09-05/27	5	23	28	0	1 CT <sup>b</sup> , 1 EBT
2008	02/27-05/21	14	62	76	5	1 RBT sex unknown, 1 EBT

<sup>a</sup> CTxRBT = Apparent cutthroat/rainbow hybrid trout, CT = Westslope cutthroat trout, and EBT = Brook trout.

<sup>b</sup> Westslope cutthroat trout encountered outside range of steelhead trapping dates.

Table 24. Salmonid and non-game species encountered during steelhead and Chinook salmon trapping dates at the East Fork Satellite Facility, 1984 to 2008.

Year	Trapping Dates	Salmonid and non-game species <sup>a</sup>						Total
		BU	CT	RBT	EBT	MWF	SUC	
1984	6/20-8/7 <sup>b</sup>	49	3	316	0	1,872	0	2,240
1985	03/15-05/22, 06/11-09/04	ND <sup>c</sup>	ND	ND	ND	ND	ND	--
1986	03/17-04/27, 05/27-09/09	119	0	0	0	49	0	168
1987	03/12-04/30, 05/11-09/03	12	0	0	0	60	0	72
1988	03/15-05/02, 06/01-09/01	0	1	0	0	677	0	678
1989	03/20-05/03, 06/07-09/07	37	0	3	3	200	0	243
1990	3/22-4/30, 06/04-09/14	2	0	0	0	0	0	2
1991	03/01-05/10, 06/03-09/05	89	0	0	0	0	0	89
1992	03/18-05/02, 06/01-09/08	73	0	0	0	0	0	73
1993	03/30-05/12, 06/18-09/06	27	1	0	0	0	0	28
1994	04/05-05/04, 06/06-09/08	61	0	0	0	0	0	61
1995	04/04-05/01, 07/27-08/31	17	0	0	0	0	0	17
1996	03/22-05/10, 06/25-08/30	175	0	1	0	63	0	239
1997	03/28-05/25, 07/08-09/08	13	0	1	0	4	0	18
1998	04/06-05/11 <sup>d</sup>	1	1	1	0	117	0	120
1999	04/02-05/03 <sup>d</sup>	0	0	2	0	29	0	31
2000	03/29-05/03 <sup>d</sup>	0	1	1	1	108	0	111
2001	03/23-05/11 <sup>d</sup>	ND	ND	ND	ND	ND	0	--
2002	03/26-05/21 <sup>d</sup>	0	12	4	0	150	0	166
2003	03/25-05/09 <sup>d</sup>	0	2	4	0	0	0	6
2004	03/29-04/25, 05/11-09/10	175	8	5	0	359	0	547
2005	03/23-05/17, 06/07-08/30	235	11	1	0	194	0	441
2006	03/23-05/18, 06/21-09/26	262	1	2	0	122	0	387
2007	03/15-05/08, 06/04-09/28	227	6 <sup>e</sup>	5	0	91	0	329

Table 24. Continued.

Year	Trapping Dates	Salmonid and non-game species <sup>a</sup>						Total
		BU	CT	RBT	EBT	MWF	SUC	
2008	03/24-05/14, 06/04-09/24	170	5 <sup>e</sup>	2	0	128	2	307

<sup>a</sup> BU = Bull trout, CT = Westslope cutthroat trout; RBT = Rainbow trout, EBT = Brook trout, MWF = Mountain whitefish, and SUC = Sucker.

<sup>b</sup> Trap not operated for steelhead.

<sup>c</sup> ND = No data.

<sup>d</sup> Trap not operated for Chinook salmon.

<sup>e</sup> One fish thought to be an apparent cutthroat/rainbow hybrid trout.

Table 25. Salmonid and non-game fish encountered during steelhead and Chinook salmon trapping dates at Sawtooth Fish Hatchery, 1984 to 2008.

Year	Trapping Dates	Salmonid and non-game species <sup>a</sup>						Total
		BU	CT	RBT	EBT	MWF	SUC	
1984	07/07-09/06 <sup>b</sup>	1	0	0	0	0	0	1
1985	03/14-05/10, 06/14-09/15	ND <sup>c</sup>	ND	ND	ND	ND	ND	ND
1986	03/13-04/23, 06/20-09/09	3	0	0	0	0	0	3
1987	03/07-05/01, 05/13-09/08	ND	ND	ND	ND	ND	ND	ND
1988	03/03-05/03, 05/23-09/06	ND	ND	ND	ND	ND	ND	ND
1989	03/13-05/03, 06/07-09/11	ND	ND	ND	ND	ND	ND	ND
1990	03/02-05/07, 05/21-09/14	7	0	0	0	1	0	8
1991	02/28-05/14, 06/07-09/15	17	0	0	0	0	0	17
1992	03/02-04/30, 05/28-09/18	24	0	0	0	0	0	24
1993	03/18-05/12, 06/18-09/06	5	0	0	0	0	0	5
1994	03/16-05/09, 05/31-10/26	38	0	0	0	0	0	38
1995	03/15-05/10, 06/12-09/06	6	0	0	0	0	0	6
1996	03/20-05/13, 06/20-09/11	4	1	1	0	9	226	241
1997	03/20-05/12, 06/16-09/04	5	0	6	0	1	116	11
1998	03/23-05/08, 06/10-09/14	4	4	5	0	12	252	277
1999	03/23-05/06, 06/28-09/07,	8	4	10	0	34	97	153
2000	03/20-05/04, 05/30-09/25	27	1	3	0	1	0	32
2001	03/19-05/03, 05/24-09/14	31	0	0	0	0	0	31
2002	03/20-05/02, 05/28-09/09	23	0	3	0	8	26	60
2003	03/28-05/05, 06/12-09/09	29	0	2	0	1	8	40
2004	03/15-04/29, 05/25-09/15	8	0	2	0	5	14	29
2005	03/25-05/05, 06/05-09/19	33	1	2	0	15	5	56

Table 25. Continued.

Year	Trapping Dates	Salmonid and non-game species <sup>a</sup>						Total
		BU	CT	RBT	EBT	MWF	SUC	
2006	03/27-05/01, 06/19-09-15	25	3	18	0	35	0	81
2007	03/15-05/01, 05/25-09/11	72	13	27	0	8	189	309
2008	03/19-05/06, 06/11-09/17	18	10	10	0	20	1,089	1,147

<sup>a</sup> BU = Bull trout, CT = Westslope cutthroat trout; RBT = Rainbow trout, EBT = Brook trout, MWF = Mountain whitefish, and SUC = Sucker.

<sup>b</sup> -- = Trap not operated for steelhead.

<sup>c</sup> ND = No data.

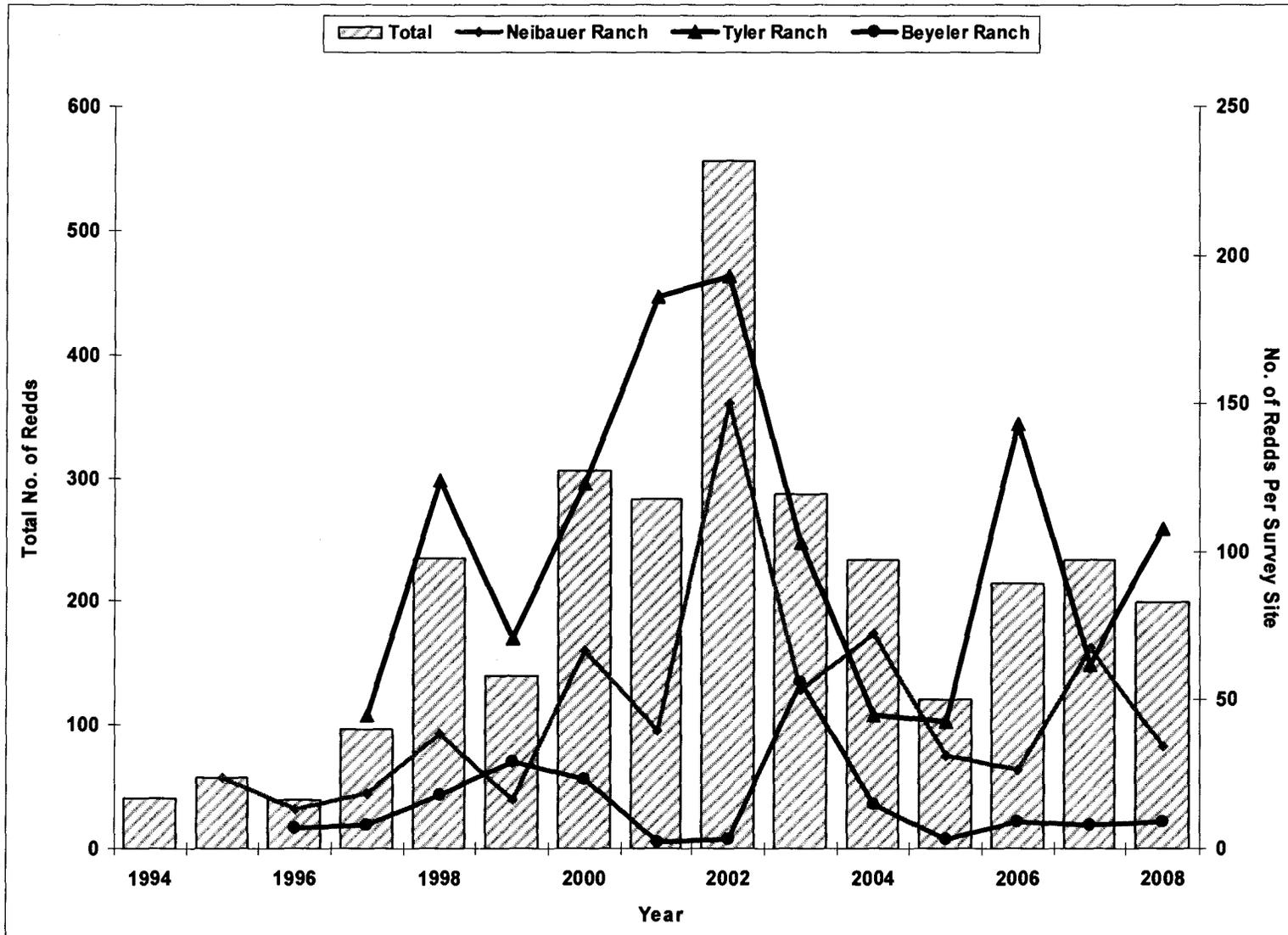


Figure 4. Resident rainbow trout spawning redds counted during ground surveys in the upper Lemhi River (Beyeler Ranch) and Big Springs Creek (Neibaur and Tyler ranches), 1994 to 2008.

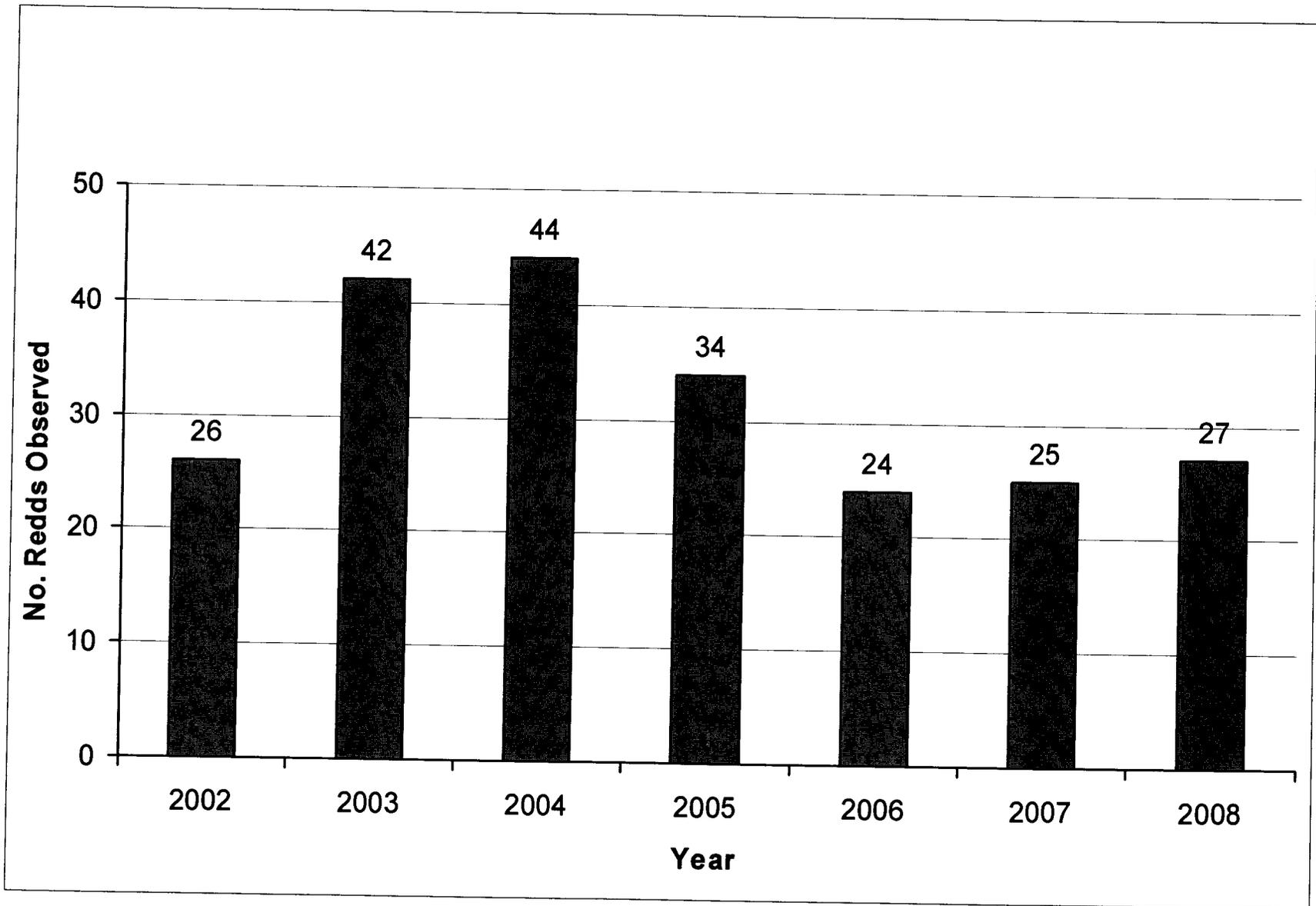


Figure 5. Fluvial bull trout redd counts in the trend transect on Bear Valley Creek, 2002 to 2008.

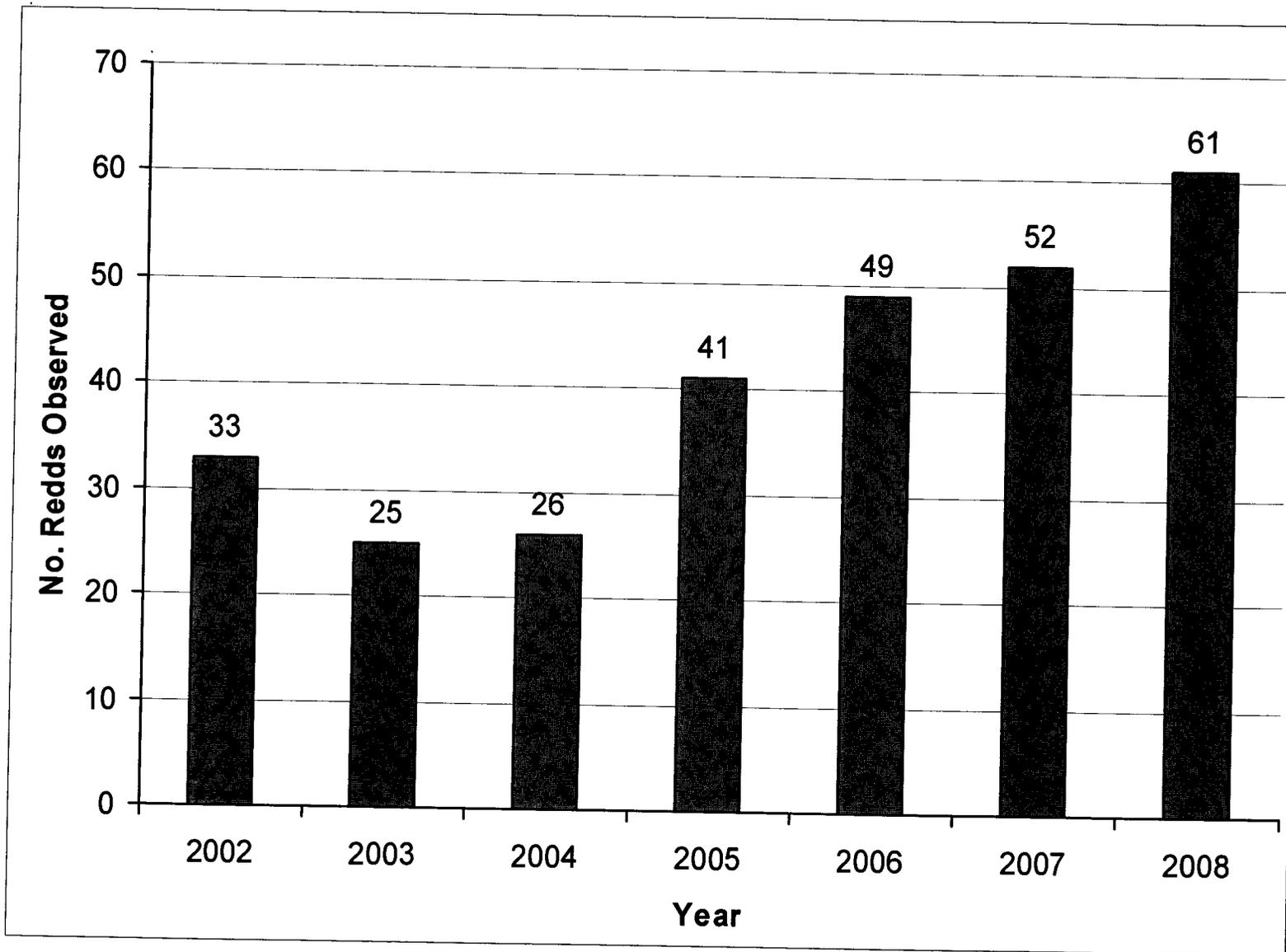


Figure 6. Resident bull trout redd counts in East Fork Hayden Creek, 2002 to 2008.

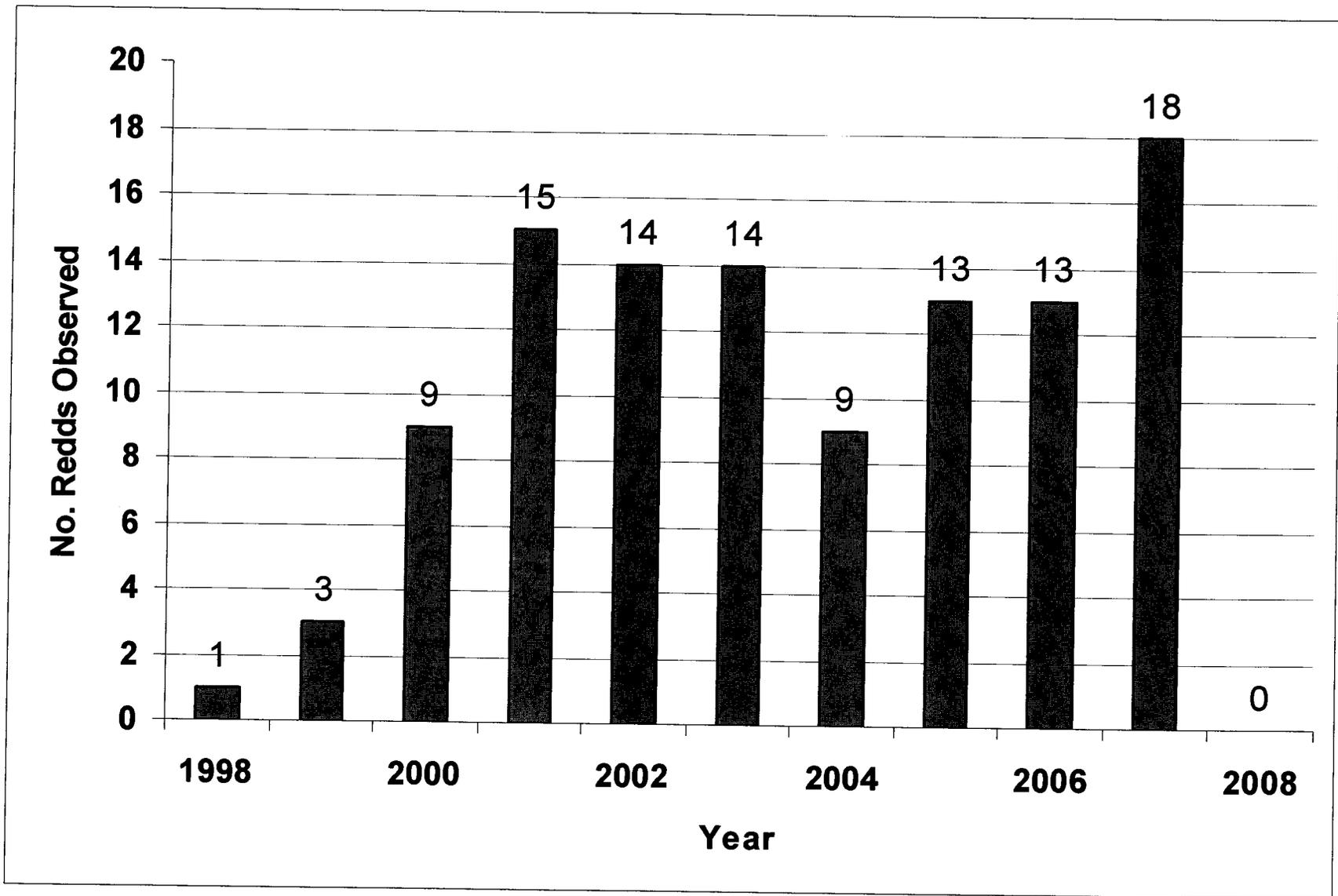


Figure 7. Bull trout redd counts in Alpine Creek, 1998 to 2008.

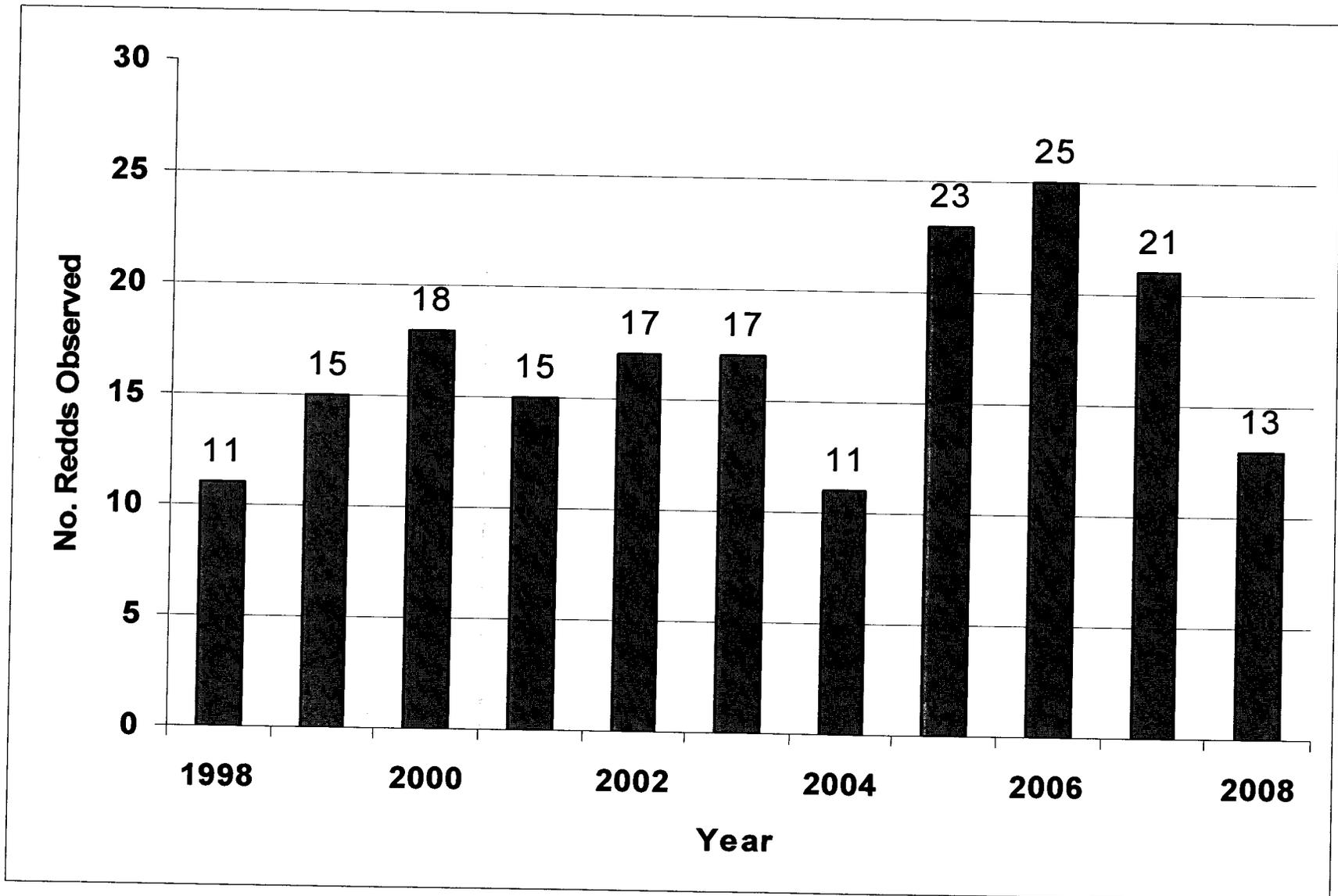


Figure 8. Bull trout redd counts in Fishhook Creek, 1998 to 2008.

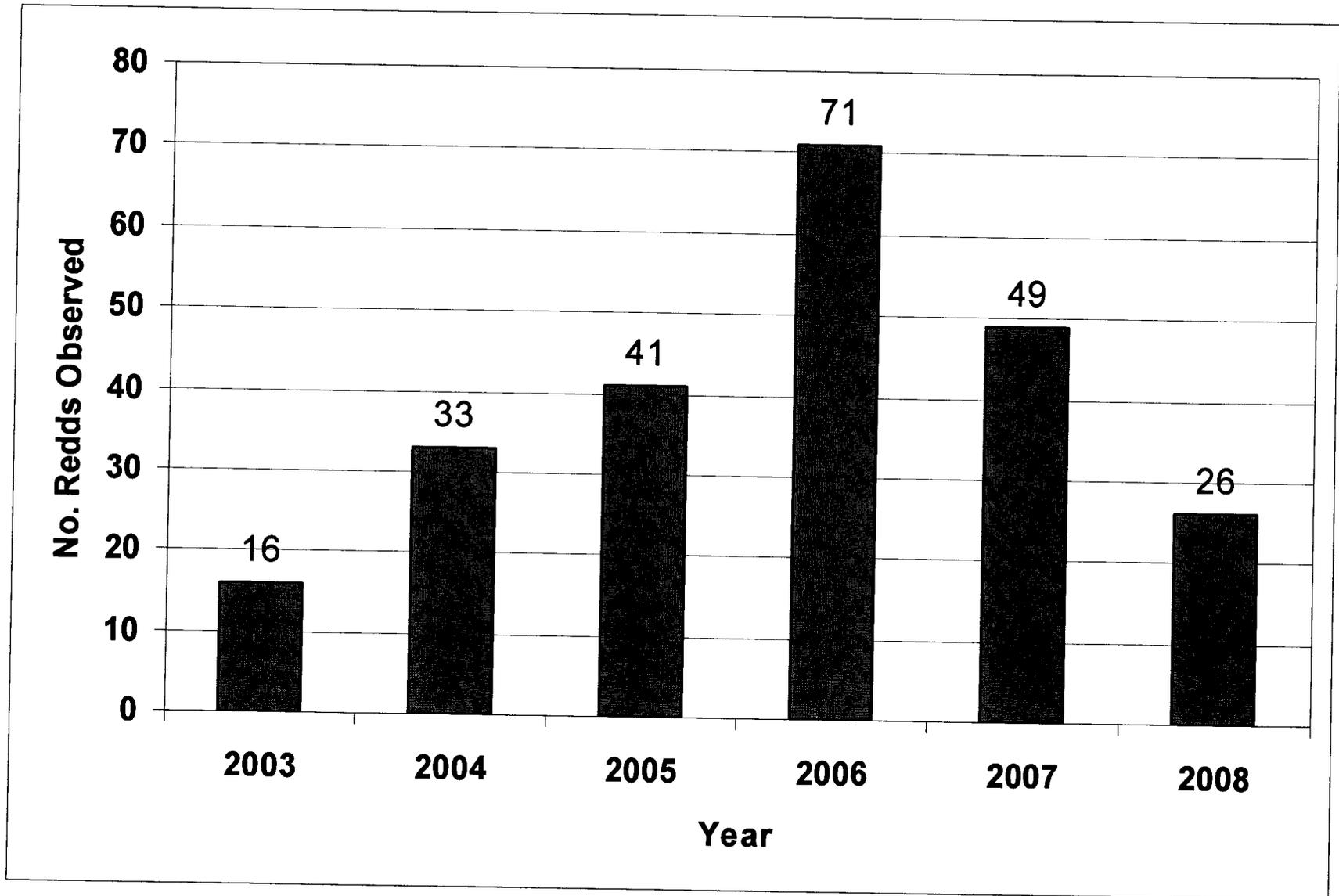


Figure 9. Fluvial bull trout redd counts in Fourth of July Creek (SNRA), 2003 to 2008.

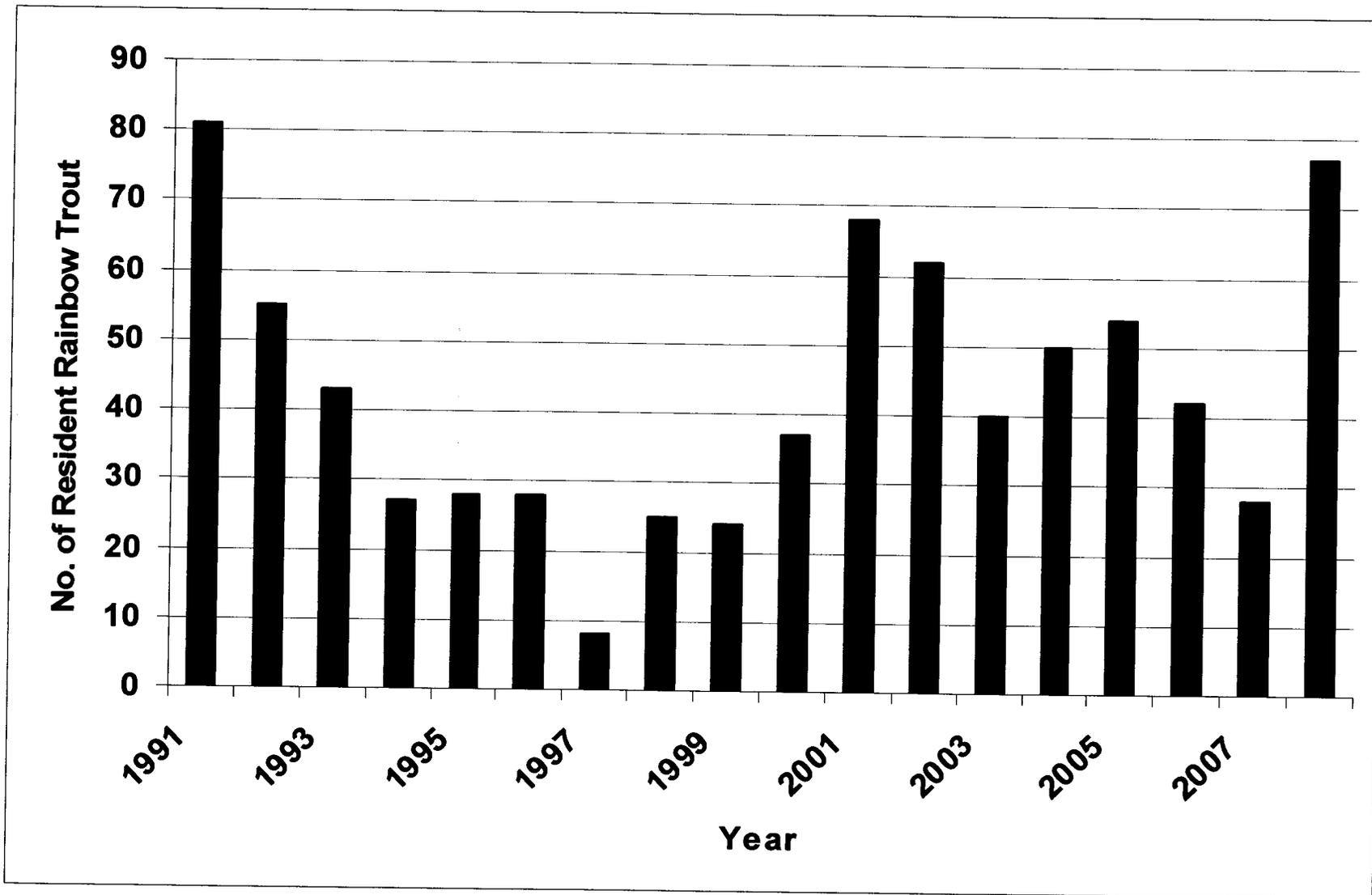


Figure 10. Annual count of resident rainbow trout trapped at the Pahsimeroi Fish Hatchery, 1991 to 2008.

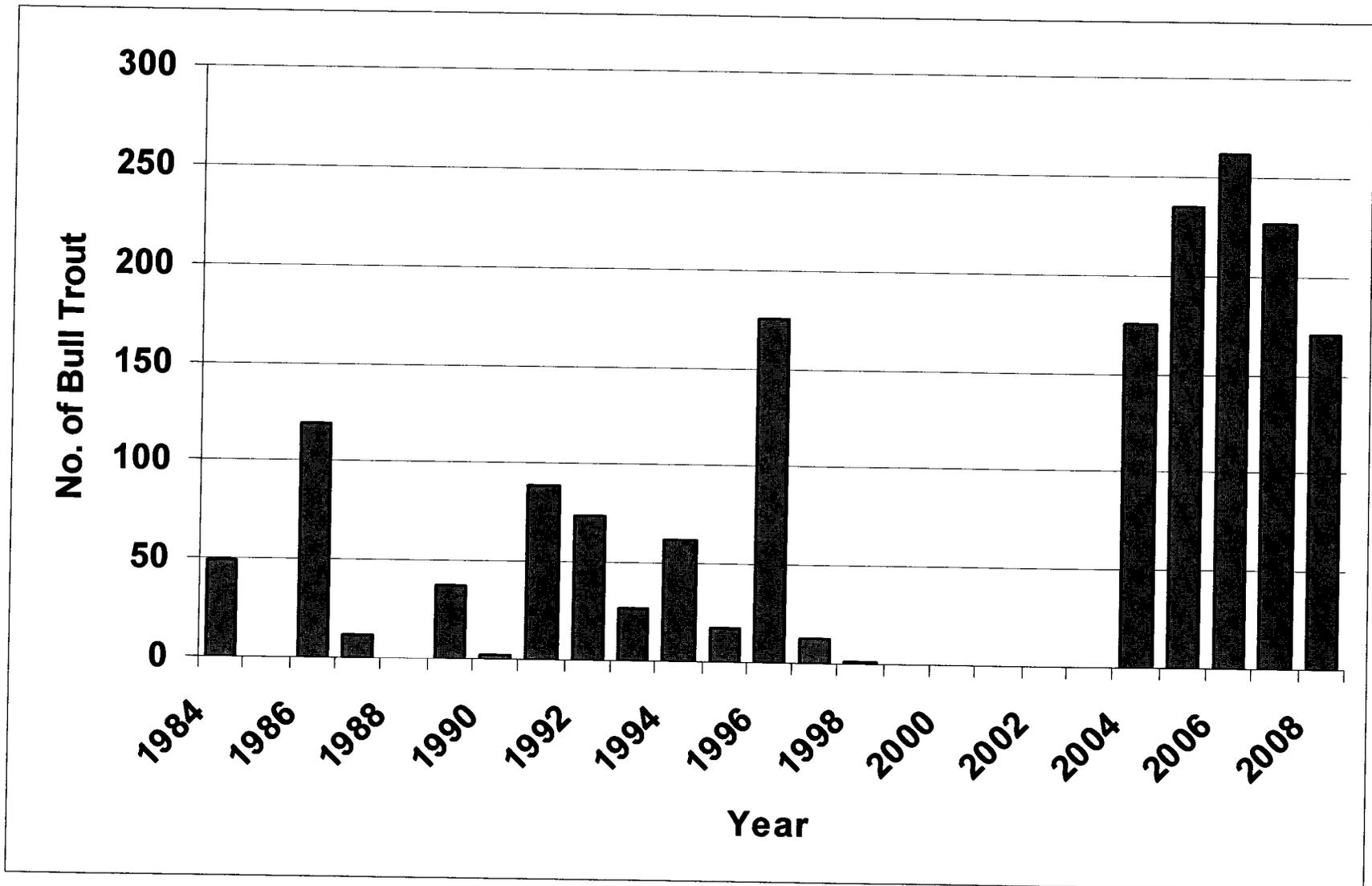


Figure 11. Annual count of bull trout trapped at East Fork Satellite Facility, 1984 to 2008.

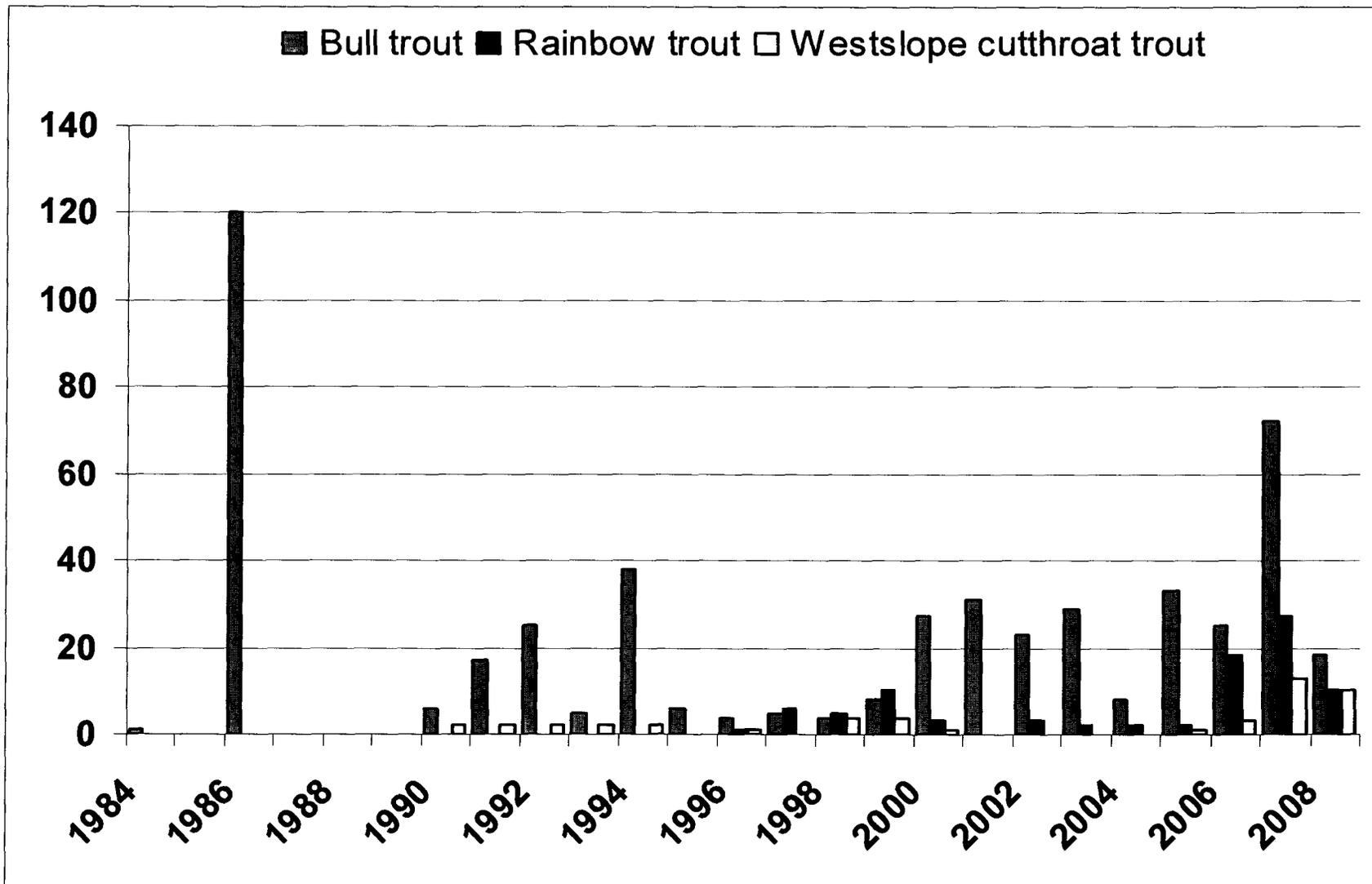


Figure 12. Annual count of selected resident salmonids trapped at Sawtooth Fish Hatchery, 1984 to 2008.

## 2008 SALMON REGION FISHERY MANAGEMENT ANNUAL REPORT

### Middle Fork Salmon River Snorkeling Transects

#### ABSTRACT

During July 2008, IDFG personnel snorkeled 6 of 29 main-stem Middle Fork Salmon River (MFSR) transects to sample for fish presence and density. In 2008, the number of sites snorkeled was limited by a severe rain storm that reduced visibility to zero in tributaries and the main-stem MFSR. For the six main-stem MFSR traditional transects surveyed in 2008, westslope cutthroat trout had a mean density of 2.3 fish/100 m<sup>2</sup>, rainbow trout /steelhead were 1.5 fish/100 m<sup>2</sup>, and juvenile Chinook salmon were 4.0 fish/100 m<sup>2</sup>. For comparison with 2007 using the same six transects, westslope cutthroat trout had a mean density of 1.8 fish/100 m<sup>2</sup>, rainbow trout /steelhead were 0.4 fish/100 m<sup>2</sup>, and juvenile Chinook salmon were 0.5 fish/100 m<sup>2</sup>.

## INTRODUCTION

The Middle Fork Salmon River (MFSR), part of the Wild and Scenic Rivers System, flows through the Frank Church River of No Return Wilderness, a remote area in east central Idaho. The MFSR originates at the confluence of Bear Valley and Marsh creeks near Cape Horn Mountain. It flows 171 km to its confluence with the Salmon River, 92 km downstream from Salmon, Idaho (Figure 13).

Primitive roads access Dagger Falls, the traditional boating ingress to the MFSR, and the headwaters of some MFSR tributaries. Access to the lower 156 km of the river is limited to aircraft, float boats, or horse/foot trails.

The MFSR is a major recreational river offering a wide variety of outdoor and backcountry experiences. The number of people floating the river during the permit season has increased substantially in the past 46 years, from 625 in 1962 to 9,501 floaters in 2008. The U.S. Forest Service estimated total use days to be 57,248 days in 2008, up from 53,730 use days calculated in 2007 (D. Leuzinger, U.S. Forest Service, personal communication).

The earliest MFSR fishery study, conducted in 1959 and 1960, evaluated the life history and seasonal movements of westslope cutthroat trout (Mallet 1960, 1961). In 1971 the IDFG initiated studies to monitor MFSR westslope cutthroat trout abundance and to evaluate catch-and-release regulations established by the IDFG Commission in 1972. The Commission adopted similar regulations for major MFSR tributaries in the early and mid-1980s.

The 1971 study established snorkeling transects to be surveyed periodically (Corley 1972; Jeppson and Ball 1977, 1979). In this report, these transects will be described as historical (Corley) sites (N = 6). Since then, IDFG has begun additional studies within the MFSR drainage. In 1981, using traditional steelhead transects established that year, IDFG began to evaluate wild steelhead trout populations on the MFSR (Thurow 1982, 1983, 1985). In 1985, the Department added additional sites to enumerate cutthroat trout and Chinook salmon and began measuring steelhead, juvenile Chinook salmon, and westslope cutthroat trout densities in the MFSR and its tributaries (Reingold and Davis 1987a, 1987b, 1988; Lukens and Davis 1989; Davis et al. 1992; Schrader and Lukens 1992; Liter and Lukens 1992). All study sites established since 1981 are known in this report as traditional transects (N = 29).

This report, a continuation of the 1985 study, presents data collected in July 2008 on fish densities in the MFSR drainage.

## OBJECTIVES

Monitor rainbow trout/steelhead, juvenile Chinook salmon, and westslope cutthroat trout densities within the MFSR and its tributaries to evaluate long-term trends in population status.

Monitor the effects of catch-and-release regulations on resident fish populations in the MFSR drainage, particularly westslope cutthroat trout.

## **METHODS**

### **Main-stem and Tributary Snorkeling Transects**

From July 19-26, 2008, IDFG personnel snorkeled 6 of 29 traditional main-stem MFSR transects using snorkeling techniques described by Thurow (1982). Historical transects on the main-stem MFSR were established prior to 1985 while traditional transects were established since 1985. No MFSR historical (Corley) transects and no traditional tributary transects were snorkeled in 2008. More detailed information on main-stem snorkel sites surveyed in 2008 is located in Appendix A, detailing snorkeling transects, locations, and transect measurements.

### **Main-stem Project Angling**

Project anglers used conventional fly-fishing and spin cast gear to collect fish species data on the MFSR from Boundary Creek, 0.9 km downstream of Dagger Falls, to Pungo Creek, 45.2 km downstream of Dagger Falls (Figure 13). Fish were identified by species, measured to the nearest 10 mm TL, and released.

## **RESULTS AND DISCUSSION**

### **Main-stem and Tributary Snorkeling Transects**

In the main-stem MFSR traditional snorkeling transects, IDFG personnel counted 73 westslope cutthroat trout, 40 rainbow trout/steelhead, 90 juvenile Chinook salmon, and 45 mountain whitefish (Table 26). In 2007, 53 westslope cutthroat trout, 11 rainbow trout/steelhead, 19 juvenile Chinook salmon, and 78 mountain whitefish were counted in these same transects (Curet et al. 2009). IDFG personnel surveyed six of 29 main-stem transects this year before severe rainstorms on the third day muddied the Middle Fork Salmon River's tributaries and the main-stem, creating zero visibility in snorkel pool transects below Pungo Creek. This year's data is reported in Tables 26-27 and Figures 14-18. However, because of the limited survey scope of the 2008 data, comparisons with previous data sets would not be reliable.

### **Project Angling**

IDFG anglers caught 155 fish from the main-stem MFSR during the first two and one-half days of this year's surveys (Figure 19). Westslope cutthroat trout comprised 41.3% (N = 64) of the catch, 90 rainbow trout/steelhead accounted for 58.1% (N = 90), and apparent cutthroat/rainbow hybrid trout (N = 1, 0.6%) accounted for the balance of fish caught (Figure 20). The 2008 mean TL for westslope cutthroat trout and rainbow trout/steelhead were 272.8 mm and 177.7 mm, respectively (Figure 21).

Catch-and-release regulations have been in effect since 1972. Before this date, approximately 20% of the westslope cutthroat trout caught by project anglers were over 300 mm TL. Since the regulation change, this proportion has fluctuated yearly, ranging from 18% to 53%, and averaged 36.3% (Figure 22). The proportion of westslope cutthroat trout larger than 300 mm caught by project anglers in 2008 was 47% (N = 30).

## **MANAGEMENT RECOMMENDATIONS**

Continue monitoring densities of westslope cutthroat trout, rainbow trout/steelhead, and juvenile Chinook salmon in all 29 main-stem sites, 10 tributary sites, and six historical main-stem MFSR sites by snorkeling between the second week of July and the third week of August annually. This information demonstrates population trends over time. The main-stem westslope cutthroat trout snorkel counts on the Middle Fork Salmon, St. Joe, Coeur d'Alene, and Selway rivers, along with the General Parr Monitoring snorkel counts for westslope cutthroat trout, likely comprise the best trend dataset for a salmonid subspecies in America (D. Schill, IDFG, personal communication).

Table 26. Numbers of fish counted in main-stem Middle Fork Salmon River snorkel transects, 2008.

Transect Name	Westslope Cutthroat Trout					Rainbow Trout/ Steelhead				Chinook Salmon			Other Species <sup>a</sup>					Total Fish		
	TL (mm)		75-150			TL (mm)		75-150		Age 0	Age 1	Total	BU	MWF	NPM	SUC	RSS			
	150-230	230-300	>300	Total	150-230	230-300	>300	Total												
Gardells Hole	1	1	3	7	12	2	0	0	0	2	1	0	1	0	8	0	0	0	0	23
Velvet	0	10	5	7	22	2	17	0	0	19	66	0	66	0	8	0	0	0	0	115
Elkhorn	0	2	2	4	8	2	5	0	0	7	11	0	11	0	11	0	0	0	0	37
Sheepeater	0	2	2	4	8	1	0	0	0	1	2	0	2	0	1	0	0	0	0	12
Rapid River	0	3	0	6	9	1	7	1	0	9	10	0	10	0	8	0	0	0	0	36
Pungo	7	0	0	7	14	0	1	0	1	2	0	0	0	0	9	4	14	0	0	43
Total	8	18	12	35	73	8	30	1	1	40	90	0	90	0	45	4	14	0	0	266

<sup>a</sup> BU=Bull trout, WF=Mountain whitefish, NPM=Northern pikeminnow, SUC=all Sucker species, RSS=Redside shiner.

Table 27. Densities of westslope cutthroat trout, rainbow trout/steelhead, and juvenile Chinook salmon in main-stem Middle Fork Salmon River traditional snorkel transects, 2008.

Transect Name	River km <sup>a</sup>	Transect Area (m <sup>2</sup> )	Densities (fish/100m <sup>2</sup> )			
			Westslope Cutthroat Trout	Rainbow Trout/Steelhead	Chinook Salmon	Other Fish <sup>b</sup>
Gardells Hole	4.3	1,200.0	1.0	0.2	0.1	0.7
Velvet	8.8	325.6	6.8	5.8	20.3	2.5
Elkhorn	13.6	560.0	1.4	1.3	2.0	2.0
Sheepeater	21.3	684.0	1.2	0.1	0.3	0.1
Rapid River	29.6	817.6	1.1	1.1	1.2	1.0
Pungo	44.3	616.0	2.3	0.3	0.0	4.4
Total		4,203.2	13.8	8.8	23.9	10.7
Mean		700.5	2.3	1.4	4.0	1.8

<sup>a</sup> River km readings begin at Dagger Falls at 0.0 km.

<sup>b</sup> Includes bull trout, mountain whitefish, northern pikeminnow, sucker (var. species), dace (var. sp.), and redbreast shiner.

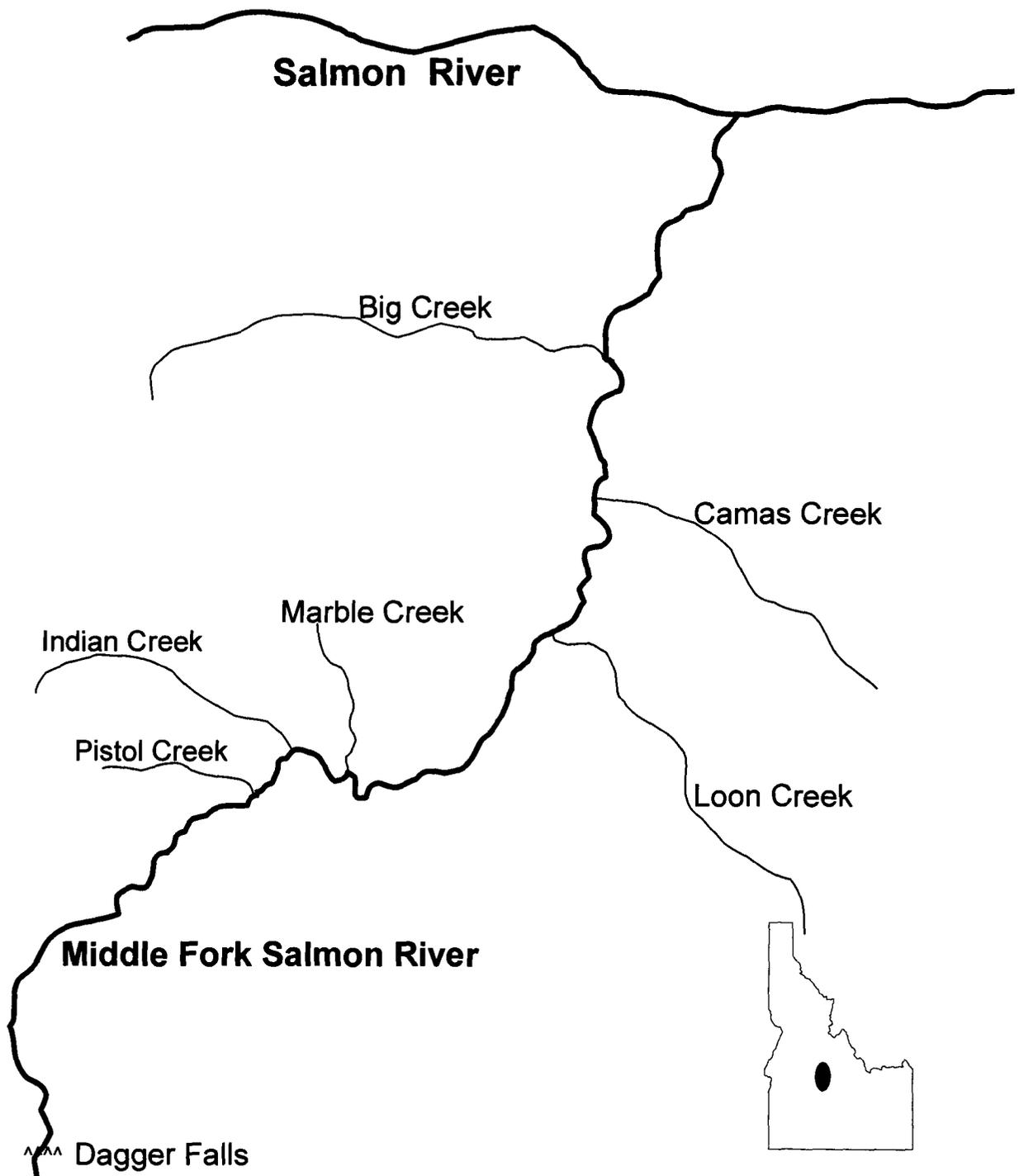


Figure 13. Map of the Middle Fork Salmon River and major tributaries, Idaho.

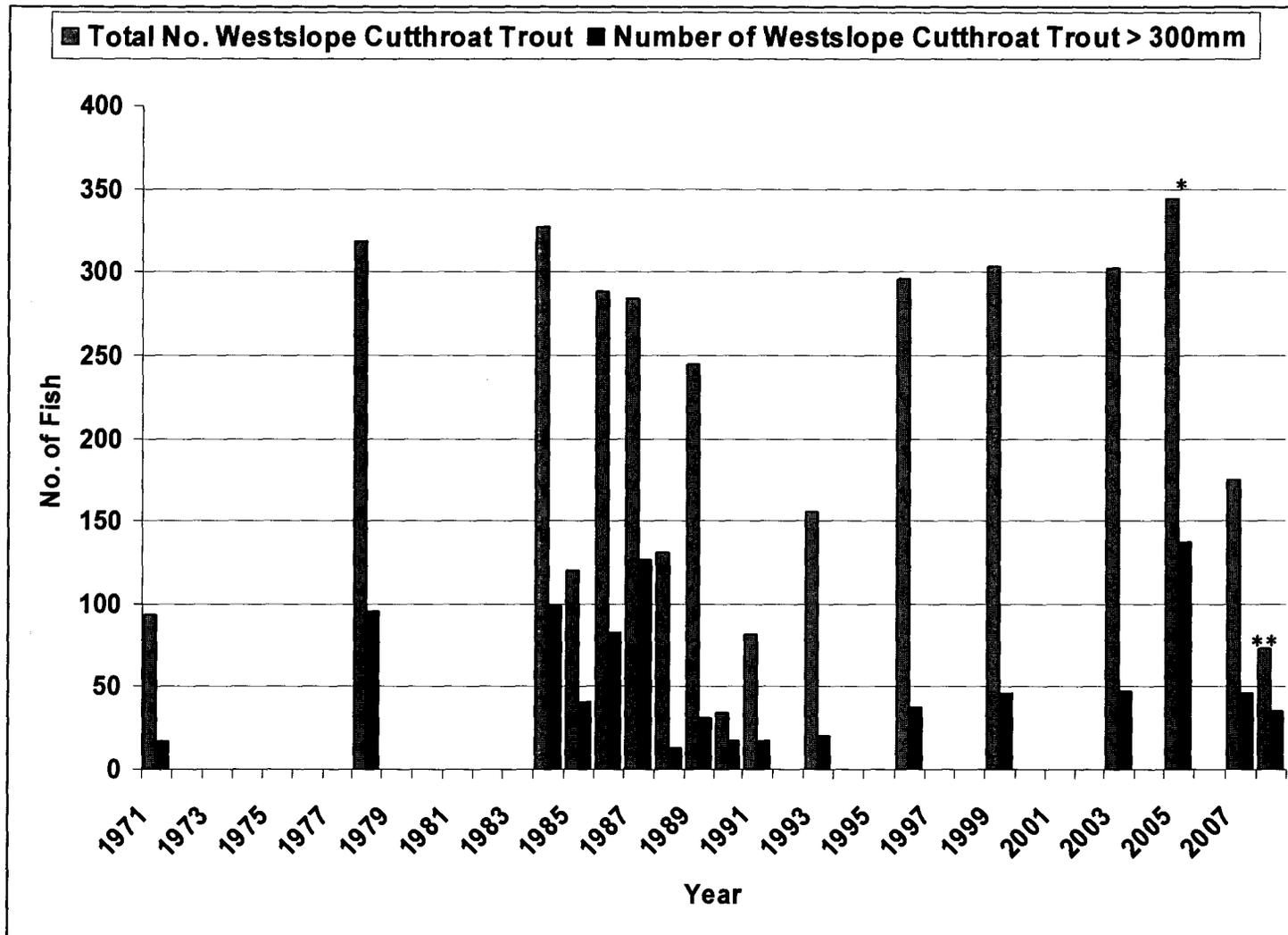


Figure 14. Number of westslope cutthroat trout counted in main-stem Middle Fork Salmon River snorkeling transects, 1978, 1984 to 1993, 1996, 1999, 2003 to 2005, 2007, and 2008. The 2004 data, marked with \*, includes only survey sites upriver of Loon Creek. The 2008 data, marked with \*\*, includes only survey sites upriver of Marble Creek.

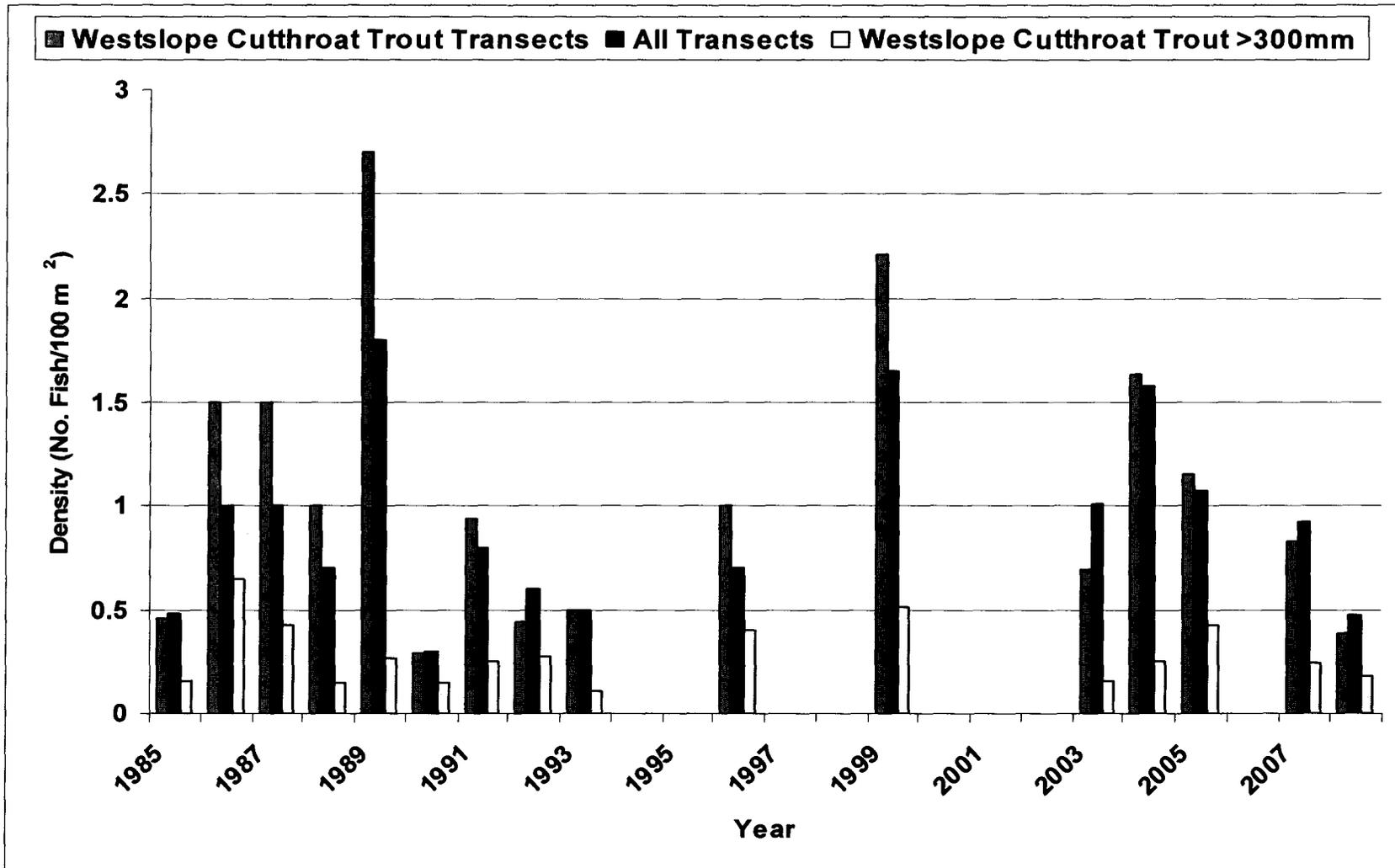


Figure 15. Densities of westslope cutthroat trout counted in westslope cutthroat trout-only transects (see Table 1), in all transects, and densities of westslope cutthroat trout greater than 300 mm counted in all transects during main-stem Middle Fork Salmon River snorkeling surveys, 1985 to 1993, 1996, 1999, 2003 to 2005, 2007 and 2008. Not all transects were sampled in all years.

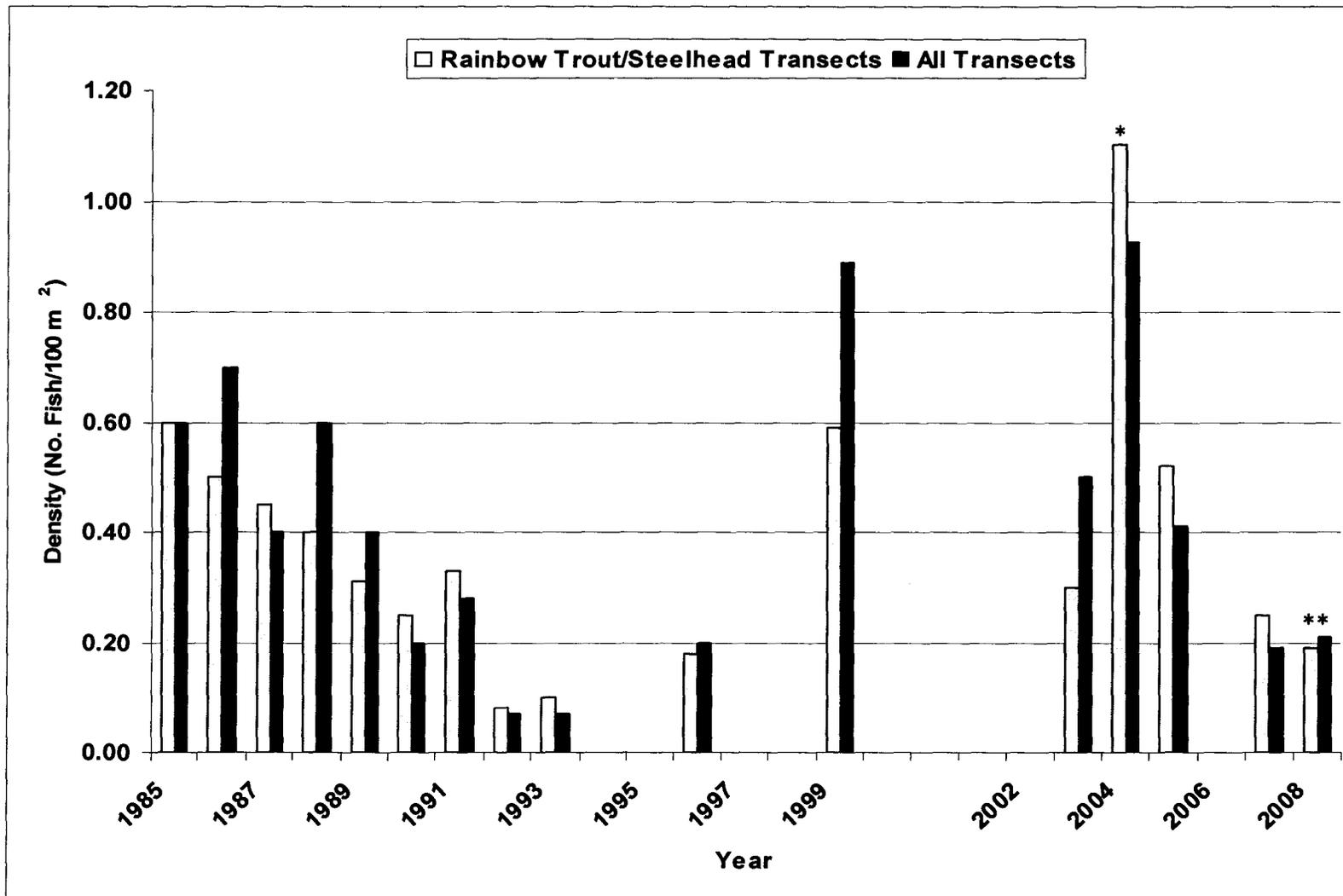


Figure 16. Densities of rainbow trout/steelhead counted in rainbow trout/steelhead-only transects (see Table 1) and in all transects during main-stem Middle Fork Salmon River snorkeling surveys in 1985 to 1993, 1996, 1999, and 2003 to 2008. The 2004 data, marked with \*, includes only survey sites upriver of Loon Creek. The 2008 data, marked with \*\*, includes only survey sites upriver of Marble Creek.

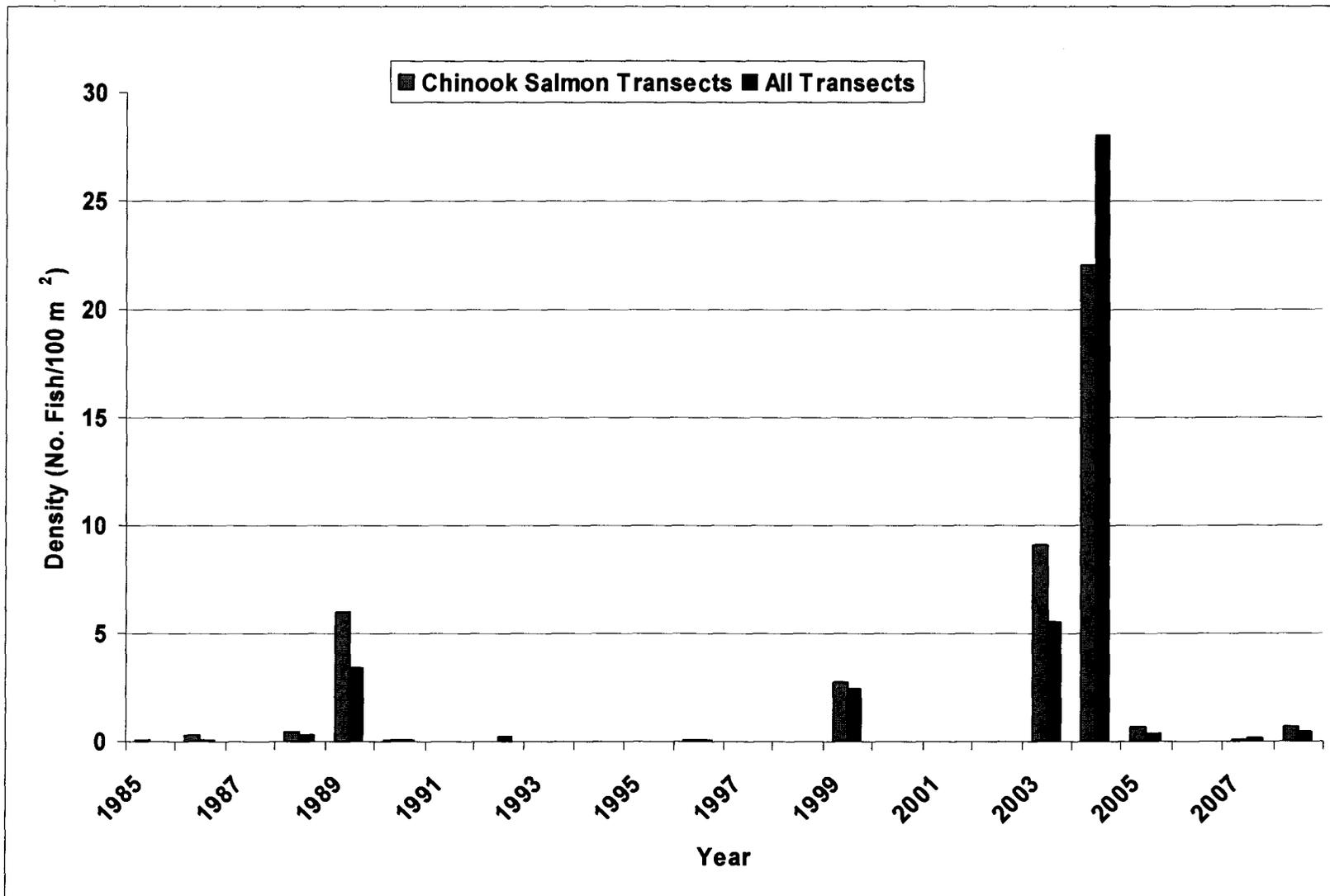


Figure 17. Densities of Chinook salmon in Chinook salmon-only transects (see Table 1) and in all transects during main-stem Middle Fork Salmon River snorkeling surveys, 1985 to 1993, 1996, 1999, 2003 to 2005, 2007, and 2008. Not all transects were sampled in all years.

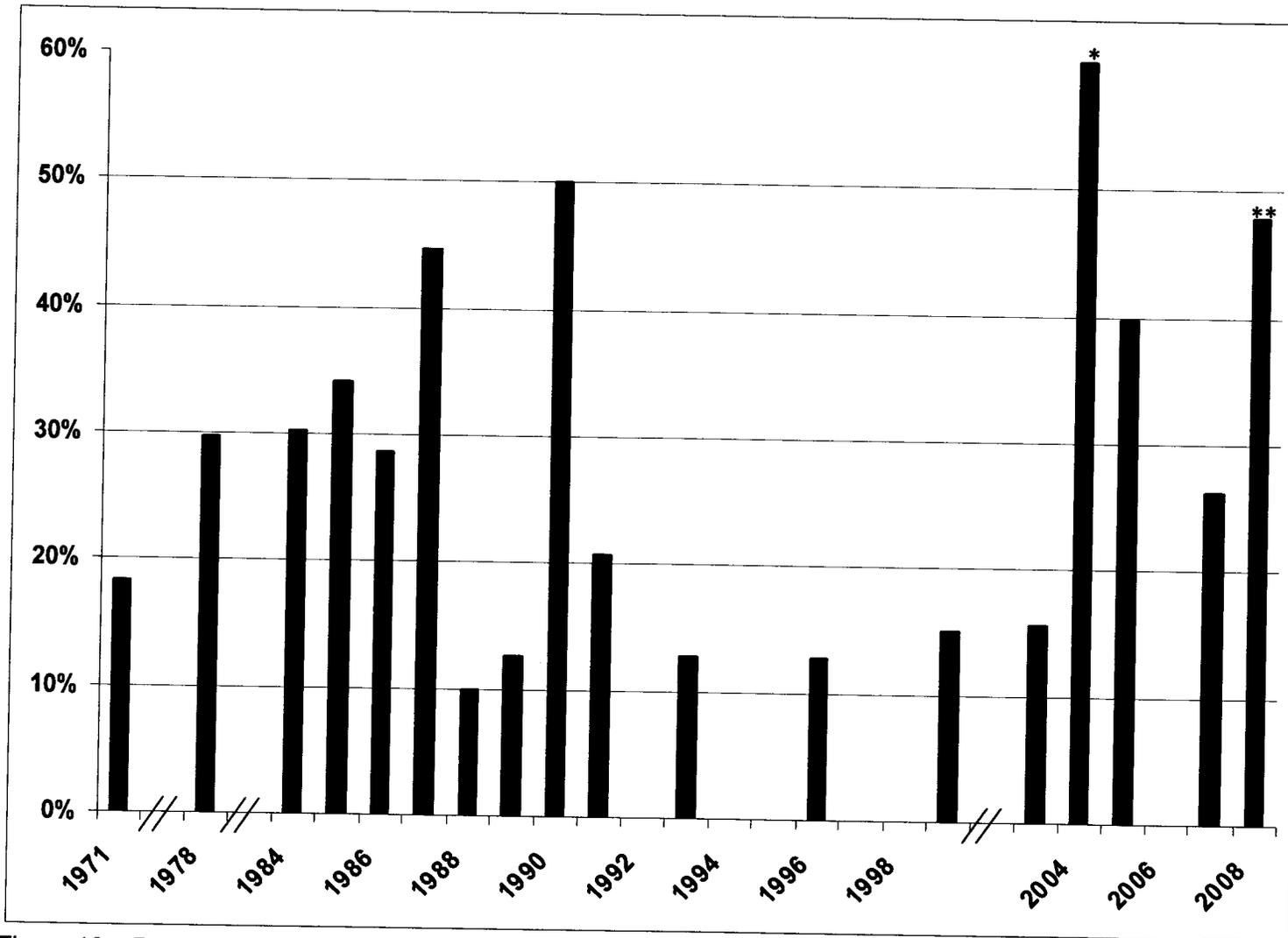


Figure 18. Percentage of westslope cutthroat trout larger than 300 mm TL sampled by snorkeling the main-stem Middle Fork Salmon River in 1971, 1978, 1984 to 1993, 1996, 1999, 2003 to 2005, 2007, and 2008. The 2004 data, marked with \*, includes only survey sites upriver of Loon Creek. The 2008 data, marked with \*\*, includes only survey sites upriver of Marble Creek.

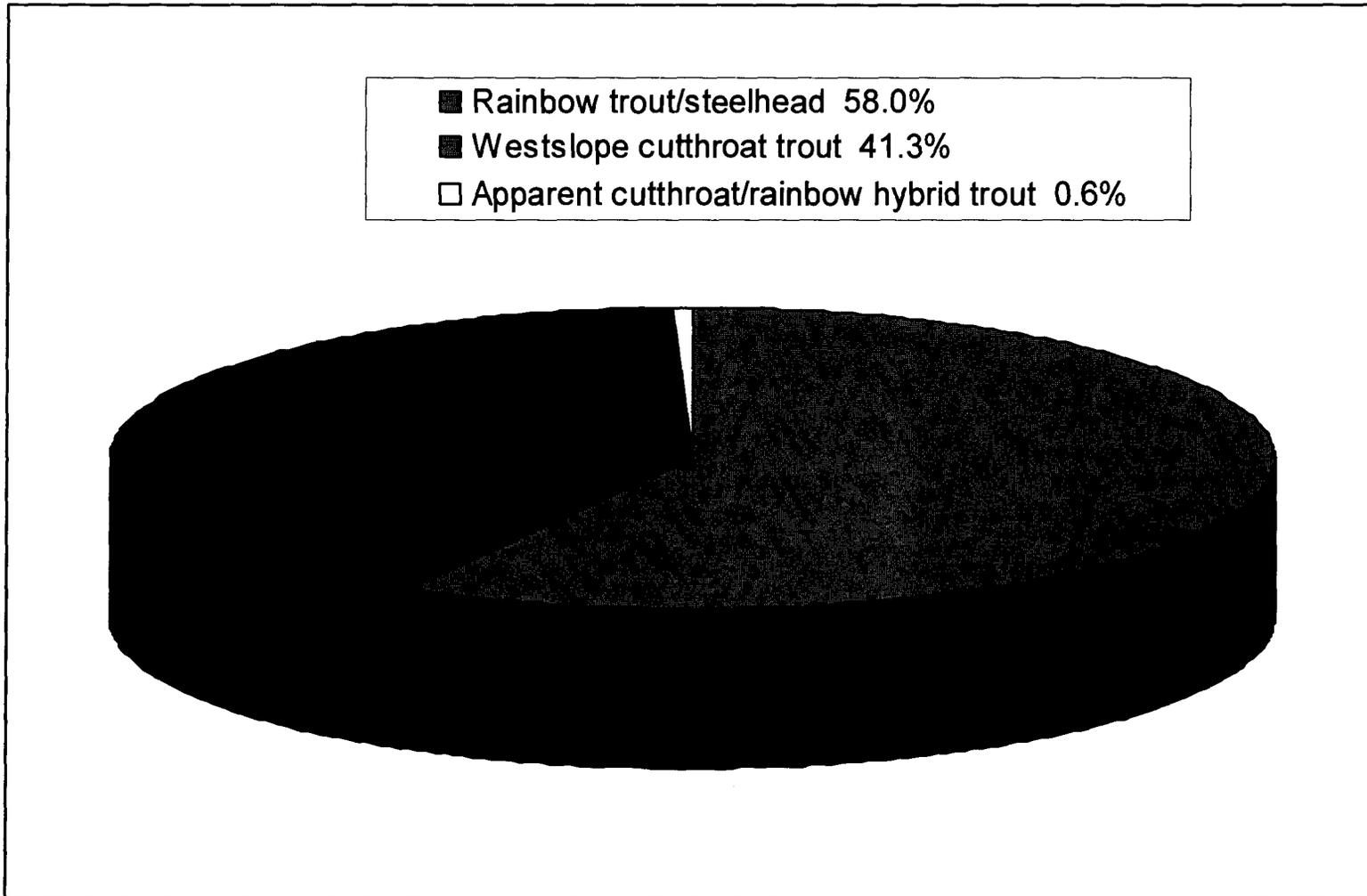


Figure 19. Species composition of fish (N = 155) caught by IDFG project anglers in the main-stem Middle Fork Salmon River upriver of Marble Creek, 2008.

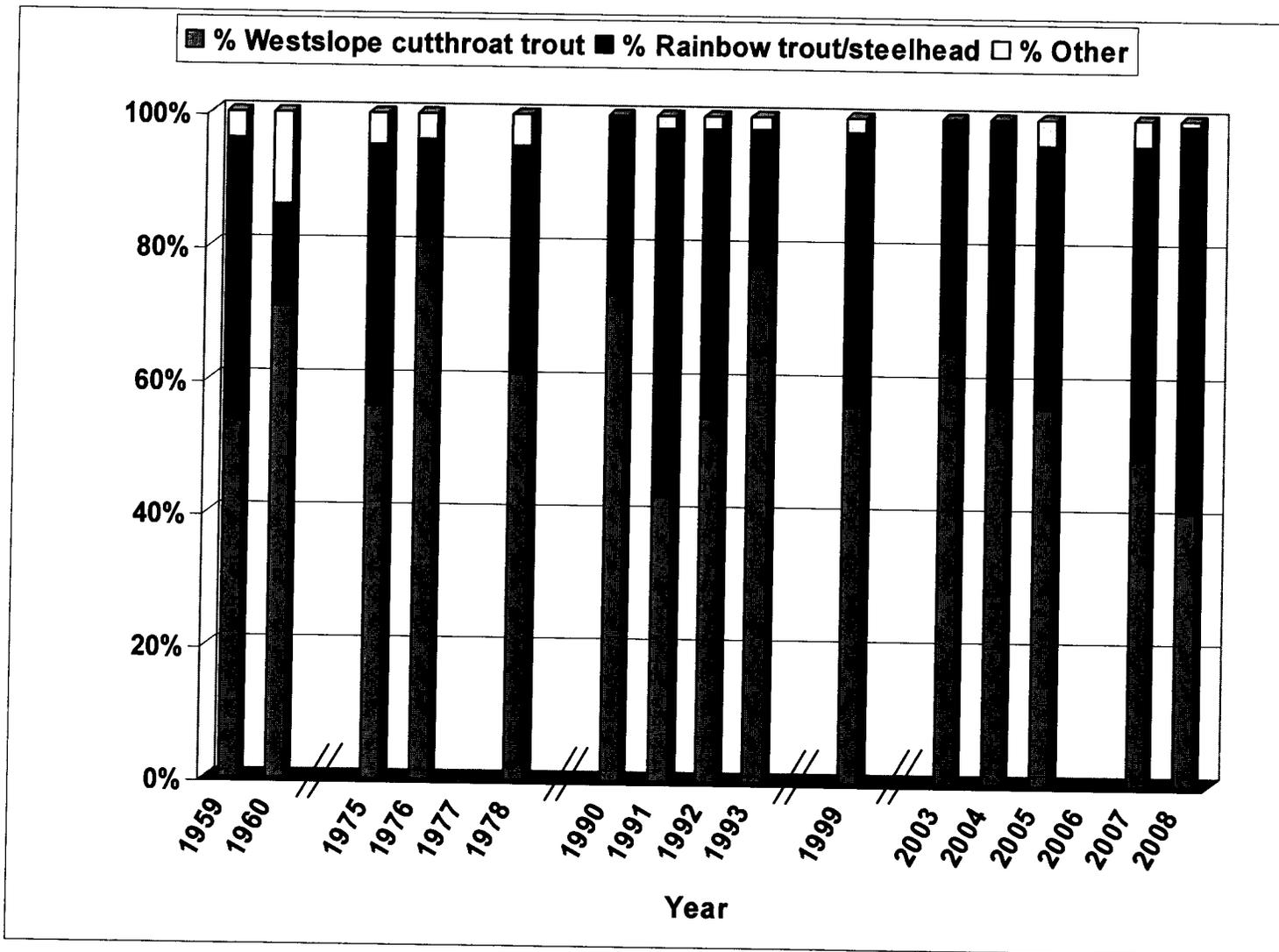


Figure 20. Proportions of species caught by project anglers in the Middle Fork Salmon River, 1959, 1960, 1975, 1976, 1978, 1990 to 1993, 1999, 2003 to 2005, 2007, and 2008. "Other" includes all fish species except westslope cutthroat trout and rainbow trout/steelhead.

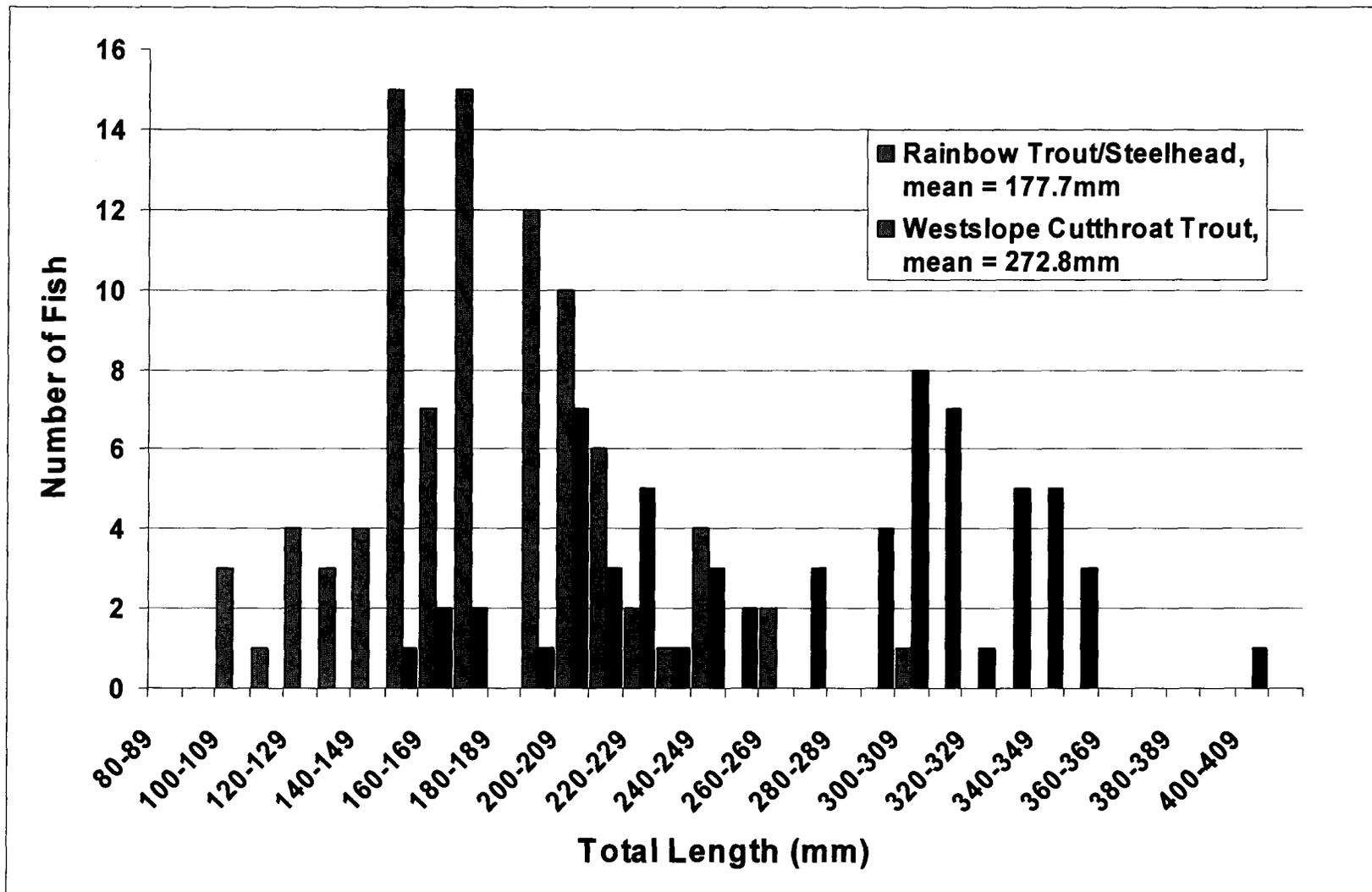


Figure 21. Length frequency of westslope cutthroat trout (N = 73) and rainbow trout/steelhead (N = 40) caught by project anglers in the Middle Fork Salmon River upriver from Marble Creek, 2008.

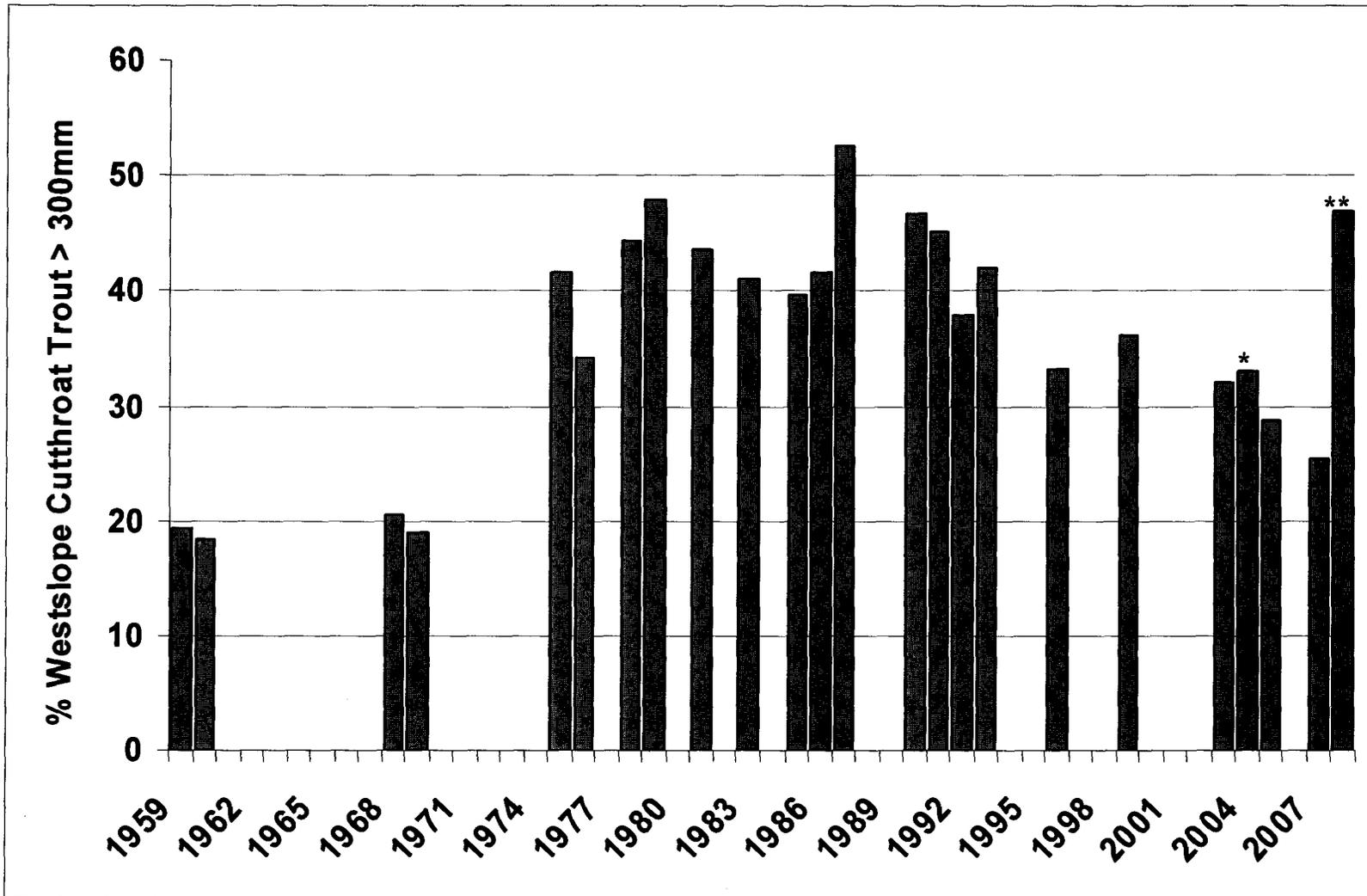


Figure 22. Percentage of westslope cutthroat trout larger than 300 mm TL sampled by project angling in the Middle Fork Salmon River in 1959, 1960, 1968, 1969, 1975, 1976, 1978, 1979, 1981, 1983, 1985 to 1987, 1990 to 1993, 1996, 1999, 2003 to 2005, 2007, and 2008. The 2004 data, marked with an \*, includes only angling upriver of Loon Creek. The 2008 data, marked with \*\*, includes only angling upriver of Marble Creek.

Appendix A. Locations and physical characteristics of Salmon Region mountain lakes surveyed in 2008.

Lake Name	Zone	NAD27 UTM		Aspect	Bahls Impact Rating
		Easting	Northing		
Dairy Lake	12	294350	4943650	NE	ND <sup>a</sup>
Everson Lake	12	292620	4944680	NE	Low
Geertson Lake #2	12	291216	5012571	W	ND
Kadletz Creek Lake #A	12	276775	4957653	N	ND
Kadletz Creek Lake #B	12	276900	4957881	N	ND
Kadletz Creek Lake	12	276852	4958008	N	ND
Middle Fork Little Timber Lake #1	12	299041	4935923	E	ND
Mill Creek Reservoir #1	12	289136	4948071	S	ND
Nez Perce Lake	12	310075	4931000	E	ND
North Fork Timber Creek Lake #1	12	300243	4939356	NE	ND
Stroud Lake	12	292225	4946403	NE	Low
Wright Lake	12	276120	4957517	NE	ND

<sup>a</sup> ND = No data.

Appendix B. Site characteristics of stream transects surveyed in the upper Salmon River in 2008.

Stream	Transect <sup>a</sup>	Sample Date	Water Temp. (C°)	Transect Length (m)	Transect Mean Width (m)	Transect Area (m <sup>2</sup> )	Sub-basin	Zone	NAD 27 UTM	
									Easting	Northing
Allison	L	07/08/2008	12.0	200	0.75	150.0	North Fork to Headwaters	12	265435	4961385
Allison	L	08/26/2008	12.0	200	1.00	200.0	North Fork to Headwaters	12	264457	4960943
Ayers	L	06/10/2008	11.2	100	2.46	246.0	Middle Fork Salmon River	11	634346	4921737
Ayers	U	06/10/2008	8.8	100	1.57	157.0	Middle Fork Salmon River	11	633704	4924063
Baldwin	L	07/16/2008	8.3	50	3.00	150.0	Middle Fork Salmon River	11	653114	4933070
Bear	L	07/15/2008	9.9	85	2.38	202.1	Middle Fork Salmon River	11	651158	4924551
Bear	L	07/15/2008	9.4	63	3.78	238.1	Middle Fork Salmon River	11	651206	4922787
Beaver	M	08/25/2008	14.6	100	11.00	1,100.0	Middle Fork Salmon River	11	652417	4922786
Bench	L	06/11/2008	1.4	100	5.14	514.0	North Fork to Headwaters	11	640833	4908974
Bernard	L	07/16/2008	7.7	50	2.92	146.0	Middle Fork Salmon River	11	659596	4934778
Big Bear	L	08/07/2008	9.4	100	2.76	276.0	Lemhi River	12	329526	4948509
Big Timber	L	08/26/2008	10.0	100	--	--	Lemhi River	12	311476	4947610
Big Timber	L	08/25/2008	13.0	100	--	--	Lemhi River	12	310029	4943631
Big Timber	L	08/25/2008	15.5	100	--	--	Lemhi River	12	309955	4943313
Big Timber	L	08/18/2008	12.0	--	--	--	Lemhi River	12	309983	4942325
Big Timber	M	08/18/2008	12.0	100	--	--	Lemhi River	12	309845	4940815
Big Timber	M	08/21/2008	10.0	100	--	--	Lemhi River	12	309796	4940075
Big Timber	M	08/21/2008	15.0	100	--	--	Lemhi River	12	309877	4939479
Big Timber	M	08/19/2008	16.0	100	--	--	Lemhi River	12	310013	4938017
Big Timber	M	08/19/2008	16.0	100	--	--	Lemhi River	12	309746	4937628
Big Timber	M	08/20/2008	11.0	100	--	--	Lemhi River	12	309284	4936626
Big Timber	M	08/20/2008	12.0	100	--	--	Lemhi River	12	308913	4936051
Big Timber	U	08/27/2008	8.0	100	--	--	Lemhi River	12	308327	4935180
Big Timber	U	08/13/2008	9.0	100	--	--	Lemhi River	12	307983	4934300
Big Timber	U	08/07/2008	8.5	100	--	--	Lemhi River	12	307311	4933184
Big Timber	U	08/05/2008	9.0	100	--	--	Lemhi River	12	306565	4932312
Big Timber	U	08/05/2008	10.5	100	--	--	Lemhi River	12	306126	4932239
Big Timber	U	08/06/2008	10.0	100	--	--	Lemhi River	12	305667	4931840
Big Timber	U	08/06/2008	9.0	100	--	--	Lemhi River	12	304854	4930821
Big Timber	U	08/01/2008	9.0	100	--	--	Lemhi River	12	304280	4930008
Big Timber	U	07/31/2008	8.0	100	--	--	Lemhi River	12	303593	4929509

Stream	Transect <sup>a</sup>	Sample Date	Water Temp. (C°)	Transect Length (m)	Transect Mean Width (m)	Transect Area (m <sup>2</sup> )	Sub-basin	Zone	NAD 27 UTM	
									Easting	Northing
Big Timber	U	07/30/2008	9.0	100	--	--	Lemhi River	12	302265	4929200
Boulder	M	07/29/2008	7.2	100	3.74	374.0	Horse Creek to North Fork	11	707761	5032401
Boundary	L	07/15/2008	13.5	50	3.76	188.0	Middle Fork Salmon River	11	635169	4931565
Cape Horn	L	07/17/2008	10.8	123	11.57	1,423.1	Middle Fork Salmon River	11	645442	4916556
Cape Horn	L	08/20/2008	9.3	121	4.77	577.2	Middle Fork Salmon River	11	641676	4931110
Challis	U	08/04/2008	9.2	93	4.00	372.0	North Fork to Headwaters	11	701688	4930742
Corral	L	07/22/2008	11.0	200	--	--	East Fork Salmon River	11	707318	4895030
Dagger	L	07/15/2008	13.0	50	4.46	223.0	Middle Fork Salmon River	11	634069	4927678
Dagger	U	07/15/2008	11.5	50	3.30	165.0	Middle Fork Salmon River	11	632892	4924992
Deep	L	08/19/2008	ND	ND	ND	--	Horse Creek to North Fork	11	723816	4996962
Dry	L	07/16/2008	--	--	--	--	Middle Fork Salmon River	11	650983	4912603
Dry	U	07/17/2008	8.8	50	1.14	57.0	Middle Fork Salmon River	11	653582	4912625
Duck	L	06/06/2008	15.0	100	3.20	320.0	Pahsimeroi River	12	266127	4942624
Duck	U	06/04/2008	ND	100	4.60	460.0	Pahsimeroi River	12	266594	4941951
Duck	U	06/04/2008	10.0	100	5.60	560.0	Pahsimeroi River	12	266732	4941775
Duffield	M	07/16/2008	6.6	50	4.40	220.0	Middle Fork Salmon River	11	658915	4935280
East Fork Hayden	M	08/12/2008	5.6	100	3.60	360.0	Lemhi River	12	288514	4956097
East Fork Pahsimeroi River	M	07/30/2008	6.7	100	4.85	485.6	Pahsimeroi River	12	284556	4889345
East Fork Tower	L	07/07/2008	11.0	100	2.14	214.0	North Fork to Headwaters	12	275014	5023696
East Fork Tower	L	07/08/2008	12.0	100	2.26	226.0	North Fork to Headwaters	12	276520	5024377
East Fork Tower	M	07/09/2008	10.0	110	2.64	290.0	North Fork to Headwaters	12	277242	5024908
East Fork Tower	M	07/15/2008	9.0	100	1.70	170.0	North Fork to Headwaters	12	277492	5026127
East Fork Tower	U	07/15/2008	6.0	100	1.78	178.0	North Fork to Headwaters	12	278702	5026904
East Pass	L	07/31/2008	9.0	100	4.77	477.0	East Fork Salmon River	11	720530	4883578
Everson	M	08/12/2008	8.9	100	1.48	148.0	Lemhi River	12	297033	4946948
Flat	L	07/17/2008	12.3	76	1.20	91.2	North Fork to Headwaters	11	650090	4911467
French	L	07/10/2008	17.0	200	1.70	340.0	North Fork to Headwaters	11	701331	4900914
Garden	L	05/30/2008	ND	--	--	ND	North Fork to Headwaters	11	720596	4931763
Gold	L	08/25/2008	5.7	100	2.00	200.0	North Fork to Headwaters	11	671065	4885972
Goldburg	M	07/08/2008	10.0	200	2.00	400.0	Pahsimeroi River	12	289300	4918750
Goldburg	U	07/08/2008	13.5	200	3.00	600.0	Pahsimeroi River	12	289528	4918232

Stream	Transect <sup>a</sup>	Sample Date	Water Temp. (C°)	Transect Length (m)	Transect Mean Width (m)	Transect Area (m <sup>2</sup> )	Sub-basin	Zone	NAD 27 UTM	
									Easting	Northing
Goldburg	U	07/08/2008	15.0	200	3.00	600.0	Pahsimeroi River	12	289577	4917899
Harlan	L	07/16/2008	8.7	73	2.39	174.2	Middle Fork Salmon River	11	649394	4934852
Hat	U	08/14/2008	10.0	100	3.66	366.0	North Fork to Headwaters	11	726805	4971861
Hawley	M	08/01/2008	10.0	100	3.86	386.0	Lemhi River	12	326036	4947928
Horse	L	09/03/2008	ND	100	6.00	600.0	Horse Creek to North Fork	11	677257	5029797
Horse	U	07/31/2008	4.4	100	2.00	200.0	Horse Creek to North Fork	11	704670	5040397
Huckleberry	L	08/25/2008	10.7	100	5.00	500.0	North Fork to Headwaters	11	670787	4883166
Jordan	L	07/22/2008	10.3	40	6.00	240.0	Yankee Fork Salmon River	11	681017	4917826
Kelly	L	07/16/2008	--	--	--	--	Middle Fork Salmon River	11	650290	4913741
Kelly	M	07/17/2008	7.9	54	0.68	36.7	Middle Fork Salmon River	11	653329	4915497
Kelly	M	07/17/2008	8.1	50	0.76	38.0	Middle Fork Salmon River	11	653261	4915482
Kenney	L	07/14/2008	10.0	100	--	--	Lemhi River	12	291078	4989167
Kenney	L	07/15/2008	9.5	100	--	--	Lemhi River	12	291568	4989475
Kenney	L	07/16/2008	8.0	100	--	--	Lemhi River	12	291930	4989806
Kenney	L	07/16/2008	11.0	100	--	--	Lemhi River	12	293368	4990476
Kenney	M	07/17/2008	12.0	100	--	--	Lemhi River	12	294150	4991140
Kenney	M	07/17/2008	9.5	100	--	--	Lemhi River	12	295285	4991823
Kenney	M	07/22/2008	9.5	100	--	--	Lemhi River	12	295979	4992481
Kenney	M	07/21/2008	11.0	100	--	--	Lemhi River	12	296304	4992639
Lime	L	07/17/2008	8.4	50	2.56	128.0	Middle Fork Salmon River	11	653076	4937346
Little Deep	M	08/13/2008	5.6	100	2.84	284.0	Horse Creek to North Fork	11	723583	4993409
Little Springs	L	06/17/2008	15.0	100	5.22	522.0	Pahsimeroi River	12	267270	4941618
Little Springs	L	06/17/2008	14.0	100	4.58	458.0	Pahsimeroi River	12	267544	4941483
Little Springs	M	06/19/2008	16.0	100	3.72	372.0	Pahsimeroi River	12	268107	4941200
Lyon	L	10/22/2008	4.0	100	2.83	283.0	North Fork to Headwaters	11	716074	4910953
Lyon	L	10/22/2008	5.0	100	3.10	310.0	North Fork to Headwaters	11	715651	4911266
Lyon	M	10/22/2008	7.5	100	2.60	260.0	North Fork to Headwaters	11	714621	4911760
Lyon	M	10/22/2008	7.5	100	2.13	213.0	North Fork to Headwaters	11	713785	4911871
Mahogany	M	08/20/2008	7.1	100	2.00	200.0	Pahsimeroi River	12	282121	4896868
Marsh	U	07/17/2008	15.2	72	2.00	144.0	Middle Fork Salmon River	11	650188	4912543
Mayrick	L	06/09/2008	12.0	85	1.18	100.3	Pahsimeroi River	12	266747	4942418
Mayrick	L	06/09/2008	10.0	100	3.36	336.0	Pahsimeroi River	12	267012	4942192
Mayrick	M	06/10/2008	9.0	100	1.90	190.0	Pahsimeroi River	12	267650	4941955

Stream	Transect <sup>a</sup>	Sample Date	Water Temp. (C°)	Transect Length (m)	Transect Mean Width (m)	Transect Area (m <sup>2</sup> )	Sub-basin	Zone	NAD 27 UTM	
									Easting	Northing
Mayrick	U	06/16/2008	11.0	80	1.11	88.8	Pahsimeroi River	12	267961	4941692
McKay	L	08/04/2008	7.9	117	3.37	394.9	Yankee Fork Salmon River	11	695349	4928542
McKim	L	08/11/2008	13.0	50	3.08	154.0	North Fork to Headwaters	11	736514	4966004
McKim	L	08/20/2008	12.0	100	4.32	432.0	North Fork to Headwaters	11	736681	4965806
McKim	M	08/13/2008	11.0	100	3.40	340.0	North Fork to Headwaters	12	263295	4965340
McKim	M	08/06/2008	12.0	100	3.90	390.0	North Fork to Headwaters	12	265063	4965798
McKim	U	08/06/2008	9.0	100	2.88	288.0	North Fork to Headwaters	12	266038	4965681
McKim	U	08/05/2008	10.0	120	3.16	379.0	North Fork to Headwaters	12	267393	4965587
North Fork McKim	L	08/04/2008	8.0	100	2.88	288.0	North Fork to Headwaters	12	266184	4966881
North Fork McKim	M	07/30/2008	9.0	100	3.34	334.0	North Fork to Headwaters	12	267284	4968107
North Fork McKim	U	07/30/2008	5.0	105	2.64	277.2	North Fork to Headwaters	12	269105	4967429
North Fork Salmon River	U	09/03/2008	6.4	100	6.00	600.0	North Fork Salmon River	12	268143	5060425
Pahsimeroi River	L	06/19/2008	11.0	100	4.42	442.0	Pahsimeroi River	12	265909	4942160
Panther	U	08/26/2008	10.5	100	5.00	500.0	Horse Creek to North Fork	11	709933	4985916
Panther	U	08/26/2008	9.6	100	6.00	600.0	Horse Creek to North Fork	11	712811	4973665
Patterson	L	07/23/2008	12.0	100	--	ND	Pahsimeroi River	12	266841	4941940
Perreau	M	06/02/2008	5.0	100	2.76	276.0	North Fork to Headwaters	12	265260	4998377
Pollard Canyon	M	05/30/2008	4.0	90	3.62	325.8	North Fork to Headwaters	12	268724	5006246
Porphyry	L	08/26/2008	9.6	100	2.50	250.0	Horse Creek to North Fork	11	708145	4988134
Porphyry	M	08/26/2008	8.2	100	2.50	250.0	Horse Creek to North Fork	11	705744	4989879
Seafoam	L	07/15/2008	13.0	77	10.17	782.9	Middle Fork Salmon River	11	651462	4933115
Shady	L	07/16/2008	8.3	50	3.24	162.0	Middle Fork Salmon River	11	656293	4933790
Silver	L	07/17/2008	6.4	50	2.24	112.0	Middle Fork Salmon River	11	653247	4931081
Silver	L	08/26/2008	20.8	100	7.00	700.0	Middle Fork Salmon River	11	699355	4967323
South Fork Big	L	08/20/2008	12.0	100	5.50	550.0	Pahsimeroi River	12	293225	4923997
Spud	L	07/09/2008	18.0	200	1.50	300.0	North Fork to Headwaters	11	712531	4902452
Spud	L	07/09/2008	19.0	25	0.75	18.8	North Fork to Headwaters	11	712306	4903363
Squaw	L	07/29/2008	7.2	56	3.16	177.0	North Fork to Headwaters	11	718101	5034599
Sulphur	L	07/16/2008	10.4	66	3.50	231.0	Middle Fork Salmon River	11	652860	4938472
Sulphur	U	07/16/2008	6.5	75	2.07	155.4	Middle Fork Salmon River	11	648367	4936707

Stream	Transect <sup>a</sup>	Sample Date	Water Temp. (C°)	Transect Length (m)	Transect Mean Width (m)	Transect Area (m <sup>2</sup> )	Sub-basin	Zone	NAD 27 UTM	
									Easting	Northing
Swamp	L	07/17/2008	9.5	72	2.70	194.4	Middle Fork Salmon River	11	648346	4913497
Thatcher	L	06/11/2008	5.0	100	4.24	424.5	Middle Fork Salmon River	11	647806	4914063
Tower	L	07/28/2008	16.0	100	--	298.0	North Fork to Headwaters	12	272271	5022425
Tower	L	07/29/2008	13.0	100	--	376.0	North Fork to Headwaters	12	273631	5022920
Tower	M	07/07/2008	12.0	100	--	278.0	North Fork to Headwaters	12	274833	5023997
Tower	M	07/28/2008	11.0	80	--	227.0	North Fork to Headwaters	12	275608	5025638
Tower	U	07/09/2008	10.0	100	--	304.0	North Fork to Headwaters	12	275984	5026734
Tower	U	07/14/2008	11.0	100	--	386.0	North Fork to Headwaters	12	276960	5028216
Tower	U	07/14/2008	8.0	93	--	250.0	North Fork to Headwaters	12	277560	5029521
Unnamed Tributary to Big Jureano	U	07/28/2008	11.1	200	--	ND <sup>f</sup>	Horse Creek to North Fork	11	718207	5006286
Unnamed Tributary to Kelly	L	07/17/2008	ND	--	--	ND	Middle Fork Salmon River	11	653395	4915037
Unnamed Tributary to Kelly	L	07/17/2008	ND	--	--	ND	Middle Fork Salmon River	11	653258	4915971
Unnamed Tributary to Mayrick	L	06/16/2008	14.0	87.8	1.21	106.2	Pahsimeroi River	12	267754	4941930
Unnamed Tributary to Rapid River	L	07/16/2008	8.7	50	1.14	57.0	Middle Fork Salmon River	11	655681	4933629
Unnamed Tributary to Woods Fork	L	07/31/2008	10.0	100	2.01	201.0	Horse Creek to North Fork	11	698600	5042353
Vader	L	07/16/2008	--	--	--	--	Middle Fork Salmon River	11	649677	4911959
Van Horn	M	09/23/2008	3.9	10	2.19	219.0	North Fork to Headwaters	11	714938	4961683
Van Horn	M	09/23/2008	3.9	35	0.93	32.7	North Fork to Headwaters	11	714938	4961683
Vanity	M	07/15/2008	11.4	50	2.96	148.0	Middle Fork Salmon River	11	653531	4930227
West Fork Morgan	M	08/26/2008	8.2	100	4.00	400.0	North Fork to Headwaters	11	711688	4953879
Williams	M	08/25/2008	6.2	100	2.00	200.0	North Fork to Headwaters	11	673805	4884356

<sup>a</sup> L = transect's lower reach, M = middle reach, and U = upper reach.

Appendix C. Locations and dimensions of main-stem Middle Fork Salmon River traditional transects surveyed in 2008.

Transect Name	River km <sup>a</sup>	Transect Length (m)	Visibility Corridor (m)	Transect Area (m <sup>2</sup> )	Traditional Species <sup>b</sup>
Gardells Hole	4.6	92	2.5	1200.0	C2, CK
Velvet	8.8	50	4.0	325.6	C2, CK
Elkhorn	14.1	57	4.0	560.0	SB
Sheepeater	21.3	89	4.0	684.0	SB
Rapid River	29.6	71.3	4.0	817.6	SB
Pungo	45.1	77	2.5	616.0	C2, CK

<sup>a</sup> River km readings start at Dagger Falls.

<sup>b</sup> Traditional steelhead transects established in 1981: SB = Steelhead B-run. Traditional cutthroat trout and Chinook transects established in 1985: C2 = Westslope cutthroat trout and CK = Chinook salmon.

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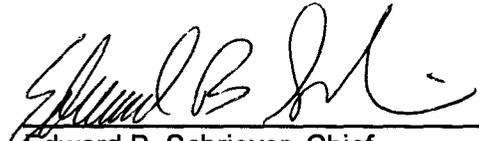
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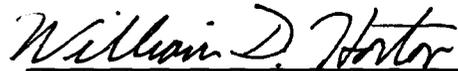
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